Disparities in Use of Lipid-Lowering Medications Among People With Type 2 Diabetes Mellitus

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Background: People with diabetes are at high risk for cardiovascular events regardless of known heart disease. Physicians may underrecognize the excess cardiovascular risk conferred by diabetes alone, without a recent cardiovascular event. Other disparities in the receipt of lipid-lowering medications (LLMs) may exist.

Methods: We studied veterans with diabetes in fiscal years 1998 and 1999 cross-sectionally. We used administrative data (demographic information, International Classification of Diseases, Ninth Revision [ICD-9] codes, utilization information, medications, and laboratory tests) to evaluate associations between use of LLMs and age, ethnicity, sex, marital status, Charlson Index, heart disease ICD-9 codes, oral agents and insulin, hospitalization status, and low-density lipoprotein cholesterol levels. We constructed separate logistic regression models to evaluate associations between low-density lipoprotein cholesterol and similar predictor variables.

Results: Odds ratios were similar in both years. For fiscal year 1999, patients without recent ICD-9 codes in their administrative data indicating heart disease were 0.35 times less likely to be given LLMs than those with such codes. Individuals older than 75 years were 0.65 times less likely to be given LLMs than those younger than 65 years. African Americans were 0.72 times less likely than whites to be given LLMs. In fiscal years 1999 and 1998, 27% and 36% of individuals given LLMs had low-density lipoprotein cholesterol levels higher than 130 mg/dL (3.37 mmol/L).

Conclusions: Veterans with diabetes but no recently coded heart disease, older individuals, and African Americans could benefit from programs targeted to introduce LLMs. Up to one third of individuals given LLMs remained above the target level of 130 mg/dL for low-density lipoprotein cholesterol.

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only patients with at least 1 LDL-C value available. We sought to identify patterns of LLM prescription; specifically, we wanted to assess to what extent utilization of LLMs differed by coronary disease status, age, sex, and race.

**METHODS**

Data from the Healthcare Analysis Information Group Diabetes Project in Milwaukee, Wis, and from the central VHA data management center in Austin, Tex, were used for this study. Since 1995, the Healthcare Analysis Information Group has maintained a national database on diabetes care in the VHA from facility-level data. Each facility that volunteered in the project has been forwarding its data directly to the Healthcare Analysis Information Group. A software algorithm identifies by their Social Security number all individuals who receive diabetes-specific medication or supplies, or who are tested for glycated hemoglobin. We sent Social Security numbers to the patient facility contacts, LLMs (statins, fibrates, resins, and niasin), laboratory values (calculated LDL-C using the Friedewald equation), and the facility in which the veteran received care. From the merged Healthcare Analysis Information Group and Austin databases we constructed cross-sectional cohorts of veterans who met the Healthcare Employer Data Information Set (HEDIS) administrative criteria for diabetes (at least 2 face-to-face contacts with a physician in an outpatient facility and an ICD-9-CM code 250.xx; or at least 1 inpatient stay and an ICD-9-CM code 250.xx; or at least 1 prescription for insulin or an oral hypoglycemic agent) for either FY98 or FY99. Our facility’s institutional review board approved the study.

In FY98, reporting was not complete and only about half of the facilities could be included. In FY99, all but 8 facilities reported LDL-C values completely. The VHA is organized into 22 semi-autonomous administrative regions, each with 6 to 10 facilities, and these regions are known as Veterans Integrated Service Networks (VISN). As all VISN had enough patients (>50) in either the African American or the female category to make these estimates stable, they were all included.

Variables available for this study included demographic data (age, sex, race/ethnicity, and marital status), diabetes medications, ICD-9-CM codes associated with both inpatient and outpatient facility contacts, LLMs (statins, fibrates, resins, and niasin), laboratory values (calculated LDL-C using the Friedewald equation), and the facility in which the veteran received care. We included only values that fell in a clinically plausible range (LDL-C >50 mg/dL [1.30 mmol/L] and <400 mg/dL [10.34 mmol/L], triglycerides <400 mg/dL [4.52 mmol/L]) and allowed use of the Friedewald equation. When multiple entries existed for any data category, we used the last recorded value that met our criteria. The resulting 2 cross-sectional cohorts are described in Table 1.

We used ICD-9-CM codes to identify all diseases. To adjust for coexisting illnesses other than diabetes, we used the Charlson Index modified for use in administrative data (the Charlson Index assigns points for the presence of 15 categories of disease, from 0 to 32, and higher scores correlate with higher 1-year mortality rates). We used all available inpatient and outpatient files in each fiscal year to construct summary Charlson scores for each individual, which we categorized into 4 groups based on the data (0, 1 or 2, 3 or 4, or ≥5). Because all individuals had diabetes and because we were interested in heart disease as a separate indicator variable, we dropped the diabetes and heart disease categories from the Charlson Index calculation. To improve the performance of the summary Charlson score, as recommended by some authors, we included among the indicator variables a dummy variable for whether or not the individual was hospitalized in the VHA in that fiscal year.

Ethnicity was recorded in VHA outpatient databases about 80% of the time, with the remainder entered as unknown. Self-reported data in the VHA databases demonstrate that the distribution of ethnicity in the “unknown” category in administrative data closely mirrors the distribution of recorded race (Donald Miller, ScD, personal e-mail communication, January 10, 2003), and this decreases the likelihood of racial bias in the “unknown” category. In addition, there was an agreement of more than 90% between administratively defined status of “white” and “African American” and self-report in VHA administrative data; this is not as true for “Hispanic,” “Asian,” or “Native American” status (Donald Miller, ScD, personal e-mail communication, January 10, 2003). We thus collapsed the ethnicity category into “white” (“Caucasian”), “African American,” “other,” and “unknown” for modeling, dropping missing values.

We hypothesized that the observed disparity in LLM use among individuals might be influenced by sex, race/ethnicity, marital status, age, and presence in medical records of recently coded heart disease. First we used bivariate methods to calculate simple odds ratios (ORs) characteristic of LLM use for each patient. We then used logistic regression models to examine the associations between LLM use and the variables of interest above. Based on clinical experience as well as preliminary frequencies, several candidate interaction terms were considered for inclusion in the models. We considered a multilevel modeling approach to account for the clustered nature of the data, i.e., patients within physicians’ practices within medical centers. However, when we entered VISN into the model, the observed improvement in the model’s concordance was only 0.3%. We therefore concluded that cluster effects in this study were not sufficient to require multilevel modeling.

All variables were categorized by age (<65, 65-74, and ≥75 years) for modeling. Hospitalizations were dichotomized into hospitalized or not in the fiscal year. Diabetes treatment was grouped into oral agents, oral agents plus insulin, insulin alone, or no diabetes medications. All stepwise logistic regression models were fitted using a significance level (P<.05) for both variable entry and retention. The statistical significance of individual parameter estimates was assessed using a Wald χ² test and a 95% confidence interval (CI). Univariate and multivariate analyses were performed using SAS system 8.0 PROC LOGISTIC (SAS Institute Inc, Cary, NC).

**RESULTS**

A total of 552128 patients in FY98 and 666227 in FY99 with possible diabetes were identified from the combined data sources. Using the HEDIS definition of diabetes, 415886 and 489832 individuals were identified as having the disease in FY98 and FY99, respectively. The reporting of LDL-C values was complete in 94 facilities in FY98 and in 136 in FY99. In FY98, 7502 LDL-C values and in FY99, 12842 LDL-C values did not meet LDL-C inclusion criteria, mostly because of high triglyceride values. In addition, individuals were dropped because of missing values for the indicator variables (mainly, LDL-C values), leaving a total of 97690 individuals in FY98 and 198991 in FY99 suitable for analysis. The numbers and demographic characteristics of the source populations...
Table 1. All Patients With Diabetes and Those With Available LDL-C Values in Fiscal Years 1998 and 1999*

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;65</td>
<td>171,768 (41.3)</td>
<td>216,211 (44.1)</td>
<td>41,000 (42.0)</td>
<td>90,450 (45.4)</td>
</tr>
<tr>
<td>65-75</td>
<td>152,141 (36.6)</td>
<td>175,839 (35.9)</td>
<td>38,412 (39.3)</td>
<td>74,812 (37.6)</td>
</tr>
<tr>
<td>&gt;75</td>
<td>91,977 (22.1)</td>
<td>97,782 (20.0)</td>
<td>18,278 (18.7)</td>
<td>33,729 (17.0)</td>
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<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>407,774 (98.0)</td>
<td>477,230 (97.9)</td>
<td>95,770 (98.0)</td>
<td>194,820 (97.9)</td>
</tr>
<tr>
<td>Female</td>
<td>8112 (2.0)</td>
<td>10,116 (2.1)</td>
<td>1920 (2.0)</td>
<td>4171 (2.1)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
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</tr>
<tr>
<td>White</td>
<td>237,633 (57.1)</td>
<td>275,431 (56.5)</td>
<td>58,216 (59.6)</td>
<td>117,625 (59.1)</td>
</tr>
<tr>
<td>African American</td>
<td>62,906 (15.1)</td>
<td>72,289 (14.8)</td>
<td>14,841 (15.2)</td>
<td>28,649 (14.4)</td>
</tr>
<tr>
<td>Other</td>
<td>29,044 (7.0)</td>
<td>31,064 (6.4)</td>
<td>6355 (6.5)</td>
<td>11,374 (5.7)</td>
</tr>
<tr>
<td>Unknown</td>
<td>86,303 (20.8)</td>
<td>108,562 (22.3)</td>
<td>18,278 (18.7)</td>
<td>41,343 (20.8)</td>
</tr>
<tr>
<td>Married</td>
<td>253,341 (60.9)</td>
<td>302,892 (61.8)</td>
<td>63,525 (65.0)</td>
<td>130,760 (65.7)</td>
</tr>
<tr>
<td>Hospitized in VHA facility</td>
<td>94,450 (22.7)</td>
<td>103,019 (21.0)</td>
<td>20,516 (21.0)</td>
<td>39,677 (19.9)</td>
</tr>
<tr>
<td>Heart disease coded</td>
<td>157,107 (38.2)</td>
<td>181,837 (37.3)</td>
<td>41,661 (42.6)</td>
<td>81,874 (41.1)</td>
</tr>
<tr>
<td>Comorbidity score (Charlson Index)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>232,605 (56.5)</td>
<td>284,211 (58.3)</td>
<td>55,004 (56.3)</td>
<td>115,340 (58.0)</td>
</tr>
<tr>
<td>1 or 2</td>
<td>152,932 (32.3)</td>
<td>155,302 (31.9)</td>
<td>32,772 (33.6)</td>
<td>65,271 (32.8)</td>
</tr>
<tr>
<td>3 or 4</td>
<td>30,654 (7.5)</td>
<td>33,929 (7.0)</td>
<td>7232 (7.5)</td>
<td>15,728 (6.9)</td>
</tr>
<tr>
<td>&gt;5</td>
<td>15,307 (3.7)</td>
<td>13,990 (2.9)</td>
<td>2586 (2.7)</td>
<td>4662 (2.3)</td>
</tr>
<tr>
<td>Prescribed lipid medication§</td>
<td>118,302 (28.4)</td>
<td>178,223 (40.4)</td>
<td>45,345 (46.4)</td>
<td>99,338 (49.9)</td>
</tr>
<tr>
<td>LDL-C, mean ± SD, mg/dL</td>
<td>117.6 ± 32.7</td>
<td>113.6 ± 36.3</td>
<td>117.6 ± 32.7</td>
<td>113.6 ± 36.3</td>
</tr>
<tr>
<td>Diabetes treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral agent only</td>
<td>211,296 (50.8)</td>
<td>264,302 (54.0)</td>
<td>61,173 (62.6)</td>
<td>121,546 (61.1)</td>
</tr>
<tr>
<td>Oral agent plus insulin</td>
<td>43,390 (10.4)</td>
<td>61,050 (12.50)</td>
<td>12,971 (13.3)</td>
<td>29,135 (14.6)</td>
</tr>
<tr>
<td>Insulin alone</td>
<td>88,608 (21.3)</td>
<td>95,476 (19.5)</td>
<td>22,713 (23.2)</td>
<td>38,847 (19.5)</td>
</tr>
<tr>
<td>No diabetes medications§</td>
<td>72,592 (17.4)</td>
<td>81,907 (18.7)</td>
<td>833 (.8)</td>
<td>9463 (4.8)</td>
</tr>
</tbody>
</table>

Abbreviations: LDL-C, low-density lipoprotein; VHA, Veterans Health Affairs.

§Conversion factor: To convert LDL-C to millimoles per liter, multiply by 0.0259.

*Data are given as number (percentage) unless otherwise specified.
†Patients with diabetes were those with at least 1 inpatient International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) 250 code, or at least 2 outpatient ICD-9-CM 250 codes, or at least 1 diabetes medication prescribed in the fiscal year in question.
‡These are individuals with diabetes who have a usable LDL-C value and no missing data on the explanatory variables.
§Especially in fiscal year 1998, the category of individuals not receiving diabetes medications was markedly smaller among those with LDL-C values due to the exclusion of facilities with incomplete reporting on diabetes medications. Likewise, the number of individuals apparently receiving lipid-lowering medications was also influenced by reporting issues in 1998, resulting in an apparently low percentage on these medications in 1998 diabetes sample.

with diabetes and the final analytic cohorts in each fiscal year are depicted in Table 1.

Overall, the mean LDL-C values in the analytic cohort were 117.6 mg/dL (3.04 mmol/L) in FY98 and 113.6 mg/dL (2.94 mmol/L) in FY99. Nearly one third (32.1%) of these patients in FY98 and 27.6% in FY99 had LDL-C values greater than 130 mg/dL (3.37 mmol/L). For individuals with a code for heart disease in the fiscal year of analysis, 25.6% in FY98 and 26.4% in FY99 used LLMs, whereas for those without recently coded heart disease, 20.8% in FY98 and 23.5% in FY99 used LLMs. Of the 31,350 patients in FY98 and 54,855 patients in FY99 whose LDL-C values were greater than 130 mg/dL, 53.0% and 50%, respectively, were not receiving LLMs. Moreover, 54.7% of patients in FY98 and 52.6% of patients in FY99 whose LDL-C values were greater than 100 mg/dL (2.59 mmol/L) were not receiving medication. Of the individuals receiving LLMs in the cohort, 32.5% had LDL-C values greater than 130 mg/dL and 69.2% had LDL-C values greater than 100 mg/dL in FY98; for FY99, the percentages for these values were 27.4% and 59.4%, respectively.

The final model examining associations with use of LLMs included age, sex, race, marital status, heart disease status, whether patients were hospitalized in a VHA facility in the fiscal year, categorized modified Charlson score, LDL-C values, and diabetes treatment group. Because the interaction terms for age × Charlson score, age × coronary artery disease status, race × coronary artery disease, and sex × coronary artery disease added at most 0.2% to the models' concordance, they were not included in the final model. Sample sizes were large, and thus ORs near 1 reached statistical significance; but since such small differences are unlikely to be clinically relevant, we focused on adjusted ORs (≥1.2 or ≤0.8).

The adjusted ORs for associations with use of LLM are presented in Table 2 and the Figure. The final models' concordances were, respectively, 64.9% and 65.0% in the 2 fiscal years. For FY99, after adjustment for the listed confounders, individuals without recently coded heart disease were 0.35 (CI, 0.35–0.36) times less likely than those with recently coded heart disease to receive LLMs. Individuals older than 75 years were 0.65 times (CI, 0.64–0.67) less likely to receive LLMs than those younger than 65 years. African Americans were 0.75 times (CI, 0.64–0.67) less likely than whites, and minorities who were neither African American nor white were 0.83 times less likely than whites, to receive LLMs. Married indi-
Individuals were 1.21 times (CI, 1.19-1.23) more likely than unmarried individuals to be receiving LLMS. Patients hospitalized in that fiscal year were 1.26 times (CI, 1.22-1.29) more likely than those who were not hospitalized to be receiving LLMS. Individuals not receiving diabetes medications from the VHA were less likely to be receiving LLMS (OR, 0.73 [CI, 0.70-0.77]), and those receiving both oral agents and insulin were more likely to be receiving LLMS (OR, 1.27 [CI, 1.24-1.31]) than those only receiving oral agents. The remainder of the predictor variables had adjusted ORs between 0.8 and 1.2.

Results were similar for the FY98 multivariate analysis of associations with use of LLMS. All adjusted ORs were within 0.05 of those for FY99. However, individuals identified in FY98 as neither African American nor whites were 0.77 times less likely than whites to be receiving LLMS, and this improved to 0.83 times (CI, 0.79-0.86) in FY99. The remaining ORs for FY98 were between 0.8 and 1.2, and similar to those for FY99.

Because some individuals received LLMS but did not have LDL-C values available in FY98, we ran this model on the entire HEDIS diabetes population for FY98 and obtained very similar results (data not shown). The OR differed by ±0.17, and all but 3 variables differed by only ±0.08. All variables with an OR greater than 1.2 or less than 0.8 for patients whose LDL-C values were available also had associations above or below those ranges in the model run on the entire FY98 diabetes population. When we pared down the predictor model for use of LLMS for FY99 to include only diabetes treatment group and heart disease status, we obtained a 52.6% concordance, and the OR for recently coded heart disease status changed only negligibly, to 0.37 (CI, 0.37-0.38). For FY98, the pared-down model’s concordance was 51.5% and the OR for recently coded heart disease was 0.38 (CI, 0.37-0.39).

**COMMENT**

Decreasing adverse cardiovascular outcomes among people with diabetes is an important goal. Although clinical trials of glycemic control have failed to demonstrate a significant benefit for cardiovascular outcomes,62 the efficacy of lipid-lowering therapy in achieving lower rates of adverse cardiovascular events and deaths can no longer be doubted.43,15,37 Effective, largely well-tolerated agents that can achieve very low levels of LDL-C are available in the VHA at no or minimal copay to veterans. Under these conditions, achieving best practices is an attainable goal. However, our study demonstrated that many individuals with diabetes do not receive these medications. The most striking examples were people with diabetes but without recently coded heart disease in their administrative data.

The combination of heart disease and diabetes has been demonstrated to be especially lethal. Men known to have both conditions have been reported to have 4.7 times the age-adjusted risk of dying of men with neither disease, and 12.0 times their risk of dying from heart disease.44 However, diabetes alone confers considerable excess risks. Men known to have only diabetes have been reported to be 2.3 times more likely to die of any cause and 3.3 times more likely to die of heart disease than men without diabetes.44 Recent recommendations to consider diabetes a heart disease risk equivalent are supported by these data.20,45

Our study demonstrates that in FY98 and FY99, individuals with diabetes and no coded heart disease in their records were not treated as aggressively with LLMS as those with coded heart disease. Indeed, 35.3% of those without coded heart disease in FY99 were not prescribed LLMS, compared with 14.8% of those with heart disease. Further, individuals without coded heart disease were 1.5 times more likely to have LDL-C values above 130 mg/dL (3.37 mmol/L) than those with coded heart disease. These data suggest that in FY98 and FY99, VHA physicians may not have acted on the strong association between diabetes and cardiovascular risks in the absence of known heart disease despite VHA guidelines and performance measures emphasizing these associations.96,67

Although we noted an apparent improvement over the 2 years, we found that considerable numbers of individuals with high LDL-C values did not have evidence of receipt of LLMS. In FY98, 31.7% and in FY99, 27.7% of individuals with diabetes and LDL-C values greater than 130 mg/dL—the level emphasized by the VHA’s diabetes guidelines in those years—did not receive LLMS from

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**Table 2. Adjusted Odds Ratios for Predictors of the Use of Lipid-Lowering Medications Among People With Diabetes Who Had LDL-C Values Available, Fiscal Years 1998 and 1999**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 65-75 y vs &lt;65 y</td>
<td>1.01 (0.98-1.05)</td>
</tr>
<tr>
<td>Age &gt;75 y vs &lt;65 y*</td>
<td>0.69 (0.66-0.70)</td>
</tr>
<tr>
<td>Woman vs man</td>
<td>1.16 (1.05-1.27)</td>
</tr>
<tr>
<td>African American vs white*</td>
<td>0.73 (0.70-0.77)</td>
</tr>
<tr>
<td>Not white or African American vs white*</td>
<td>0.77 (0.73-0.81)</td>
</tr>
<tr>
<td>Unknown vs white</td>
<td>0.82 (0.79-0.85)</td>
</tr>
<tr>
<td>Married vs unmarried</td>
<td>1.22 (1.19-1.23)</td>
</tr>
<tr>
<td>Heart disease not coded vs coded*</td>
<td>0.36 (0.35-0.37)</td>
</tr>
<tr>
<td>Hospitalized vs not hospitalized</td>
<td>1.28 (1.23-1.32)</td>
</tr>
<tr>
<td>Comorbidity score (Charlson Index)</td>
<td></td>
</tr>
<tr>
<td>1 or 2 vs 0</td>
<td>1.05 (1.02-1.08)</td>
</tr>
<tr>
<td>3 or 4 vs 0</td>
<td>1.03 (0.97-1.08)</td>
</tr>
<tr>
<td>&gt;5 vs 0</td>
<td>0.81 (0.75-0.89)</td>
</tr>
<tr>
<td>LDL-C &gt;=130 mg/dL (3.37 mmol/L) vs &lt;130 mg/dL</td>
<td>1.17 (1.14-1.21)</td>
</tr>
<tr>
<td>Medications</td>
<td></td>
</tr>
<tr>
<td>Insulin vs oral agent therapy</td>
<td>0.94 (0.91-0.97)</td>
</tr>
<tr>
<td>No diabetes medication vs oral agent therapy</td>
<td>0.78 (0.76-0.80)</td>
</tr>
<tr>
<td>Both insulin and oral agent vs oral agent</td>
<td>1.27 (1.22-1.32)</td>
</tr>
</tbody>
</table>

*Odds ratios are for likelihood of receiving LLMS compared with the second group in the comparison adjusted for the remaining variables. For example, individuals older than 75 years were 0.65 times less likely to receive LLMS than those younger than 65, adjusted for sex, race, marital status, heart disease status, hospitalization status, comorbidities, LDL-C level, and diabetes treatment.
In our population, high serum lipid levels were more likely among African Americans (OR of LDL-C >130 mg/dL, 1.33 in FY98 and 1.40 in FY99; data not shown) compared with whites. However, LLMs were less likely to be given to African American veterans with diabetes than to whites in both FY98 (OR, 0.73) and FY99 (OR, 0.75). Racial disparities having been reported in many other settings, this finding merits further evaluation in our population. Although women were slightly more likely to have LDL-C values greater than 130 mg/dL (OR, 1.38 in FY98 and 1.29 in FY99; data not shown), they were also slightly more likely to be receiving LLMs than men (OR, 1.16 in FY98 and 1.09 in FY99). The relatively small number of women in our study should be considered when evaluating the importance of this finding. Nevertheless, these data suggest that women veterans with diabetes were receiving LLMs at rates comparable to those of their male counterparts in FY98 and FY99.

Particularly of interest is the finding that one quarter to one third of patients prescribed LLMs had serum LDL-C values above the target values. Most (>95%) of the LLMs used in FY98 and FY99 were of the statin class. We were not able to determine adherence to treatment or maximal dosage from the data available for this study, and pretreatment levels were not available; but since statins are potent LLMs, it is likely that many more individuals could have achieved better LDL-C levels.

The population we studied comprised predominantly older, economically disadvantaged white males. Other populations may differ significantly, and some caution should be applied when generalizing our findings. Also, this study was based on data collected during actual care episodes, with incomplete reporting and missing data, which raises the possibility of biasing the study sample. We addressed this important issue in several ways. First, we used FY99 data (when reporting was nearly complete) in addition to FY98 data, and we were reassured by the remarkably similar results in both years. Second, we applied the LLM-use model in FY98 to the entire HEDIS diabetes population without considering LDL-C level, again obtaining very similar results.

We utilized the HEDIS administrative criteria for identifying diabetes cases to maximize specificity, and therefore were likely to select patients receiving more care for diabetes (see Table 1). Such patients would be expected to be also treated for other conditions, including hyperlipidemia. The finding that these types of diabetes patients without recently coded heart disease were one third as likely to be prescribed LLMs than those with recently coded heart disease increases the likelihood that the demonstrated disparity is a result of underrecognition, not of opportunity.

These 2 cross-sectional analyses revealed a trend toward improvement in many of the identified disparities (people prescribed lipid medications; people prescribed LDL-C values greater than 130 mg/dL who were not given LLMs in FY99 had been treated like older patients in the Simvastatin Survival Study, up to 460 lives might have been saved after 2.5 years of treatment with a statin. Older individuals were less likely to be treated with LLMs than younger individuals in both years, even after adjusting for the lower mean level of LDL-C in the older group. Three quarters of deaths from myocardial infarction in the United States occur in patients older than 65 years, and recent studies have demonstrated that older individuals benefit from treatment with LLMs.
these medications but not reaching the treatment target; African Americans prescribed medications; and individuals without recently coded heart disease not prescribed medications). Conclusions about changes over time should be drawn with caution, since the design of the study was not longitudinal. Indeed, the VHA’s diabetes patients are a dynamic cohort, with substantial drop-ins and dropouts each year. Also, some of the apparent improvements could stem from more complete reporting in the later year.

We identified heart disease by using ICD-9-CM codes in both inpatient and outpatient records to maximize the likelihood of detection. This approach in all likelihood undercounts true prevalence, but offers the distinct advantage of using readily available data. Because recent events are likely to influence current clinical decision making more than remote events, we reasoned that recent evidence of heart disease might most closely approximate the data that clinicians use in formulating their management plans. Reports from VHA populations indicate that recent acute conditions, such as acute myocardial infarction, can be reasonably reliably detected using inpatient administrative data. However, validating the sensitivity and specificity of ICD-9-CM codes for determining the prevalence of heart disease in outpatient administrative data was beyond the scope of our study.

We found that individuals not treated with diabetes medications from the VHA were also less likely to be treated concurrently with LLMs. We caution that patients who have evidence of diabetes in VHA administrative data but no pharmacy record of a diabetes medication cannot be assumed to be diet controlled. Lack of pharmacy utilization could reflect care and utilization patterns in addition to stage of disease. We have no data available to evaluate how much care these veterans were receiving in the private sector at the time of the study. Since at least 45% of veterans nationwide are also Medicare beneficiaries, so-called dual users are quite common and present particular challenges for health services research. However, survey data for the years 1996 to 2000 indicate that 67% of VHA users had self-reported annual incomes of less than $20,000, and an additional 26.3% an annual income of $20,000 to $40,000. At the time of this study, Medicare did not cover medication costs. Thus, since LLMs were quite costly in 1998 and 1999, we suppose that patients who paid for medications outside the VHA system comprised a small number.

Using administrative data, we identified several groups that could be targeted for an increase in LLM use, including older individuals and African Americans, but particularly patients with diabetes without recently coded heart disease. In our study, women received LLMs at the same rates as men. We discovered that large numbers of individuals prescribed LLMs were not achieving LDL-C target levels. Our study thus identified several patterns of care that could be readily remedied to decrease the cardiovascular risks and improve the lives of many thousands of patients with diabetes.

CONCLUSIONS

Using administrative data, we identified several groups that could be targeted for an increase in LLM use, including older individuals and African Americans, but particularly patients with diabetes without recently coded heart disease. In our study, women received LLMs at the same rates as men. We discovered that large numbers of individuals prescribed LLMs were not achieving LDL-C target levels. Our study thus identified several patterns of care that could be readily remedied to decrease the cardiovascular risks and improve the lives of many thousands of patients with diabetes.
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