

Recent Research on Diabetes

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This issue's research column focuses on articles important for the care of patients with diabetes. In 2000, the most recent year for which national data are available, approximately 7.2 million patients were discharged from home healthcare. Of these patients, 347,000 (4.8%) had a primary diagnosis of diabetes mellitus, whereas 1.2 million had diabetes among all listed diagnoses. The average length of home care stay for people with diabetes as their primary diagnosis was 84 days, compared with an average of 69 days for all patients receiving home care (Centers for Disease Control, 2004). Diabetes is a high-prevalence, high-cost condition and one that poses numerous challenges to patients and clinicians. We hope the following summaries will enhance our readers' understanding of the underlying research base available to help them manage these challenges and provide evidence-based care.

Russell, L. B., Valiyeva, E., Roman, S. H., Pogach, L., Suh, D-C., & Safford, M. M. (2005). Hospitalizations, nursing home admissions, and deaths attributable to diabetes. *Diabetes Care*, 28(7), 1611-1617.

The popular media have called public attention to the fact that diabetes is a growing health problem in the United States. The incidence is growing, especially among adults aged 30 to 39 years, but so is the prevalence, as better treatment leads to longer survival. Thus, increasing numbers of people are at risk for complications of diabetes, especially those related to cardiovascular disease. To better understand the magnitude of hospitalizations, nursing home admissions, and

deaths attributable to diabetes, the authors applied sophisticated quantitative modeling techniques to data obtained from the National Health and Nutrition Examination Surveys (NHANES), longitudinal surveys conducted by the National Center for Health Statistics during the period 1971 to 1994. These surveys are widely used in the United States to provide data for national health goals and clinical guidelines. The authors' quantitative models linked outcomes reported over time (and verified through hospital records and death certificates) to baseline patient risk factors to reproduce the natural course of diabetes.

- Controlling for other risk factors, a diagnosis of diabetes accounted for 9% of

hospitalizations, 12% of nursing home admissions, and 10% of deaths among all surveyed adults aged 45 to 74 years.

- The impact of diabetes was much greater in the group directly affected—people with diabetes. In that group, 43% of hospitalizations, 52% of nursing home admissions, and 47% of deaths were attributable to diabetes.
- When the authors adjusted for factors associated with diabetes (higher blood pressure and cholesterol, as well as higher rates of heart attack, heart failure, and stroke), they found that the presence of diabetes increased the risk of hospitalization and death to 51% and 57%, respectively, or about 8 to 10 percentage points higher than in comparable groups without diabetes. The increase in nursing home admissions rose about 5 percentage points.

Home Care Implications

This article provides data that quantify the daily experience of home health nurses, who understand the increased risks of hospitalization and death associated with diabetes. The study also underscores the tremen-

dous individual and societal health benefits to be gained by helping home care patients more effectively manage their diabetes.

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Centers for Disease Control and Prevention (CDC). (2004). *Home health care discharges*. Retrieved December 21, 2004 from <http://www.cdc.gov/nchs/data/nhhcs/d/homecaredischarges98.pdf>.

Elia, M., Ceriello, A., Laube, H., Sinclair, A. J., Engfer, M., & Stratton, R. J. (2005). Enteral nutritional support and use of diabetes-specific formulas for patients with diabetes: A systematic review and meta-analysis. *Diabetes Care, 28*(9), 2267-2279.

An increasing number of patients with diabetes (many receiving home healthcare) receive short- or long-term nutritional support, either through oral supplements or tube feeding, to reduce malnutrition associated with increased risk of infections, poorly healing pressure ulcers, or general functional decline. Standard enteral (oral or tube) formulas are high in carbohydrates, low in fat, and low in fiber and might compromise glycemic control because of a rapid gastric emptying rate and rapid nutrient assimilation. Diabetes-specific formulas have been developed not only to avoid such problems but also to enable better glycemic control. The authors of this article reviewed 23 research studies (comprising 784 patients) to examine the relative benefit of diabetes-specific versus standard enteral formulas.

For a subset of studies they were able to perform a meta-analysis by combining the data from multiple studies and reanalyzing them.

- Most studies focused on patients with type 2 diabetes; however, four included patients with type 1.
- Compared with standard formulas, diabetes-specific formulas were found to result consistently in lower postprandial rise in blood glucose, lower peak blood glucose concentrations, and lower glucose AUC (area under the curve) in patients with diabetes.
- No evidence was found of hypoglycemia. Furthermore, a few of the individual studies reported that diabetes-specific formulas resulted in a reduced requirement for insulin and fewer complications. These findings all suggest that glycemic control may be better achieved with the use of diabetes-specific formulas than with standard enteral formulas
- Diabetes-specific formulas are higher in fat, with a large concentration from monounsaturated fatty acids (as well as fructose, fiber, soy protein, and antioxidants). However, no significant effects on HDL (high-density lipoprotein), total cholesterol, or triglyceride concentrations were associated with their use.

Home Care Implications

The authors concluded that for patients with diabetes who are in need of nutritional support, the use of diabetes-specific formulas is the preferred ap-

proach. However, the data were insufficient to address the efficacy of nutritional support, including diabetes-specific formulas, according to diabetes type (type 1 or type 2) or patient's nutritional status. Additional research was recommended to shed light on these two issues and to establish the optimal composition of nutritional feeds to assist metabolic control, improve immune function, and achieve satisfactory nutritional status.

Vermeire, E., Wens, J., Van Royen, P., Biot, Y., Hearnshaw, H., & Lindenmeyer, A. (2005). Interventions for improving adherence to treatment recommendations in people with type 2 diabetes mellitus. *The Cochrane Database of Systematic Reviews, 2 Art. No.:CD003638.pub2. DOI: 10.1002/14651858.CD003638.pub2.*

Type 2 diabetes is no longer considered the "mild" form of diabetes. Its long-term complications are now widely understood (e.g., retinopathy, nephropathy, neuropathy, and greatly increased risk of cardiovascular disease). Once type 2 diabetes has been diagnosed, patients are confronted with a host of treatment and life-style recommendations intended to help them obtain optimal blood glucose and blood pressure levels and to minimize serious complications. Yet both anecdotal experience and research studies have shown that patient adherence to recommended healthcare regimens and life-style changes is a significant problem. A number of system-

atic reviews and meta-analyses of educational interventions have shown that educational interventions can be beneficial, especially in promoting dietary changes, and that patient-centered, as opposed to didactic, approaches are more likely to be effective (Deakin et al., 2005). Nevertheless, fewer than half of patients adhere to healthcare recommendations as proposed, even though a host of educational and other interventions have been used to increase the adherence rate. This review aimed to summarize and synthesize the available body of rigorously conducted research studies on the effects of interventions for improving adherence to “treatment recommendations” among people with type 2 diabetes mellitus.

- To narrow the scope of the study, the reviewers excluded diet¹ or exercise recommendations and focused on more medically oriented recommendations, such as medication taking, self-injection of insulin, prescription refill, appointment keeping, and use of preventive services.²
- The reviewers identified 21 studies that focused on “treatment recommendations” and met rigorous methodological criteria: 14 were randomized controlled trials; 4 were controlled before and after

studies; and 1 was an epidemiological study. The reviewers grouped the interventions in five broad categories: nurse interventions (mostly telephone follow-up in addition to usual care); “home aides” (including home health aide visits, mailed educational materials, and appointment reminders); diabetes education programs (a variety of educational approaches); pharmacy-based interventions (e.g., pill counts, electronic bottle tops, and prescription refill reminders); and dosing and frequency interventions (e.g., calendar “blister packs”). The interventions, particularly educational interventions, often were poorly described, so it was not possible to discern differences or similarities across interventions.

- Most of the individual studies reported that the interventions yielded positive effects on HbA1c and on various measures such as appointment keeping, eye clinic attendance, and prescription refill adherence. However, the reviewers found that the number of participants in most studies was so small and the measures of adherence so poorly described that they could not confidently conclude that the interventions

had a clinically meaningful impact on patient adherence.

- As a result, the reviewers reached a rather gloomy conclusion. Although adherence-enhancing interventions produced no significant “harms,” the authors concluded that:

...though every health care professional considers adherence to be a crucial element in health care, though everyone recognizes nonadherence as a major health care problem, though every scientist ascertains that diabetes mellitus may be considered a new epidemic in the decades to come, the evidence base on adherence to treatment recommendations in diabetes is almost nonexistent (p 13).³

Home Care Implications

How should clinicians respond to the cautions raised by these international experts in the review and synthesis of research studies? We propose a multifaceted response: do not give up, but do not assume that you have found the “magic bullet” to improve patient adherence; employ focus groups of clinicians and former patients to get their perceptions about culturally sensitive interventions; do not design a huge program and adopt it agency wide; instead, design and test a number of

¹ A prior Cochrane review had shown that dietary advice was not effective in changing the diets of patients with diabetes, although the adoption of exercise appeared to improve glycosylated hemoglobin at 6 and 12 months (Moore et al., 2004). Psychological interventions showed improvements in long-term glycemic control but not in weight control or blood glucose concentration (Moore et al., 2004).

² They did include smoking cessation in the category of treatment recommendations.

³ Moreover, a recent systematic review on improving adherence to blood-pressure-lowering medication described the same problems and pitfalls and was able to draw only one general conclusion: that reducing the number of daily doses appeared to be effective in enhancing adherence in ambulatory care (Schroeder, 2004).

small interventions to see what can be feasibly implemented in your organization and how clinicians and patients respond; and work with your quality management department and with outside nursing or health services researchers to document your intervention, to specify your definition of adherence, and to devise a rigorous data collection and analysis plan. Finally, consider collaborating in cross-agency research conducted by rigorous researchers to address the methodological flaws observed in other studies and to contribute to the national evidence base on improving patient adherence.

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people with type 2 diabetes mellitus. *The Cochrane Database of Systematic Reviews*, 2 Art. No.: CD003417.pub2. DOI: 10.1002/14651858.CD003417.pub2.

As noted, “educational” interventions that go beyond didactic lectures and embrace more patient-centered approaches have led to modest improvements in patient adherence to life-style changes, especially diet. However, a frustration of reviewers has been the lack of specificity in the description of particular interventions, leading to the term “black box” research. In so-called black box studies, the investigators never described what “really happened” to participants, “what made metabolic parameters change or what made them remain unchanged,” or how adherence played a role (Vermeire et al., 2005). To bring greater focus and specificity to the subject, the authors of this review narrowed their scope to patient self-management interventions delivered in a group format. They assessed the shorter (4-6 months) and longer-term (more than 12 months) effects of group-based (six or more people), patient-centered diabetes training on clinical, life-style, and psychosocial outcomes.

- The reviewers identified 11 studies that included patients with type 2 diabetes, involved a patient-centered, group-based education program and used rigorous research methods. Of these, eight were randomized controlled trials and three were controlled clinical tri-

als. The control groups for the various studies received routine treatment, such as individual appointments with a dietitian, nurse, or general practitioner, or 15 to 20 minutes with a multidisciplinary diabetes team every 3 months.

- All the interventions used the principles of patient empowerment, patient participation, and adult learning. However, they varied by intensity (number of hours per year), setting (primary care or hospital-based diabetes centers), type of educator (physician, nurse, dietitian, physician assistant, or lay health worker), and whether or not family members were involved.
- Overall, these interventions resulted in “clinically important improvements” in health outcomes for glycosylated hemoglobin and fasting blood glucose at 4- to 6-month and 12-month follow-ups.
- During both the shorter- and longer-term follow-up periods, the interventions also showed evidence of increasing patients’ diabetes knowledge, improving their diabetes and self-management skills, enhancing perceptions of self-empowerment, and leading to reductions in required diabetes medications.
- Programs in both primary care settings and hospital-based clinics were beneficial, and the number of hours per year did not seem to make a difference. Benefits did not vary according to group size (4-6 or 16-18 participants) or

whether a physician or a nurse provided the education. However, studies involving physician assistants or lay health workers were too few to assess the effect of these educators. In addition, the data were not sufficient to draw inferences about the effect of family involvement.

- In brief, the authors of this review concluded that: “group-based training for self-management strategies in people with type 2 diabetes results in better diabetes management.”

Home Care Implications

Because the patients in these studies were mobile enough to make it to a site-based group session, readers of *Home Healthcare Nurse* may wonder what take-home lessons there might be for their own homebound patients with diabetes. Perhaps the most obvious is that patient discharge arrangements should include an active effort on the

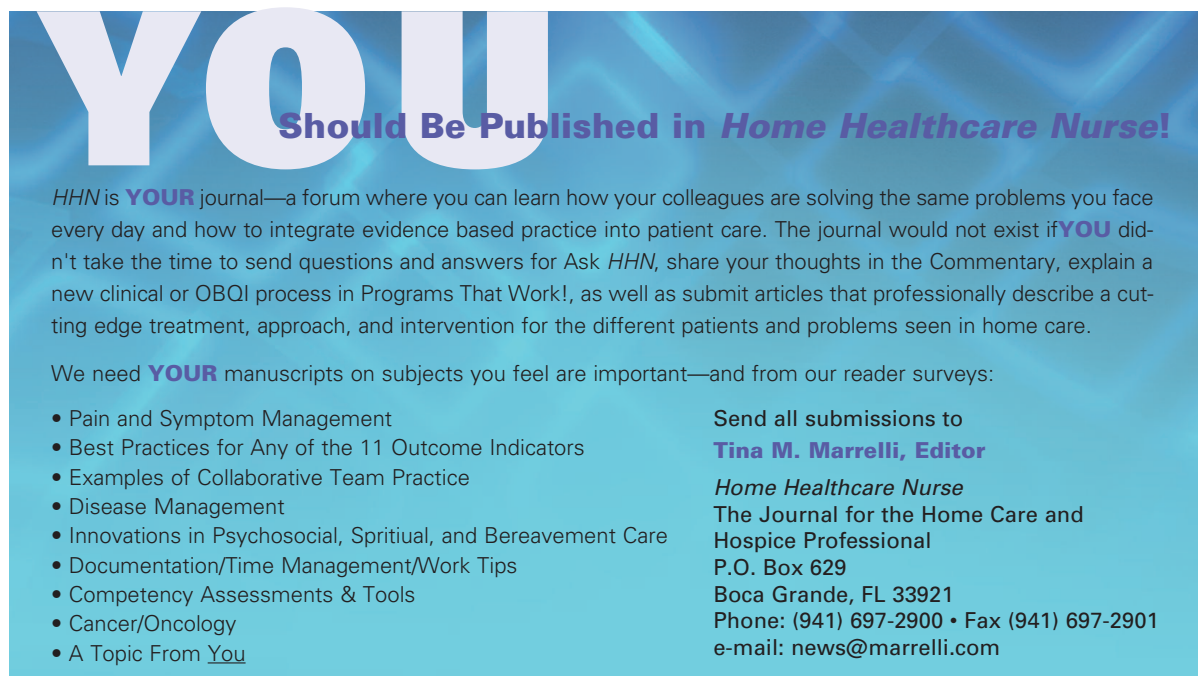
part of agency staff to make the connection between the discharged patient with diabetes and the nearest, most convenient group program. A second possibility might be that the enterprising home health agency may wish to seek support from a local foundation or other outside fund source to establish its own group program for discharged patients, thus maintaining loyalty to the agency while contributing in the long run to improved diabetes outcomes. In addition, some aspects of successful group educational interventions might show promise within the home care episode and may be worth testing for feasibility and impact. At the least, principles of patient empowerment, patient participation, and adult learning should be incorporated into staff development programs to help clinician educators improve the results of their one-on-one patient teaching. It is also conceivable that with the help of the local diabetes association, trained

agency volunteers, or lay health workers, a creative home health agency could establish “virtual” group sessions for self-directing patients able to call into a central “800” number. Drawing on the message of the research summary above, such agencies should start on a small scale, document their intervention, and devise a practical plan for measuring results! ■

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Vermeire, E., Wens, J., Van Royen, P., Biot, Y., Hearnshaw, H., & Lindemeyer, A. (2005). Interventions for improving adherence to treatment recommendations in people with type 2 diabetes mellitus. *The Cochrane Database of Systematic Reviews 2005*, Issue 2. Art. No.: CD003638.pub2. DOI: 10.1002/14651858.CD003638.pub2.

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