

per patient during the study period ranged from 2 (32 patients, or 4%) to 50 or more (10 patients, or 1%), with a median of 10 visits.

Measurement of physicians' empathy

Although a few research instruments are available to measure empathy in the general population, none is content-specific to patient care.^{19(pp63–74)} The Jefferson Scale of Empathy (JSE) was developed in 2001 at our medical school as an instrument to measure empathy in the context of medical education and patient care.^{19–23} Developed following an extensive review of the literature, the instrument relies on the definition of empathy in the context of patient care as a predominantly cognitive attribute that involves an understanding of the patient's experiences, concerns, and perspectives, combined with a capacity to communicate this understanding and an intention to help.^{24,25} The scale includes 20 items answered on a seven-point Likert-type scale (Strongly Agree = 7, Strongly Disagree = 1).

Evidence in support of the JSE's construct validity,^{19,20,23} criterion-related validity,^{20,21} predictive validity,²⁶ internal consistency reliability,^{20,21,23} and test-retest reliability²³ has been reported for physicians. The JSE has received broad acceptance and has been translated into 38 languages to date. (More information about versions of the JSE can be found at www.tju.edu/jmc/crmehc/medu/oempathy.cfm.)

Measures of clinical outcomes

The most recent results from the patients' hemoglobin A1c and LDL-C were used as indicators of the patients' metabolic control.^{27–29}

Procedures

After receiving approval from the institutional review board of Thomas Jefferson University, we administered the JSE to all 31 attending physicians in the Department of Family and Community Medicine in 2009. All of the physicians practice in the same office located in an urban setting where minority patients constitute more than half of the patients. The chair of the department provided the physicians with a brief explanation of the study's purpose and encouraged them to complete the JSE and return it directly to the Center for Research in Medical

Education and Health Care in the provided addressed envelope for processing and statistical analyses. Each physician was identified by a numeric code printed on the JSE scanning form and was told that the code would be used to correlate their JSE scores with his or her diabetic patients' hemoglobin A1c and LDL-C test results.

All attending physicians agreed to participate in the study. Two physicians with minimal patient responsibilities (they provide primary care for fewer than 45 patients) were excluded from the statistical analyses. Because the patients' electronic records were linked to their physicians' empathy levels by the numeric codes, the patients remained anonymous. For the purpose of statistical analyses, we classified the physicians into three groups according to the distribution of their JSE scores: high- (top third), moderate- (middle third), and low-scoring physicians (bottom third).

The results of the A1c tests were classified into three categories according to the standards of National Quality Measures Clearing House (www.qualitymeasures.ahrq.gov): good control (<7.0%), poor control (>9.0%), and moderate control ($\geq 7.0\%$ and $\leq 9.0\%$). A1c levels were used to measure the adequacy of blood glucose control according to national standards developed on the basis of numerous studies showing a strong relationship between A1c levels and the development of complications from diabetes such as microvascular disease and neuropathic problems. The levels of LDL-C were also classified into three categories: good control (<100 mg/dL), poor control (>130 mg/dL), and moderate control (≥ 100 and ≤ 130 mg/dL).^{27–29} The proportions of patients in each of the

mentioned categories were calculated.

Statistical analyses

The chi-square test was used to examine the significance of associations between physicians' levels of empathy and levels of the hemoglobin A1c and LDL-C test results. In addition, pairwise differences in the proportions of patients with good and poor control test results for physicians receiving high or low empathy scores were examined by using the *z* test for proportions. The possible confounding effects of physicians' and patients' gender and age, and patients' type of health insurance in the relationships between empathy scores and medical test results, were examined using logistic regression analyses. Statistical analyses were performed using SAS version 9.1 for Windows.

Results

Descriptive statistics on empathy scores for the three groups of high-, moderate-, and low-scoring physicians are reported in Table 1. As shown in the table, the differences for the mean empathy scores for the three groups of physicians were statistically significant by analysis of variance and Duncan multiple comparison test ($F_{(2, 27)} = 77.0, P < .001$, high scorers > moderate scorers > low scorers).

The proportions of patients in the good, moderate, and poor control A1c and LDL-C categories were compared for the high-, moderate-, and low-empathy-scoring physicians. The frequency and percent distributions of A1c test results by levels of physicians' empathy are reported in Table 2.

The association between the three levels of the hemoglobin A1c test outcomes and

Table 1

Means and Standard Deviations of the Jefferson Scale of Empathy Completed by 29 Participating Family Physicians, From a Study of Physicians' Empathy and Patients' Outcomes, Jefferson Medical College, 2009*

Groups	No. of physicians (no. of women)	Mean	SD	Range
High scorers	9 (5)	133.1	3.1	129–137
Moderate scorers	10 (6)	123.0	3.1	118–127
Low scorers	10 (5)	112.3	4.5	103–117
Total	29 (16)	122.4	9.3	103–137

* $F_{(2, 27)} = 77.0, P < .001$ (high scorers > moderate scorers > low scorers).

Table 2

Frequency and Percent Distributions of the Hemoglobin A1c and LDL-C Test Results for 891 Diabetic Patients, Treated Between July 2006 and June 2009, by Levels of Their Physicians' Empathy*

Patient outcome	No. (%) of patients by levels of physicians' empathy		
	High (n = 205)	Moderate (n = 282)	Low (n = 404)
Hemoglobin A1c†			
<7.0%	115 (56)	139 (49)	163 (40)
≥7.0% and ≤9.0%	59 (29)	99 (35)	135 (34)
>9.0%	31 (15)	44 (16)	106 (26)
LDL-C‡			
<100	121 (59)	149 (53)	180 (44)
≥100 and ≤130	56 (27)	86 (30)	128 (32)
>130	28 (14)	47 (17)	96 (24)

* From a study of physicians' empathy and patients' outcomes, Jefferson Medical College.

† $\chi^2_{(4)} = 22.04, P < .001$.

‡ $\chi^2_{(4)} = 15.55, P < .001$.

the three levels of physicians' empathy was highly significant ($\chi^2_{(4)} = 22.04, P < .001$). The likelihood of good control (A1c < 7.0%) was significantly greater in the patients of physicians with high empathy scores than in the patients of physicians with low scores (56% and 40%, respectively; $z = 4.0, P < .01$). Conversely, the likelihood of poor control (A1c > 9) was significantly lower in the patients of physicians with high empathy scores than it was in the patients of physicians in the low-scoring group (15% and 26%, respectively; $z = -3.7, P < .01$).

Frequency and percent distributions of the LDL-C test results by levels of physicians' empathy and summary results of statistical analysis are also reported in Table 2. Similar to the previous findings, the association between the three levels of LDL-C test outcomes and the three levels of physicians' empathy was highly significant ($\chi^2_{(4)} = 15.55, P < .001$), both of which provide support for our research hypothesis. The results of LDL-C test outcomes showed that the likelihood of good control (LDL-C < 100) was significantly higher for the patients of physicians with high empathy scores than for the patients of physicians with low scores (59% and 44%, respectively; $z = 3.8, P < .01$). Conversely, the likelihood of poor control (LDL-C ≥ 100) was lower for the patients of high-empathy-scoring physicians than for the patients of low scorers (14% and 24%, respectively; $z = -3.3, P < .01$).

Statistical control for gender, age, and type of insurance

Logistic regression was used to examine the unique contribution of levels of physicians' empathy in predicting optimal clinical outcomes after controlling for physicians' and patients' gender and age, and patients' health insurance. In the first logistic model, the outcomes of the hemoglobin A1c test were dichotomized according to whether they had achieved good control (<7.0%, $n = 452$). The independent variables included physicians' and patients' gender; physicians' age (>50 years and ≤50 years); and patients' age (median split, >56 years, $n = 443$; and ≤56 years, $n = 448$). Patients were grouped into three categories based on their type of health insurance: private insurance ($n = 470$), Medicare ($n = 312$), and Medicaid ($n = 108$). The sole uninsured patient was deleted from the logistic regression analyses. Summary results of the logistic regression analysis are reported in Table 3.

The results indicate that the physicians' empathy scores were associated significantly and uniquely with the prediction of good A1c outcomes. The odds ratio of 1.8 obtained for physicians' empathy (high versus low) indicated that for an increase from the low- to the high-scoring category, the odds of good control of hemoglobin A1c (<7.0) increased by 80%. Also, for an increase from the low-scoring to the moderate-

scoring category of physicians' empathy, the odds of good control of A1c increased by 50%. Physicians' gender (being male was associated with good control of patients' A1c outcome), physicians' age (younger age was associated with good control of patients' A1c), and patients' type of insurance (Medicare was associated with good control) also contributed significantly to the model. Patients' gender and age did not contribute. The Hosmer–Lemeshow goodness-of-fit test showed that the model was mathematically sound ($\chi^2_{(8)} = 7.03, P = .53$). These findings indicated that the physicians' degree of empathy was a unique and significant contributor to the prediction of good control of hemoglobin A1c for diabetic patients, beyond the contributions of gender and age of the physicians and patients, and type of patients' health insurance.

In another logistic regression model, we classified the results of the LDL-C test into two categories in which an LDL-C test result of less than 100 was regarded as good control. The same predictors used in the previous model were included as the independent variables. The summary results of this analysis are reported in Table 3.

The odds ratios for physicians' empathy reported in the table indicated that for an increase from a low- to a high-scoring category of physicians' empathy, the odds of good control of LDL-C (<100) increased by 80%. Also, for an increase from a low- to a moderate-scoring category of physicians' empathy, the odds of good control of patients' LDL-C increased by 40%. Patients' gender also contributed significantly to the prediction model (being male was associated with good control of the LDL-C). Neither physicians' gender and age, nor patients' age or type of health insurance, predicted the medical outcome. The Hosmer–Lemeshow goodness-of-fit test indicated a mathematically sound model ($\chi^2_{(8)} = 2.94, P = .94$). These findings indicated that physicians' empathy contributed uniquely and significantly to the prediction of good control of LDL-C test outcomes for diabetic patients beyond the gender and age of physicians and patients, and patients' health insurance. These findings provide additional support for our research hypothesis.

Table 3

Summary Results of Logistic Regression Analysis Predicting Hemoglobin A1c and LDL-C Test Outcomes for 891 Diabetic Patients, Treated Between July 2006 and June 2009, by Levels of Their Physicians' Empathy, Gender, Age of Physicians and Patients, and Type of Patients' Insurance*

Predictors	Odds ratio (95% confidence limits)	
	Hemoglobin A1c <7.0%	LDL-C <100
Physicians' gender		
Female (reference)		
Male	1.5 [†] (1.1–2.0)	0.93 (0.69–1.3)
Physicians' age		
<50 (reference)		
≥50	0.68 [‡] (0.49–0.94)	0.92 (0.69–1.3)
Patients' gender		
Female (reference)		
Male	0.86 (0.65–1.1)	1.6 [†] (1.2–2.1)
Patients' age		
<56 (reference)		
≥56	1.2 (0.85–1.6)	1.3 (0.98–1.8)
Insurance		
Private (reference)		
Medicare	1.5 [†] (1.1–2.0)	0.96 (0.69–1.3)
Medicaid	0.86 (0.56–1.3)	1.3 (0.83–2.0)
Physicians' empathy score		
Low (reference)		
Moderate	1.5 [†] (1.1–2.0)	1.4 [†] (1.1–2.0)
High	1.8 [‡] (1.3–2.7)	1.8 [‡] (1.2–2.6)

* From a study of physicians' empathy and patients' outcomes, Jefferson Medical College.

[†] $P < .05$.

[‡] $P < .01$.

Discussion

Confirmation of the hypothesis that physicians' empathy is associated with positive clinical outcomes suggests that empathy should be viewed as an integral component of physician competence. The methods used did not permit us to delineate the cause-and-effect mechanism that would explain our findings. A number of explanations are plausible and worthy of further investigation. One possible explanation is that greater empathy in the physician–patient relationship enhances mutual understanding and trust between physician and patient, which in turn promotes sharing without concealment, leading to better alignment between patients' needs and treatment plans and thus more accurate diagnosis and greater adherence.

Research provides support for the aforementioned explanations. For example, it has been reported that

physicians' understanding of their patients' perspective—a key feature in the definition of physician empathy¹⁹—enhances patients' perceptions of being helped,³⁰ improves emotional management and patients' empowerment,¹ and increases patients' perceptions of social support networks.^{1,19} In a factor analytic study, 52% of the variance in patients' ratings of satisfaction with their medical care was accounted for by the physicians' level of interpersonal warmth and respect,³¹ which are among the features of physician empathy.¹⁹ In another study with diabetic patients, dietitians' empathic engagement proved to be predictive of patient satisfaction and successful consultations.³² In yet another study, the researchers found that empathy was the most important quality for being a “good physician.”³³ Further research is needed to explore the underlying mechanisms of the link between physicians' empathy and patient outcomes.

We noticed that the highly empathic physicians saw a smaller number of patients than the other groups of physicians. One may speculate that this could be due to highly empathic physicians spending more time with their patients, thus leading to fewer patients being seen. These physicians may also be involved in additional academic activities. These and other speculations need to be empirically tested in future research.

Limitations and Concluding Remarks

Achieving the goals of clinical care is a complex endeavor involving multiple factors that include physicians, patients, culture, race, ethnicity, severity of disease, environment of care, and health care regulations, among others. Obviously, controlling for all these factors in clinical research is difficult. In addition to these factors, our study was limited in other ways. For example, we did not control for factors that may have had an impact on the intermediate outcomes we measured, such as severity of disease. Also, the study was conducted in a single institution in an academic setting, and intermediate outcomes were measured for only one complex chronic disease.

We attempted to minimize the impact of some of the limitations in several ways. Although we did not control for severity of disease, we conducted the research with faculty in a large practice setting, which accepts all patients from all insurers and does not consider severity when assigning them. We chose to study diabetes because of its high prevalence, the availability of well-accepted evidence regarding the value of achieving intermediate optimal outcomes, and readily available and accepted quantitative measures for assessing the control of the disease. In addition, because of the chronic nature of the disease, diabetic patients need sustained contact and follow-up with their physicians, making empathic engagement more important. To improve the validity of the findings in future research, it would be desirable to include other factors involved in patient outcomes, such as

hospitalization for complications caused by diabetic acidosis, coma, or septicemia.

Despite the study's limitations, however, our findings support the recommendations of such professional organizations as the Association of American Medical Colleges³⁴ and the American Board of Internal Medicine³⁵ to assess and enhance empathic skills in undergraduate and graduate medical education.

Finally, our findings regarding the substantial associations between physicians' empathy and patient outcomes, combined with research findings documenting the erosion of empathy during undergraduate^{24,36,37} and graduate medical education,^{38,39} reinforce the need for the assessment and enhancement of empathic skills in both physicians-in-training and practicing physicians. Although questions have been raised about the validity of findings regarding the decline in empathy during medical education,⁴⁰ such critics have not been left unchallenged.⁴¹

Replication of this study in multiple institutions, across different cultures, and with a variety of disease conditions (e.g., hypertension, asthma, infectious diseases, cancer, etc.) can establish physicians' empathy as an important component of their overall competence and as a significant factor in positive patient outcomes, thus placing empathy in the domain of evidence-based medicine.

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