Diabetes Care in Extended-Care Facilities

Appropriate intensity of care?

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OBJECTIVE — The American Diabetes Association (ADA) does not recognize different treatment goals for the institutionalized adult compared with the outpatient adult with diabetes, nor has it outlined specific recommendations for this population. The purpose of this study was to examine physician management of patients with type 1 and type 2 diabetes residing in extended-care facilities and to compare this management with ADA standards of care for the outpatient adult.

RESEARCH DESIGN AND METHODS — This retrospective chart review included data from 108 residents with type 1 or type 2 diabetes at 11 extended health care facilities in the Midwestern U.S. and included a review of the medical problem list, medication list, laboratory reports, and all physician and consultation notes during the study period.

RESULTS — Blood glucose was monitored in 98% of the subjects, and 38% met glucose goals. A1C goal was achieved in 67% of patients. Blood pressure was monitored in 94% of patients, with 55% meeting goal. Thirty-one percent of patients had yearly lipids checked, 37% had annual electrocardiograms, 7% had urine analyzed for microalbuminuria, 42% were on aspirin, 87% received foot exams, 42% received dilated eye exams, 89% received influenza vaccinations, and 46% received pneumoccocal vaccinations.

CONCLUSIONS — Care of the institutionalized elderly with diabetes fails to meet ADA standards of care for the outpatient adult. Separate practice guidelines are needed for people with diabetes who reside in extended care facilities in order to improve quality and consistency of care.

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An estimated 21 million Americans have diabetes (1). Another 22 million have impaired glucose tolerance, half of whom will go on to develop type 2 diabetes (2). The incidence of diabetes is expected to increase dramatically over the next 50 years, with the largest increases occurring in the oldest age-groups (3,4). The projected 336% increase in the incidence of diabetes by 2050 in the aged population (≥75 years) will produce an enormous national economic burden (4,5).

Diabetes is a known risk factor for cardiovascular disease, contributing to the great majority of the mortality from the disease. Approximately 80% of people with diabetes will die from cardiovascular disease (6). Data suggest that people with diabetes, but no history of myocardial infarction, have a similar risk for myocardial infarction as those without diabetes who have had a myocardial infarction (7). Tight control of blood pressure, lipids, and blood glucose has been proven to decrease morbidity and mortality outcomes of aging people with diabetes (8–10). A 1% reduction in A1C is associated with a 37% decline in microvascular complications and a 21% reduction in risk of any end point related to diabetes (7,9). The American Diabetes Association (ADA) has published standards of care for physicians to follow for cardiovascular risk reduction in the ambulatory adult (11). Reducing cardiovascular risk in the older adult is of paramount importance due to the increased risk for cardiovascular disease in this population (12). However, a recent study (8) showed that the treatment and control of cardiovascular risk factors in elderly outpatients with diabetes often do not meet these guidelines.

Very little has been published regarding glucose control for the institutionalized person with diabetes (8,12–14). In this population, the cardiovascular benefit of tight glycemic control must be balanced with the increased risk of hypoglycemic reactions and adverse side effects from additional medication, such as high risk for serious hypoglycemia, bradycardia, orthostatic hypotension, and myalgia, which could all lead to injurious falls or other adverse health effects (7,12). The American Geriatric Society (AGS) has published guidelines regarding glucose control for older ambulatory adults with diabetes (12). These guidelines acknowledged the possible risks associated with tight glycemic control and therefore suggested a modified A1C goal of <8.0% (12). Although this is an important step, there is no specific recognition for the unique situation of the adult in the extended health care facility.

Because of the heterogeneity of the elderly population, the treatment of diabetes and its comorbid diseases in this population must take into account patient age, duration since diagnosis, frailty status, and patient preferences (15–19). The earlier the age of onset of diabetes, the greater the burden from the disease and its complications. According to a recent publication, knowledge of the duration of diabetes could indicate different treatment goals and therefore should be pursued (19). Frailty status has been shown to affect morbidity and is a stronger predictor for individual mortality than chronologic age (20,21). The benefit of medical treatment in the frail elderly must be weighed with the patient's increased risk for adverse effects from these medi-

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Abbreviations: ADA, American Diabetes Association; AGS, American Geriatric Society.
A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

cations (20–22). In addition, clinical goals to reduce morbidity and mortality must always be balanced with patient preferences (18).

Long-term care facilities will likely bear much of the burden of caring for the increasing number of aging people in America. Due to the complexity of diabetes, aging people with this disease are twice as likely to be admitted to a nursing home (23,24). People with diabetes also require more skilled nursing care upon admission than their nondiabetic counterparts (23,24). People with diabetes, therefore, present a unique challenge to both physicians and nursing facility staff.

Due to a lack of studies evaluating diabetes control and treatment in the extended care facility, little is known about how diabetes is being managed in this setting. A 1999 article by Funnell (22) discussed guidelines for care of the nursing home residents with diabetes. However, diabetes care has changed dramatically in the last 8 years due to recent research and the introduction of numerous new diabetes drug classes. The AGS produced recommendations for the older ambulatory adult, but no specific guidelines were given for the older institutionalized adult (12). The ADA treatment guidelines recognize that softer treatment goals could be indicated for the older adult, but separate treatment goals are not recommended for the institutionalized adult. Real-world experience demonstrates that providing intensive control for these patients can be challenging at best and even dangerous at times. To establish appropriate guidelines, the strengths and weaknesses of current diabetes treatment in extended care facilities must be identified. The purpose of this study was to examine physician management of patients with type 1 or type 2 diabetes residing in extended-care facilities. This study also looked at physician adherence to the ADA standards of care for outpatients.

RESEARCH DESIGN AND METHODS

This retrospective chart review included data from 108 residents with physician-documented type 1 or type 2 diabetes at 11 extended health care facilities in the Midwestern U.S. Approval for the study was obtained from the Ohio University Institutional Review Board, and a letter of agreement was provided by each of the participating facilities. A list of all current residents was obtained from the director of nursing for each facility. Each chart was reviewed for a documented history of type 1 or type 2 diabetes. Residents were excluded if they had resided at the facility for <3 of the previous 12 months. Short-term rehabilitation residents were also excluded from the study. All chart reviews were completed by investigators and included review of the medical problem list, medication list, laboratory reports, and all physician and consultation notes during the study period. No patient, physician, or facility identifiers were included in the chart review. The ADA standards of care for outpatient adults were used as a comparison point for blood glucose (fasting 80–120 mg/dl, postprandial 100–140 mg/dl), A1C (<7.0%), blood pressure (<140/90 mmHg), and lipid levels (LDL cholesterol <100 mg/dl, HDL cholesterol >45 mg/dl in men [>55 mg/dl in women], and triglycerides <150 mg/dl). All data were entered into an Excel database by key and entry format.

Statistical analysis

Results were analyzed using SPSS version 14.0 (SPSS, Chicago, IL). Percentages and means ± SD were used to describe the data. The Pearson χ^2 test or Mann-Whitney *U* test was used to determine differences between groups. Continuity correction was used when necessary. Statistical significance was determined at $\alpha = 0.05$.

RESULTS

Subject characteristics

All 108 subjects were identified as meeting inclusion criteria. A total of 84 women (79%), 23 men (21%), and 1 subject with missing sex identification were included. Ninety-five percent of the study subjects were Caucasian. The mean age of enrolled subjects was 82 ± 9 years (range 41–103). The overwhelming majority (95%) had type 2 diabetes. Insulin was used by 60% of patients, and 50% of patients used oral glycemic controlling medication. About half of the patients (49%) using insulin were using sliding-scale coverage. Primary care physicians managed the care of all study participants. Family practitioners cared for the majority of patients (81%), with internists (11%) and geriatricians (8%) managing the remaining residents.

Table 1—*Clinical characteristics of nursing home residents*

	ADA/study goal	Percent meeting goal (%)
Glucose goal	Fasting (80–120 mg/dl) Postprandial (100–140 mg/dl)	38
A1C	<7%	67
Blood pressure	<140/90 mmHg	55
ACE inhibitor/angiotensin receptor blocker	—	52
Lipids	Yearly	31
Electrocardiogram	Yearly	37
Microalbumin	Yearly	7
Aspirin	75–325 mg	42
Foot exam	Monthly	87
Podiatrist consult	—	58
Eye exam	Yearly	42
Influenza vaccine	Yearly	89
Pneumoccocal vaccine	One lifetime	46

Glucose and A1C monitoring and treatment

Blood glucose was monitored in 98% of the subjects (at least one finger stick glucose by the unit's glucose meter per month), but only 38% of subjects met glucose goals (fasting 80–120 mg/dl, postprandial 100–140 mg/dl) (Table 1). At least one A1C per year was measured in 84% of the patients, with 67% meeting goal (<7.0%). If the AGS goal of <8.0% had been used for this study, 94% of patients would have met A1C goal. However, correlations using the AGS goal frequencies were not possible due the small number of patients not meeting goal. A1C frequency was not significantly correlated with A1C goal being met ($P = 0.20$). Patients using insulin were less likely to meet glucose goals than their non–insulin using counterparts ($P = 0.0001$). Insulin using patients were more

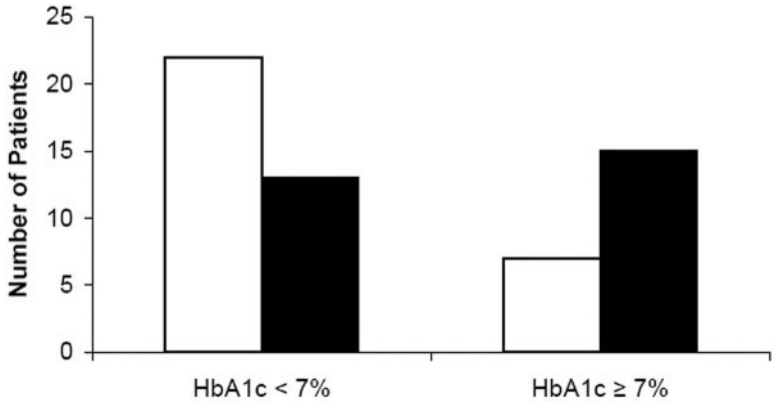

Figure 1—*Sliding scale and A1C. □, no sliding scale; ■, sliding scale.*

likely to have three or four A1C measures per year, although results were not statistically significant ($P = 0.06$). Patients using insulin without a sliding scale correction were more likely to meet A1C goal ($P = 0.02$) (Fig. 1).

Preventive medicine

Foot examinations were performed on 87% of patients in the study, with 58% of patients receiving podiatrist consultations. Less than half (42%) of the patients received dilated eye examinations. Influenza vaccinations were given to 89% of the subjects, but only 46% documented pneumoccocal vaccinations were given in the past year.

Depression

Depression was documented in 52% of patients. Fifty-eight percent of patients received documented pharmacological treatment for depression, and 17% of patients had psychiatrist consultations.

Monitoring and control of cardiovascular risk factors

Although 94% of patients had monthly blood pressure checks, only 55% of patients met the goal (<140/90 mmHg). Just over half (52%) of patients received ACE inhibitor or angiotensin receptor blocker therapy. However, blood pressure goal was more likely to be met without the use of an ACE inhibitor or angiotensin receptor blocker ($P = 0.02$). Lipids were checked yearly in only 31% percent of patients, with 58% of those checked meeting the LDL cholesterol goal (<100 mg/dl). Yearly electrocardiograms were reported in 37% of patients, 7% of patients had urine checked for microalbuminuria, and 42% of patients were on a daily aspirin regimen.

CONCLUSIONS — Although limited, data regarding control and treatment of diabetes in the nursing home has shown that care of the older outpatient person with diabetes often does not meet ADA standards of care (8,25). This study demonstrates that diabetes care in the extended care facility is even further from meeting ADA guidelines for the outpatient adult.

The limitations associated with this study should be considered before discussion of the results. Because there is no gold standard for treatment of the institutionalized adult, the study treatment goals used were not specific for this population. However, the ADA standards of care for the ambulatory adult were the most appropriate guidelines to use because separate guidelines have yet to be published. Although the AGS published guidelines suggesting modified A1C goals in older ambulatory adults with diabetes, there was no specific recognition of the institutionalized adult (12). Due to this fact and the fact that the AGS A1C goal recommendation (<8.0%) was based on level IIIB evidence as referenced in the article by Brown et al. (12) (level III, evidence from respected authorities based on clinical experience, descriptive studies, or reports of expert committees; level B, moderate evidence to support the use of a recommendation, which clinicians should do most of the time), AGS guidelines were not used as a comparison point in this study. If the AGS A1C guidelines had been used, 94% of the study population would have met A1C goal compared with the 67% who met the ADA goal.

Another limitation to the study was that chart review data were attained for only 1 year. Lack of chart documentation or exclusion of pertinent health care information due to the exclusion criteria may have affected study outcomes. Some patients residing at a facility for <1 year had limited data due to the timing of their annual screening tests and procedures that were absent from their chart. Because the study used a limited number of facilities located in only one region of the country, its generalizability for national trends could be limited. Also, because frailty status and age of onset of diabetes were not obtained in our chart review we were unable to stratify our data based on these two factors. However, our study only included individuals who needed full-time institutionalized nursing care. One can infer that our patients are all considered part of the frailest elderly group and therefore cannot be stratified based on frailty status.

Despite poor ADA guideline adherence in a number of areas, this study showed some positive data concerning the care of diabetes in the extended care facility. Monthly foot exams were regularly performed in the nursing home (87%), and many residents received a podiatrist consultation (58%). However, this reflects a difference from a 1999 Centers for Disease Control and Prevention survey, which found that 89% of nursing homes were offering podiatrist consultations to residents (26). Reasons contributing to this difference could be that fewer nursing homes are offering podiatrist services to their residents than in 1999, that our study facilities are not representative of a larger trend toward providing this service for residents, or that a lack of reimbursement for this service has decreased its use.

Influenza vaccinations were also regularly given during the study period (89%), demonstrating another positive adherence to ADA guidelines. Pneumoccocal vaccinations were not routinely documented (46%). However, because this study only looked at chart records over 1 year's time, this percentage does not necessarily represent the number of residents that were up to date with their pneumoccocal vaccine because only one to two lifetime immunizations are required before the age of 65 years. Yearly dilated eye exams were documented in less than half of the population (42%). Refraining from using this simple screening exam increases the occurrence of blindness, which in turn increases the likelihood for extended nursing home stays, contributes to falls, and decreases quality of life (23). However, changes in

ADA guidelines have occurred since the start of this study. The 2006 ADA guidelines permit less frequent eye exams (every 2–3 years) after a normal initial exam (27).

When looking at the average A1C (6.4%), it appears that glycemic control in the nursing home population is excellent. However, the low number of residents (38%) meeting finger stick glucose goals indicates that there is a mismatch between meeting glucose goal and meeting A1C goal. Patients meeting A1C, but not glucose, goals are likely having widely variable sugars. Increased glucose variability may be dangerous for the elderly patient because they are likely to have hypoglycemic episodes that may not be identified. Also, recently research has demonstrated a connection between glucose variability and oxidative stress on vascular tissue (28). This has led to a proposal that minimal blood glucose variability should be a goal of diabetes treatment along with A1C (28).

According to the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, 20% of individuals aged 60–79 years are not treated for hypertension (29). Because only 55% of this study's patients met blood pressure goal and only 52% were on ACE inhibitors or angiotensin receptor blocker therapy, hypertension treatment of the institutionalized adult may be even less optimal than among the ambulatory elderly. Antihypertensive treatment has been shown to reduce coronary artery events (23%), strokes (30%), cardiovascular deaths (18%), and total deaths (13%) in the elderly, with the greatest benefit seen in those aged >70 years (30). Also, data have shown that people with diabetes receive the greatest mortality benefit from treating hypertension first, lipids second, and blood glucose third (31). The significant cardiovascular morbidity and mortality benefit the elderly gain from controlling hypertension indicates a need for tighter blood pressure control than was found in this study.

Other cardiovascular screening and treatment parameters examined in this study were also found to be less than optimal. Lipids were checked in only 31% of patients, with 58% of those checked meeting goal. Because people with diabetes receive the second greatest mortality benefit from control of this cardiovascular risk factor, there is a need for increased attention to both the screening and treatment of lipids (31).

Only 7% of patients had urine checked for microalbumin. Microalbumin is an early screening tool for cardiovascular disease and renal failure and has been identified as an independent marker of cardiovascular mortality (12,32). Also, renal failure in the elderly has been shown to increase the risk of cardiovascular disease (33). Electocardiograms were performed in only 37% of patients. The DIAD (Detection of Ischemia in Asymptomatic Diabetics) study found that 22% of low-risk asymptomatic adults with diabetes had silent coronary artery disease (34). These results indicate the even greater importance of early screening tools for the patient with diabetes. Therefore, greater efforts should be made to increase the prevalence of electrocardiogram and microalbumin checks in the institutionalized adult population.

Data have shown that low-dose aspirin (100 mg) reduces cardiovascular deaths in at-risk patients by 44% (35). Aspirin, which is one of the most cost-effective treatments for cardiovascular disease, was used by only 42% of patients in this study. Lack of aspirin use could be a result of physician apprehension to use the medication for fear of side effects such as bleeding. However, research has demonstrated that the risk of a major bleed in elderly nursing home residents on aspirin therapy is very low (36). Because of the significant cardiovascular benefit, the low cost, and the minimal risk of side effects, aspirin should be used more frequently in this population.

Failing to meet the challenge of the ADA standards of care in this study could be a result of many factors. Control and treatment of diabetes in the institutionalized elderly is a complex and difficult task due to the numerous comorbidities present. In addition, physicians may feel that treating diabetes and its comorbidities aggressively is less important in this population due to the shortened life expectancy and possibility of adverse effects from treatment. However, this is contrary to data that has shown that only 2–4 years of treatment for hypertension or dyslipidemia are needed before mortality benefit is realized (31). Because the average length of stay in a nursing facility is 2.5 years, many residents would likely benefit from treatment of hypertension or dyslipidemia (26). Benefit from aggressive glucose management may be less significant, however, because an average of 8 years of treatment is needed before the patient receives mortality benefit (31).

Another reason for lack of adherence could be that competing medical illnesses, which are often present in patients with diabetes, can make it difficult to comprehensively treat all problems. Time constraints that are placed on both physicians and nursing home facility staff make the complex treatment of diabetes challenging. Lastly, limitations of treatment may exist because diabetes is a very costly disease to treat. With extended care facilities already feeling financial constraints, comprehensive care of the resident with diabetes presents an additional financial burden.

This study not only demonstrates that care of the institutionalized elderly is less than optimal but also that practice guidelines for this population are greatly needed. Specific guidelines concerning the care of diabetes in this population would give physicians and nursing facility staff a solid framework for developing treatment plans for this challenging population. Future studies are needed in order to develop guidelines that will improve the quality and consistency of care for extended care facility residents with type 1 and type 2 diabetes.

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