

Gender Disparities in Lipid Management: The Presence of Disparities Depends on the Quality Measure

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Objective: To determine if the use of a more detailed quality measure affected the finding of gender disparities in lipid management.

Study Design: Retrospective cohort study.

Methods: Study subjects included 2589 patients with diabetes mellitus in a managed care plan in 2000-2001. We compared the quality of lipid management in men and women using the following 3 measures: (1) the traditional screening measure (measurement of low-density lipoprotein cholesterol [LDL-C] level), (2) the LDL-C level (ie, among those with an LDL-C level measured, an LDL-C level < 130 mg/dL [< 3.37 mmol/L]), and (3) a more detailed appropriate management measure (an LDL-C level < 130 mg/dL or an LDL-C level ≥ 130 mg/dL plus statin initiation or intensification). Multivariate models were adjusted for clustering within clinic and for patient age, insulin use, hypertension, ischemic heart disease, cerebrovascular disease, congestive heart failure, and number of visits.

Results: In unadjusted analyses, using the traditional screening measure, women were less likely to be screened than men ($P < .001$). Using the LDL-C measure, women were less likely to have an LDL-C level less than 130 mg/dL ($P = .047$). However, using the appropriate management measure, women were as likely to receive appropriate management as men once their lipid levels were measured ($P = .08$).

Conclusions: Quality measures that only examine LDL-C screening or LDL-C levels may demonstrate that women receive poorer lipid management than men among patients with diabetes mellitus. However, this gender disparity does not persist with the use of a more detailed measure.

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Using these traditional quality measures, findings from studies⁴⁻⁹ suggest that men have cholesterol levels measured more often, are treated more aggressively, and have lower LDL-C levels than women. One managed care cohort study¹⁰ found that only 12% of women attained optimal lipid levels. This apparent suboptimal management of dyslipidemia in women has been attributed to physician bias or to physician inaction.^{11,12}

However, gender-related disparities in lipid management could depend on the lipid quality measure used rather than on physician bias or inaction. Previous investigators found that the use of more detailed lipid quality measures reduces the number of patients receiving "poor" care, because such quality measures account for clinician efforts to control poor LDL-C levels.¹³ These efforts include statin initiation or intensification, as well as achievement of optimal lipid levels through other means. In a study conducted by Kerr and colleagues,¹³ the most common reason for reclassifying quality from "substandard" to "appropriate" was that, rather than ignoring an elevated LDL-C level, clinicians often responded appropriately and intensified medication therapy; subsequently, the proportion of those identified as receiving poor lipid management dropped from 27% to 13%.

Therefore, we hypothesized that gender disparities in lipid management might also be affected by the use of more detailed quality measures. We examined the following 3 quality measures: (1) LDL-C screening (yes

In patients with diabetes mellitus, treating elevated low-density lipoprotein cholesterol (LDL-C) levels reduces the risk of cardiovascular disease.¹ To measure the quality of lipid management, healthcare organizations typically examine the proportion of patients who receive LDL-C screening and the LDL-C levels.^{2,3} Health Plan Employer Data and Information Set guidelines mandate minimal performance standards for patients with diabetes mellitus, specifically setting a cut point for LDL-C levels of less than 130 mg/dL (< 3.37 mmol/L) as an "action" point, with a goal of LDL-C levels less than 100 mg/dL (< 2.59 mmol/L).^{2,3}

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or no), (2) LDL-C control (LDL-C level < 130 mg/dL [< 3.37 mmol/L]), and (3) appropriate management of elevated LDL-C levels¹³ among patients with diabetes mellitus enrolled in managed care.

METHODS

Data Sources and Collection Procedures

We received institutional review board approval to examine automated data for a sample of managed care enrollees. These patients were receiving care from a university-affiliated physician group that is part of a network managed care plan serving approximately 200 000 members. The study population included 2589 patients aged 18 to 75 years who were continuously enrolled for at least 1 year, had at least 2 visits in the past 3 years with a diagnosis of diabetes mellitus or had filled a prescription for diabetes medication or for glucose monitoring supplies, and were seen at least twice in the past 2 years in the outpatient setting. Approximately 139 physicians provide primary adult care for these patients. We obtained 2 years (2000-2001) of laboratory and pharmacy data from electronic clinical databases, as well as demographic information and diagnosis codes.

Statistical Analysis

We compared men and women using several lipid quality measures. First, we determined the proportion of patients who were screened, defined as the measurement of LDL-C level during the first 18 months of the 2-year study period (quality measure 1). Second, we applied the current Health Plan Employer Data and Information Set and National Diabetes Quality Improvement Program

measure, namely, the proportion of patients whose LDL-C level at the end of the study period was less than 130 mg/dL (< 3.37 mmol/L) (quality measure 2).^{2,3} Third, we determined the proportion of patients with an index LDL-C level less than 130 mg/dL (< 3.37 mmol/L) or with an index LDL-C level of 130 mg/dL or higher (≥ 3.37 mmol/L) plus appropriate monitoring or adjustment ("appropriate management") within 6 months of the elevated test result (quality measure 3). For this measure, appropriate management was defined as any one of the following scenarios being met: (1) the patient was taking a high-dose statin within 100 days before the index LDL-C level, (2) the patient started taking a statin within 6 months of the index LDL-C level if he or she was not already taking a statin, (3) the patient had an increase in statin dosage within 6 months if he or she was already taking a statin, or (4) the patient had a repeat LDL-C level less than 130 mg/dL (< 3.37 mmol/L) within 6 months of the index LDL-C level. In the original specification of quality measure 3, several sensitivity analyses were conducted.¹³ Including all lipid-lowering medications instead of only statins had a negligible effect on the number of patients classified as receiving good lipid management. Classifying patients with contraindications to treatment or those with end-stage comorbidities as receiving good lipid management also had a negligible effect in the overall assessment of quality.¹³

In multivariate analyses, we examined the association between gender and quality of lipid management after adjustment for age, insulin use, hypertension, ischemic heart disease (IHD), cerebrovascular disease, congestive heart failure, and number of visits. We used each of the lipid quality measures as the dependent variable in multivariate logistic regression models in which gender was the main independent variable and which adjusted for clustering of patients within clinic or treatment site and for the covariates listed in Table 1. Interactions between gender and other covariates did not change the primary point estimates and were not included in the final models. The inclusion of race as a covariate did not change the association between gender and lipid management, so this variable was excluded because of missing data for approximately 9% of patients. In a sensitivity analysis, we examined the inclusion of a comorbidity index with the aforementioned diagnoses and cancer, renal disease, respiratory tract

Table 1. Characteristics of Men and Women With Diabetes Mellitus Enrolled in Managed Care

Characteristic	Men (n = 1219)	Women (n = 1370)	P
Age, y			< .001
< 45	26	33	
45-65	54	49	
≥ 65	20	18	
Insulin use	19	24	.003
Hypertension	48	46	.35
Ischemic heart disease	16	11	< .001
Cerebrovascular disease	5	4	.53
Congestive heart failure	7	6	.20
Visits, mean \pm SD*	5.9 \pm 6.8	6.8 \pm 7.6	.002

Data are given as percentages unless otherwise indicated.

*Visits defined as the number of contacts during the study period.

infection, and chronic obstructive pulmonary disease but found that this did not change the results. All analyses were performed using Stata statistical software (release 8.0; StataCorp LP, College Station, Tex).

RESULTS

Table 1 lists the characteristics of men and women. Women were younger and less likely to have a diagnosis of hypertension, IHD, cerebrovascular disease, or congestive heart failure; women had a greater number of visits and were more likely to use insulin than men.

The quality of lipid management was high across all lipid quality measures. There were differences across gender. As summarized in Table 2, fewer women than men had a lipid measurement (quality measure 1) ($P < .001$), and fewer women had LDL-C levels less than 130 mg/dL (< 3.37 mmol/L) ($P = .047$) (quality measure 2). However, the percentages of men and women receiving appropriate management (quality measure 3) were not statistically different ($P = .08$). Of note, the percentages of men and women who were classified as receiving good lipid management increased with the use of the more detailed measure.

In multivariate analyses adjusted for the covariates listed in Table 1, gender disparities did not change significantly for any of the lipid measures. Men were more likely than women to undergo screening (odds ratio, 1.5; 95% confidence interval, 1.2-1.8) and to have an LDL-C level less than 130 mg/dL (< 3.37 mmol/L) (odds ratio, 1.3; 95% confidence interval, 1.1-1.6), but men and women were similarly likely to experience appropriate LDL-C management (odds ratio, 1.3; 95% confidence interval, 0.9-1.6). Predictors of optimal lipid management were fairly consistent across all lipid measures: younger age was less often associated with good lipid management, while insulin use, IHD, and number of visits were consistently associated with better lipid management.

DISCUSSION

Women experience lower rates of lipid screening and have higher LDL-C levels than men among patients with diabetes mellitus in managed care. Such gender disparities in lipid

management have been previously demonstrated and are commonly attributed to physician and patient bias.⁴⁻⁹ However, using a more detailed quality measure, we found that men and women experienced similar lipid management. Such detailed measures that account for statin initiation and intensification have reduced the number of patients receiving poor lipid management in other settings.¹³ We showed that these detailed measures reduce the gender disparity in lipid management as well. To our knowledge, no other studies have demonstrated the role of quality measures as factors in gender disparities.

The fact that our results did not change after adjustment suggests that lipid management in managed care is not necessarily affected by differences in age or certain risk factors between men and women. This study also demonstrates that clinician bias seems to be less important in explaining women's higher lipid levels, although it does not rule out that clinician factors may be responsible for the lower proportion of women who had a lipid level initially measured. Although women visited their healthcare providers more often than men, the additional visits were not used as opportunities for lipid management.

Findings from previous studies of lipid lowering in managed care have suggested that men and women receive different care. Nau and Mallya¹⁴ concluded that women with diabetes mellitus were less likely than men with diabetes mellitus to receive lipid tests or lipid-modifying drugs when all patients, regardless of lipid levels,

Table 2. Lipid Management in Men and Women With Diabetes Mellitus by Several Quality Measures

Variable	Men	Women	P
Quality Measure 1			
LDL-C level measured	(n = 1219) 76	(n = 1370) 68	< .001
Quality Measure 2			
Of the patients with an LDL-C measurement, LDL-C level < 130 mg/dL	(n = 816) 78	(n = 809) 74	.047
Quality Measure 3			
Of the patients with an LDL-C measurement, LDL-C level < 130 mg/dL or LDL-C level ≥ 130 mg/dL plus appropriate management (statin initiation or intensification)	(n = 816) 85	(n = 809) 82	.08

Data are given as unadjusted percentages unless otherwise indicated. To convert cholesterol levels to millimoles per liter, multiply by 0.0259. LDL-C indicates low-density lipoprotein cholesterol.

were considered. In a multicenter study¹⁵ of managed care health plans, women with diabetes mellitus without known IHD were less likely to have their lipid profiles tested than men with diabetes mellitus without known IHD, although patients with known IHD were equally likely to have their lipid profiles tested. In addition, women with diabetes mellitus and IHD were less likely to receive lipid medications than men with diabetes mellitus,¹⁵ in contrast to our findings that management was similar. Patients with diabetes mellitus, regardless of IHD, should receive aggressive lipid management.¹⁶ It is possible that the diagnosis of IHD made the importance of lipid management more "salient" to the providers in that study,¹⁵ whereas the university-based physicians in our study were already aware of guidelines. In our study population, once the gender difference in screening was taken into account, management of lipid levels was similar in men and women managed care enrollees. Gender differences in screening reach beyond the cardiovascular risk factors we examined in our sample. This may be attributed to other disease severity factors that we did not examine, such as body mass index, duration of diabetes mellitus, or comorbidities, although these factors do not affect treatment guidelines.

Our study has several limitations. First, we examined managed care enrollees in a single group within a health plan, and it is possible that gender differences might be larger in other managed care organizations. Indeed, the generally high rates of quality that we found contrast markedly with previous reports.¹⁰ Second, we examined performance of laboratory tests, rather than actual ordering through a computerized data entry system, leaving open the possibility that providers gave instructions for tests and prescriptions that were not fulfilled. Third, we were unable to ascertain specific variables such as socioeconomic status, duration of diabetes mellitus, and body mass index, and it is possible that gender disparities are partially mediated through these factors, although again the guidelines for lipid management do not change depending on these factors.

CONCLUSIONS

Using the example of gender, we showed that disparities found using traditional quality measures may

not persist with the use of alternative measures of quality. Among managed care enrollees, men and women seem to have similar management of lipids once lipids are measured and the LDL-C levels are considered. Our findings demonstrate that gender disparity research needs to include detailed assessments of management before conclusions regarding the presence of disparities can be made. If our work is replicated, quality initiatives in managed care should focus on initial lipid measurement in all patients with diabetes mellitus, particularly younger women without known IHD.

REFERENCES

- 1. LIPID Study Group.** Prevention of cardiovascular events and death with pravastatin in patients with coronary heart disease and a broad range of initial cholesterol levels. *N Engl J Med.* 1998;339:1349-1357.
- 2. National Committee for Quality Assurance.** HEDIS 2000: Health Plan Employer Data and Information Set. Available at: http://www.ncca.org/somc2001/diabetes/somc_2001_cdiab.html. Accessed February 15, 2003.
- 3. Fleming BB, Greenfield S, Engelgau MM, Pogach LM, Clauser SB, Parrott MA.** The Diabetes Quality Improvement Project: moving science into health policy to gain an edge on the diabetes epidemic [published erratum appears in *Diabetes Care.* 2002;25:249]. *Diabetes Care.* 2001;24:1815-1820.
- 4. Legato MJ.** Dyslipidemia, gender, and the role of high-density lipoprotein cholesterol: implications of therapy. *Am J Cardiol.* 2000;86:15L-18L.
- 5. Brown DW, Giles WH, Greenlund KJ, Croft JB.** Disparities in cholesterol screening: falling short of a national health objective. *Prev Med.* 2001;33:517-522.
- 6. Davis KC, Cogswell ME, Rothenberg SL, Koplan JP.** Lipid screening in a managed care population. *Public Health Rep.* 1998;113:346-350.
- 7. Pearson TA.** The undertreatment of LDL-cholesterol: addressing the challenge. *Int J Cardiol.* 2000;74(suppl 1):S23-S28.
- 8. Gardner CD, Winkleby MA, Fortmann SP.** Population frequency distribution of non-high-density lipoprotein cholesterol (Third National Health and Nutrition Examination Survey [NHANES III], 1988-1994). *Am J Cardiol.* 2000;86:299-304.
- 9. Meigs JB, Stafford RS.** Cardiovascular disease prevention practices by US physicians for patients with diabetes. *J Gen Intern Med.* 2000;15:220-228.
- 10. Mosca L, Merz NB, Blumenthal RS, et al.** Opportunity for intervention to achieve American Heart Association guidelines for optimal lipid levels in high-risk women in a managed care setting. *Circulation.* 2005;111:488-493.
- 11. Kim C, Hofer TP, Kerr EA.** Review of evidence and explanations for suboptimal screening and treatment of dyslipidemia in women: a conceptual model. *J Gen Intern Med.* 2003;18:854-863.
- 12. Phillips LS, Branch WT, Cook CB, et al.** Clinical inertia. *Ann Intern Med.* 2001;135:824-834.
- 13. Kerr EA, Smith DM, Hogan MM, et al.** Building a better quality measure: are some patients with 'poor quality' actually getting good care? *Med Care.* 2003;41:1173-1182.
- 14. Nau DP, Mallya U.** Sex disparity in the management of dyslipidemia among patients with type 2 diabetes mellitus in a managed care organization. *Am J Manag Care.* 2005;11:69-73.
- 15. Ferrara A, Williamson DF, Karter AJ, Thompson TJ, Kim C; Diabetes (TRIAD) Study Group.** Sex differences in quality of health care related to ischemic heart disease prevention in patients with diabetes: the Translating Research Into Action for Diabetes (TRIAD) Study, 2000-2001. *Diabetes Care.* 2004;27:2974-2976.
- 16. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults.** Executive Summary of the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *JAMA.* 2001;285:2486-2497.