Articles

Quality of Diabetes Care for Non–English-Speaking Patients
A Comparative Study

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To determine the quality of care provided to non–English-speaking patients with non–insulin-dependent (type 2) diabetes mellitus compared with English-speaking patients, we did a retrospective cohort study of 622 patients with type 2 diabetes, of whom 93 were non–English-speaking and 529 were English-speaking. They were patients at primary and specialty care clinics at a university and a county hospital, and the study was based on clinical and administrative database records with a 12-month follow-up. Professional interpreters were provided to all non–English-speaking patients. Patients were identified using interpreter services records, which reliably included all patients who did not speak English. After adjusting for demographic differences, significantly more non–English-speaking patients received care that met the American Diabetes Association guidelines of 2 or more glycohemoglobin tests per year (odds ratio, 1.9; 95% confidence interval, 1.2–3.0) and 2 or more clinic visits per year (odds ratio, 2.6; 95% confidence interval, 1.2–5.4). More non–English-speaking patients had 1 or more dietary consultations (odds ratio, 2.8; 95% confidence interval, 1.3–6.1). No other significant differences were found in routine laboratory test use or in the number of ophthalmologic examinations. Outcome variables also did not differ, including standardized glycohemoglobin and other laboratory results, complication rates, use of health services, and total charges. At these institutions, the quality of diabetes care for non–English-speaking patients appears to be as good as, if not better than, for English-speaking patients. Physicians may be achieving these results through more frequent visits and laboratory testing.

(Tocher TM, Larson E. Quality of diabetes care for non–English-speaking patients—A comparative study. West J Med 1998; 168:504–511)

According to the 1990 US Census, 14 million persons living in the United States reported that they did not speak English well.[1,2] A number of studies have shown that when patients and physicians do not speak the same language, the patient history,[3–6] comprehension of diagnosis and treatment,[7] and compliance with therapy[8] may suffer. These studies suggest that language barriers may result in lower quality medical care for non–English-speaking patients. Despite these findings, we have found no published studies that examine the quality of care for non–English-speaking patients when language barriers are minimized through the use of professional interpreters.

Several factors may prevent non–English-speaking patients from receiving high-quality medical care, even when professional interpreters are available. Patients from other cultures may use different conceptual models of illness, treatment, and the physician-patient relationship, which can cause confusion, impair compliance, and decrease satisfaction with care.[9–11] Studies have also shown that persons of lower socioeconomic status or from racial or ethnic minorities have processes[12–16] and outcomes[17–19] of care worse than those provided to most Americans.

We undertook this study to determine whether the quality of non–insulin-dependent (type 2) diabetes mellitus (NIDDM) care provided to non–English-speaking patients differed from that provided to English-speaking patients. Even in a setting where professional interpreters were used, would enough barriers to communication and compliance remain to measurably affect the quality of diabetes care? We examined whether there

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ABBREVIATIONS USED IN TEXT
ADA = American Diabetes Association
HMC = Harborview Medical Center
IDDM = insulin-dependent diabetes mellitus
NIDDM = non–insulin-dependent diabetes mellitus
UWMC = University of Washington Medical Center

were differences in any of the following domains of quality: processes of care, including compliance with American Diabetes Association (ADA) guidelines, clinical and laboratory outcomes, and complications.

Patients and Methods

Subjects and Data Sources

Data were obtained from clinical and administrative databases at the University of Washington Medical Center (UWMC), a university referral center, and Harborview Medical Center (HMC), a county hospital. The databases contained information on laboratory use and results, prescriptions filled, interpreter use and language type, and physician and hospital billing records, which included demographic information, clinic visits, diagnoses, admissions to the hospital, and charges.

During a four-month enrollment period, between May and August 1994 for UWMC and between July and October 1994 for HMC, patients with diabetes were identified using the screening protocol developed for the Patient Outcome Research Team study (E. H. Wagner, MD, MPH, written communication, February, 1995) We included all persons who at any time had any one of the following: a plasma glucose level of greater than 11.1 mmol per liter (>200 mg per dl); total (unstandardized) glycohemoglobin of greater than 0.07 (>7.0%) (normal range, 0.04–0.07 [4.3%–6.8%]); or a prescription for oral hypoglycemic agents or insulin. A more conservative plasma glucose level of 11.1 mmol per liter was selected because no information on patients' fasting status was available, and a level between 7.8 mmol per liter (140 mg per dl) and 11.1 mmol per liter might represent glucose intolerance. This algorithm produced a total of 2,246 patients.

The period of follow-up was September 1994 through August 1995 for the UWMC and November 1994 through October 1995 for the HMC. The periods of enrollment and follow-up differ for the two institutions because several months into the study, we elected to increase the number of subjects by adding patients from the HMC, but the method of database storage did not permit us to retrieve HMC records earlier than July 1994.

Because our principal measures were the process and outcomes of ambulatory care in NIDDM, we excluded all persons who, during the follow-up period, made no visits to clinics providing routine diabetes care at the two institutions, and all persons who were younger than 30 years or had insulin-dependent diabetes mellitus (IDDM) as identified by diagnostic codes from the *International Classification of Diseases, Ninth Revision, Clinical Modification.*[24] After these exclusions, 1,494 (73.9%) English-speaking patients and 130 (58.3%) non–English-speaking patients were removed from analysis, leaving 622 patients in the final study cohort, and all data were merged into a single database.

Measures

Patient characteristics. Interpreter use and English fluency were determined from the UWMC and HMC Interpreter Services databases. These databases contain information on the date of service and language type for all patients who have used interpreters at the institutions. Both institutions have policies of providing interpreters when needed for all patient encounters, regardless of ability to pay. All patients who appeared at least once in the Interpreter Services database during the enrollment period were classified as non–English-speaking, and those who did not were classified as English-speaking.

Patient demographic information, including age, sex, race, insurance status, source of routine diabetes care, new patient status, and hospital site, came from physician and hospital billing databases. During the 12-month follow-up, each patient's visits at all clinics providing routine diabetes care were counted, and the most frequently visited clinic was designated as the patient's source of care. If a patient visited two or more clinics an equal number of times, a tie-breaker scheme was used that ranked the clinics from "most primary" care to "most specialty" care, and the "most primary" care clinic was designated as the patient's source of care. If the source of care recorded any patient's visit using a New Patient Evaluation and Management code from the *Physicians' Current Procedural Terminology*,[25] the patient was classified as new to the clinic. Using source-of-care data, patients were classified as attending either the UWMC or the HMC, and patient identifiers were cross-matched to determine if any patients attended both institutions.

We attempted to measure the initial severity of diabetes by assessing baseline retinopathy status. A patient was classified as having baseline retinopathy if during the first four months of the follow-up period, he or she was seen by an ophthalmologist at the UWMC or the HMC and received a diagnosis of diabetic retinopathy. For this variable, our analysis was restricted to the 29 (31.2%) non–English-speaking patients and 151 (28.5%) English-speaking patients who visited ophthalmology clinics during this period.

Process measures

Relevant process measures were based on ADA guidelines for medical care. These included, during a one-year period, two or more glycohemoglobin tests, two or more physician visits, one or more urinalyses, and one or more ophthalmologic examinations. Other services recommended as ADA guidelines have minimum treatment intervals that, depending on the clinical situation, could exceed the 12-month follow-up, and care for patients who did not receive these services during the

TABLE 1.—*Characteristics of the Study Population**

Characteristic	*Non–English-Speaking Patients (n=93), %*	*English-Speaking Patients (n=529), %*
Language, 5 most frequent		
Russian	19.4	
Cambodian	15.1	
Spanish	11.8	
Vietnamese	9.7	
Tigrinian	7.5	
Age, yr†		
30-44	12.9	16.3
45-59	23.7	38.2
60-74	43.0	35.9
≥75	20.4	9.6
Male†	38.7	56.3
Race†		
White (includes Hispanic)	25.8	60.7
Black (includes Hispanic)	10.8	26.7
Asian	52.7	7.2
Other	10.8	5.5
Patients new to clinic	5.4	12.3
Insurance status†		
Medicaid	37.6	15.1
Medicare	35.5	47.1
Private insurance	10.8	21.6
Uninsured	16.1	16.3

*Of the 2,246 patients with diabetes mellitus identified by the screening protocol, the sample excluded 1,624 because they were <30 years of age, had type 1 diabetes, or had no primary care clinic.

†$P<.01$ by the χ^2 test.

study period could still be in compliance with ADA guidelines. We considered the provision of these services during the study period to be reasonable but not essential, and these were categorized as "other process measures." These services included a lipid panel, serum creatinine level, 24-hour urinary protein collection, and dietary consultation.

Outcome measures

Laboratory outcomes were standardized glycohemoglobin (the primary outcome measure), plasma glucose level, blood urea nitrogen level, and serum creatinine concentration. For each patient, the mean of all values during the follow-up was calculated, and these were summarized as group means for the final analysis. Health services use was assessed with two variables, emergency department or urgent care use, and hospital admissions.

Each patient's total charges from the UWMC or the HMC were measured for the 12-month follow-up period. Because the distribution of these data were skewed, the number in each group with charges exceeding the study population's 95th percentile was calculated, and a natural log transformation of all charges was performed.

Complications

Using diagnostic codes,[24,25] several common complications of diabetes mellitus were assessed, including hospital admissions for diabetic ketoacidosis, hyperosmolar coma, lower extremity amputations, foot ulcers, and foot infections. Any diagnosis of diabetic retinopathy, new or established, was counted, with the analysis restricted to the 29 (31.2%) non–English-speaking patients and 159 (30.0%) English-speaking patients seen in the ophthalmology clinic during the full 12-month follow-up period. Renal disease was assessed by comparing the percentages of patients in each group with a mean blood urea nitrogen level of greater than 14.3 mmol per liter (>40 mg per dl), mean serum creatinine level of more than 177 mmol per liter (>2 mg per dl), a *Physicians' Current Procedural Terminology* code for hemodialysis, or any combination of the above. The analysis was limited to the 76 (81.7%) non–English-speaking patients and 395 (74.7%) English-speaking patients who had both blood urea nitrogen and creatinine levels measured.

Statistical Analysis

The relationships between non–English-speaking status and process and outcome measures were tested, with and without adjustment. The null hypothesis for all statistical tests was that there would be no difference between the English-speaking and non–English-speaking groups. For unadjusted comparisons, $\leqslant^2$ tests were performed for categorical variables, and two-sided *t* tests were performed for continuous variables. If a variable had two or more categories, the $\leqslant^2$ test was performed over all categories.

To adjust for differences in patient characteristics, we constructed a multiple regression model that controlled for age, sex, new patient status, and insurance status, with English-speaking patients composing the reference group. The model was not adjusted for race because of its strong association with non–English-speaking status. We also elected not to control for baseline retinopathy because data were available for only 25% of our cohort. We analyzed results by both institution and primary versus specialty clinic. These variables did not affect the main outcome measures, and we elected to leave them out of the final model. For categorical variables, adjusted odds ratios and 95% confidence intervals were calculated from multiple logistic regression. For continuous variables, standardized differences and 95% confidence intervals were calculated from multiple linear regression. All analyses were performed using a commercial statistical software packaged (Statistical Package for the Social Sciences for Windows, Release 6.0, SPSS Inc, Chicago, Illinois).

Results

Patient Characteristics

The non–English-speaking group included persons speaking 24 different languages. The five most common of these are listed in Table 1. Non–English-speaking

TABLE 2.—*Process Measures During 12 Months of Follow-up*

Clinical Services	*Non–English-Speaking Patients (n=93)*	*English-Speaking Patients (n=529)*
ADA Guidelines*		
Standardized glycohemoglobin, ≥2 tests/yr		
No. of tests, mean	1.8	1.4
Patients meeting guideline, %†	58.1	41.8
Urinalysis, ≥1 tests/yr		
No. of tests, mean	0.8	0.6
Patients meeting guideline, %	40.9	33.3
Physician visits, ≥2/yr		
No. of visits, mean	5.8	4.9
Patients meeting guideline, %†	90.3	79.0
Ophthalmologic examination, ≥1/yr		
No. of visits, mean	1.1	1.0
Patients meeting guideline, %	30.1	27.8
Other Process Measures		
Lipid panel		
No. of tests, mean	0.3	0.4
Patients with ≥1 tests done, %	22.6	29.9
Serum creatinine level		
No. of tests, mean	3.8	4.9
Patients with ≥1 tests done, %	81.7	76.0
24-Hr urine protein collection		
No. of tests, mean	0.2	0.1
Patients with ≥1 tests done, %	17.2	10.8
Dietary consultation		
No. of visits, mean	0.2	0.1
Patients with ≥1 visits, %‡	12.9	5.1

*These process measures are based on American Diabetes Association (ADA) Guidelines for Clinical Services. Other process measures are recommended by the ADA, but at variable intervals depending on the clinical situation.
†$P<.05$ by the χ^2 test.
‡$P<.01$ by the χ^2 test.

patients were more likely to be older, female, Asian, and covered by Medicaid compared with English-speaking patients (all *P*<.05). They were also more likely to receive routine diabetes care from a primary care clinic (83.9% versus 71.3%; *P*<.05) and attend the county hospital (62.4% versus 51.0%; *P*<.05). None of the patients attended both the UWMC and the HMC. Approximately twice as many English-speaking patients were new to their clinic, and this approached statistical significance: *P*=.05). Differences in baseline retinopathy were not statistically significant.

Process Measures

The non–English-speaking group had a significantly higher percentage of patients whose care met the ADA guidelines of two or more standardized glycohemoglobin tests per year and two or more physician visits per year (Table 2; all *P*<.05). There was also a significantly greater percentage of non–English-speaking patients who received one or more dietary consultations (*P*<.01). The groups did not differ significantly in the percentages of patients receiving other process-of-care measures.

Outcome Measures

Table 3 shows the outcome measures for the two groups. Non–English-speaking and English-speaking patients did not differ significantly in the mean values of standardized glycohemoglobin, serum lipids, blood urea nitrogen, and serum creatinine. Although only about a quarter of all patients had lipid panels performed, for other laboratory tests, more than 75% of patients had the tests performed. The groups were similar in emergency department and urgent care use, hospital admissions, and total charges.

Complications

The number of patients with complications was small (Table 4). There were no significant differences in the percentages of admissions for hyperosmolar coma, lower extremity amputations, foot ulcers, or foot infections. As expected, there were no diagnoses of diabetic ketoacidosis because the screening process removed all patients with IDDM from the cohort. The percentages of patients with retinopathy were similar, as were the percentages of patients with elevated blood urea nitrogen levels, elevated serum creatinine levels, undergoing dialysis, or with any combination of renal abnormalities.

Multivariate Analysis

Table 5 shows the adjusted odds ratios and standardized differences using English-speaking patients as the reference group. Regression analyses were not performed for variables where group values were zero. The differences between the non–English-speaking and English-speaking groups persisted after adjustment, with non–English-speaking patients more likely to receive two or more glycohemoglobin tests, two or more physician visits, and one or more dietary consultations (all *P*<.05). There were no significant differences between the groups for all other process measures, outcome measures, or complications.

Comment

This study suggests that both before and after adjustment for baseline characteristics, there are significantly more non–English-speaking patients at these institutions whose care met the ADA guidelines of two or more glycohemoglobin tests per year and two or more clinic visits per year and who received one or more dietary consultations. We discovered no other significant differences in processes or outcomes of care, despite our findings that the non–English-speaking patients had significantly greater percentages of persons who were elderly, from racial minorities, or covered by Medicaid.

Our observation that the quality of NIDDM care for non–English-speaking patients appears to be as good as,

TABLE 3.—*Outcome Measures During 12 Months of Follow-up*

Outcomes	*Non–English-Speaking Patients (n=93)*	*English-Speaking Patients (n=529)*
Mean standardized glycohemoglobin, proportion of total (%)	0.08 (8.5)	0.08 (8.4)
Mean plasma glucose, mmol/liter (mg/dl)	11.0 (198)	11.2 (203)
Lipids*		
Mean plasma cholesterol, mmol/liter (mg/dl)	5.59 (216)	5.41 (209)
Mean plasma triglycerides, mmol/liter (mg/dl)	2.75 (243)	2.78 (246)
Mean low-density lipoprotein cholesterol, mmol/liter (mg/dl)	3.41 (132)	3.22 (124)
Mean high-density lipoprotein cholesterol, mmol/liter (mg/dl)	1.12 (43.4)	1.12 (43.2)
Mean blood urea nitrogen, mmol/liter (mg/dl)	7.0 (19.6)	7.1 (19.8)
Mean serum creatinine, (mol/liter (mg/dl)	101.0 (1.1)	110.0 (1.2)
Emergency department/urgent care use		
Mean visits/patient	0.3	0.6
Ever visited, %	22.6	26.1
Hospital admissions		
Mean hospital days/patient	0.2	0.3
Mean admissions/patient	0.02	0.04
Ever admitted, %	2.2	3.2
Total charges		
Mean (SD), $	3,520 (5,940)	4,290 (7,330)
Mean of ln dollars (SD)	7.3 (1.4)	7.3 (1.6)
Patients with total charges >$18,000, %	5.4	5.1

*Twenty-one (22.6%) non–English-speaking patients and 158 (29.9%) English-speaking patients had lipid panels performed. For all other laboratory outcomes, at least 75% in each group had the tests performed.

and possibly better than, the quality of care for English-speaking patients, was unexpected. A large body of research suggests that patients from racial and ethnic minorities and of lower socioeconomic status receive worse processes and outcomes of medical care than most US residents. Kahn and co-workers demonstrated that hospitalized Medicare patients who were black or from poor neighborhoods had worse processes of care and greater instability at discharge.[15] Peterson and colleagues concluded that blacks admitted to Veterans Affairs medical centers with acute myocardial infarction were significantly less likely to undergo cardiac catheterization or coronary revascularization.[19] Both studies showed differences in the processes of care based on racial and socioeconomic factors in care systems where ability to pay is likely not an issue. Several studies have shown that persons who are poor, uninsured, or covered by Medicaid are less likely to receive recommended health maintenance screenings,[16] have longer and more costly hospital admissions,[17] suffer more adverse outcomes during a hospital stay,[13] and are admitted to a hospital more frequently for preventable conditions, including diabetic ketoacidosis and hyperosmolar coma.[26,27]

Physicians who work with large numbers of non–English-speaking patients face many challenges in providing care to them. Many patients do not have access to adequate interpretation services, and for those who do, their physicians must be able to use interpreters skillfully and overcome the extra time spent in translation of the medical interview.[2–7,10] Patients from other cultures use different conceptual models of illness, treatment, and the physician-patient relationship.[9–11,28] To many non–English-speaking persons who are unfamiliar with the western medical concepts of changing dietary habits, monitoring asymptomatic conditions, and taking medication for an entire lifetime, the treatment of diabetes in the United States seems strange and at odds with their own beliefs. Many people who do not speak English are refugees and have endured severe psychosocial stresses, both in their home countries and in relocating to this country.[9,11,29–31] They frequently suffer from somatization and major depression and often look to their primary care physician as the source of a wide variety of social services.[32]

For physicians caring for non–English-speaking patients, addressing these issues may lead to considerable time spent performing activities other than routine health maintenance.[9,11] Given this background, the observation that care for non–English-speaking patients at these institutions appeared to be as good as, if not better than, care for English-speaking patients was unexpected.

Although the quality of diabetes care for non–English-speaking patients was comparable to that received by the English-speaking patients, the care for both groups still fell short of ADA guidelines. This is consis-

TABLE 4.—*Complications During 12 Months of Follow-up*

Complications	*Non–English-Speaking Patients (n=93), %*	*English-Speaking Patients(n=529), %*
Hospital admissions for hyperosmolar coma	0.0	0.2
Lower extremity amputations, new cases	0.0	0.6
Diabetic foot ulcers, new cases	3.2	4.3
Diabetic foot infections, new cases	0.0	2.6
Diagnosis of retinopathy*	41.4	46.5
Nephropathy Patients with blood urea nitrogen >14.3 mmol/liter (40 mg/dl)†	3.9	6.3
Patients with serum creatinine >177 mmol/liter (2 mg/dl)†	7.9	6.0
Patients undergoing dialysis	2.2	1.5
Patients with renal insufficiency‡	7.9	8.6

*The analysis was limited to the 29 (31.2%) non–English-speaking patients and 159 (30.0%) English-speaking patients who were seen in the ophthalmology clinic during the 12-month follow-up period. Percentages include both new and established cases of retinopathy.

†The analysis was limited to the 76 (81.7%) non–English-speaking patients and 395 (74.7%) English-speaking patients who had both blood urea nitrogen and serum creatinine tests performed.

‡Renal insufficiency was defined as the presence of any or all of the preceding 3 renal complications.

TABLE 5.—*Multivariate Analysis During 12 Months of Follow-up**

	Standardized Difference or Odds Ratio (95% CI)
Process Measures	
Standardized glycohemoglobin, ≥2 tests	1.9 (1.2 to 3.0)†
Physician visits, ≥2	2.6 (1.2 to 5.4)†
Urinalysis, ≥1 tests	1.5 (0.9 to 2.4)
Ophthalmologic examination, ≥1	1.0 (0.6 to 1.6)
Lipid panel, ≥1 tests	0.6 (0.4 to 1.1)
Serum creatinine level, ≥1 tests	1.4 (0.8 to 2.6)
24-Hr urine protein collection, ≥1 tests	1.5 (0.8 to 2.9)
Dietary consultation, ≥1	2.8 (1.3 to 6.1)†
Outcome Measures	
Mean standardized glycohemoglobin	0.2 (–0.3 to 0.6)
Mean plasma glucose	–2.8 (–23.3 to 17.7)
Mean blood urea nitrogen	–1.5 (–4.4 to 1.4)
Mean serum creatinine	–0.1 (–0.4 to 0.2)
Mean plasma cholesterol	9.3 (–7.3 to 25.8)
Mean plasma triglycerides	12.9 (–89.5 to 115.3)
Mean low-density lipoprotein cholesterol	11.3 (–7.5 to 30.1)
Mean high-density lipoprotein cholesterol	–3.1 (–8.5 to 2.2)
Total charges, mean of ln dollars	0.2 (–0.2 to 0.5)
Complications	
Diabetic foot ulcers, new cases	0.8 (0.2 to 2.7)
Diabetic foot infections, new cases	0.1 (0.0 to 3^{11}‡)
Retinopathy, new or established§	0.8 (0.3 to 2.1)
Renal insufficiency, new or established‖	0.7 (0.3 to 2.0)

Note: For Outcome Measures, data is standardized difference.

*For categorical variables, adjusted odds ratios and 95% confidence intervals (CIs) were calculated from multiple logistic regression. For continuous variables, standardized differences and 95% CIs were calculated from multiple linear regression. Regression models control for age, sex, new patient status, and insurance status, with English-speaking patients as the reference group.

†$P<.05$.

‡141847.2

§The analysis was limited to the 29 (31.2%) non–English-speaking patients and 159 (30.0%) English-speaking patients who were seen in the ophthalmology clinic during the 12-month follow-up period.

‖The analysis was limited to the 76 (81.7%) non–English-speaking patients and 395 (74.7%) English-speaking patients who had both blood urea nitrogen and serum creatinine tests performed.

tent with previous research. Brechner and associates found that 51% of all persons with diabetes in the United States did not receive annual dilated eye examinations.[33] Weiner and colleagues demonstrated that for Medicare patients with diabetes mellitus, during 12 months of follow-up, 89% did not receive glycohemoglobin testing, 54% did not see an ophthalmologist, and 45% received no cholesterol testing.[34]

There are several possible explanations for why non–English-speaking patients in this study received diabetes care comparable in quality to that for English-speaking patients, when previous research suggests that they usually receive worse medical care. Many of the studies that documented worse processes and outcomes of care for socially disadvantaged patients concluded that access to care was a major causative factor. Our cohort was not drawn from the population at large, but from established patients, who may have been more health-conscious or faced fewer access barriers. Our study suggests that once non–English-speaking persons have access to these two institutions, they can receive the same quality of care as English-speaking patients. Almost all previous studies of non–English-speaking patients in the United States have been of Latino patients only. Our non–English-speaking patient group was heterogeneous, with large numbers of Soviet, east African, and Asian refugees, and these persons may interact with the US medical system differently than Latino patients. Finally, our two most significant findings—increased frequency of glycohemoglobin testing and clinic visits—may simply be a reflection of the physicians being less certain of the medical history and getting less done at each visit. To compensate, they may have ordered more tests and scheduled more visits.

Our findings have several limitations. Because the databases were not insurance claims data but provider records, it is possible that patients may have received care outside the UWMC and HMC for services such as eye examinations, dialysis, or emergency care, and these visits would not have been included in this study. Because we cannot be sure of the number of patients who received outside ophthalmologic examinations, and because we only examined four months of data, our figures for baseline retinopathy are likely incomplete. Nonetheless, we do not think ascertainment bias favors one group over the other. We were unable to adjust for disease severity using baseline retinopathy, and it is possible that one group may have more advanced disease. Our estimate of cost of care does not include a per-patient cost of interpreter use because the costs of interpreter services are paid using an overall institutional budget. It is likely that we underestimated the mean charges for the non–English-speaking group. Based on an average interpreter charge of $37 for a typical follow-up office visit, we estimate that the mean non–English-speaking patient charge for outpatient services would increase by $216.

How we were able to assess quality of care was also limited. By restricting our analysis to measures available in institutional databases, we could not evaluate clinical examination criteria such as foot examinations. Because performing these examinations consumes more time than ordering laboratory tests, physicians may have done them less frequently for non–English-speaking patients. We were not able to assess whether the content of physician-patient interaction differed between the two groups, and it is possible that because of time constraints and language barriers, key elements of history taking or diabetic teaching were omitted for non–English-speaking patients. This was a relatively small sample with only 12 months' follow-up. The study may not have had adequate power or duration to demonstrate differences in certain outcomes, particularly complications such as renal insufficiency that take years to develop. The absence of differences in disease outcomes, although somewhat reassuring, should be interpreted with caution. The study did have adequate power to detect relatively small differences in processes of care and short-term laboratory outcomes. For example, the study had 80% power to detect a difference in standardized glycohemoglobin values of 0.6 points. Therefore, our findings for processes of care and short-term laboratory outcomes are likely robust and reflect real differences.

Finally, the potential for misclassification exists. There is, however, no reason to suspect that there would be selective misclassification of diagnostic and procedure codes for non–English-speaking patients. Moreover, many of our key measures, including laboratory process and outcome measures and the identification of diabetic patients, were independent of billing databases. Although we were unable to review medical records to confirm the accuracy of diagnostic and procedure codes, a 1994 audit of the physician billing database at the UWMC demonstrated that virtually 100% of inpatient billing records were free of errors compared with medical records. It is also possible that some patients who did not speak English well did not have interpreters present for their appointments. This number is likely to be low, based on discussions with physicians at these institutions and because of the state and institutional policies for providing interpreters for all patients regardless of ability to pay.[2] Furthermore, after reviewing data from a five-month time-motion study that we performed at Harborview Medical Center Adult Medicine Clinic (T.M.T. and E.B.L., unpublished data, January-May, 1996), we found that only 2 of the 79 non–English-speaking patients identified by the interpreter services schedule arrived without an interpreter. All other patients not on the interpreter services schedule were assumed to be English speakers, and all of the remaining 135 patients were able to read and understand a consent form in English.

A major implication of this study is that with a commitment to make professional interpreters available to all patients, health care institutions can provide diabetes care to non–English-speaking patients that appears to be of comparable quality to that provided to English speaking patients. Our results should not be generalized to all non–English-speaking patients, however. Washington State and the two institutions studied here have some of the most comprehensive interpreter services policies anywhere in the country.[2] Every interpreter working at these institutions has passed a written and oral certification examination. Most institutions rely on family members or employees to act as interpreters, which often leads to considerable distortion in the communication process and is associated with worse quality of care.[2–8,10,14] In this study, diabetes care was evaluated for only a highly selected cohort of patients who visited the clinics. We had no way, however, of measuring the processes and outcomes of care for the non–English-speaking persons in our community who were unable, because of language or socioeconomic factors, to enter the health care system.

Studies are needed of the quality of medical care for non–English-speaking patients. A recent article documented the systematic exclusion of non–English-speaking patients from biomedical research.[35] Furthermore, most large-scale health surveys of non-English speakers have focused exclusively on Spanish-speaking persons, thereby excluding other non–English-speaking groups. Research on the quality of medical care needs to include a broad spectrum of non–English-speaking patients and also focus on whether the content of care differs for non–English-speaking patients. Investigators should also study whether using professional versus nonprofessional interpreters affects quality of care. Most physicians who have non–English-speaking patients agree that care for these persons requires more time and effort, but our findings offer encouragement that this extra work may result in comparable quality of care.

ACKNOWLEDGMENT

We thank Daniel Lessler, MD, MHA; Alex Malter, MD, MPH; Thomas Payne, MD; Sharyne Shiu-Thornton, MA; and Edward Wagner, MD, MPH, for their insightful reviews of earlier drafts of this article. Thanks also go to Michael Beck, BS, and Patrick Murphy, CPA, of University of Washington Physicians and Ken Cameron, BS, and Kate Szilard, ART, of the University of Washington Medical Center Information Systems for technical assistance.

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