



## Comanagement of elderly patients with type 2 diabetes: better adherence to ADA guidelines?

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**OBJECTIVE:** This study reviewed intermediate diabetes outcomes including hemoglobin A1c (A1C) values, blood pressure, and low-density lipoprotein (LDL) cholesterol levels in individuals 65 years and older with type 2 diabetes (T2DM), and then compared outcomes between those managed by a geriatrician or diabetes specialist with those who were comanaged by both a specialist and geriatrician or primary care physician.

**METHODS:** A retrospective chart review examined 165 elderly patients with T2DM from a geriatric primary care clinic and a diabetes specialist clinic. Eighty-two patients were comanaged by an endocrinologist/diabetologist and their geriatrician/primary care physician, 45 patients were managed solely by their geriatrician, and 38 patients were managed solely by a diabetologist. Outcomes were compared using analysis of variance.

**RESULTS:** A significant difference was found between the three groups in two outcome measures: A1C ( $F = 4.166$ ,  $df = 2$ ;  $P < .05$ ) and diastolic blood pressure ( $F = 19.799$ ,  $df = 2$ ;  $P < .000$ ). No significant difference was found in the other two measures: LDL levels ( $F = .651$ ,  $df = 2$ ;  $P > .05$ ) and systolic blood pressure ( $F = 1.312$ ,  $df = 2$ ;  $P > .05$ ). Patients managed by their geriatrician were more likely to have diastolic blood pressure at American Diabetes Association (ADA) goal, whereas patients managed by a diabetologist achieved recommended A1C more often.

**CONCLUSIONS:** Elderly patients with T2DM managed by either their geriatrician or diabetologist were more likely to achieve 2008 ADA outpatient outcome goals than those comanaged by both a specialist and geriatrician/primary care physician. However, the limitations of this study warrant further research that focuses on elderly patients and comanagement of chronic disease.

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Diabetes has been increasing at an alarming rate worldwide. Currently only a minority of patients with diabetes ever see an endocrinologist. This number is sure to drop even further as the incidence of diabetes increases without a corresponding increase in diabetes specialists.<sup>1</sup> This study took place in Appalachian Ohio, where access to specialist care is limited. As a result, most patients in this region with chronic diseases are managed by a primary care physician.

The 2008 American Diabetes Association guidelines recommend that diabetes patients keep their hemoglobin A1c (A1C) level below 7.0%, low-density lipoprotein (LDL) cholesterol level below 100 mg/dL, and blood pressure

below 130/80 mm Hg to reduce long-term diabetes-related complications.<sup>2</sup> However, studies show that many patients with diabetes are not reaching these standards,<sup>3</sup> especially the elderly population with type 2 diabetes mellitus (T2DM).<sup>4</sup> Previous studies have found that patients treated by a diabetes specialist are more likely to receive care that meets quality of care standards than those whose care is managed solely by a primary care physician.

However, these studies suggest that the patients still did not meet the American Diabetes Association (ADA) guidelines<sup>5</sup> for diabetes care no matter who their doctor was.<sup>6-10</sup> In addition, many of the previous studies are dated and involve younger individuals. Little research has been published on the comanagement of patients with T2DM by their geriatrician/primary care physician and a diabetes specialist (endocrinologist/diabetologist). One recent study showed that patients with diabetes who were comanaged by a cardiologist and a primary care physician actually had worse blood pressure control than patients who were exclusively managed by their primary care physician.<sup>11</sup>

Almost one-third of people over age 65 have diabetes.<sup>12</sup> Rural Appalachian elderly face significantly higher rates of chronic disease than their urban counterparts, have limited access to health care, and have higher rates of behavioral risks.<sup>13</sup> Therefore, determining whether there is a difference in patient outcomes between the type of physician providing care is important, especially considering the potential added cost of specialist care. This question is even more important in rural regions where residents face limited access to health care in general and, in particular, to specialists.

Elderly adults with T2DM are two times more likely to need hospitalization and outpatient medical services.<sup>14</sup> This may be because the elderly have delayed symptoms of hyperglycemia because of an impaired thirst mechanism and increased renal threshold for hyperglycemia.<sup>15</sup> The presence of diabetes is a strong predictor of functional decline in this population.<sup>15</sup> Older adults with T2DM have higher rates of "premature death, functional disability, and coexisting illnesses such as hypertension, coronary heart disease (CHD), and stroke, than do those without T2DM."<sup>16</sup> These higher rates of comorbid conditions are a major concern for approximately half of the elderly individuals diagnosed with T2DM who have A1C levels of 7% or higher.<sup>4</sup> In fact, in one study, elderly participants with nephropathy or renal insufficiency, after adjusting for patient characteristics such as "duration of diabetes mellitus, patients," were 40% less likely to achieve controlled A1C.<sup>4</sup>

In many older adults, many of the diabetes-related complications can be prevented or delayed. For example, patients are likely to experience fewer microvascular complications with reduction of their A1C<sup>17</sup> and fewer macrovascular events with lowered cholesterol levels and blood pressures.<sup>4,18</sup> In one large study, researchers found "highly significant associations between the development of each of the complications of diabetes, including mortality, across the wide range of exposure to glycemia that occurs in patients with T2DM."<sup>19</sup>

## Material and methods

This study examined charts from a geriatric clinic and a diabetes/endocrine center in Appalachian Ohio. Inclusion criteria were (1) patients must have T2DM for at least one year; (2) patients must have been in the practice for at least one year and had at least two visits during that time; (3) patients had to have an expected life expectancy of at least six months; and (4) upon reviewing the chart, it had to be clear who was providing the diabetes-related care (geriatrician or primary care physician, diabetes specialist, or comanagement). Patients were excluded if they (1) did not meet the inclusion criteria, (2) if they had an active cancer diagnosis or, (3) if they were participating in hospice. This study was approved by the Ohio University Institutional Review Board.

Patients were identified using diagnostic codes for T2DM (250.00 and the related subidentifiers). Patient lists were generated from the office billing system (all offices used the same system, Athenahealth). Subsequently, the research team manually pulled charts and reviewed them for inclusion and exclusion criteria. The researchers reviewed the problem lists, initial history and physical, progress notes, and all lab sections. Information collected for this study included patient demographics (age, body mass index [BMI], duration of diagnosis, gender, marital status) and major diabetes intermediate outcomes including A1C, lipid levels including LDL cholesterol, and blood pressure). Finally the provider of diabetes care was recorded based on communications between physicians and treatment modifications on their progress notes. Patients were placed into one of three groups: (1) managed solely by their geriatrician, (2) managed solely by the diabetes specialists, or (3) managed by both their primary care physician and diabetes specialist.

Data was entered in an SPSS database (16.0; SPSS, Inc., Chicago, IL) by type and key format. Blood pressures were averaged and recorded, but only the most recent A1Cs and LDL levels were entered into the database. No patient identifiers were included in the dataset. Recorded patient values were compared against the 2008 ADA "Standards of Medical Care in Diabetes—2008."<sup>2</sup> The three groups were compared using analysis of variance.

## Results

A total of 336 charts of patients 65 years or older with T2DM were reviewed. Fifty-two patients were excluded because of a diagnosis of cancer and 118 were excluded because they had not been with the practice for one year. This study compared outcome measures and adherence to ADA guidelines in three groups of elderly patients with T2DM (n = 165): (1) those managed solely by a geriatric clinic (n = 45); (2) those managed solely by a diabetes specialist (n = 38); (3) and those comanaged by a primary care physician or geriatrician and a diabetes specialist (n =

**Table 1** Participant demographics means and standard deviations covariates

	N	All 3 groups	Geriatrician	Comanaged	Diabetes sp.
Age (y)	165	74.1 (±5.92)	76.8 (±6.24)	73.0 (±5.37)	73.3 (±5.86)
BMI*	131	31.3 (±7.0)	32.9 (±7.21)	31.2 (±6.52)	31.0 (±7.85)
Male	67%	67%	11%	39%	17%
Female	98%	98%	34%	43%	21%
Duration of DM	77	10.4 (±8.36)	11.7 (±9.53)	10.8 (7.96)	6.4 (7.46)

\*BMI calculation and normal values: <http://www.nhlbisupport.com/bmi/>.<sup>27</sup>

82). The clinical outcomes used to determine adherence were A1C values, systolic and diastolic blood pressure, and LDL levels.

There were 98 women and 68 men in the study. The mean age was 74.1 years (SD = 5.92) (Table 1). The mean A1C was 6.8% (SD = 1.1) across all three groups but varied between specialties with the geriatricians (6.9%, SD = 1.20), diabetes specialists (6.5%, SD = .65), and comanaged patients (7.1%, SD = 1.19) (Table 2). Obesity, which is closely related to the development of T2DM, affected the majority of the participants (n = 131): 98 individuals (74%) had a BMI ≥30 and 13 (9.8%) had a normal BMI <25.

A significant difference was found between the three groups in two outcome measures: A1C (F = 4.166, df = 2; P = .017) and diastolic blood pressure (F = 19.799, df = 2; P < .000). No significant difference was found in the other two measures: LDL levels (F = .651, df = 2; P = .523) and systolic blood pressure (F = 1.312, df = 2; P = .272). No provider type was clearly superior in all outcome measures. The geriatricians' patients had higher adherence to 2008 ADA guidelines for both systolic and diastolic BP (41.9% and 95.3%) than the other two groups (comanaged = 27.2% and 70.4%; diabetes specialist = 26.3% and 65.8%), but only differences in diastolic blood pressure were statistically significant. The diabetes specialists' patients were more likely to meet guidelines for A1C (75.7%) than both the geriatric primary care patients (66.7%) and the comanaged patients (55.8%) (Table 3).

Post hoc comparisons using the Tukey HSD test indicated that the A1C mean score for patients managed by the diabetes specialist (M = 6.5, SD = .65) was still significantly better than for those who were comanaged (M = 7.13, SD = 1.19, P < .05) but not significantly better than those managed by a geriatrician (M = 6.76, SD = 1.11, P = .520). For diastolic blood pressure, there was a signif-

icant difference between those managed by geriatricians (M = 69.2, SD = 6.73) and those managed by diabetes specialist (M = 78.4, SD = 8.94, P = .000) or comanaged (M = 77.3, SD = 6.70, P < .001) (Table 2).

An analysis of covariance was run to control for age, BMI, and duration of diabetes diagnosis. None of these characteristics was found to be a significant factor. Although nonsignificant, men had slightly better adherence rates for A1C (67%-63%) and LDL (63%-45%), whereas women had slightly better adherence rates for diastolic (79%-64%) and systolic (34%-25%) blood pressure.

## Discussion

Based on the results of this study, it appears that elderly patients with T2DM who are comanaged are less likely to meet the 2008 ADA standards than patients who are managed by either a geriatrician or a diabetes specialist alone. Although we did not collect data on process of care measures (e.g., frequency of eye, foot, and A1C examinations), previous studies found that, although endocrinologists/diabetes specialists were more likely to complete the ADA Guidelines for Care-recommended processes of care, patient outcomes were similar.<sup>20,21</sup>

These results demonstrate that comanagement of care did not predict improved intermediate outcomes. This may be because highly complicated patients are more likely to be referred to a specialist. In addition, once diabetes progresses to beta cell exhaustion/failure it is very common for primary care physicians to refer their patient to a specialist for the initiation of insulin. Finally, many patients with complications are referred for management of complications as well. Conversely, it could be argued that comanagement of dia-

**Table 2** Means and standard deviations outcome measures

	N	All 3 groups	Geriatrician	Comanaged	Diabetes sp.	Guidelines*
HbA1C	157	6.8 (±1.1)	6.9 (±1.20)	7.1 (±1.19)	6.5 (±0.65)	<7
LDL-C	124	87.7 (±37.94)	89.0 (±30.14)	90.7 (±45.49)	81.2 (±29.76)	<100
Systolic BP	162	138 (±16.14)	135 (±15.92)	140 (±16.70)	138 (±16.84)	≤130
Diastolic BP	162	75.5 (±8.15)	69.5 (±6.79)	77.3 (±6.70)	78.4 (±8.94)	≤80

\*ADA Guidelines.<sup>2,5</sup>

**Table 3** Adherence to ADA 2008 “Standards of Care”

	Adherence	Nonadherence	Total	Adherence to recommended goal
<b>HbA1C</b>				
Geriatrician	30	15	45	66.7%
Comanaged	43	34	77	55.8%
Diabetes specialist	28	9	37	75.7%
Total	101	56	159	
<b>LDL-C</b>				
Geriatrician	24	21	45	53.3%
Comanaged	36	46	82	43.9%
Diabetes specialist	26	11	37	70.3%
Total	86	76	164	
<b>Systolic blood pressure</b>				
Geriatrician	18	25	43	41.9%
Comanaged	22	59	81	27.2%
Diabetes specialist	10	28	38	26.3%
Total	50	110	162	
<b>Diastolic blood pressure</b>				
Geriatrician	41	2	43	95.3%
Comanaged	57	24	81	70.4%
Diabetes specialist	25	13	38	65.8%
Total	122	38	162	

Adherence was defined as being values less than or equal to the values suggested by the ADA. Non-Adherence was defined as being above the ADA suggested value, or not having A1C, LDL, or blood pressure measurement taken within the past year.

betes provides opportunities for gaps in communication, conflicting medical opinions, and increased confusion for the patient. The chain of communication is critical in the care of patients who are acutely ill, who have chronic medical problems or multiple medical conditions. These issues need to be examined more closely because the impact on care is substantial.

Several research findings raise questions about whether the ADA Standards of Care should apply to older adults who may be more frail, have multiple comorbidities, and have limited life spans. It could be argued that intensive control of intermediate outcomes in the elderly may be “action without benefit.” In fact, some authors believe, “In the absence of long-term studies demonstrating the benefits of lowering the A1C to less than 7% in elderly persons with diabetes mellitus, aggressive glycemic control may not be practical or beneficial . . .”<sup>24</sup> The United Kingdom Prospective Diabetes Study (UKPDS) found that tight control of blood pressure was more effective in reducing complications than glycemic control.<sup>18</sup> This is especially true of the elderly because “Coronary artery disease is by far the leading cause of death in elderly people with diabetes: 40% to 50% of patients with type 2 diabetes die of cardiac disease.”<sup>22</sup> The ADA in *Standards of Medical Care in Diabetes—2009*, states: “Although control of hyperglycemia may be important in older individuals with diabetes, greater reductions in morbidity and mortality may result from control of other cardiovascular risk factors rather than from tight glycemic control alone.”<sup>23</sup>

The American College of Physicians issued guidance statements on optimal A1C targets for patients with T2DM:

“Based on individualized assessment, a hemoglobin A1C level less than 7% is a reasonable target for many patients, but not for all. Hemoglobin A1C goals higher than 7% may be indicated for patients who are elderly or frail, who are at higher risk for adverse events from tight control, or who have substantially lowered life expectancy from comorbid conditions.”<sup>24</sup> As well, the American Geriatrics Society recommended A1C levels of 7% or lower for healthy adults and less stringent levels of less than 8% for those with life expectancy of less than five years.<sup>25</sup> Finally, findings from the Action to Control Cardiovascular Risk in Diabetes (ACCORD) suggest that a less aggressive A1C target may be preferable if an individual is a high cardiovascular risk, older, and has a 10-year or longer history of T2DM.<sup>26</sup> We, however, opted to use the current recommendation of 7 because there have not been any definitive studies that identify those elderly who should avoid aggressive measures to reduce their A1C to 7% or less.

Clinical trials suggest that “approximately 8 years are needed before the benefits of glycemic control are reflected in a reduction in microvascular complications . . . and that only 2 to 3 years are required to see benefits from better control of blood pressure and lipids.”<sup>16</sup> Therefore, a guideline published by the American Geriatrics Society emphasized the reduction of “macrovascular endpoints for persons with DM—blood pressure management, aspirin therapy, and lipid management.”<sup>16</sup>

Given that elderly individuals with T2DM are more likely to have comorbid conditions, memory issues that can affect adherence, and shorter lifespans than their younger counterparts, it is imperative that physicians and their pa-

tients determine realistic outcomes. Individuals with multiple chronic diseases, polypharmacy, and/or dementia pose a challenge as far as controlling their A1C and most need someone managing the multiple aspects of their care. How that management is realized warrants additional discussion and research. Prioritizing interventions, identifying the risks and benefits of tight control, along with quality of life issues, may determine the type of care that best meets elderly patient needs.

There were several limitations of this study that constrain generalizations. This study used a retrospective chart review, so the data were record-dependent and covered only a short time period. In addition, the physicians and patients in this study may not be representative of those in the state or nation. Finally, the authors were unable to control for several factors, such as number of doctor visits per year and whether not physicians followed ADA best practice guidelines.

## Conclusion

This retrospective chart review suggests that patients managed by a single physician (geriatrician or diabetes specialist) were more likely to achieve intermediate diabetes outcomes (A1C and diastolic blood pressure) than those who were comanaged. This has profound implications on patient care and cost effectiveness. However, the limitations to this study warrant more research that deals with elderly patients with T2DM and comanagement versus primary care or specialist care alone.

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