Social Impact Analysis of the Effects of a Telemedicine Intervention to Improve Diabetes Outcomes in an Ethnically Diverse, Medically Underserved Population: Findings From the IDEATel Study

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Objectives. We examined the social impact of the telemedicine intervention effects in lower– and higher–socioeconomic status (SES) participants in the Informatics for Diabetes Education and Telemedicine (IDEATel) study.

Methods. We conducted a randomized controlled trial comparing telemedicine case management with usual care, with blinded outcome evaluation, in 1665 Medicare recipients with diabetes, aged 55 years or older, residing in federally designated medically underserved areas of New York State. The primary trial endpoints were hemoglobin A1c (HbA1c), low-density lipoprotein cholesterol, and systolic blood pressure levels.

Results. HbA1c was higher in lower-income participants at the baseline examination. However, we found no evidence that the intervention increased disparities. A significant moderator effect was seen for HbA1c ($P = .004$) and systolic blood pressure ($P = .023$), with the lowest-income group showing greater intervention effects.

Conclusions. Lower-SES participants in the IDEATel study benefited at least as much as higher-SES participants from telemedicine nurse case management for diabetes. Tailoring the intensity of the intervention based on clinical need may have led to greater improvements among those not at goal for diabetes control, a group that also had lower income, thereby avoiding the potential for an innovative intervention to widen socioeconomic disparities. (*Am J Public Health.* 2013;103:1888–1894. doi:10.2105/AJPH.2012.300909)

We recently conducted a randomized trial, the Informatics for Diabetes Education and Telemedicine (IDEATel) trial, comparing telemedicine-based nurse case management with usual care for Medicare beneficiaries with diabetes living in federally designated medically underserved areas of New York State.[1,2] We found improved levels of the 3 prespecified trial outcomes—namely, hemoglobin A1c (HbA1c), systolic blood pressure, and low-density lipoprotein (LDL) cholesterol—in the intervention group compared with the usual-care group at 1- and 5-year follow-up.[3,4]

Targeting underserved patients was a key design feature in the IDEATel trial. Lack of access to care for chronic conditions in general and for diabetes specifically may be an important contributing factor in shortfalls in meeting treatment guideline–defined management goals.[5–7] Thus, an eligibility requirement for randomization in the IDEATel study was residing in a federally defined medically underserved area, and the individual-level socioeconomic status (SES) of the enrolled study participants therefore was generally low. Nonetheless, SES had substantial variability among the randomly assigned participants.

Theoretical and empirical studies of the adoption of innovations indicate a general pattern such that earlier adopters tend to have higher income and to be better educated than later adopters.[8] In the context of public health, this phenomenon has the potential to increase social disparities. Other theoretical models also identify socioeconomic factors as important determinants of health services use.[9] Thus, although the IDEATel intervention improved outcomes compared with usual care overall in the randomly assigned groups, the intervention potentially could have improved clinical outcomes to a greater degree in the more socioeconomically advantaged participants than in the less advantaged, thereby widening disparities while improving overall outcome.

Few if any randomized trials have analyzed the social effects of complex interventions for chronic disease management. We therefore tested the hypothesis that the IDEATel intervention had differential effects by SES on the primary trial outcomes, with the null hypothesis being no difference.

METHODS

IDEATel was conducted as a randomized controlled trial with blinded assessment of the outcomes. As previously described,[3,4] patients were enrolled through primary care practices in New York City, with the enrollment hub at Columbia University Medical Center, and in Upstate New York, where the enrollment hub was at State University of New York (SUNY) Upstate Medical University at Syracuse.

Sample

The sample consisted of 1665 study participants residing in New York State, recruited and randomly assigned between December 2000 and October 2002. Inclusion criteria were being 55 years or older, a current Medicare beneficiary, and fluent in either English or Spanish; having diabetes as defined by a physician's diagnosis; undergoing treatment with diet, an oral hypoglycemic agent, or insulin;

and residing in a federally designated medically underserved area (either of 2 federal designations: medically underserved area or health professional shortage area) as of the date of randomization. Exclusion criteria were having moderate or severe cognitive impairment or severe visual, mobility, or motor coordination impairment; having a severe comorbid condition; having severe expressive or receptive communication impairment; lacking a free electrical outlet for the home telemedicine unit; and spending more than 3 months a year at a location different from their New York State residence (to exclude "snowbirds" who spent > 3 months at another residence and therefore would not have exposure to the intervention during that time).

Participants were recruited through their primary care provider practice. The number of study participants per primary care provider ranged from 1 to 35 (mean = 3.27; SD = 4.40). Random assignment to telemedicine case management or to usual care occurred within the primary care provider patient panels immediately on completion of the baseline examination.

Intervention

The telemedicine intervention in IDEATel has been described in detail elsewhere.[2,3] Participants randomly assigned to the intervention group received a home telemedicine unit (American Telecare, Inc, Eden Prairie, MN) consisting of a Web-enabled computer with modem connection to an existing telephone line. The home telemedicine unit had the following components: (1) Web camera that allowed videoconferencing with nurse case managers at the Berrie Diabetes Center at Columbia University in New York City or the Joslin Diabetes Center at SUNY Upstate Medical University at Syracuse; (2) home glucose meter (One Touch Sure Step; Lifescan, Inc, Milpitas, CA) and blood pressure cuff (UA-767PC Blood Pressure Monitor; A&D Medical, San Jose, CA) connected to the home telemedicine unit through an RS-232 serial port, so that home fingerstick glucose and blood pressure readings could be uploaded into a clinical database; (3) access to patients' own clinical data; and (4) access to a special educational Web page created for the project by the American Diabetes Association in regular and low-literacy versions in English and Spanish.

Nurse case managers were trained in diabetes management and in the use of computer-based case management tools to facilitate interactions through videoconferencing with patients. In New York City, the nurses were fluent in Spanish and familiar with Hispanic culture. Goals for the intervention were initially based on Version 2.2b (updated May 2000) of the *Veterans Health Administration Clinical Practice Guidelines for the Management of Diabetes Mellitus in the Primary Care Setting*.[10] Intervention management goals were subsequently updated to reflect the most recently available authoritative guidelines—namely, the Adult Treatment Panel III guidelines of the National Cholesterol Education Program[11] and 2004 National Cholesterol Education Program Report,[12] the American Diabetes Association Clinical Practice Guidelines, and the recommendations of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.[13] The intervention was delivered by approximately 4 full-time–equivalent nurse case managers, with daily supervision by endocrinologists. The intervention was designed to be culturally and linguistically appropriate to a diverse, underserved population with many participants who had low educational attainment. In addition, the frequency of contact by the nurse case managers was tailored to clinical need, on the basis of meeting the guideline-based intervention management goals.

The primary care physicians of intervention patients retained full responsibility and control over their patients' care. When a case manager determined that a change in management was indicated, he or she contacted the primary care physician (by e-mail, fax, or telephone). The study sought to avoid disruption of established relationships and patterns of care and to ensure continuity of care for intervention patients at the end of the study.

Usual Care

Participating primary care providers cared for patients in both the intervention and the usual-care groups, following the design whereby randomization was clustered within provider panel. The primary care providers received periodic mailings with current guidelines for the care of patients with diabetes. Patients in the usual-care group received clinical care from their primary care providers, without other guidance or direction from study personnel.

Clinical Endpoints

Prespecified clinical endpoints were HbA1c, LDL cholesterol, and blood pressure levels. Follow-up examinations were conducted at 1-year intervals after randomization, with study time beginning at the baseline examination. Personnel conducting these examinations were blinded to intervention status and were not involved in supporting the clinical or technical aspects of the intervention. Data were collected annually, starting at the baseline visit and including 5 follow-up visits through February 28, 2007, when the intervention ended. Thus, the primary analyses consisted of 6 waves of data.

Study participants were instructed to come to the baseline and follow-up examinations fasting and not taking their glycemic control medications but taking their blood pressure medications. Specimens were processed and frozen at the data collection sites and analyzed at Medstar Laboratory (Washington, DC). HbA1c was analyzed by boronate affinity chromatography with the Primus CLC 385 (Primus, Kansas City, MO). Total cholesterol, triglycerides, and high-density lipoprotein (HDL) cholesterol were measured with enzymatic colorimetric methods (Vitros; Johnson & Johnson, New Brunswick, NJ). LDL cholesterol level was calculated with the Friedewald equation[14] for participants with triglyceride levels of 300 milligrams per deciliter or lower and measured directly with a homogeneous assay (Polymedco, Cortlandt Manor, NY) for those with triglyceride levels greater than 300 milligrams per deciliter, total cholesterol levels greater than 240 milligrams per deciliter, or HDL cholesterol level less than 35 milligrams per deciliter. Resting blood pressure was measured with a Dinamap Monitor Pro 100 (Critikon, Tampa, FL) automated oscillometric device. Three measurements were obtained with a standardized protocol after 5 minutes of rest.[15] The average of the second and third measurements was recorded as the resting blood pressure. In both the intervention and the usual-care groups, blood pressure values were communicated to participants at the time of the examinations, and HbA1c and lipid level measurements were mailed to participants and their primary care providers.

Demographic and Socioeconomic Status Measures

We determined demographic variables and SES from data obtained by structured interview at the baseline examination. SES was categorized based on annual family income (<$10 000, n = 821; $10 000–$20 000, n = 377; >$20 000, n = 348) and years of school completed as group 1 (0–5 years, n = 278), group 2 (6–8 years, n = 321), group 3 (9–11 years, n = 298), group 4 (12 years, n = 460), and group 5 (≥ 13 years, n = 272).

Statistical Methods

Our primary approach was to use complex, longitudinal modeling, examining the interaction of income groups by time by treatment groups.[16–19] Significance tests were 2-tailed. Up to 6 waves of data (baseline plus 5 follow-ups) were included in the analyses. The endpoints entered into the models were treated as continuous variables and did not require prior transformation after graphical inspection of the distribution of the outcome and of the residuals from the models. We estimated adjusted means (SE) of the clinical endpoints during follow-up as follows. Power terms were added if a nonlinear model provided a better fit. A linear model was appropriate for the blood pressure endpoints, whereas the best-fit models for HbA1c and LDL cholesterol were nonlinear and included quadratic (group $\times$ time^2) and exponential (group $\times$ e^{-time}) terms. A significant quadratic term indicates differences between treatment groups, with 1 of the groups showing a U-shaped distribution of the outcome over time. A significant exponential term suggests that the treatment groups experienced different rates of decline over time. Group heterogeneity in cluster and residual variances also required modeling. The best covariance structure for modeling the repeated outcome variables was selected after examination of the Akaike Information Criterion[20] and Schwarz's Bayesian Information Criterion.[21]

Nonlinearity, heterogeneous variances, design features (clustering within primary care practices), and multiple repeated measures were modeled. The interaction term compared each dummy-coded term (centered to avoid colinearity) with the highest-income group. A significant effect thus indicated that the intervention group slope was significantly different from that of the highest group. We performed follow-up contrasts to examine the mean differences between intervention and control groups across waves and between the first and the last wave. To increase power, we conducted subgroup analyses to examine the lowest-income group in contrast to the 2 highest groups combined. Although a goal was to perform intent-to-treat analyses, because income was missing for about 100 respondents, they were excluded. We conducted sensitivity analyses to perform subgroup analyses, examining separate regressions within each group. Slopes were estimated separately. The results were very similar in terms of estimated slopes and resultant means and SEs.

We treated income as a categorical variable and examined the effect of the intervention over time. We included categorical terms in the model (e.g., interaction terms for dummy variables for the 3 income groups, with income of >$20 000 as the reference group). Only the highest interaction terms (not the main effects) were of interest. If these terms were significant, then they were indicative of income group differences in the treatment effects over time, relative to the reference group (income >$20 000). Income and time were centered to avoid colinearity. Because the estimated means and difference for each wave were unadjusted for baseline, we also examined the contrast between baseline and year 5 estimated means.

Consistent with the primary analyses of treatment effects, we did not include demographic covariates in the analyses. However, in sensitivity analyses, the 5 covariates that differed significantly across income groups were included in the model. These included age, treated continuously, and 4 dummy-coded variables: female gender, Black and Hispanic race/ethnicity, and marital status (married).

We performed analyses to examine the influence of missing data and assumption violation on the inference about the effects. Thus, in addition to the primary intent-to-treat analyses, the expectation maximization algorithm for missing data was used in sensitivity analyses of the results, and 2 alternative approaches were investigated: imputing baseline values (baseline carried forward), assuming that the outcomes for dropouts return to baseline values, and the use of other imputation algorithms.

In the analyses of the primary outcomes, we used both maximum likelihood estimation, based on generalized linear mixed effects models, and generalized estimating equation approaches. Generalized estimating equation produces unbiased estimates of the regression parameters, even if the covariance is misspecified and the distribution is unknown. Several nonlinear models were used in sensitivity analyses, including 2 models that have been used in modeling nonlinear change in older participants. The adjacent change model is an extension of growth curve models.[22] Another model examined in sensitivity analyses was change since baseline, which can include random effects for heterogeneity of change since baseline.[23]

We performed statistical analyses with SPSS version 18.0 (SPSS, Chicago, IL), and SAS version 9.2 (SAS Institute Inc, Cary, NC).

RESULTS

The mean age of the study participants was approximately 71 years (Table 1). Mean annual family income was approximately $15 000 in the years 2000 to 2002, and 39% were Medicaid-eligible. Nearly 80% reported at baseline that they did not know how to use a computer (Table 1). HbA1c level at the baseline examination was higher in the lower-income (<$10 000) group than in the middle- ($10 000–$20 000) and higher-income (>$20 000) groups, and also higher in the lower-education groups (Table 2). Blood pressure and LDL cholesterol levels at baseline did not vary consistently by income level.

Treatment Effect and Hemoglobin A1c

Compared with the highest level of income, none of the income group coefficients for the interaction terms indicating change in A1c over time were significant (Figure 1a). However, examination of endpoint differences for the follow-up waves of the study (1, 2, 3, 4, 5) showed a significant difference in means for the lowest group only. The groups started out equivalently; however, by study endpoint, the telemedicine group in the lowest-income level had the greatest reduction in A1c, relative to

TABLE 1—Baseline Characteristics of the Study Participants, by Randomization Group: Informatics for Diabetes Education and Telemedicine (IDEATel) Study, NY, December 2000–October 2002

Characteristic	Telemedicine Case Management (n = 844), Mean (SD) or %	Usual Care (n = 821), Mean (SD) or %
Age at randomization, y	70.8 (6.5)	70.9 (6.8)
Female	63.5	62.1
Race/ethnicity		
African American (non-Hispanic)	15.3	14.5
Hispanic	35.8	34.6
White (non-Hispanic)	48.2	50.6
Other	0.7	0.2
Marital status		
Married or living with significant other	41.4	40.9
Single, never married	13.0	10.1
Separated or divorced	16.4	18.1
Widowed	29.1	30.7
Data missing	0.1	0.1
Lives alone	38.1	37.1
Family income, $/y	14 942 (13 660)	15 173 (18 553)
Education, y	9.7 (4.1)	9.9 (4.1)
Eligible for Medicaid	39.0	39.2
Duration of diabetes, y	11.2 (9.6)	11.0 (9.2)
Participant "knows how to use a computer"		
Yes	18.8	21.2
No	79.9	78.1
Data missing	1.3	0.7

Note. The sample size was n = 1665.

usual care (difference of 0.50). Contrasts between difference scores for baseline and year 5 to adjust for baseline differences showed a significant difference for group 1 (the lowest-income group) only ($P \le .001$). This result was confirmed with a traditional moderator analysis comparing the lowest-income group with the other groups combined. The interaction term for time by income group by intervention group was significant ($P = .031$, quadratic effect; $P = .004$, exponential effect).

Treatment Effect and Low-Density Lipoprotein Cholesterol

Compared with the highest level of income, none of the income group coefficients for the interaction terms indicating change in LDL over time were significant. Examination of endpoint differences for the follow-up waves of the study (1, 2, 3, 4) showed a significant difference in means for the lowest- and middle-income groups and a significant difference in means for the highest-income group in year 2 (Figure 1b). At study end (year 5), the differences in means for the usual care and telemedicine groups were not significant.

Treatment Effect and Systolic Blood Pressure

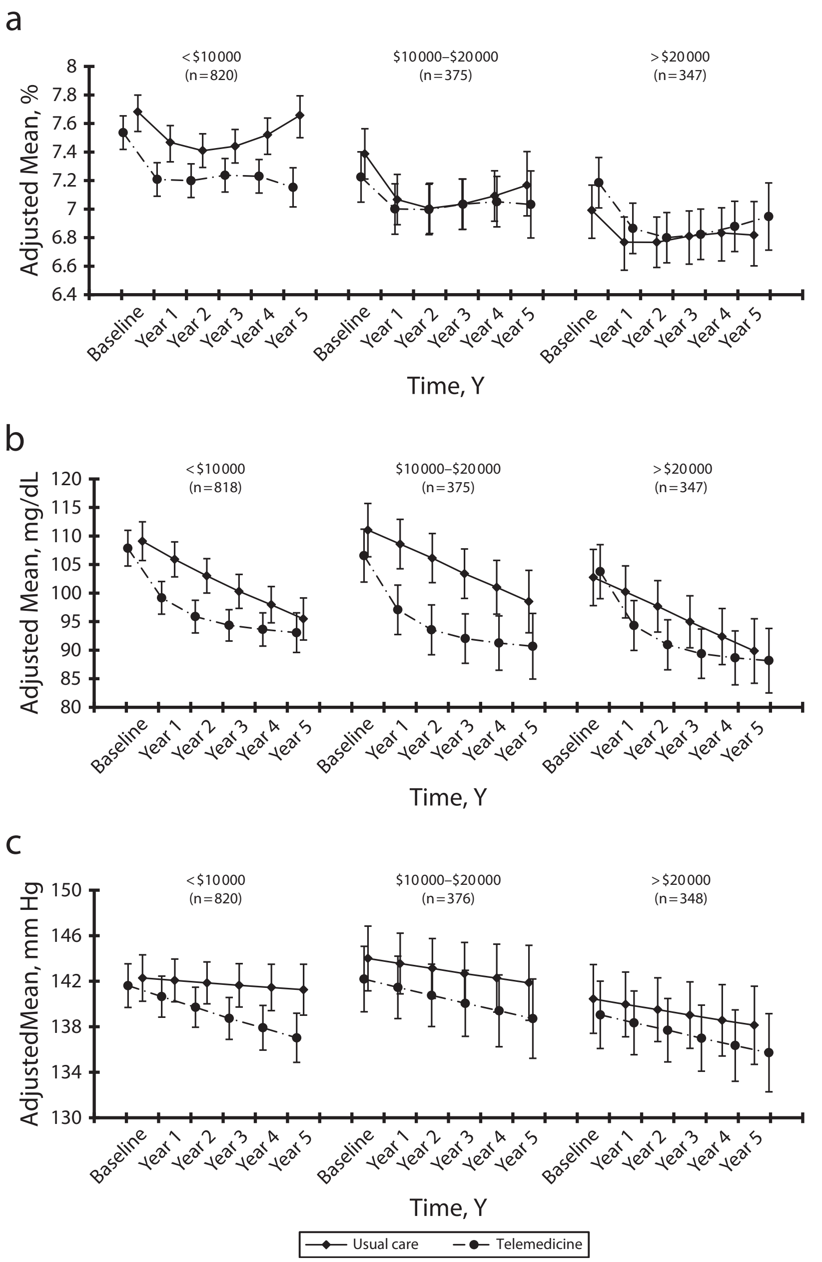
Compared with the highest level of income, none of the income group coefficients for the interaction terms indicating change in systolic blood pressure over time were significant (Figure 1c). However, when we used the parameter estimates in the model and calculated the average effect, the endpoint differences for the last waves of the study (3, 4, 5) showed a significant difference in means for the lowest group only. The groups started out equivalently; however, by study endpoint, the telemedicine group in the lowest-income level had the greatest reduction in systolic blood pressure, relative to usual care (difference of 4.23 mm Hg). The analyses contrasting difference scores between baseline and wave 5 showed a trend for the lowest-income group to have the greatest reduction in systolic blood pressure ($P = .019$); the other group differences were not significant ($P = .557$, .663). This result was confirmed after examining the interaction effect (time × income group × intervention group) in a 2-group analysis comparing the lowest-income group with the other groups. The result was significant (b = 0.7824; SE = 0.3441; $P = .023$).

The analyses of the education groups were performed in a similar fashion to those conducted for income. Results of these analyses

TABLE 2—Relations of Family Income and Education Level With Diabetes Clinical Outcomes at the Baseline Examination: Informatics for Diabetes Education and Telemedicine (IDEATel) Study, NY, December 2000–October 2002

	Reported Annual Family Income Level, Mean (SD)				Reported Education Level Attained, Mean (SD)					
	< $10 000	$10 000–$20 000	> $20 000	P^a	Group 1 (0–5 y)	Group 2 (6–8 y)	Group 3 (9–11 y)	Group 4 (12 y)	Group 5 (≥ 13 y)	P^a
Hemoglobin A1c, %	7.7 (1.65)	7.2 (1.44)	7.0 (1.25)	< .001	7.7 (1.63)	7.5 (1.66)	7.2 (1.51)	7.3 (1.44)	7.2 (1.41)	< .001
Systolic blood pressure, mm Hg	142.1 (24.10)	145.4 (23.59)	141.6 (23.41)	.045	142.8 (26.10)	142.9 (23.44)	143.4 (23.89)	143.1 (23.33)	140.6 (23.26)	.646
Low-density lipoprotein cholesterol, mg/dL	106.0 (34.88)	111.7 (38.30)	107.0 (32.52)	.034	107.0 (32.92)	105.6 (33.53)	109.8 (36.47)	107.5 (36.78)	107.6 (36.30)	.704

[a]*P* values determined by analysis of variance.



Note. Adjusted means were based on a nonlinear model for HbA1c and LDL and a linear model for SBP, and the best fitting covariance structure was used for each. Income group (IG) 3 (>$20 000) was the reference group for income (IG1 < $10 000; IG2 = $10 000–$20 000). Time was measured in months from baseline, but the figure shows annual points. To enhance readability, the plot symbols and error bars for the telemedicine group have been offset. Error bars represent 95% confidence intervals. For more information, see the Appendix (available as a supplement to the online version of this article at http://www.ajph.org).

[a]Contrast estimates for usual care vs telemedicine IG1 quadratic term, $P = .003$; exponential term, $P = .001$; IG2 quadratic term, $P = .884$; exponential term, $P = .976$; IG3 quadratic term, $P = .156$; exponential term, $P = .523$.

[b]Contrast estimates for usual care vs telemedicine IG1 exponential term. $P = .035$; IG2 exponential term, $P = .369$; IG3 exponential term, $P = .155$.

[c]Contrast estimates for usual care vs telemedicine term IG1, $P = .019$; IG2, $P = .543$; IG3, $P = .686$.

FIGURE 1—Treatment effect and change over time in (a) mean hemoglobin A1c, (b) mean low-density lipoprotein, and (c) systolic blood pressure: Informatics for Diabetes Education and Telemedicine (IDEATel) Study, NY, 2002–2007.

did not support a consistent differential treatment effect across education groups. With respect to A1c, the subgroup analysis showed that the lowest-education group had greater reduction than in the 2 higher groups combined ($P < .01$). The baseline adjusted effects for the first education group at waves 4 and 5 were 0.53 (95% confidence interval [CI] = 0.24, 0.82) and 0.81 (95% CI = 0.48, 1.14), in contrast to the other groups, in which the effects were significantly smaller (ranging from 0.08–0.28 across groups). Similar to the income analyses, the baseline A1c levels were higher (7.87; SD = 1.72 for usual care and 7.51; SD = 1.53 for telemedicine) for the lowest-education group (≤ 5 years) than for the higher groups (e.g., 7.14; SD = 1.36 for usual care and 7.31; SD = 1.47 for telemedicine) in the highest-education group (≥ 13 years). Analysis with education treated as a continuous variable yielded materially the same results.

DISCUSSION

We performed a social impact analysis of potential disparities in outcomes in the context of a large randomized trial of a telemedicine nurse case management intervention to improve diabetes clinical outcomes. The intervention improved HbA1c, systolic blood pressure, and LDL cholesterol levels in the intervention group compared with usual care at 1 and 5 years.[3,4] We found no evidence that the intervention increased socioeconomic disparities in outcomes in the IDEATel trial. Subgroup analyses showed that the intervention differentially improved A1c and systolic blood pressure outcomes in the lowest- compared with the higher-SES participants. These findings can be considered in terms of effect sizes. In the subgroup analysis comparing the lowest- with the 2 highest-income groups, the estimated (adjusted for baseline values) difference between the lowest- and the 2 highest-income groups for HbA1c was 0.40% and 0.07%, for an estimated net difference of 0.33%, favoring the lowest-income group. Similarly, for systolic blood pressure, the treatment group by time interaction term was statistically significant, indicative of a moderator effect (baseline to 5-year difference of 3.01 mm Hg in the intervention group as contrasted with −0.92 mm Hg in the usual care group, for a net difference of 3.93 mm Hg).

Several explanations for our findings may be considered. One possible explanation is that the range of SES was narrowed because study eligibility was restricted to residents of federally designated medically underserved areas of New York State, such that the effects predicted by Rogers' theory of innovation diffusion were blunted. The observation that the mean reported family income was approximately $15 000 per year (years 2000–2002) is consistent with this eligibility restriction, but the observation that a range of family income and participant education attainment were reported is not consistent with this restriction as the sole explanation. Another possible explanation is that those whose clinical outcomes were most above guideline targets benefited most from the intervention. This effect was observed for HbA1c. At 1-year follow-up, the net difference between intervention and usual-care groups in HbA1c was 0.18% overall but 0.32% in the subset (approximately one third) with HbA1c of 7% or greater at the baseline examination.[3] The greater intervention effect on participants with higher HbA1c levels at baseline in part reflects the fact that intervention intensity was tailored by level of diabetes control, with participants who had HbA1c levels at goal receiving video visits from the nurse case managers approximately every 4 to 6 weeks but those with HbA1c levels above goal receiving video visits more often to discuss self-monitoring, diet, exercise, and treatment intensification. As shown in Table 2, the lowest-income group had the highest HbA1c level at the baseline examination. Thus, tailoring the intervention strategy to participants with HbA1c levels above goal may have led to relatively greater effect on the lowest-income group than would have been observed with an intervention strategy applied uniformly to all participants. Other factors also may have contributed to effective use of the technology by the lower-income participants in IDEATel. The intervention including the technology was provided free of charge to the participants, and extensive efforts were made to ensure that interactions were culturally appropriate, to ensure that the nurses providing telemedicine visits to Spanish-speaking study participants were fluent in Spanish, to adapt the technology to the abilities of participants, and to provide training and support for participants to use the technology.[24,25]

Limitations and Strengths

Our findings were subject to several limitations. First, complex statistical methods were necessary to analyze interactions between socioeconomic indicators and treatment effects in longitudinal repeat measures data and with nonlinear relations over time. Second, IDEATel experienced some attrition. Previous analyses indicated that attrition did not have major effects on the main study findings.[4] Family income was self-reported, and there may have been error or bias in the levels reported. For this limitation to have affected our findings, there would need to have been systematic error (bias) in income reporting that was differentially associated with the intervention effect. The subgroup analyses were post hoc and should not be overinterpreted, although we believe they strengthen the main finding.

The IDEATel study also had several important strengths. The randomized design, blinded ascertainment of clinical outcomes, and quality control for the measures were all features of the trial. In addition, the sample size was large, and the follow-up was long compared with other studies of telemedicine. No other trials of telemedicine or nurse case management have reported a social impact analysis, to the best of our knowledge. It is difficult therefore to compare the findings of our analysis with those of other reports.

Conclusions

In summary, we found no evidence that the telemedicine nurse case management intervention in IDEATel had differential effects by income level on any of the 3 main clinical outcomes of the study: namely, HbA1c level, systolic blood pressure, or LDL cholesterol. In subgroup analyses, the lowest-income group as contrasted with the highest groups combined benefited significantly more from the intervention for HbA1c and systolic blood pressure, and the lowest-education group had significantly greater HbA1c reduction than in the highest groups. IDEATel was conducted in a relatively poor sample of Medicare beneficiaries, almost all of whom were computer-naïve at the start of the study. The lowest-income group, where these greater subgroup effects were observed, was also the group with the worst A1c control at baseline. We suggest that by tailoring the intensity of the intervention in IDEATel based on clinical need, greater improvements were obtained among those not at goal for diabetes control, a group that also had lower income, and that the potential for an innovative intervention to widen socioeconomic disparities was thus avoided. ■

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S. Shea, J. A. Teresi, and R. S. Weinstock obtained funding. S. Shea, R. A. Lantigua, W. Palmas, and R. S. Weinstock contributed to the design and conduct of the trial. S. Shea originated the hypothesis for this article. S. Shea and D. Kothari drafted the article. D. Kothari, J. A. Teresi, J. Kong, and J. P. Eimicke contributed to the statistical analysis. J. A. Teresi, R. A. Lantigua, W. Palmas, and R. S. Weinstock contributed to critical revision of the article. J. A. Teresi had access to all study data and was responsible for the statistical analyses.

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Human Participant Protection

The institutional review boards at all participating institutions approved the study protocol. All participants provided informed consent. An independent data and safety monitoring board monitored the study to ensure participant safety and adherence to the protocol.

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