

Insurance Status and Quality of Diabetes Care in Community Health Centers

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Access to high-quality health care is considered a critical foundation for eliminating socioeconomic and racial disparities and increasing the quality and years of life for all persons in the United States.¹ Four major policy options for improving access to quality care are expanding employer-sponsored health insurance, which constitutes the backbone of health care coverage for most nonelderly Americans²; expanding public insurance coverage through Medicare and Medicaid, which provide low-cost health care to almost all the elderly and some of the nonelderly poor based on federal poverty level and categorical requirements³; expanding safety-net providers such as federally qualified community health centers, which provide low- or no-cost primary care to medically underserved populations; and providing universal coverage through health care vouchers.⁴

Among the substantial body of literature examining the consequences of the lack of insurance, some researchers have recommended national health insurance through public finance.^{5–7} However, recent literature also suggests that public health insurance coverage, such as Medicaid, is associated with quality-of-care problems, although it is unclear whether this association is because of inadequate funding levels, challenging patients, or the quality of providers and health care organizations.^{8–10} Even less is known about the effect of public health insurance coverage on quality of care for patients seen by safety-net providers such as community health centers. Because community health centers are currently providing critical primary care to more than 16 million Americans and are in the process of expanding their service capacity by 40%,^{11,12} it is important to know whether the quality-of-care gap remains with these safety-net providers.

We sought to examine the differences in quality of care by health insurance status in community health centers. Although there is a substantial body of literature on the effect of health insurance on quality of care, many of

Objectives. We sought to compare quality of diabetes care by insurance type in federally funded community health centers.

Method. We categorized 2018 diabetes patients, randomly selected from 27 community health centers in 17 states in 2002, into 6 mutually exclusive insurance groups. We used multivariate logistic regression analyses to compare quality of diabetes care according to 6 National Committee for Quality Assurance Health Plan Employer Data and Information Set diabetes processes of care and outcome measures.

Results. Thirty-three percent of patients had no health insurance, 24% had Medicare only, 15% had Medicaid only, 7% had both Medicare and Medicaid, 14% had private insurance, and 7% had another insurance type. Those without insurance were the least likely to meet the quality-of-care measures; those with Medicaid had a quality of care similar to those with no insurance.

Conclusions. Research is needed to identify the major mediators of differences in quality of care by insurance status among safety-net providers such as community health centers. Such research is needed for policy interventions at Medicaid benefit design and as an incentive to improve quality of care. (*Am J Public Health.* 2008;99:742–747. doi:10.2105/AJPH.2007.125534)

these studies have a number of major methodological problems.^{4,13} Those methodological problems include failure to adequately control for clinical characteristics such as comorbidities that may alter achieved quality, failure to include respondents without insurance as a comparison group, and failure to separately categorize those patients with multiple types of insurance, such as those with Medicaid and Medicare, all of which may bias results.

Community health centers, as safety-net providers, are an excellent setting to study the role of insurance in quality of care. More than 75% of patients at community health centers have no medical insurance or depend on Medicaid.¹⁴ The uninsured and the Medicaid dependent are key targeted populations for the federally funded initiative to close gaps in quality of care. Community health centers also provide patients with low- or no-cost care based on their family income.^{15,16} This safety-net feature of community health centers provides an important opportunity to compare the quality of care of the uninsured to the care provided to patients with public and private insurance in community health centers. Comparisons

of the quality of care by these 3 types of insurance coverage have rarely been undertaken simultaneously in a cohesive system.

For our study, we focused on the association between insurance status and quality of diabetes care and used the National Committee for Quality Assurance Health Plan Employer Data and Information Set (HEDIS) diabetes processes of care and outcome measures to quantify the quality of care for those diabetes patients.¹⁷ The HEDIS measures of comprehensive diabetes care have been extensively used recently to assess quality of care in general and diabetes care in particular.^{18–24} Diabetes affects more than 17 million Americans²⁵ and is among the 10 most expensive medical conditions in the United States.²⁶ In light of the health and economic burden of diabetes, diabetes is an important model condition in examining the relationship of insurance coverage and quality of care.

METHODS

We recruited 27 community health centers in 17 states that were participating in the Health

Disparities Collaborative (HDC), a quality-improvement collaborative aimed at eliminating disparities and improving care in community health centers.²⁷ Described in detail elsewhere,²⁷ the HDC combines rapid-cycle quality improvement, the MacColl chronic care model, and learning sessions in which community health centers share best practices. As of December 2007, 915 community health center sites across the nation were participating in the HDC (Charles Daly, Health Resources and Services Administration; written communication; December 10, 2007). The 27 community health centers in our study were located in the states of Arizona, Colorado, Illinois, Indiana, Iowa, Louisiana, Michigan, Minnesota, Missouri, Montana, Nebraska, New Mexico, North Dakota, Ohio, South Dakota, Texas, and Utah.

Trained staff at all 27 health centers used a standardized codebook to conduct medical chart audits of 80 random patients aged 18 through 75 years in 2002 with a diagnosis of diabetes (existing or newly diagnosed) during the year 2002, or on all diabetic patients if their centers had fewer than 80, excluding patients with gestational diabetes or pregnancy. We gathered audit data on sociodemographic variables such as year of birth, gender, race/ethnicity, and insurance payer. The chart auditors were asked to check all types of insurance that applied, so we could gather information on patients with more than 1 insurance type. The chart auditors collected several process-of-care and intermediary outcome measures from the HEDIS comprehensive diabetes care quality measurement set. These measures included: hemoglobin A1c (HbA1c) test performed, HbA1c poorly controlled (>9.5%), lipid profile performed, low-density lipoprotein (LDL) controlled (LDL <130 mg/dL), retinal eye examination performed, and urine microalbumin measured to monitor kidney disease. The chart audit also included 7 comorbidities or complications related to diabetes: hypertension, myocardial infarction, diabetic retinopathy, diabetic neuropathy, peripheral vascular disease, renal failure, and proteinuria.

We developed an algorithm to expand the insurance groupings commonly reported in the literature and categorized our diabetes patients into 6 mutually exclusive groups. We first created 4 separate groups in the patients'

insurance pool: Medicaid with no Medicare, Medicare with no Medicaid, Medicare with Medicaid, and no insurance. We further categorized the remainder of patients into 2 additional groups: private insurance group and "other" group. The "other" group consisted of patients that had a mix of medical payment methods that included grants, a government plan such as Veterans Administration, international patients, and special handling cases, which did not fit into any of the previously mentioned categories. This algorithm was developed ad hoc before any regression analyses were performed. Of 2135 diabetes patients with chart audits available, 83 (3.9%) patients did not have an insurance category checked on their chart audit and were subsequently excluded from this analysis. After further excluding 34 patients (1.6%) with missing values for demographic variables, the final sample size was 2018 patients.

Data Analysis

Patient demographics, including age, gender, race/ethnicity, and urban or rural location of services, as well as the 6 indicators of comprehensive diabetes care, were examined by insurance group. We used multivariate regression analysis technique to further analyze the association between insurance coverage and quality of care for each of the 6 HEDIS comprehensive diabetes care measures. Specifically, we performed mixed logistic regression analyses to estimate the odds ratio and its associated *P* value by using no insurance as the reference group for the 5 dummy variables (Medicaid without Medicare, Medicare without Medicaid, dual-eligibility for Medicare and Medicaid, private insurance, other), in 6 regression models with each of the 6 quality indicators as the dependent variable, respectively adjusting for age, gender, race, 1 dummy variable for urban location of services, 7 dummy variables for comorbidities or complications as described previously, and random effects of community health center site.

In addition, to ascertain the collective effect of insurance regardless of public or private insurance, we fit 6 additional models comparing those with insurance to those without, adjusting for all the covariates described previously. Because sampling was based on selecting patients nested in 1 of 27 community

health centers, we used a 2-level logistic regression model with community health center site as the second-level random effect to address the sampling effect. We also repeated analyses by using fixed-effect estimation. We performed all regression analyses with XTLOGIT procedure in Stata version 8 (StataCorp LP, College Station, TX).

RESULTS

More than 33% of patients did not have any type of insurance, and 32% of Medicaid patients were dually eligible for Medicare and Medicaid. Combined, 79% had no health insurance or had public insurance through Medicare or Medicaid or both. The mean age of the sample was 54 years (SD=15; Table 1). Overall, 60% were women, 20% were African American, and 29% were Hispanic. Forty-one percent of patients were treated at community health centers located in urban areas (Table 1).

The specific patient sociodemographic characteristics by insurance status were as follows in unadjusted analysis: the no-insurance group had the highest fraction of Hispanic patients (42%) and the highest fraction of patients cared for in the urban setting (60%). The Medicare and Medicare–Medicaid dual-eligible groups had the highest mean age (67 years and 64 years, respectively). The Medicaid group had the highest percentage of women (72%) and African American patients (33%). Sociodemographic characteristics were associated with the patients' insurance status (Table 1).

The comorbidity or complication distribution by insurance status was as follows in unadjusted analysis: in general, patients in the no-insurance group were healthier, because this group had the lowest percentage of patients with hypertension (56%), myocardial infarction (2%), peripheral vascular disease (3%), and renal failure (2%). By contrast, patients in the Medicare, Medicaid, and Medicare–Medicaid dual-eligible groups had higher rates of comorbidities and complications. Specifically, patients in the Medicare group had the highest percentage with hypertension (83%), myocardial infarction (7%), neuropathy (14%), peripheral vascular disease (8%), renal failure (8%), and proteinuria (15%). The Medicaid, Medicare, and dual-eligible groups all had the highest percentage of patients with neuropathy

TABLE 1—Demographics, Comorbidities, and Complications Among Adults With Diabetes, by Insurance Type: 27 Community Health Centers in 17 States, 2002

	All Patients	No Insurance	Medicare ^a	Medicaid ^b	Dual Eligibility ^c	Private	Other	<i>P</i> ^d
Total patients, no. (%)	2018 (100)	667 (33)	488 (24)	295 (15)	146 (7)	278 (14)	144 (7)	
Age, y, mean (SD)	54 (15)	48 (12)	67* (11)	50 (13)	64* (13)	49 (11)	49 (12)	
Women, no. (%)	1214 (60)	385 (58)	285 (58)	213 (72)	96 (66)	158 (57)	77 (53)	<.001
Race/ethnicity, no. (%)								
White	956 (47)	249 (37)	320 (66)	131 (44)	74 (51)	160 (58)	22 (16)	
African American	414 (20)	112 (17)	99 (20)	96 (33)	41 (28)	59 (21)	7 (5)	<.001
Hispanic	580 (29)	283 (42)	60 (12)	47 (16)	29 (20)	54 (19)	107 (74)	
Other	68 (3)	23 (3)	9 (2)	21 (7)	2 (1)	5 (2)	8 (6)	
Urban health center, no. (%)	831 (41)	402 (60)	146 (30)	160 (54)	22 (15)	84 (30)	17 (12)	<.001
Comorbidities or complications, no. (%)								
Hypertension	1373 (68)	372 (56)	407 (83)	208 (70)	117 (80)	179 (64)	92 (64)	<.001
Myocardial infarction	71 (4)	12 (2)	33 (7)	11 (4)	5 (3)	6 (2)	4 (3)	<.001
Diabetic retinopathy	131 (6)	35 (5)	30 (6)	26 (9)	15 (10)	12 (4)	13 (9)	.04
Diabetic neuropathy	228 (11)	66 (10)	71 (14)	40 (13)	20 (14)	20 (7)	11 (8)	.01
Peripheral vascular disease	90 (4)	17 (3)	39 (8)	16 (5)	9 (6)	8 (3)	1 (1)	<.001
Renal failure	85 (4)	13 (2)	40 (8)	16 (5)	9 (6)	7 (3)	0 (0)	<.001
Proteinuria	255 (13)	89 (13)	72 (15)	42 (14)	17 (12)	33 (12)	4 (3)	.008

Note. The no-insurance group as reference group in general linear regression, unadjusted for other covariates.

^aMedicare without Medicaid.

^bMedicaid without Medicare.

^cDually eligible for Medicare and Medicaid.

^dFrom the χ^2 test.

**P* ≤ .05.

(13%–14%). In addition, those dually eligible for Medicare and Medicaid had the highest percentage of patients with retinopathy (10%; Table 1).

Compared with those without health insurance, in multivariate regression analysis, those with any type of health insurance collectively were more likely to have HbA1c tested (adjusted odds ratio [AOR]=1.66; 95% confidence interval [CI]=1.11, 2.47), less likely to have poor HbA1c control (AOR=0.75; 95% CI=0.57, 0.98), and more likely to have had a lipid profile (AOR=1.38; 95% CI=1.08, 1.77) (Table 2). When each type of insurance coverage was individually assessed, the private insurance group was most likely to receive better quality of care.

Overall, there appeared to be a varied relationship between quality of care and insurance status, in that those without insurance were the least likely to meet the HEDIS quality-of-care measures, and those with Medicaid only were very similar to those with no insurance. Compared with those without insurance, the quality of care received by those with private insurance was

statistically significantly different in 4 of 6 measures, the most among all other groups (Table 3).

We performed additional statistical tests by using alternative fixed-effect estimation to examine the robustness of the results. In this model specification, we modeled all the sites as

dummies by using one of the largest sites as reference, with all other covariates remaining the same as in the random-effect model. We found a persistent pattern. For example, in terms of poor HbA1c control, compared with the no-insurance group, those with private

TABLE 2—Comparison of Diabetes Quality of Care Among Adults With Diabetes, by Any Type of Health Insurance Versus No Health Insurance: 27 Community Health Centers in 17 States, 2002

	No Insurance, % (Ref)	Any Type of Insurance, %	OR (95% CI) ^a
HbA1c test	90	92	1.66 (1.11, 2.47)
Poor HbA1c control (>9.5%)	27	15	0.75 (0.57, 0.98)
Eye examination	44	46	1.30 (0.99, 1.71)
Lipid profile	67	73	1.38 (1.08, 1.77)
Lipid control (LDL cholesterol <130 mg/dL)	70	75	1.16 (0.87, 1.54)
Urine microalbumin	36	38	1.12 (0.74, 1.69)

Note. OR = odds ratio; CI = confidence interval; LDL = low-density lipoprotein.

^aAdjusted odds ratio derived from 2-level random-effect multivariate logistic regressions. The reference group for insurance is the no-insurance group. Covariates included age (measured as continuous quantity), gender, race/ethnicity (African American and Hispanic), urban or rural location of health centers, 7 comorbidity or complication dummy variables, and random effect of health center sites, with XTLOGIT procedure in Stata version 8 (StataCorp LP, College Station, TX).

TABLE 3—Percentage of and Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Patients Meeting Quality of Diabetes Care Standards: 27 Community Health Centers in 17 States, by Insurance Status, 2002

	No Insurance		Medicaid ^a		Medicare ^b		Dual Eligibility ^c		Private Insurance		Other Insurance	
	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)
HbA1c testing	90	1.00	89	1.37 (0.81, 2.28)	92**	1.71 (0.99, 2.95)	96*	3.88 (1.52, 9.84)	94*	2.46 (1.32, 4.60)	86	4.46 (0.98, 20.3)
Poor HbA1c control (>9.5%)	27	1.00	20	0.83 (0.55, 1.24)	11	0.89 (0.57, 1.36)	13**	0.54 (0.28, 1.06)	15*	0.65 (0.42, 1.00)	23	1.06 (0.57, 1.97)
Eye examination	44	1.00	45	1.32 (0.95, 1.85)	47	1.38 (0.98, 1.95)	41	1.50 (0.93, 2.42)	53*	1.66 (1.17, 2.37)	39	2.53 (1.45, 4.40)
Lipid profile	67	1.00	66	1.03 (0.74, 1.43)	72**	1.34 (0.96, 1.88)	76**	1.51 (0.94, 2.43)	80*	1.98 (1.36, 2.87)	73	1.64 (0.83, 3.24)
Lipid control (LDL cholesterol < 130 mg/dL)	70	1.00	74	1.20 (0.76, 1.89)	79**	1.42 (0.91, 2.20)	75	1.10 (0.62, 1.94)	71	1.04 (0.68, 1.58)	73	0.93 (0.42, 2.06)
Urine microalbumin	36	1.00	36	1.04 (0.74, 1.46)	41	1.25 (0.89, 1.76)	34	1.06 (0.66, 1.70)	41	1.16 (0.81, 1.64)	31	1.01 (0.53, 1.95)

Note. LDL=low-density lipoprotein. Percentage is the percentage of patients meeting specific quality indicator for each insurance group. Adjusted odds ratio derived from 2-level random-effect multivariate logistic regressions. The reference group for insurance is the no-insurance group. Covariates included age (measured as continuous quantity), gender, race/ethnicity (African American and Hispanic), urban or rural location of health centers, 7 comorbidity or complication dummy variables, and random effect of health center sites, with XTLOGIT procedure in Stata version 8 (StataCorp LP, College Station, TX).

^aMedicaid without Medicare.

^bMedicare without Medicaid.

^cDually eligible for Medicare and Medicaid.

* $P \leq .05$; ** $P \leq .10$.

insurance or dual eligibility for Medicare and Medicaid were less likely to have poor HbA1c control (AOR=0.61; 95% CI=0.40, 0.95, and AOR=0.51; 95% CI=0.26, 0.99, respectively). Conversely, those with Medicaid only or Medicare only were also less likely to have poor HbA1c control than the no-insurance group, but these findings were not significantly different (OR=0.77; 95% CI=0.52, 1.15, and OR=0.84; 95% CI=0.54, 1.28, respectively). Treating those with any type of insurance as a group, and compared with those without insurance, those with insurance were less likely to have poor HbA1c control (AOR=0.71; 95% CI=0.52, 0.96). The results were robust when the age variable was modeled as a categorical variable instead of as a continuous quantity.

DISCUSSION

We demonstrated that presence and type of health insurance are associated with the quality of diabetes care in community health centers. Patients with and without insurance did not receive the same quality of care. Therefore, although the expansion of community health centers may increase access to health care services among underserved populations, it may not be sufficient to completely close gaps in quality of care.

We also showed that not all types of health insurance coverage are equal, even across categories of public health insurance. We found that there was no difference in quality of care between the no-insurance and Medicaid-only groups, whereas those dually eligible for Medicare and Medicaid were more likely to receive HbA1c tests and marginally were more likely to have HbA1c under control and to have lipid profiles. These observed differences may be the result of specific differences in health insurance coverage that influence quality of care. In contrast to the Medicare beneficiaries who get help paying for their out-of-pocket medical expenses from their state Medicaid program,²⁸ the Medicaid-only group has to pay out-of-pocket expenses for the services they receive. Medicaid enrollees may find the out-of-pocket costs for medical care beyond their means, which may influence the patients' decisions to seek and follow through with care for chronic conditions such as diabetes.

Apart from differences in health insurance coverage, there are likely to be multiple explanations for the differential quality of care by health insurance status in community health centers. For example, a recent study suggested that physicians incorporate their patients' health insurance status into their clinical decisionmaking and acknowledge that they

frequently alter their clinical management as a result, including changes in preventive services, diagnostic evaluations, and therapeutic treatments. These changes were even more evident when the physician practiced in a community health center.²⁹ However, it is unknown in this data set if and to what degree physicians took their patients' health insurance status into account in clinical decisionmaking. Future research is needed to examine the interaction of patients' health insurance status, physicians' clinical decisionmaking, and care outcomes.

Other patient characteristics may also play a role in the relationship between quality of care and health insurance status. Younger, uninsured patients might still be active in the labor force and may work for smaller companies that do not provide employer-sponsored health insurance. Thus, the lack of health insurance may mark the higher cost in time as well as lower perceived value of visiting a doctor's office for younger, healthier, uninsured patients. Lack of health insurance increases the economic burden of the patients' illness and, thus, encourages less-aggressive pursuit of care. Furthermore, younger diabetic patients may be less aware of the gravity of the disease or may be less motivated to aggressively pursue medical treatment, because it can take many years before complications develop.

It is also unknown, in this data set, whether the lower quality of care for the younger patients was more attributable to patient characteristics or the clinical judgment of treating physicians. However, the regression analyses were controlled for patients' demographic characteristics and comorbidities, with the exception of duration of diabetes. It is possible that the younger patients with longer duration of diabetes had died and, thus, did not enter into our study sample. Future studies should attempt to control for the duration of diabetes to further ascertain the net effect of health insurance status on quality of care.

Implications

Our results point to several areas in which comprehensive diabetes care is susceptible to the influence of health insurance status, including HbA1c tests, poor HbA1c control, and lipid profiles, and further illustrates the individual variation of each measure of quality of care within a wide spectrum of health insurance types. A recent study on community health centers that used a summary service score and limited health insurance categorizations suggested gaps in quality of care for the uninsured but did not specify the areas in which quality of care may be sensitive to the exogenous insurance variable.³⁰ Our study also adds to the literature by identifying that dually eligible Medicare and Medicaid beneficiaries may be inherently different from other Medicare and Medicaid enrollees. To address the quality-of-care gap, we need to start with the underserved areas in which quality improvement programs are most likely to be effective and clinical benefit is most substantial.

Our findings raise some important policy questions. Differences in diabetes care quality between dually eligible Medicare and Medicaid beneficiaries and Medicaid-only enrollees seem to suggest that the Medicaid enrollees might be fairly price sensitive to the benefit design. Unfortunately, there is little guidance in the literature on how Medicaid enrollees with chronic diseases such as diabetes respond to different benefit designs, and we were limited because our data did not contain information on those key cost variables. It is possible that the poor are highly price sensitive and that relatively small differences in copayments or deductibles can result in a significant impact on

health service utilization. Research is needed to investigate the price elasticity of demand for diabetes care in the Medicaid population to improve the effectiveness of Medicaid benefit design.

Our findings also raise questions about the adequacy of policies that focus on expanding community health centers' services to close the quality-of-care gap by health insurance status. The Bush administration's initiative to expand community health centers' capacity will help to address some of the unmet medical needs of the uninsured and underinsured. However, as our study illustrates, in community health centers, differences in quality of care by patients' health insurance status remain. It is possible that beyond the patients' sensitivity to the health insurance benefits, the generosity of the plans to the physicians' services might be a potential mediator. There was also an increasing awareness of pay-for-performance measures to improve quality of care during the time of our data collection, and research is needed to study how such measures can be implemented to better serve the poor.^{31,32}

Assessing the association between health insurance and care outcomes has been hampered by a number of methodological limitations such as confounding.^{4,10} Our study benefited from a rich set of clinical data including detailed information on comorbidities and complications, which were controlled for in this analysis. Quality outcomes are a complex set of variables. Without control for these comorbid conditions, there could be significant bias. This study also benefited from an improvement in the classification of insurance status by separating dually eligible Medicare and Medicaid beneficiaries from both the Medicare and the Medicaid populations to minimize the heterogeneity problem, because those with dual eligibility are a distinctly different group.

Limitations

Our study had several limitations. First, some of the unobserved characteristics of patients may have been associated with their behavior with regard to their participation in a health insurance program. One such behavior is "adverse selection." Specifically, those patients who seek to enroll in private health insurance programs may be sicker, may utilize

health insurance to cover their financial risk because of illness, and subsequently may receive more of the processes of care measured by performance standards. However, adverse selection is hardly a plausible scenario for the Medicare beneficiaries, because Medicare is an entitlement program.

In addition, we did not find significant differences in comorbidities or complications between the no-insurance group and the private insurance group, suggesting that the selection bias because of health status is limited. Another limitation is that the number of patients' office visits was unknown. Federal funding to update information technology in community health centers to more easily obtain information on patients' sociodemographic and health care characteristics may be extremely valuable in assessing, and thus improving, the quality of care in community health centers. The role that higher education and income can play in health behaviors such as recommended screening should be noted as important potential confounders and thus should be dealt with analytically in future studies. Although many community health centers are participating in various quality improvement programs such as the HDC, the community health centers in this study may not be representative of those that did not participate in the HDC. In addition, we were unable to appropriately model all levels of nesting. For example, information on providers was not available to us and other patient characteristics unknown to us could also have driven the difference in quality of care.

Health insurance may influence the quality of diabetes care in patients who already have access to basic health care services in community health centers. Research is needed to identify the major mediators of differences in quality of care by health insurance status in safety-net providers such as community health centers. Identifying these mediators may help policymakers and researchers design policy interventions at the level of Medicaid benefit design that lessen some of these differences in quality of care and strengthen economic incentive for the providers to improve quality of care. ■

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Contributors

J.X. Zhang originated and supervised the study, completed the analyses, and led the writing. E.S. Huang assisted in writing. M.L. Drum assisted with the study and analyses. A.C. Kirchoff, J.A. Schlichting, C.T. Schaefer, and L.J. Heuer assisted in obtaining the chart review data and editing of the article. M.H. Chin obtained funding for the study and supervised the study.

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Human Participant Protection

This study was approved by the University of Chicago's institutional review board.

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