

# Psychosocial Outcomes of Telemedicine Case Management for Elderly Patients With Diabetes

The randomized IDEATel trial

PAULA M. TRIEF, PHD<sup>1</sup>  
 JEANNE A. TERESI, EDD, PHD<sup>2</sup>  
 ROBERTO IZQUIERDO, MD<sup>3,4</sup>  
 PHILIP C. MORIN, MS<sup>3</sup>  
 ROBIN GOLAND, MD<sup>5</sup>  
 LESLIE FIELD, RN, MSN<sup>5</sup>

JOSEPH P. EIMICKE, MS<sup>2</sup>  
 REBECCA BRITTAIN, BS<sup>1</sup>  
 JUSTIN STARREN, MD, PHD,<sup>6</sup>  
 STEVEN SHEA, MD<sup>7</sup>  
 RUTH S. WEINSTOCK, MD, PHD<sup>3,4,8</sup>

**D** iabetes case management (DCM) may improve medical outcomes (1,2). Case managers coordinate care and often provide a mix of interventions, e.g., telephone outreach, education, reminders. However, the efficacy of DCM is unclear. Three systematic reviews lend only limited support for the efficacy of DCM for improving glycemic control but none for lipid, weight, or blood pressure benefits (3–5).

DCM studies typically target biomedical outcomes and ignore potential psychosocial effects. Yet, psychosocial variables (e.g., depression, anxiety, social support) relate to hyperglycemia, complications, adherence, and quality of life (6–11). Thus, a positive impact of DCM on these factors is important. Two studies did assess psychosocial outcomes of DCM and found improved self-efficacy and satisfaction (cluster visit) (12) and quality of life (dietitian-led DCM group) (13).

Because barriers (e.g., distance, weather) limit DCM access, telemedicine can be used. A review of telemedicine versus face-to-face trials concluded that,

while feasible and acceptable, there is little evidence that telemedicine has clinical benefits (14). Our team published results of a trial of telemedicine DCM versus usual care for elderly diabetic patients (15). The intervention resulted in significant improvements in glycemic control, blood pressure, and total and LDL cholesterol (16).

The purpose of the Informatics for Diabetes Education and Telemedicine (IDEATel) project, funded by the Centers for Medicare and Medicaid Services, is to evaluate the feasibility and effectiveness of telemedicine with a diverse, medically underserved, elderly diabetic sample. The purpose of this study is to assess the impact of the IDEATel intervention on secondary psychosocial outcomes.

## RESEARCH DESIGN AND METHODS

— A detailed description of the IDEATel study design has been previously reported (15,16). Medicare recipients were recruited if they were aged  $\geq 55$  years, diagnosed with diabetes, and without moderate/severe impairments or

comorbidities. Research nurses blinded to the groups conducted baseline and 1-year medical and psychosocial assessments. The study was approved by appropriate institutional review boards.

## Intervention

Subjects received a home telemedicine unit to upload blood glucose and blood pressure readings, videoconference with a nurse case manager and dietitian, and access educational materials. Videoconferences routinely occurred every 4–6 weeks (with significant need, every 2 weeks) to educate patients, facilitate goal-setting/self-management, and discuss concerns. Supportive interactions provided contact tailored to individual needs. Under endocrinologist supervision, nurse case managers consulted with primary care providers who made treatment decisions.

## Data

Psychosocial measures were depression (17), diabetes distress (18), and self-efficacy (19), all with excellent reliability and validity estimates. Medical measures were glycemic control (A1C) and blood pressure. Covariates were age, sex, race/ethnicity, education, marital status, smoking, comorbidity (20), years of diabetes duration, symptom severity (21), and insulin use.

## Analyses

Intent-to-treat analysis of the relationship between groups (intervention versus usual care) and change in psychosocial outcomes (1-year value controlling for baseline value) were performed. A mixed-effects regression model was used to adjust for clustering due to randomization of subjects within physician practices, using Proc Mixed (SAS 9.0). A variance components covariance structure was used that controlled for baseline value and subject variables.

**RESULTS** — Recruitment and retention have been described, and the intervention effect on medical outcomes (A1C,

From the <sup>1</sup>Departments of Psychiatry and Medicine, SUNY Upstate Medical University, Syracuse, New York; the <sup>2</sup>Research Division, Hebrew Home for the Aged at Riverdale, Riverdale, New York; the <sup>3</sup>Department of Medicine, SUNY Upstate Medical University, Syracuse, New York; the <sup>4</sup>Joslin Diabetes Center, Syracuse, New York; the <sup>5</sup>Naomi Berrie Diabetes Center, Columbia University, New York, New York; the <sup>6</sup>Biomedical Informatics Department, Columbia University, New York, New York; the <sup>7</sup>Department of Epidemiology and Biomedical Informatics, Joseph Mailman School of Public Health, Columbia University, New York, New York; and the <sup>8</sup>Department of Medicine, VA Medical Center, Syracuse, New York.

Address correspondence and reprint requests to Paula M. Trief, PhD, Department of Psychiatry, SUNY Upstate Medical University, 750 E. Adams St., Syracuse, NY 13210. E-mail: triefp@upstate.edu.

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**Abbreviations:** DCM, diabetes case management; IDEATel, Informatics for Diabetes Education and Telemedicine.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

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Table 1—Predicting psychosocial outcomes using baseline values and other covariates including treatment group

	CARE depression (n = 1,358)*			DDS emotional burden subscale (n = 1,356)*			DDS interpersonal subscale (n = 1,355)*			Diabetes self-efficacy scale (n = 1,355)*		
	Estimate	SE	P	Estimate	SE	P	Estimate	SE	P	Estimate	SE	P
Intercept	-1.16	1.29	0.37	0.41	1.59	0.80	0.86	0.97	0.37	-1.28	3.50	0.71
Baseline values	0.58	0.02	<0.001	0.56	0.02	<0.001	0.35	0.02	<0.001	0.48	0.02	<0.001
Group	0.19	0.18	0.30	0.06	0.22	0.77	0.00	0.14	0.98	2.38	0.50	<0.001
Race/ethnicity	0.22	0.24	0.36	-0.43	0.29	0.14	-0.18	0.18	0.31	-0.80	0.64	0.21
Age	0.02	0.01	0.20	-0.00	0.02	0.85	-0.01	0.01	0.24	0.05	0.04	0.25
Sex	0.75	0.21	0.00	0.43	0.26	0.11	0.15	0.16	0.35	0.05	0.59	0.94
Years of education	-0.03	0.03	0.26	0.03	0.03	0.30	0.04	0.02	0.04	0.00	0.07	0.10
Years of diabetes	0.02	0.01	0.07	0.01	0.01	0.64	-0.00	0.01	0.70	0.01	0.03	0.68
Marital status	0.06	0.21	0.78	0.02	0.26	0.95	-0.26	0.16	0.11	-0.24	0.57	0.67
BMI	-0.02	0.01	0.17	-0.03	0.02	0.06	-0.01	0.01	0.34	0.03	0.04	0.47
Comorbidity	-0.01	0.05	0.83	0.12	0.07	0.07	0.02	0.04	0.54	0.33	0.14	0.02
Smoking (pack-years)	0.00	0.00	0.27	-0.00	0.00	0.29	0.00	0.00	0.31	0.02	0.01	0.03
Insulin (yes/no)	-0.48	0.23	0.04	0.19	0.28	0.50	0.06	0.17	0.73	-0.49	0.63	0.44
Diabetes symptom severity	0.32	0.06	<0.001	0.31	0.07	<0.001	0.17	0.04	0.00	0.62	0.15	<0.001

All analyses are adjusted for clustering within primary care practices. \*Adjusted for group heterogeneity in cluster and residual variances. Variables: group: treatment group (0, control; 1, experimental); race: participant Caucasian (0, no; 1, yes); age: computed at time of baseline annual assessment; sex: 1, male; 2, female; marital status: participant married (0, no; 1, yes); and insulin: 0, no; 1 yes. CARE, Comprehensive Assessment and Referral Evaluation; DDS, Diabetes Distress Scale.

blood pressure, and cholesterol) was reported (16).

Subjects lost to follow-up did not differ from subjects who remained. Intervention and control groups did not differ in age, sex, race/ethnicity, or medical/psychosocial measures. There were anticipated differences between New York City and Upstate samples as previously described (16). In terms of psychosocial variables of interest, the New York City group reported greater depression ( $P = 0.001$ ) and diabetes distress ( $P < 0.001$ ) but greater diabetes self-efficacy ( $P < 0.003$ ) at baseline. Table 1 presents analyses of prediction of 1-year psychosocial outcomes controlling for baseline values.

Intervention subjects improved significantly (versus control subjects) in diabetes self-efficacy ( $P < 0.0001$ ). The effect size (estimated using adjusted for covariate difference scores, expressed in the original units of the scale) of the intervention on self-efficacy was 2.377 (95% CI 1.40–3.36). (No established minimally important differences could be located for this measure.) There were no significant differences between groups on change in depression ( $P = 0.30$ ) or diabetes distress ( $P = 0.77$ ,  $P = 0.98$ ). Separate analyses for New York City and Upstate found a significant difference Upstate on change in self-efficacy ( $P < 0.001$ ), with a similar trend in New York City ( $P = 0.103$ ). While the New York City group had higher baseline self-efficacy, improvement in the Upstate

group led to no 1-year group differences. Other predictors of lower 1-year self-efficacy were greater comorbidity ( $P = 0.02$ ), more smoking ( $P = 0.03$ ), and greater symptom severity ( $P < 0.001$ ). Predictors of more depressive symptoms at 1 year were being female ( $P = 0.001$ ), not using insulin ( $P = 0.04$ ), and greater symptom severity ( $P < 0.001$ ). Greater symptom severity predicted greater diabetes distress ( $P < 0.001$ ).

**CONCLUSIONS**— Diabetes case management, including support, goal-setting, and education, delivered using telemedicine resulted in significantly improved diabetes self-efficacy for elderly diabetic patients but not improved depression or diabetes distress.

Self-efficacy is important as it relates to better diabetes self-care (22,23), lower health risk, and better overall health (24) and may mediate the positive link between physical activity and quality of life (25).

The finding that the effect on self-efficacy was stronger in the Upstate sample may relate to group differences. The New York City group was mostly urban Hispanic with less education than the mostly rural Caucasian Upstate group. It may also reflect unintended differences in intervention delivery.

This intervention was designed to (and did) improve A1C, blood pressure, and lipids but not depression, distress, or self-efficacy. While there is often the expectation that a supportive relationship

with a knowledgeable provider will benefit emotional well-being, this has not been studied and was not demonstrated in this study.

Some have argued for the converse, i.e., treat depression and expect a positive effect on glycemic control. However, a depression treatment for patients with comorbid diabetes and depression who achieved improved depression outcomes had no impact on A1C (26).

There are limitations to our study, including 1) a possible “spillover effect,” i.e., with education and consultation, physicians may have altered interactions with control patients; and 2) generalizability, i.e., sample was poor and elderly, intervention was a unique telemedicine intervention, and primary care physician prescreening may affect representativeness.

Diabetes case management and telemedicine are developed to improve medical outcomes and may also have a beneficial effect on diabetes self-efficacy. Future interventions may have to directly target psychosocial domains to achieve significant gains. Future research that examines the benefits of case management should include measurement of psychosocial outcomes.

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**APPENDIX** — The following warrant IDEATel Upstate Consortium publication credit. SUNY Upstate Medical University (Syracuse, NY): Ruth S. Weinstock, MD, PhD\*; Roberto Izquierdo, MD; L. Thomas Wolff, MD; Philip C. Morin, MS; Suzanne Meyer, RN, CDE; Suzan M. Carusone, RN, CCRC; Fraser G. Tudiver, MD†; Teresa J. Wagner, MS; Carina Laguna, MA, RD, CDE; Susan West, RN, MSN, CDE; JoAnn Shupe, AOS; Donald R. Roller, BS; Joseph Ziemba, MBA; David P. Thomson, MD; Kelly Duncan, BSW, CCRC; Wendy VanRiper; Sarah Doolittle, BS, CCRC; Joanne Kearns, MA, RD, CDE; and Deborah Bowerman, RN, CDE. A.L. Lee Memorial Hospital, Inc. (Fulton, NY): Shirley Seabury, MHA. Arnot-Ogden Medical Center (Elmira, NY): John F. Carroll, MD, MBA; Frederic P. Skinner, MD, PhD; and Terri L. Ennis, RN. Bassett Healthcare (Cooperstown, NY): Kathleen Sellers, RN, PhD, and Elsie Haus, MEd, FNP. Delaware Valley Hospital (Walton, NY): Michael J. Freeman, DO, MPH. Family Health Network of Central New York, Inc. (Cortland, NY): Susan Ulrich, MS, RN, CPNP. Guthrie Healthcare System (Sayre, PA): Brian D. Cassetta, MD. Hudson Headwaters Health Network (Glens Falls, NY): Patricia Auer, MSN, FNP; W. Emily Hammond, AAS, RN; Cairenn L. Young, MSW; and Mary M. Beadnell, LPN. Lourdes Hospital (Binghamton, NY): Timothy C. Howland, MD. Olean General Hospital (Olean, NY): Robert Catalano, MD; Galvin Anderson, MD; and Terri N. Kolasinski, RN. Samaritan Medical Center (Watertown, NY): Anil Shah, MD; Kate R. Fraczek, RN; and Terry Flynt, BSN, RN. State University of New York at Buffalo (Buffalo, NY): John Taylor, MBA; Lurene R. Tumieli, PhD; Marc Shilling, MA, MPA; and Chester Fox, MD. United Health Services (Binghamton, NY): David Kwiatkowski, MD. \*Department of Veterans Affairs, Syracuse, New York. †Current address: Department of Family Practice, East Tennessee State University, Johnson City, Tennessee.

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