Health Care Utilization and Self-Care Behaviors of Medicare Beneficiaries with Diabetes: Comparison of National and Ethnically Diverse Underserved Populations

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Abstract

Caring for persons with diabetes is expensive, and this burden is increasing. Little is known about service use, behaviors, and self-care of older individuals with diabetes who live in underserved communities. Information about self-care, informal care, and service utilization in urban (largely Latino, $n = 695$) and rural (mostly white, $n = 819$) Medicare beneficiaries with diabetes living in federally designated medically underserved areas was collected using computer-aided telephone interviews as part of the baseline assessment in the Informatics and Diabetes Education and Telemedicine (IDEATel) Project. Where items were comparable, service use was compared with that of a nationally representative group of Medicare beneficiaries with diabetes, using data from the Medical Expenditure Panel Survey. Compared to nationally representative groups, the underserved groups reported worse general health but similar health care service use, with the exception of home care. However, compared to the underserved rural group, the underserved, largely minority urban group, reported worse general health ($P < 0.0001$); more inpatient nights ($P = 0.003$), emergency room visits ($P < 0.001$), and home health care ($P < 0.001$); spent more time on self-care; and had more difficulty with housework, meal preparation, and personal care. Differences in service use between urban and rural groups within the underserved group substantially exceeded differences between the underserved and nationally representative groups. These findings address a gap in knowledge about older, ethnically diverse individuals with diabetes living in medically underserved areas. This profile of disparate service use and health care practices among urban minority and rural majority underserved adults with diabetes can assist in the planning of future interventions. (*Population Health Management* 2011;14:11–20)

Introduction

AN ESTIMATED 24 MILLION PERSONS IN THE UNITED STATES have diabetes mellitus, and both the incidence and the prevalence of diabetes are growing.¹ Glycemic control is important to prevent acute and chronic complications.² Limited health care access has been shown to adversely impact outcomes of diabetes.³ Patient involvement in a treatment-oriented regimen can improve outcomes,⁴ and perhaps ultimately reduce long-term

costs. Differences in self-care may partially explain differences in diabetes outcomes by education, race, and ethnicity.^{5,6}

Caring for persons with diabetes is expensive: the total overall cost of diabetes in 2007 was \$174 billion.⁷ This includes \$116 billion for medical expenditures (50% of which was for inpatient care) and \$58 billion in lost productivity. The lost productivity cost estimates are due partially to morbidity but also are related to self-care. While self-care imposes costs on individuals with diabetes, self-care potentially

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can reduce direct medical care costs by preventing complications. Indirect health care costs also include informal care provided by friends and family, which can be particularly important for the elderly and more disabled people who may need help getting to medical appointments, taking medications or insulin, and performing other tasks, because of physical limitations.⁸

Both the financial burden⁹ and the burden on informal care networks¹⁰ associated with diabetes have been documented. However, little is known about service use and self-care of older medically underserved individuals with diabetes who live in low-income communities, or about differences in care between minority and majority subgroups. Service use and self-care data were collected as part of the Informatics and Diabetes Education and Telemedicine (IDEATel) Project that enrolled Medicare beneficiaries with diabetes who lived in federally designated medically underserved areas.¹¹ These data provide a unique opportunity to learn about the self-care, informal and formal care, and overall disease burden on an ethnically diverse, medically underserved sample of Medicare beneficiaries with diabetes. For all measures, we compare 2 underserved groups: non-urban, largely rural, white, non-Latino older adults, and urban, largely minority Latino and black older adults. Unique data are provided on the self-care, informal care, and overall burden of diabetes for the underserved groups. Findings from this sample are also compared to those from a nationally representative sample of elderly people with diabetes.

Methods

Data

The main source of data was the IDEATel baseline survey collected from December 2000 to April 2003. The study design of IDEATel has been described previously.¹¹ Inclusion criteria included: (1) Medicare coverage; (2) diabetes; (3) 55 years of age or older; (4) residence in a federally designated medically underserved area^a or in a federally designated health professional shortage area within New York state. Urban subjects ($n=755$) primarily lived in Northern Manhattan or the Bronx (NYC), and rural subjects ($n=867$) lived in upstate New York. Exclusion criteria included very low vision, receipt of ongoing dialysis, and/or severe cognitive or physical impairment. The 2000 Medical Expenditure Panel Survey (MEPS) was used to compare the underserved Medicare sample with diabetes to a nationally representative Medicare population with diabetes. Extensive information about MEPS is available at www.meps.ahrq.gov. Except for the underserved designation, the inclusion criteria used in the trial were employed select cases from the MEPS for inclusion in these analyses. Specifically, all respondents who (1) had Medicare coverage (2), had diabetes, and (3) were 55 years of age or older were selected. A diagnosis of diabetes was based on the MEPS condition file, which combines several sources including both provider reports of visits with

a diagnosis of diabetes and self-reports of having diabetes. Patients with very low vision, chronic renal failure, or a diagnosis of senility or organic mental disorder were excluded from further analyses, leaving 501 observations.^b

Procedures for underserved data collection and training interviewers

Demographic data were collected during an initial telephone screen interview. All other data were collected through a computer-aided telephone interview (CATI), which dealt with service usage, self-care, informal care, time burden, and outcomes.¹¹ The CATI interview was administered using English and Spanish versions of the instrument. Standard procedures, including cognitive interviews and back-translation, were used during the translation process.

CATI interviewers were trained and certified using standard best practices including listening to tapes of prior interviews and conducting taped practice interviews. Interviewers were certified once they had satisfactorily rated 5 "gold standard" interview tapes. Every fifth interview was tagged and required to be taped for reliability purposes. Respondents were asked for permission to tape the interview and were informed that their interview may be monitored for quality assurance. A maximum of 10 telephone attempts were made to reach a participant within a 3-month time period, at which point the interview was coded as "unreachable" and recycled back into the pool. The estimated average time to conduct an interview was 30–35 minutes. The Institutional Review Boards for the Protection of Human Subjects of Columbia University, SUNY Upstate Medical University, and all other participating institutions approved the study.

Measures

Measures were selected from the MEPS based on whether they were comparable to those available from the underserved group. These included basic demographics, self-reported health status, physician visits, nonphysician provider visits, inpatient admissions, inpatient nights spent in a facility, emergency department visits, physical therapy visits, and home health care days.

The 2000 MEPS contained a follow-up self-administered questionnaire specifically for respondents with diabetes that contained diabetes-specific questions comparable to questions asked of the underserved (eg, whether insulin was taken, whether other diabetes medications were taken). Because the MEPS diabetes questionnaire did not ask about blood glucose monitoring or other self-care measures, we could not compare the self-care of the underserved with other nationally representative groups. In constructing the high school graduate indicator variable for the nationally representative group, those who reported in the MEPS that they had a General Equivalency Diploma degree or had no degree were identified as such, and excluded from the high school category.

^aMedically Underserved Areas/Populations are areas or populations designated by Health Resources and Services Administration (HRSA) as having: too few primary care providers, high infant mortality, high poverty and/or large elderly population. (See <http://muafind.hrsa.gov/>, accessed 2/19/10.)

^bThe complex survey sampling of MEPS implies that not all observations will contribute equally.

The IDEATel protocol was developed by combining measures and items from several sources. This questionnaire provided information dealing with intervening variables in the modeling of service use and with outcome variables from several measures such as level of functioning in activities of daily living (ADL),¹² health behavior activities, (eg, smoking, exercise, eating), instrumental formal and informal support,^{13,14} different categories of service use,¹⁵⁻¹⁷ overall satisfaction with life,^{18,19} and satisfaction with health care. The specific information gathered from the underserved group included frequency of self-monitoring of blood glucose; use of insulin; method of insulin administration; types of insulin used; out-of-pocket costs for diabetes supplies; waiting and travel time for visits to providers; time spent on various methods of diabetes education; extent and form of assistance from family, friends, and formal caregivers; phone and e-mail contact with providers, care provided by physical therapists, nutritionists, psychologists, and a wide variety of other providers; as well as measures of inpatient, outpatient and emergency care.

Those who did not answer the question or responded with "don't know" were excluded from the denominator of use rates for all groups. However, unless otherwise noted, those who did not report any usage are included in the denominator of all usage measures. For example, the average number of inpatient nights/year included those who have no inpatient admissions whatsoever. In certain cases, such as the rate of usage of insulin pumps, the rate was restricted to those who took insulin. In all such instances the rate was denoted as being "among."

Baseline information was collected from the 3 months prior to entry into the trial. As such, it was not affected by the trial intervention. However, because service use among the underserved is contrasted with that among the nationally representative group, the quarterly rates were converted to annual rates. It was assumed that the use rate observed for the prior 3 months was representative of the rates throughout the year, so the annual use rate was obtained by simple multiplication by 4 (see Table 4). While this is a reasonable approach for use rates for the entire sample, including those with no utilization, it is not reasonable for measures of whether there is no use of a particular form of care, because some people are likely to be users throughout the year and others to be users only one quarter of a year. Items that simply asked about any utilization were not annualized and were not compared with the national data.

Participants in the trial were given the opportunity to select 1 or more race categories from among 5 (American Indian or Alaska Native, Asian, black or African American, Native Hawaiian or Other Pacific Islander, white). Double, triple, and/or multiple race combinations were coded and used as a single response to the race question, (eg, white, black, and American Indian). For analysis in this paper, a measure "black" was constructed that included all groups self-identified as black or African American or partially black or partially African American, such as "African American and white."

Participants' ethnicity was elicited independently of race by asking separate questions using a skip pattern format; namely, a question about Latino/Hispanic descent, another about the ethnicity of those who identified themselves as non-Latino blacks, and a third question asking about the

ethnic background of those who had not provided definitive answers to the preceding two questions. Because many Latinos were reluctant to embrace racial categories and often provided "Latino" or "Hispanic" as the answer to the race question, 67% of Latinos in the underserved group described themselves as being of "other" race. Among the largely Latino urban group, the race variable is not very dependable; 65.8% of Latinos were Dominican, 19.6% were Puerto Rican, 7.0% were Cuban, and 6.8% were "other." Thus, the black group of the urban sample was likely to be substantially larger than the 7.7% in the nonurban area. A series of articles published in the *American Journal of Public Health*²⁰ discusses this method and possible guidelines for the analysis of race categories. Kaplan and Bennett²¹ discuss caveats in the use of race and ethnicity in biomedical publications, and offer guidelines to be used when these constructs are addressed in such context. Because the analyses presented here focus on differences between urban and rural groups and between higher and lower income neighborhoods, rather than on differences between racial or ethnic groups per se, some of these concerns are mitigated.

For the underserved, impairments in impairment in ADLs were defined using several questions. Respondents were first asked if they experienced any difficulty performing a task, such as housework. They were then asked if they had received help with that task. If they had received help, they were asked if they could have performed the task themselves if necessary. If they reported capability to perform the task on their own if necessary, they were asked whether they could have done it without assistance, could have done it without assistance but only with difficulty, or could not have done it at all. The ADL levels were defined as follows: level 0 is no difficulty; level 1 is difficulty but no assistance; level 2 is assistance but could have done without such assistance; level 3 is assistance and difficulty doing the task without such assistance; level 4 is could not be done without assistance.

Analytic approach

The analysis consists primarily of univariate and bivariate descriptive statistics, such as means and cross-tabulations. In the IDEATel trial, subjects were randomized within clusters of patients with the same physician, and standard errors and significance tests were corrected for the physician-level clustering. Similarly, for the MEPS sample, standard errors and significance tests were corrected for the multi-stage sampling scheme.²² These adjustments were made using Stata software's survey commands.²³ Using this method for both data sets, the chi square test used with cross-tabulations became an F test with noninteger degrees of freedom. Tests of differences in means of continuous variables were analyzed using *t*-statistics. In all instances, missing values, including "don't know" responses, were excluded from the analysis.

The MEPS sample, when weighted, is nationally representative, whereas the underserved sample comes from a trial and, therefore, is not nationally representative. Consequently, the underserved group could differ from the nationally representative sample for reasons other than being underserved. To examine this issue, the age distributions of each population were compared (Table 1). The underserved sample was slightly younger than is the nationally representative

TABLE 1. AGE DISTRIBUTION OF SAMPLES OF MEDICARE BENEFICIARIES WITH DIABETES

Age Category	MEPS (National)	Underserved
55–64	8.0%	10.6%
65–70	28.8%	31.6%
70–74	26.7%	27.1%
75–80	19.8%	18.8%
>80	16.8%	11.8%

MEPS, Medical Expenditure Panel Survey.

population (while the means were very similar, the underserved group had more people who were younger than age 65 and fewer people who were older than age 80). In order to determine whether observed differences between the two samples were driven by the age distributions, a sensitivity analysis was performed. Specifically, we examined whether results were meaningfully different, first when restricted to those 65 years of age or older and second when restricted to those 80 years of age or younger. It is noted that such adjustments will not address the possibility that the underserved and nationally representative populations could differ in unmeasured ways unrelated to being underserved.

Where the two data sources had comparable questions, the national and underserved groups were compared. The urban and nonurban groups were compared using most items from the IDEATel service use measures.

Results

National and underserved groups

Table 2 presents the basic demographic and insurance variables for the underserved and nationally representative groups. The underserved group differed from the nationally representative sample. As expected, those in the underserved group were significantly less educated, more likely to be on Medicaid, and less likely to have private supplemental in-

surance. Fifty percent of the underserved sample reported an annual household income of \$10,000 or lower (monthly income 0 = 1259, s.e. = 63; median = 759), illustrating that the underserved indeed had relatively low income.

With regard to general health status (Table 3), a somewhat smaller proportion of the underserved reported being in excellent, very good, or good health. When the fair and poor categories were combined, the differences between the national and underserved groups were modest but clearly showed the underserved to report worse general health (51.5% vs. 43.8%). On balance, the underserved group can be described as reporting worse health status than the nationally representative group.

Because the nationally representative and underserved groups differed in their age distribution, we examined the self-reported health status results without those who were younger than age 65 and without those who were older than 79. For the nationally representative group, the results were hardly different, with a less than 1 percentage point increase in the direction of better health, when the younger group was excluded. This is consistent with expectations regarding measurement of self-reported health status based on age-matched comparisons. Those younger than 65 may have considered themselves to have been in worse health related to their peers because of their diabetes, while older individuals with diabetes may not have seen themselves as in relatively worse health. However, the effect was quantitatively fairly small. After excluding the older group, the health status results changed in the direction of worse health, but by less than the standard errors of the estimates. For the underserved group, the differences between the two age groups were even smaller, with the greatest difference being a 0.5 percentage point increase in the share of the sample reporting very good health for the older group. Thus, differences between the two groups in self-reported health status were not driven by differences in the age distribution.

Comparing the health care service use of the underserved and nationally representative groups (Table 4), the under-

TABLE 2. MEDICARE BENEFICIARIES WITH DIABETES: DEMOGRAPHICS (standard errors in parentheses^c)

	National (2000 MEPS)	Underserved (2000–2002)	Urban ^d Underserved (2000–2002)	Nonurban Underserved (2000–2002)
Latino	10.1% (1.9%)	35.5% (3.2%)	74.8%* (2.3%)	1.2% (0.6%)
Black ^e	15.0% (1.5%)	17.4% (1.5%)	28.6%* (2.2%)	7.7% (1.8%)
HS grad or higher	57.1% ^f (2.6%)	43.5% (2.3%)	20.5%* (1.9%)	63.7% (1.9%)
8 th grade or less	24.5% (1.2%)	36.6% (2.5%)	64.1%* (2.3%)	12.7% (1.4%)
Years Education	10.9 (.12)	9.8 (0.22)	7.4* (.19)	11.8 (.13)
Medicaid	16.4% (2.1%)	47.5% (2.9%)	80.4%* (2.0%)	19.2% (1.8%)
Private Medigap	50.9% ^g (2.3%)	40.7% (2.3%)	7.95%* (1.3%)	68.4% (2.3%)
Age (years)	72.4 (.29)	71.4 (.22)	71.1 (.27)	71.6 (.33)

^cStandard errors for the underserved sample are corrected for physician-level clustering. Standard errors for the MEPS data are corrected for complex survey sampling.

^dThe majority of the urban population is of Latino descent while the majority of the nonurban sample is white and non-Latino.

^eBlacks include all groups self-identified as black or African American or partially black or African Americans, such as African American and white. The black and Latino categories are not mutually exclusive.

^fIn the National MEPS data, those who reported a High School diploma, Bachelor's degree, Master's degree, or doctorate as their highest degree obtained are considered high school graduates, while those who report having a GED (3.7%) and those who report some other degree (3.4%) are not.

^gUsing the MEPS data, the Medigap variable is defined as having private supplemental insurance in any month of the year.

*The urban and nonurban differences are significant at $P < 0.001$ level.

MEPS, Medical Expenditure Panel Survey; HS, high school.

TABLE 3. MEDICARE BENEFICIARIES WITH DIABETES: SELF-REPORTED GENERAL HEALTH STATUS
(standard errors in parentheses^h)

	National (2000 MEPS)	Underserved (2000–2002)	Urban ⁱ Underserved (2000–2002)	Nonurban Underserved (2000–2002)
Excellent	4.2% (1.2%)	2.7% (.4%)	2.6%* (.6%)	2.8% (.6%)
Very Good	16.3% (1.1%)	13.4% (1.1%)	4.6%* (.9%)	20.9% (1.4%)
Good	35.7% (1.3%)	32.3% (1.6%)	17.7%* (1.5%)	44.7% (1.8%)
Fair	28.8% (2.0%)	43.4% (2.0%)	63.4%* (2.0%)	26.5% (1.5%)
Poor	15.0% (1.2%)	8.1% (.7%)	11.6%* (1.1%)	5.1% (.8%)
Sample size ^{j,k}	501	1514	695	819

^hStandard errors for the underserved sample are corrected for physician-level clustering. Standard errors for the MEPS data are corrected for complex survey sampling.

ⁱThe majority of the urban population is of Latino descent while the majority of the nonurban sample is white and non-Latino.

^jNote that we are giving the actual number of respondents used. Due to the complex survey sampling of the MEPS, each respondent does not contribute equally.

^kThose who said that they did not know or declined to answer, 5.2% of the nonurban and 7.8% of the urban, were not included.

*The urban and nonurban differences are significant with a clustering-corrected F statistic of 69.5 (*P* value < 0.0001).

MEPS, Medical Expenditure Panel Survey.

served reported using modestly less inpatient care, although the difference was not statistically significant. This group reported having somewhat more emergency visits. There were no significant differences in terms of physician office visits, but the underserved made dramatically fewer nonphysician office visits. There was no difference in the likelihood of taking insulin, but the underserved group was more likely to take pills for diabetes. The underserved group reported using significantly more physical therapy and home health care. When sensitivity analysis was performed without those younger than age 65 and those older than age 79 in the nationally representative sample, the usage patterns for all care except for home health care remained essentially the same, with changes less than the standard errors of the estimates. For home health care, the age 65-and-older group had a mean of 13.0 visits while the group younger than 80 had a mean of 6.09 visits.

Urban and nonurban underserved groups

Within the IDEATel (underserved) sample, the urban (*n* = 695) and nonurban (*n* = 819) groups differed in a variety of ways (Table 2). By design, the urban group was 75% Latino, while the nonurban group was only 1% Latino. Education differed, with the nonurban group substantially more educated. Insurance status differed dramatically, with the urban group far more likely to be on Medicaid than is the nonurban group and less likely to have private Medigap coverage. Because ethnicity was highly collinear with urban area, we could not disentangle the reasons for the differences but could only describe the differences between the urban and nonurban groups, which should also be seen as minority and majority groups.

While the urban and nonurban groups did not differ significantly in mean age, the nonurban group had greater

TABLE 4. MEDICARE BENEFICIARIES WITH DIABETES: ANNUAL UTILIZATION (mean visits/year),¹
(standard errors in parentheses^m)

	National (2000 MEPS)	Underserved Trial Sample (2000–2002)	Urban ⁿ Underserved Trial Sample (2000–2002)	Nonurban Underserved Trial Sample (2000–2002)	t-statistic or F-statistic for urban/nonurban comparison (<i>P</i> value in parentheses)
Inpatient nights/year	2.80 (0.22)	2.43 (0.32)	3.48 (0.61)	1.53 (0.26)	t-stat = 2.96 (<i>P</i> = 0.003)
Inpatient Admissions/year	0.44 (0.03)	0.392 (0.04)	0.476 (0.06)	0.32 (0.05)	t-stat = 2.11 (<i>P</i> = 0.035)
ER visits/year	0.39 (0.03)	0.65 (0.05)	0.84 (0.08)	0.48 (0.06)	t-stat = 3.7 (<i>P</i> < 0.001)
MD office visits/year	8.93 (0.30)	9.58 (0.23)	9.19 (0.35)	9.92 (0.31)	t-stat = 1.55 (<i>P</i> = 0.121)
Non-MD practitioner office visits/year	1.95 (0.19)	0.57 (0.07)	0.61 (0.10)	0.54 (0.09)	t-stat = 0.56 (<i>P</i> = 0.576)
Takes insulin	28.1% (2.2%)	29.9% (1.2%)	30.5% (1.8%)	29.4% (1.7%)	F = 0.19 (<i>P</i> = 0.66)
Takes medications for diabetes	74.8% (1.4%)	82.0% (1.0%)	83.9% (1.5%)	80.4% (1.4%)	F = 2.75 (<i>P</i> = 0.03)
Physical therapy visits	0.73 (0.31)	5.52 (0.63)	5.94 (0.86)	5.17 (0.91)	t-stat = 0.62 (<i>P</i> = 0.54)
Home health care days	8.43 (1.52)	11.3 (1.4)	18.1 (2.6)	5.5 (1.2)	t-stat = 4.5 (<i>P</i> < 0.001)

¹All individuals are included, including those who had no visits.

^mStandard errors for the underserved sample are corrected for physician-level clustering. Standard errors for the MEPS data are corrected for complex survey sampling.

ⁿThe majority of the urban sample is of Latino descent while the majority of the nonurban sample is white and non-Latino.

MEPS, Medical Expenditure Panel Survey; ER, emergency room; MD, doctor of medicine.

variance, with a larger share of those younger than age 65 and those older than age 80. The urban group reported substantially worse general health status than did the nonurban group. The variation in health status within the underserved group far exceeded that between the underserved and nationally representative groups.

The urban group used more care in general, particularly inpatient, emergency room, and home health care (Table 4). The greater use of home health care by the urban groups was substantially reduced and the difference was no longer statistically significant after adjusting for Medicaid coverage. The urban and nonurban groups did not differ significantly in use of physical therapy or in visits to physicians or to nonphysician providers.

Self-care measures are shown in Table 5. The urban group was less likely to measure blood glucose levels than was the nonurban group, although levels were high in both groups (the average level of hemoglobin A1c was 7.76% (s.d. = 1.69) for the urban and 7.04% (s.d. = 1.30) for the nonurban group).²⁴ Among those who reported measuring their blood glucose level, the urban group did so less frequently than the nonurban group, with those who reported measuring their blood glucose less than once a day being 24.3% compared with 17.0% in the nonurban group. Measuring blood glucose is particularly critical for those who take insulin and, among those using insulin, only 2% reported that they did not measure their blood glucose at all, the same level in both the urban and nonurban subsamples. The urban group was more likely to take oral medications for glycemic control.

Among those reporting taking insulin, the urban group was less likely than the nonurban group to use the more flexible, convenient, or effective methods of administration, such as disposable pens or cartridge pens, or the newer insulin analogs, such as lispro or glargine. Reported use of older insulin preparations, such as Regular and NPH, did not differ between the two groups. Upon examination of the burden on participants from self-care, we found that the groups reported spending an average of 28.3 minutes per day spent on caring for their diabetes, with the urban group reporting a mean of 35.7 minutes per day vs. 22.1 minutes reported by the nonurban group. Only 4.3% reported spending any time on the Internet related to diabetes, with an average of 4.4 minutes per week, but respondents did report spending an average of 30.8 minutes per week reading about diabetes. This is likely to be good news for patient outcomes, but does represent a burden on individuals with diabetes. The greater time that the urban subsample reported spending on caring for their own diabetes could reflect greater difficulty for a less educated group. The extensive time the urban group reported spending reading about diabetes is striking, given the generally low levels of education.

The time reported spent waiting during visits to providers was also considerable, with an average of 41.4 minutes per visit. Waiting time was 3 times longer for the urban group compared to the nonurban group, with a mean waiting time per visit of over an hour for the urban group. Round trip travel times were 47.2 minutes per visit, with similar values for the urban and nonurban groups. Mean out-of-pocket costs for diabetes supplies were a relatively modest monthly cost of \$4.29, although this is a substantial amount for some. Only 1.1% of respondents reported that their families contributed financially to the purchase of supplies.

A variety of general health behaviors are important for those with diabetes. The underserved group reported, on average, a good diet for 5 of the previous 7 days; 3.6 days per week of physical activity; and 2.6 days per week with formal exercise. The nonurban group reported more good diet days and physical activity but less formal exercise; 8.8% of the underserved reported smoking at all in the last week, with an average of 13.5 cigarettes smoked by smokers. The nonurban were less likely to exercise and more likely to smoke but more likely to have some form of physical activity than were the urban group.

Formal health care utilization measures are shown in Table 5. The likelihood of visits with physicians and test-only visits were remarkably similar for the urban and nonurban, but emergency room visits and hospital admissions were more prevalent among the urban group. The urban group was also more likely to report having a visiting nurse, home health aide, home personal care, transportation services, or psychiatric care than the nonurban group, but the nonurban group was more likely to report having meal delivery and case management.

Phone and e-mail contacts have the potential to reduce patient burden. Nine percent of underserved reported having had any phone contact with a doctor. Twelve percent reported having had any phone contact with another provider, with a much greater share of the nonurban (15.7%) reporting phone contact with other providers. Only 0.3% reported having had e-mail contact with a doctor, and only 1.5% reported e-mail contact with another provider.

Reported assistance with ADLs was a mean of 8.3 hours/week reported as provided by family members, and 3.7 hours from paid sources. The urban group reported dramatically more paid help than the nonurban group. While this was partially due to a few people with very high rates of paid help, including 3 individuals with 168 hours/week (ie, 24 hours/day, 7 days/week), there was a noticeable difference throughout the range. (Excluding those 3 observations only reduced the urban average to 6.5 hours/week.) Most of the help was with housework and meal preparation.

Examining the ADL measures that were constructed from multiple questions (Table 6), almost half reported no difficulty with housework, with substantially greater proportions reporting no difficulty with meal preparation, personal care, or other tasks. On the other hand, 18.3% reported that they could not do housework at all by themselves, 9.6% could not do meal preparation, 5.2% could not do personal care, and 20.4% could not do "other" tasks. For all tasks, but particularly for personal care, few reported that they received help but could manage without it. Comparing the urban and nonurban groups, the urban group reported substantially more difficulty with housework, meal preparation, and personal care.

Discussion

An understanding of health care utilization as well as self-care and health behaviors is critical in designing interventions to improve diabetes care in older adults. This information has been lacking for underserved adults. A strength of the study is the in person survey that provided information not available in other data sets. Additionally,

TABLE 5. UNDERSERVED MEDICARE BENEFICIARIES WITH DIABETES: COMPARISON OF URBAN AND NONURBAN GROUPS (standard errors in parentheses^o)

	<i>Underserved Trial Sample (2000–2002)</i>	<i>Urban^P Underserved Trial Sample (2000–2002)</i>	<i>Nonurban Underserved Trial Sample (2000–2002)</i>	<i>t-statistic or Chi-square (P value) for urban/nonurban comparison</i>
<i>Self-Care</i>				
Measures blood glucose	92.9% (0.8%)	91.1% (1.1%)	94.4% (1.1%)	F = 4.19 (P = 0.04)
Frequency of measuring blood glucose (among)				F = 5.56 (P = 0.0042)
	20.3%	24.3%	17.0%	
<once a day	47.9	46.0	49.6	
once a day	31.8	29.7	33.5	
>once a day				
Pills for blood glucose	82.0% (1.0%)	83.9% (1.5%)	80.4% (1.4%)	F = 2.75 (P = 0.03)
Takes insulin	29.9% (1.2%)	30.5% (1.8%)	29.4% (1.7%)	F = 0.19 (P = 0.66)
Frequency (per day) of taking insulin (among)	1.87 (0.03)	1.78 (0.04)	1.94 (0.04)	t-stat = 2.87 (P = 0.004)
Syringe insulin	91.9% (1.3%)	97.2% (1.2%)	87.2% (2.1%)	F = 14.8 (P = 0.0002)
administration (among)				
Disposable pen insulin	8.2% (1.8%)	4.3% (1.4%)	11.6% (1.2%)	F = 8.5 (P = 0.004)
administration (among)				
Cartridge pen Insulin	4.2% (1.1%)	1.4% (.8%)	6.6% (1.8%)	F = 7.0 (P = 0.009)
administration (among)				
Pump insulin	1.1% (.5%)	0 (NA or 0%)	2.1% (.9%)	F = 4.8 (P = 0.03)
administration (among)				
Regular insulin (among)	49.5% (2.5%)	45.5% (3.7%)	52.9% (3.5%)	F = 2.16 (P = 0.14)
Lispro (Humalog) (among)	9.1% (1.4%)	5.2% (1.6%)	12.6% (2.1%)	F = 7.2 (P = 0.008)
NPH (Among)	16.2% (1.7%)	16.5% (2.6%)	15.9% (2.2%)	F = 0.032 (P = 0.86)
Glargine (Lantus) (among)	4.2% (1.0%)	2.4% (1.1%)	5.9% (1.7%)	F = 3.5 (P = 0.064)
Pre-mixed insulin (among)	41.6% (2.9%)	31.7% (3.7%)	50.5% (3.9%)	F = 11.7 (P = 0.0007)
<i>Patient Self-Care Burden</i>				
Minutes/day caring for diabetes	28.3 (1.1)	35.7 (1.6)	22.1 (1.1)	t-stat = 6.99 (P < 0.001)
Any Internet time for diabetes	4.3% (.5%)	2.3% (0.6%)	6.1% (0.8%)	F = 13.36 (P = 0.0003)
Minutes/week on	4.4 (1.1)	2.4 (1.2)	6.2 (1.7)	t-stat = 1.83 (P = 0.067)
Internet for diabetes				
Minutes/week on	30.8 (2.2)	27.9 (3.9)	33.3 (2.5)	t-stat = 1.16 (P = 0.245)
reading for diabetes				
Waiting time per visit (minutes) ^q	41.4 (2.3)	64.1 (2.7)	21.3 (1.3)	t-stat = 14.6 (P < 0.001)
Round trip traveling	47.2 (1.2)	49.7 (1.7)	45.1 (1.7)	t-stat = 1.9 (P = 0.058)
time (minutes) per visit				
Out-of-pocket costs for	\$4.29 (0.49)	\$3.57 (0.59)	\$4.92 (0.74)	t-stat = 1.42 (P = 0.156)
diabetes supplies (monthly)				
Family contributes	1.1% (0.3%)	1.7% (0.5%)	0.6% (0.3%)	F = 4.2 (P = 0.04)
to diabetes supplies				
<i>General Health Behaviors</i>				
Days of week with good diet	5.0 (0.8)	4.6 (1.2)	5.4 (1.0)	t-stat = 5.2 (P < 0.001)
Days of week physical activity	3.6 (0.1)	2.2 (0.1)	4.7 (0.1)	t-stat = 14.9 (P < 0.001)
Days of week exercise	2.6 (0.1)	2.9 (0.1)	2.3 (0.1)	t-stat = 4.3 (P < 0.001)
Smoking at all in last week	8.8% (0.8%)	8.1% (1.1%)	9.5% (1.0%)	F = 0.86 (P = 0.35)
Number of cigarettes	13.5 (1.1)	10.8 (1.5)	15.5 (1.5)	t-stat = 2.3 (P = 0.026)
smoked (among smokers)				
<i>Formal Health Care Utilization</i>				
Any test-only visit	35.6%	36.2%	35.1%	F = 0.14 (P = 0.70)
Any doctor's visit	90.5% (0.8%)	92.1% (1.1%)	89.1% (1.1%)	F = 3.39 (P = 0.066)
Any ER visit	13.0% (0.9%)	16.5% (1.4%)	10.0% (1.1%)	F = 13.7 (P = 0.0002)
Any hospital admission	8.5% (0.8%)	10.5% (1.2%)	6.9% (0.9%)	F = 5.94 (P = 0.015)
Any physical therapy	8.2% (0.7%)	9.5% (1.1%)	7.0% (0.9%)	F = 3.13 (P = 0.077)
Any visiting nurse	12.5% (1.1%)	21.2% (1.6%)	5.1% (0.8%)	F = 81.4 (P < 0.0001)
Any adult day care	0.7% (0.2%)	0.7% (0.3%)	0.7% (0.3%)	F = 0.002 (P = 0.96)
Any home health aide	5.7% (.6%)	7.8% (1.0%)	3.9% (.7%)	F = 9.5 (P = 0.002)
Any home personal care	7.8% (.9%)	15.5% (1.4%)	1.2% (.4%)	F = 115.6 (P < 0.0001)
Any case management	14.8% (1.0%)	10.7% (1.1%)	18.4% (1.6%)	F = 16.2 (P = 0.0001)
Any home meal delivery	4.8% (0.6%)	2.2% (0.6%)	7.1% (1.0%)	F = 18.2 (P < 0.0001)

(continued)

TABLE 5. (CONTINUED)

	Underserved Trial Sample (2000–2002)	Urban ^P Underserved Trial Sample (2000–2002)	Nonurban Underserved Trial Sample (2000–2002)	T-statistic or Chi-square (P value) for urban/nonurban comparison
Any transportation services	9.4% (1.0%)	17.4% (1.5%)	2.5% (0.5%)	F = 101.24 (P < 0.0001)
Any telephone check	2.1% (0.4%)	1.6% (0.5%)	2.6% (0.6%)	F = 1.85 (P = 0.174)
Any nutritionist	4.1% (0.5%)	4.8% (0.8%)	3.6% (0.7%)	F = 1.36 (P = 0.24)
Any diabetes educator	3.1% (0.5%)	2.9% (0.6%)	3.3% (0.8%)	F = 0.19 (P = 0.66)
Any substance abuse rehab care	0.3% (0.1%)	0.14% (0.1%)	0.37% (0.2%)	F = 0.71 (P = 0.40)
Any psychiatric or psychological services	4.5% (0.6%)	6.6% (1.0%)	2.6% (0.5%)	F = 14.4 (P = 0.0002)
Any phone contact with doctor	9% (1%)	10% (1%)	8% (1%)	t stat = 1.38 (P = 0.167)
Any phone contacts with other provider	12.0% (1.0%)	7.7% (1%)	15.7% (1.5%)	t stat = 4.49 (P < 0.001)
Any e-mail with doctor	0.3% (0.1%)	0.6% (0.3%)	0.1% (0.1%)	t stat = 1.45 (P = 0.147)
Any e-mail with other provider	1.5% (0.4%)	1.5% (0.5%)	1.5% (0.5%)	t stat = 0.04 (P = 0.969)
<i>Assistance</i>				
Hours/week help from family	8.32 (0.46)	5.18 (0.42)	11.0 (0.59)	t stat = 8.04 (P < 0.001)
Hours/week help from friends	0.56 (0.08)	0.40 (0.10)	0.69 (0.13)	t stat = 1.75 (P = 0.08)
Hours/week family take off to help	0.05 (0.01)	0.03 (0.01)	0.06 (0.02)	t stat = 1.11 (P = 0.27)
Hours/week paid help	3.70 (0.42)	7.22 (0.68)	0.72 (0.12)	t stat = 9.5 (P < 0.001)
Hours/week help with housework	5.94 (0.32)	4.44 (0.31)	7.14 (0.44)	t stat = 4.98 (P < 0.001)
Hours/week help with meal prep	4.64 (0.22)	4.02 (0.28)	5.15 (0.31)	t stat = 2.67 (P = 0.008)
Hours/week help with personal care	0.51 (0.06)	0.65 (0.08)	0.40 (0.09)	t stat = 2.14 (P = 0.03)
Hours/week help with anything else	1.67 (0.10)	1.40 (0.11)	1.87 (0.16)	t stat = 2.41 (P = 0.016)

^aStandard errors for the underserved sample are corrected for physician-level clustering. Standard errors for the MEPS data are corrected for complex survey sampling.

^PThe majority of the urban sample is of Latino descent while the majority of the nonurban sample is white and non-Latino.

^QThis is the mean time for the first visit. Subsequent visits are not statistically different.

this is one of the few studies with a large ethnically diverse sample from urban and rural areas.

Despite major differences in terms of educational level, insurance status, and ethnicity between the national and underserved groups, most usage levels were similar for inpatient care and physician visits. While this result could be interpreted as equal levels of care, it could also be interpreted as worse care for the underserved because they report poorer health status. There were some significant differences, however, the underserved did report somewhat higher numbers of emergency visits and substantially more physical therapy and home health visits but substantially fewer nonphysician provider visits. It is possible that some of these differences, particularly the reports of nonphysician provider visits, stem from differences in how these data were collected, namely from claims data in MEPS and from self-report in IDEATel.

Self-care is critical for good diabetes outcomes. Seven percent of the underserved reported not measuring their blood glucose levels at all, but among insulin users, for whom blood glucose measurement is most important, only 2% (a fraction not statistically significantly different from zero) reported not measuring their blood glucose at all. Twenty percent reported measuring their blood glucose less than once a day, and only 33% reported measuring their blood glucose more than once a day. On average, the underserved reported spending 28 minutes per day on their diabetes, a good sign for improving their health outcomes but hardly an inconsequential burden. Respondents also reported considerable time spent waiting for and traveling to appointments. Finally, the care of nutritionists and diabetes educators is thought to be valuable to help those with dia-

betes to improve their self-care; it was striking that the underserved group reported very little care provided by nutritionists or diabetes educators. This is not unexpected because dietitians and educators are not readily available in medically underserved areas.

The mean monthly out-of-pocket expenses for the underserved group were relatively modest at \$4.29. In contrast, for the general population older than age 65, mean monthly out-of-pocket prescription drug expenses were about \$48 in 2003.²⁵ While the comparatively low out-of-pocket spending may be due to poor recall in self-reports, it may reflect an effective safety net. Because evidence suggests that significant cost-sharing can hurt the health of the chronically ill,²⁶ the low out-of-pocket spending is reassuring to the extent that it reflects low cost-sharing for those with diabetes.

Among the underserved, the urban group reported more use of inpatient and emergency department care, perhaps because they are in closer proximity to hospitals. They also reported more use of transportation services, again perhaps due to availability. The urban group reported worse general health status and more ADL impairment. They also reported substantially more use of home health care, possibly due to a higher rate of Medicaid coverage. From the IDEATel cross-sectional data, it was not clear the extent to which truly higher levels of functional impairment drove the greater use of home health care in the urban group among the underserved. It is also possible that greater use of home health care drove greater reporting of impairments by contributing to a perception of impairment or need to justify the assistance. In the critical areas of self-care, particularly blood glucose

TABLE 6. ACTIVITIES OF DAILY LIVING (ADL) IMPAIRMENTS (standard errors in parentheses[†])

Type of Impairment	Level of Impairment	Underserved Trial Sample ^s (2000–2002)	Urban ^t Underserved Trial Sample (2000–2002)	Nonurban Underserved Trial Sample (2000–2002)	t-statistic or chi-square (P value) for urban/nonurban comparison
Housework	No difficulty	46.2% (1.6%)	35.5% (2.0%)	55.4% (1.9%)	F = 22.4 (P < 0.0001)
	Difficulty but no assistance	11.5% (0.9%)	13.8% (1.3%)	9.6% (1.0%)	
	Difficulty and assistance but could do without	2.6% (0.4%)	1.6% (0.5%)	3.4% (0.6%)	
	Could do with difficulty	21.4% (1.1%)	22.2% (1.6%)	20.6% (1.5%)	
	Could not do by self	18.3% (1.2%)	27.0% (1.7%)	10.9% (1.2%)	
Meal preparation and cleanup	No difficulty	68.5% (1.6%)	56.6% (2.0%)	78.7% (1.6%)	F = 31.7 (P < 0.0001)
	Difficulty but no assistance	7.4% (0.7%)	10.8% (1.0%)	4.6% (0.8%)	
	Difficulty and assistance but could do without	1.3% (0.3%)	1.3% (0.4%)	1.4% (0.4%)	
	Could do with difficulty	13.2% (.9%)	14.4% (1.3%)	12.2% (1.1%)	
	Could not do by self	9.6% (0.9%)	17.0% (1.4%)	3.2% (0.6%)	
Personal care	No difficulty	79.9% (1.3%)	72.4% (1.7%)	86.4% (1.3%)	F = 12.8 (P < 0.0001)
	Difficulty but noassistance	8.5% (0.8%)	10.8% (1.2%)	6.5% (0.9%)	
	Difficulty and assistance but could do without	0.5% (0.2%)	0.4% (0.2%)	0.6% (0.3%)	
	Could do with difficulty	5.9% (0.6%)	8.2% (1.1%)	3.9% (0.7%)	
	Could not do by self	5.2% (0.6%)	8.2% (1.1%)	2.6% (0.6%)	
Other tasks	No difficulty	60.1% (1.6%)	53.2% (2.2%)	66.0% (1.9%)	F = 7.7 (P < 0.0001)
	Difficulty but no assistance	6.5% (0.7%)	8.5% (1.1%)	4.8% (0.8%)	
	Difficulty and assistance but could do without	2.2% (0.4%)	2.0% (0.5%)	2.3% (0.5%)	
	Could do with difficulty	10.8% (0.9%)	11.0% (1.1%)	10.7% (1.3%)	
	Could not do by self	20.4% (1.1%)	25.4% (1.6%)	16.2% (1.4%)	

[†]Standard errors for the underserved sample are corrected for physician-level clustering. Standard errors for the MEPS data are corrected for complex survey sampling.

^sTrial data gathered at baseline for prior 3 months only. The data are converted to an annual measure by assuming that the annual usage rate is 4 times the prior 3-month rate.

^tThe majority of the urban sample is of Latino descent while the majority of the nonurban sample is white and non-Latino.

measurement, the urban group had worse performance. The most striking finding is that, on average, differences between the urban and nonurban groups, who are also minority and majority groups, are much greater than those between the underserved and nationally representative groups. Health care service use has been reported to differ in Hispanics and non-Hispanics, even within facilities.²⁷ Given the ethnic differences between the urban and rural groups in IDEATel, this study cannot determine if differences between these urban and rural groups were due to geographic or ethnic differences.

A limitation of this study is that the sample was not random and may not be representative of underserved Medicare beneficiaries with diabetes. As shown, IDEATel participants had low average income and resided in medically underserved areas. The nonurban (upstate) sample may generalize to low income geographic regions with lower levels of public services and poor or no public transportation. The urban sample may generalize to low-income individuals of Latino and African American or black descent, living in NYC. It is

emphasized that the data reported for the underserved group is not intended to be representative of all the medically underserved, but represents low-income people with diabetes living in medically underserved areas. As in all studies, those willing to participate in a study or survey may differ from the broader population. A further limitation of this study is that it is descriptive and cannot determine the *causes* of differences. Rather the study reveals what differences do and do not exist—valuable information for policy makers and practitioners.

The findings presented address a gap in knowledge about older individuals with diabetes because they focused on the medically underserved, including a substantial number of minority group members. Moreover, despite the limitation inherent in self-reported data, information about services not included in claims data, such as community-based home care, care provided by unpaid informal sources, and self-care, were presented. These data will be of use to educators and policy planners seeking a profile of service use and health care practices among medically underserved and

minority elderly individuals with diabetes living in urban and rural areas to help direct future programs to improve care.

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References

- Centers for Disease Control and Prevention. <http://www.cdc.gov/media/pressrel/2008/r080624.htm>, accessed January 24, 2010.
- American Diabetes Association. Standards of medical care in patients with diabetes 2010 *Diabetes Care* 2010;33:S11–S61.
- Rhee MK, Cook CB, Dunbar VG, et al. Limited health care access impairs glycemic control in low socioeconomic status urban Africa Americans with type 2 diabetes. *J Health Care Poor Underserved* 2005;16:734–746.
- Anderson RM, Funnell MM, Butler PM, Arnold ML, Fitzgerald JT, Feste CC. Patient empowerment: Results of a randomized control trial. *Diabetes Care* 1995;18:943–949.
- Schillinger D, Grumbach K, Piette J, et al. Association of health literacy with diabetes outcomes. *JAMA* 2002;288:475–482.
- Walsh ME, Katz MA, Sechrest L. Unpacking cultural factors in adaptation to type 2 diabetes mellitus. *Medical Care* 2002;40:I129–I139.
- American Diabetes Association Economic costs of diabetes in the United States in 2007. *Diabetes Care* 2008;31:296–615.
- Ryerson B, Tierney EF, Thompson TJ, et al. Excess physical limitations among adults with diabetes in the U.S. population, 1997–1999. *Diabetes Care* 2003; 26:206–210.
- Bernard DM, Banthin JS, Encinosa W. Health care expenditure burdens among adults with diabetes in 2001. *Medical Care* 2006;44:210–215.
- Langa KM, Vijan S, Hayward R, et al. Informal caregiving for diabetes and diabetic complications among elderly Americans. *J Gerontol* 2002;57B:S177–S186.
- Shea S, Starren J, Weinstock RS, et al. Columbia University's Informatics and Telemedicine (IDEATel) project: Rationale and design. *J Am Med Inform Assoc* 2002;9:49–62.
- Teresi J, Toner J, Bennett R, Wilder D. Caregiver burden and long-term care planning. *J Appl Soc Sci* 1998–1999;13: 192–214.
- Holmes D, Teresi J, Holmes M, Bergman S, King Y, Bentur N. Informal versus formal supports for impaired elderly people: Determinants of choice on Israeli kibbutzim. *Gerontologist* 1989;29:195–202.
- Teresi JA, Holmes D, Dichter B, Koren MJ, Ramirez M, Fairchild S. Prevalence of behavior disorder and disturbance to family and staff in a sample of adult day health care clients. *Gerontologist* 1997;37:629–639.
- Hokenstad A, Ramirez M, Haslanger K, Finneran K. Medicaid home care services in New York City: Service utilization and family involvement. New York: United Hospital Fund, 1998.
- Hokenstad A, Ramirez M, Haslanger K, Finneran K. Medicaid home care services in New York City: Demographics, health conditions, and impairment levels of New York City's Medicaid homecare population. New York: United Hospital Fund, 1997.
- Holmes D, Teresi J, Ramirez M, Gould D, Haslanger K, Hokenstad A. Hours and costs of Medicaid reimbursed in-home personal care [abstract]. *Gerontologist* 1996; 36:196.
- Golden RR, Teresi JA, Gurland BJ. Development of indicator scales for the comprehensive assessment and referral evaluation (CARE) Interview Schedule. *J Gerontol* 1984;39:138–146.
- Gurland B, Golden RR, Teresi JA, Challop J. The SHORT-CARE: An efficient instrument for the assessment of depression, dementia and disability. *J Gerontol* 1984;39: 166–169.
- Symposium: Race/Ethnicity and the 2000 Census. *Am J Public Health* 2000;90.
- Kaplan JB, Bennett T. Use of race and ethnicity in biomedical publication. *JAMA* 2003;289:2709–2716.
- Scheaffer RL, Medenhall W, Ott L. *Elementary Survey Sampling*, 5th ed. Boston: Duxbury Press, 1996.
- Stata Reference Manual Release 8. College Station, Texas: Stata Press, 2003.
- Shea S, Weinstock RS, Teresi JA, et al. A randomized trial comparing telemedicine case management with usual care in older, ethnically diverse, medically underserved patients with diabetes mellitus. *J Am Med Inform Assoc* 2006;13: 40–51.
- Desmond K, Rice T, Cubanski J, Neumann P. The Burden of Out-of-Pocket Health Spending Among Older Versus Younger Adults: Analysis from the Consumer Expenditure Survey, 1998–2003; 2007. Available at <http://www.kff.org/medicare/upload/7686.pdf>.
- Remler DK, Greene J. Cost-sharing: A blunt instrument. *Ann Rev Public Health* 2009;30:293–311.
- Robinson S, Baron RB, Cooper B, Janson S. Does health service use in a diabetes management program contribute to health disparities at a facility level? Optimizing resources with demographic predictors. *Pop Health Manag* 2009; 12:139–147.

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