

**ORIGINAL RESEARCH**

# How well are we managing diabetes in long-term care?

The care received by nursing home residents with diabetes does not meet ADA standards for ambulatory adults, this study finds. Nor should it. The frail elderly need new standards that address their particular needs.

**ABSTRACT**

**Purpose** ► Our objective was to compare the management of diabetes mellitus (DM) in residents of extended-care facilities with the American Diabetes Association (ADA) standards of care for ambulatory adults.

**Methods** ► We reviewed the charts of 245 residents in 14 extended-care facilities. All had a physician-documented diagnosis of type 1 or type 2 DM and had spent at least 3 of the past 12 months in the facility. We reviewed medical diagnoses, medications, laboratory reports, and consultation notes of one-year duration, then compared our findings with the ADA standards of care.

**Results** ► Of the 245 patients, 211 (86.1%) had their glucose monitored; 36.7% had a hemoglobin A1c (A1c) below 7%. Fifty-two residents (21.2%) experienced hypoglycemic events; 103 (42%) had hyperglycemic events. Of the 240 patients (98%) whose blood pressure (BP) was monitored, 107 (43.7%) met the ADA goal. Lipids were checked in 190 residents (77.6%), 89 (46.8%) of whom met the goal for low-density lipoprotein (LDL). Dilated eye examinations were provided to 133 patients (54.3%). Foot examinations were performed on 187 residents (76.3%); 170 (69.4%) had a consultation with a podiatrist.

**Conclusions** ► Our chart review demon-

strates that the management of diabetes in extended-care facilities does not meet the recommended ADA standards of care for ambulatory adults. Although 36.7% of patients met the A1c goal, the A1c did not account for glucose variability. Only 46.8% of patients met the recommended LDL goal. Our results suggest the need for new standards of care for patients with diabetes residing in nursing facilities. These standards should take into account the particular needs of this patient population, specifically with regard to hypoglycemic risk, cardiovascular risk factors, and quality of life.

A surge in elderly patients with diabetes has placed a large burden on extended-care facilities. According to the Centers for Medicare and Medicaid Services, the prevalence of diabetes among nursing home residents is 33.3%.<sup>1</sup> Between 1995 and 2004, the estimated number of long-term care residents with diabetes mellitus (DM) grew by 7.1%, from approximately 242,000 to 329,000.<sup>2</sup> The increase adds to the challenge extended-care facilities face in attempting to provide high-quality care to patients with diabetes. No well-accepted management guidelines exist for nursing home residents with DM.<sup>3</sup>

CONTINUED

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➤ Although poor glycemic control and hypertension are major problems facing nursing home patients with diabetes mellitus, little research has examined how therapies targeting these problems help the elderly.

Frail older adults with DM are more likely to suffer from cardiovascular conditions than younger patients, and are at greater risk for hypoglycemic coma and serious hyperglycemia.<sup>4,5</sup> A high frequency of hypoglycemia, especially nocturnal hypoglycemia, has been reported among nursing home residents with diabetes.<sup>6</sup> Intensive insulin therapy is associated with hypoglycemia and increased mortality.<sup>7</sup> However, hyperglycemia also must be considered because it significantly impairs quality of life. Uncontrolled hyperglycemia causes osmotic diuresis, leading to polyuria, nocturia, aggravated incontinence, and disrupted sleep, as well as contributing to dehydration.<sup>4</sup> All of these problems have serious implications for quality of life and overall health.

Although studies have identified poor glycemic control and hypertension as the major problems facing nursing home patients with DM,<sup>2,6</sup> little research has examined how therapies targeting these problems help the elderly. Solid evidence supports the effectiveness of controlling hyperglycemia, lipid levels, and blood pressure (BP), along with aspirin therapy, in preventing microvascular disease, but does not reflect research involving older patients.<sup>8</sup>

■ **A study of nursing homes** found that health care teams did not respond to half of all significantly abnormal laboratory test results.<sup>9</sup> Physicians who are aware of the problems associated with DM in elderly patients may hesitate to treat them because of the lack of guidelines for this patient population or concerns about adverse effects. Because of the deficiency of clinical trial data in elderly patients and the heterogeneity of the population, the American Diabetes Association (ADA) suggests that “less stringent treatment goals” may be appropriate.<sup>10</sup>

■ **A central conflict in diabetes** care for nursing home residents revolves around the need for guidelines that are both generalizable and easily individualized. Some studies support the need for individualized care, particularly with regard to A1c goals, because residents vary greatly in both disease burden and frailty.<sup>8,11</sup> Yet individualized treatment could increase the complexity of care for nurses who must manage many patients, potentially hav-

ing a negative effect on patient care.

■ **Implementation of a treatment protocol** for residents with DM is associated with a decrease in the number of hospital days for acute and chronic complications,<sup>12</sup> but one study found that only 15% of nursing homes had such a protocol.<sup>13</sup> Ultimately, long-term care facilities may benefit from an approach that strikes a balance between individualized care and generalized goals and does not closely mimic either acute hospital care or outpatient management of diabetes.<sup>3</sup>

In the absence of specific recommendations for extended-care residents with diabetes, our study evaluated the status of care in this population on the basis of pharmacotherapy and standards of care recommended by the ADA for ambulatory adults with DM.

## METHODS

### Data collection

We reviewed the charts of 245 patients in 14 long-term care facilities in Ohio and West Virginia. All participating facilities signed a letter of agreement to take part in the study. The study was approved by the Ohio University Institutional Review Board.

At each facility, the director of nursing supplied a list of residents with DM. To be eligible for chart review, residents had to have a physician-documented diagnosis of type 1 or type 2 DM and have lived at the facility for at least 3 of the previous 12 months. Residents in both skilled nursing care and assisted living facilities were able to participate; short-term rehabilitation residents were not.

We performed a comprehensive review of each chart, examining the medical diagnoses, medication lists, laboratory reports, and physician and consultation notes for a one-year period. Data collection focused on diabetes-related intermediate outcomes and processes of care. Intermediate outcomes included A1c tests, lipid panels, and BP readings. Processes of care included aspirin therapy, use of angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers, use of statins, eye exams, foot exams, and microalbumin tests. The data collected omitted information identifying the patient, physician, or facility.

TABLE 1

## Study population profile

Patient characteristic	N (%)
<b>Sex</b>	
Male	60 (24.5)
Female	185 (75.5)
<b>Diabetes diagnosis</b>	
Type 1	9 (3.7)
Type 2	236 (96.3)
<b>Managing physician specialty</b>	
Family medicine	162 (66.1)
Internal medicine	63 (25.7)
Geriatrics	17 (6.9)
Endocrinology	2 (0.8)
Other	1 (0.4)

We compared the collected data with the 2011 ADA standards of care: blood glucose (fasting 80-120 mg/dL; postprandial 100-140 mg/dL), A1c (<7%), BP (<130/80 mm Hg), and lipid levels (low-density lipoprotein [LDL] <100 mg/dL; high-density lipoprotein [HDL] >40 mg/dL in men and >50 mg/dL in women; triglycerides <150 mg/dL).

**Data analysis**

We entered the data into an Excel database by type and key format and analyzed results using SPSS software, version 14.0 (SPSS, Chicago, IL). We used percentages and means±standard deviation to describe the data.

**RESULTS**

**TABLE 1** lists characteristics of the patients in the study: 24.5% were male and 75.5% were female; 9 (3.7%) were diagnosed with type 1 DM; 236 (96.3%) had type 2 DM. The mean age was 81±9 years, with a range of 44 to 103 years. Approximately 96% were Caucasian. The residents' medical care was managed by family physicians (66.1%), internists (25.7%), geriatricians (6.9%), endocrinologists (0.8%), and other physicians (0.4%). The findings that follow are all based on a one-year period unless otherwise specified.

**Diabetes management**

Most of the residents (211 [86.1%]) under-

went glucose monitoring. The proportion of residents who received specific diabetes interventions is detailed in **TABLE 2**.

**■ Hypoglycemia.** Fifty-two residents (24.6% of those receiving glucose monitoring and 21.2% of the total) experienced a hypoglycemic event; 103 (representing 48.8% of the monitored patients and 42% of the total) had hyperglycemic events. On average, each resident experienced 1±2 mild hypoglycemic episodes per month, with a maximum of 13 mild episodes for one resident. Severe hypoglycemia (< 50 mg/dL) occurred less often, on average 0.24±1 time per resident. One resident had 15 severe hypoglycemic events in a month. The mean low hypoglycemic episode was at a glucose level of 52±16 mg/dL.

**■ Hyperglycemia** occurred more often than hypoglycemia (8±14 times per month), with a mean high glucose level of 352±89 mg/dL. This study used a generous range for normal glucose readings (70-249 mg/dL), and 89% of blood glucose readings were within that range. Thirty-seven percent of residents had an A1c <7.0%.

**■ Medication.** Thirty-two (13.1%) patients received no oral medication or insulin, and were managed with lifestyle interventions alone. Sixty-four patients (26.1%) used only oral medications, 64 (26.1%) received only insulin, and 85 (34.7%) were treated with both. Of the patients receiving insulin, 108 (72%) were on a sliding scale regimen. Seventy-seven (51.7%) of the patients on insulin experienced hypoglycemia, vs 30 (20%) of those taking oral medication. Twenty-seven (31.8%) patients in the combined therapy group had hypoglycemic events.

**Preventive care**

**Foot and eye care.** Dilated eye examinations were provided for 133 residents (54.3%). Most (76.3%) received foot examinations, and 69.4% were seen by a podiatrist.

**■ Blood pressure.** Of the 240 residents (98%) whose BP was monitored, 107 (43.7%) had readings lower than 125/85 mm Hg, a goal set by a team of diabetologists, endocrinologists, and geriatricians at Ohio University. One hundred residents (40.8%) were taking an angiotensin-converting enzyme inhibitor or an angiotensin II receptor blocker;



**Frail older adults with diabetes are more likely to suffer from cardiovascular conditions than younger adults and are at greater risk for hypoglycemic coma and serious hyperglycemia.**

TABLE 2

## Interventions received by the study population

Intervention	N (%)
Glucose monitoring	211 (86.1)
Blood pressure monitoring	240 (98.0)
Lipids checked	190 (77.6)
Dilated eye exams	133 (54.3)
Foot exams*	187 (76.3)

\*170 (69.4%) patients had a consultation with a podiatrist.

**Evidence suggests that patients with diabetes derive the greatest mortality benefit from a treatment plan centered first on hypertension, then lipids, and finally, glycemic control.**

122 (49.8%) were receiving aspirin therapy. In the total population, 110 patients (44.9%) were prescribed a statin.

**Lipid monitoring.** Of the 190 residents (77.6%) whose lipids were monitored, only 89 (46.8%) met the LDL goal suggested by the ADA. Fifty-six (29.5%) had triglycerides <150 mg/dL.

The HDL goal recommended by the ADA is >40 mg/dL for men and >50 mg/dL for women. Three of the 24 men and 16 of the 91 women whose lipids were monitored met the HDL goal.

### DISCUSSION

Although several components of diabetes management in our study population failed to meet the ADA standards of care for ambulatory adults, some elements of care were well managed. Monthly foot exams were performed on 76.3% of patients; 69.4% were seen by a podiatrist. While the number of residents receiving foot exams had decreased by 10.7% since a previous study by our research group, the number of podiatric consults increased by 11.4%.<sup>14</sup>

Dilated eye exams were given to 54.3% of residents. More patients should be given the opportunity to have an annual eye exam. Diabetes is the leading cause of new cases of blindness among adults 20 to 74 years of age,<sup>15</sup> and impaired vision affects patient activity levels, susceptibility to falls, and quality of life.

In addition to a good record of preventive exams, physicians were proficient in monitoring residents with diabetes with regular test-

ing regimens. Eighty-six percent of patients underwent regular blood glucose monitoring; 84% had had their A1c tested in the past year, and 36.7% achieved the A1c goal of <7%. The average A1c reading was 6.7±1%.

While these A1c values would seem to reflect well-managed diabetes, blood glucose readings tell a different story. A comparison of A1c values and hyperglycemic events revealed a disparity between the estimated average glucose reading and the actual readings. Of the patients who underwent scheduled fingersticks, 24.6% experienced a hypoglycemic event and 48.8% had hyperglycemic events. On average, each patient had 8 hyperglycemic episodes per month. The average highest glucose reading was >350 mg/dL.

**A1c is only part of the story.** While A1c can be a marker of sustained hyperglycemia, it does not reflect the stability of glycemic control.<sup>16</sup> A study by Löfgren and colleagues confirmed that elderly diabetic patients in nursing homes who have low A1c levels often suffer from hypoglycemia.<sup>6</sup> Patients receiving insulin therapy are more likely to experience hypoglycemia.<sup>7</sup>

The mismatch between A1c and glucose readings reveals an important point about the management of diabetes in long-term care patients: A1c values do not tell the entire story about a patient's blood glucose; thus, a physician cannot look only at A1c to assess a patient's diabetes management. A previous study demonstrated that when physicians base treatment plans solely on A1c without consulting glucose logs or being familiar with newer treatments, adherence to evidence-based algorithms is unlikely.<sup>17</sup>

While A1c does provide information about average blood glucose levels, it does not offer perspective on hypoglycemia or glucose variability. It is vital that physicians screen the glucose log for evidence of hypo- and hyperglycemia before adjusting the patient's treatment plan. Physicians must also keep in mind that A1c may be falsely low in elderly patients who have concomitant anemia, which lowers the value.

**Controlling BP and lipids helps prevent complications.** In addition to diabetes management, our study evaluated regulation

of the complications of diabetes, particularly cardiovascular complications. Evidence suggests that people with DM derive the greatest mortality benefit from a treatment plan centered first on hypertension, then lipids, and finally, glycemic control.<sup>18</sup> A renewed focus on the BP and lipid aspects of diabetes care is needed.

Our data demonstrate that, of the 240 patients who met the ADA goal of <130/80 mm Hg, only 100 (40.8%) were taking an angiotensin-converting enzyme inhibitor or an angiotensin II receptor blocker. Lowering BP to <130/80 mm Hg may provide further benefit in preventing diabetes-related macrovascular complications.<sup>8</sup>

Lipid levels are a critical gauge of cardiovascular risk. Previous studies of patients with type 2 DM have shown that treating hyperlipidemia can produce a mortality benefit within 2 to 4 years, whereas aggressive glucose management takes approximately 8 years.<sup>18</sup>

A lipid panel was performed for 77.6% of the patients in our study—an improvement over a previous study by our team in which only 33% of patients received lipid checks.<sup>14</sup> In the current study, a mere 2.9% of patients met the ADA's combined lipid goals (LDL <100 mg/dL; HDL >40 mg/dL in men and >50 mg/dL in women; and triglycerides <150 mg/dL). Considering the LDL goal alone, 46.8% of the 190 patients whose lipids were monitored achieved it.

One hundred ten (44.9%) of the 245 patients in our study were prescribed a statin. Various studies support the use of lipid-lowering medications to increase HDL in elderly patients with DM.<sup>8</sup> Yet data suggest that the rate of statin use among older adults is suboptimal.<sup>19</sup> Our study highlights the limited prescription of statins for elderly nursing home patients who need them.

The ADA lipid goals are reasonable for this patient population, especially consider-

ing the potential mortality benefit. Rather than adjust lipid and BP goals, standards of care should emphasize the importance of meeting these objectives and suggest means to achieve them, including greater use of statins.

**■ One set of standards does not work for all patients.** Our study demonstrates that the ADA standards of care for ambulatory adults with diabetes are not acceptable for long-term care residents with DM. Although stringent A1c goals are appropriate for ambulatory adults, the risk of hypoglycemic episodes among the older and frailer nursing home population is too great to adhere to such a strict approach.

**■ We recommend new guidelines be established.** Guidelines developed specifically for residents in extended care are necessary to ensure the proper care of these patients, particularly in the face of a steady increase in their number.

**■ Study limitations.** Future inquiries into this subject should take into account the weaknesses of this study. First, it was conducted solely in Ohio and West Virginia. A chart review covering more territory could explore regional differences in diabetes care provided by long-term facilities and provide more evidence of the need for a population-specific standards of care.

The study also failed to account for comorbid conditions, including dementia, and code status, and followed residents for only one year. More extensive reviews could examine the effects of therapy in this patient population and the relationship between mortality and treatment plan, spurring movement toward more uniform and effective care of patients with diabetes in the long-term care setting. **JFP**

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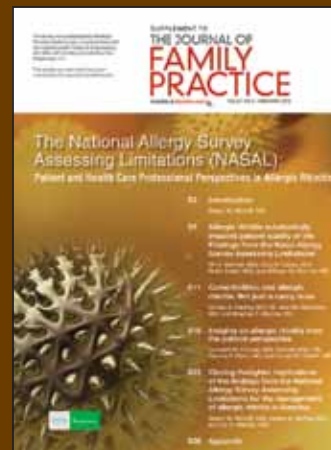
**A strict approach to A1c levels does not work for elderly, frail patients because the risk of hypoglycemic episodes is too great.**

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# The National Allergy Survey Assessing Limitations (NASAL):

## Patient and Health Care Professional Perspectives in Allergic Rhinitis

This supplement presents results from the National Allergy Survey Assessing Limitations (NASAL), which provides an up-to-date assessment of symptoms, burden of disease, and patient and provider perspectives concerning allergic rhinitis and nasal allergy treatment in the United States.



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