

## Determining Rate of Compliance with the American Diabetes Association Recommendations in Hospitalized Patients.

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### ABSTRACT

**Background:** Diabetes mellitus (DM) is a growing epidemic in the U.S. associated with significant costs, reduced quality of life, long-term complications, and high rates of morbidity and mortality. **Purpose:** Determine the rate of compliance in hospitalized patients with the American Diabetes Association (ADA) monitoring and treatment guidelines for DM regarding: glucose management, cholesterol management, stroke prevention, ACE-I/ARB utilization, and pneumococcal vaccination (PPV). **Setting:** 760-bed, tertiary-care teaching hospital. **Methods:** This retrospective chart review evaluated all adult, hospitalized patients with a diagnosis code for DM who were consecutively discharged from a general medical unit, beginning 4/1/06 until data on 100 patients were collected. Patients with gestational diabetes, hospital admission < 3days, or death prior to discharge were excluded. The following measurements were collected: blood glucose, cholesterol management, stroke prevention, ACE-I/ARB utilization, and PPV immunization. **Results:** Of the 100 patients reviewed, 96% had Type II DM; 24% had contraindications to at least one of their prescribed oral DM medications. Only 57% had HgA1c documented; of these, 56% were at goal. Only 42% had LDL cholesterol documented; of these, 76% were at goal. Appropriate stroke prevention was prescribed for 75% of patients; 70% were receiving appropriate ACE-I therapy; and 38% of eligible patients received PPV. **Conclusion:** A high percentage of hospitalized patients are not in full compliance with the ADA monitoring and treatment guidelines.

### 1. INTRODUCTION

Diabetes mellitus (DM) is a growing U.S. epidemic associated with significant economic costs, reduced quality of life, long-term complications, and high rates of morbidity and mortality. An estimated 20.8 million persons in the U.S. (7% of the population) has DM with 6.2 million of those undiagnosed. In 2002, DM was ranked the sixth leading cause of death associated with an estimated \$132 billion in direct and indirect medical expenditures.[1,2] This does not include intangibles such as pain and suffering by the patient and family.

Along with increased risk of death and economic costs, diabetes also contributes to higher rates of

morbidity due to long-term complications including heart disease, stroke, hypertension, blindness, kidney failure, peripheral nerve damage, amputations, dental disease, pregnancy complications, and others.[2,3] Compliance with various aspects of the American Diabetes Association (ADA) monitoring and treatment guidelines has been shown to reduce and delay onset of many of these long-term complications. Five of these ADA guidelines include: 1) aggressive management of long-term blood glucose control as evaluated by measuring HgA1c levels; 2) aggressive cholesterol management as evaluated by measuring both the total and LDL cholesterol levels; 3) appropriate prescribing of antiplatelet medications to reduce stroke risk; 4) use of angiotensin-converting-enzyme inhibitors (ACE-Is) or angiotensin-receptor-blockers (ARBs) to prevent/delay kidney damage; and 5) immunization with pneumococcal polysaccharide vaccine (PPV) to reduce the risk of pneumococcal infection.[1]

**The purpose of this study** was to determine the rate of compliance in hospitalized patients with the ADA monitoring and treatment guidelines for diabetes management regarding: blood glucose management, cholesterol management, stroke prevention, ACE-I/ARB utilization, and PPV immunization.

### 2. METHODS, RESULTS, SIGNIFICANCE

**Methods:** A retrospective chart review took place at a 760-bed, tertiary-care, teaching hospital. A computer-generated list of patients with diagnosis codes for diabetes (ICD-9 250.0 – 250.9) was obtained. All adults, ≥ 18 years old, consecutively discharged from a general medical unit, beginning 4/1/06 were included until data on 100 patients were collected. Exclusion criteria included gestational diabetes, hospital admission < 3 days, and death prior to discharge. This project was approved by both the Wichita State University and the Wichita Medical Research and Education Foundation Institutional Review Boards.

**Results:** Of the 100 patients reviewed, 59% were female; 96% had Type II DM; mean age was 70.5 ± 12.8 years; and average length of stay was 7.4 ± 3.9 days. Only 57% of patients had an HgA1c documented within the last three months; of these, 56% (32/57) were at a goal HgA1c of ≤ 7%. Fourteen patients (24%) had contraindications to at least one of their prescribed oral diabetes medications; all medication contraindications were due to kidney dysfunction.

**Table 1: Blood Glucose Management Results**

Measurement	Result
Patients with HgA1c documented w/i last 3 months	57%
Mean HgA1c level reported/documentated	7.48 ± 1.97
Percentage of HgA1c levels at goal, ≤ 7%	56% (32/57)
Mean number diabetes medications per patient <sup>a</sup>	1.6 ± 0.9
% of patients prescribed no medications	5%
% of patients prescribed 1 medications	48%
% of patients prescribed 2 medications	31%
% of patients prescribed ≥ 3 medications	16%
Patients prescribed oral diabetes medications	59%
% of patients with at least one contraindication to a prescribed oral medication	24% (14/59)

<sup>a</sup> Multiple insulin orders counted as one medication  
Means reported as mean ± standard deviation.

Only 42% of patients had a total or LDL cholesterol documented within the last six months; 50% (21/42) of total cholesterol levels were at the recommended goal, ≤ 135 mg/dL and 76% (32/42) of LDL cholesterol levels were at the recommended goal, ≤ 100 mg/dL.

**Table 2: Cholesterol Management Results**

Measurement	Result
% of patients with total chol doc w/i last 6 months	42%
Mean total cholesterol (mg/dL)	140 ± 37
% total cholesterol at goal, ≤ 135mg/dL	50% (21/42)
% of patients with LDL doc w/i last 6 months	42%
Mean LDL (mg/dL)	82 ± 28
% LDL reported at goal, ≤ 100mg/dL	76% (32/42)
% of patients taking ≥ 1 cholesterol lowering med	48%

Means reported as mean ± standard deviation.

All study patients had risk factors indicating a need for stroke prevention with antiplatelet medications (aspirin and/or clopidogrel). Prominent strong risk factors were present in 58% of patients such as prior history of angina (30%), stroke (22%), and/or heart attack (24%). Overall, a majority of patients, 75% were prescribed appropriate stroke prevention.

**Table 3: Stroke Prevention Results**

Measurement	Result
% of patients needing stroke prevention	100%
% of patients receiving appropriate stroke prevention	75%
% of patients without appropriate stroke prevention	26%
% of patients prescribed daily aspirin alone	25%
% of patients prescribed clopidogrel alone	7%
% of patients prescribed aspirin + clopidogrel	22%
% of patients on other stroke prevention combinations	10%
% of patients with documented contraindications or justification not to be receiving stroke prevention	11%

Means reported as mean ± standard deviation.

ACE-I/ARB therapy was prescribed for 64% of patients; 5 took neither due to contraindications, therefore therapy was deemed appropriate in 70% of patients. Of the 30 patients without ACE-I/ARB therapy, 13 were at very high risk of progressing kidney damage as indicated by protein in the urine (revealed by urine analysis); four had a negative urine analysis, and 13 did not have a urine analysis on file, therefore presence of protein in the urine could neither be confirmed nor denied.

**Table 4: ACE/ARB Utilization Results**

Measurement	Result
% of patients prescribed an ACE-I and/or ARB	64%
% of patients prescribed an ACE-I	41%
% of patients prescribed an ARB	21%
% of patients on ACE-I + ARB	2%
% of patients with appropriate ACE-I/ARB therapy	70%
% of patients with documented protein in urine	47%

Means reported as mean ± standard deviation.

PPV status was documented in 82% of patients: 59% documented as current, 32% as needing vaccinated, and 10% as “unknown”. Twenty-six patients were identified and documented as needing vaccination, however, only 38% (10/26) of eligible candidates, were vaccinated in the hospital.

**Table 5: PPV Immunization Results**

Measurement	Result
% of patients with PPV status documented	82%
% of patients documented as current	59% (48/82)
% of patients documented as NOT current	32% (26/82)
% of patients documented as status “unknown”	10% (8/82)
% of eligible patients vaccinated this hospitalization	38% (10/26)
% of patients administered PPV this hospitalization	10%

Means are reported as mean ± standard deviation.

**Clinical Significance:** Hospitalization is an opportune time to make medication regimen changes and review efficacy of the patient’s overall diabetes management. Considering the high prevalence of DM in hospitalized patients and the high level of incomplete compliance found in this study, healthcare providers should consider implementation of clinical programs and clinical education designed to improve compliance with ADA monitoring and treatment goals.

Because of limited healthcare resources, future research should identify areas of high non-compliance and identify those clinical programs and education that are most effective at altering prescribing practices.

### 3. CONCLUSION

A high percentage of hospitalized patients were not in full compliance with the ADA monitoring and treatment guidelines.

- [1] CDC. National diabetes fact sheet: general information and national estimates on diabetes in the United States. 2003. Rev ed. Atlanta, GA: USDHHS, 2004.
- [2] Hogan P, et al; *Diabetes Care*. 2003;26(3):917-932.
- [3] American Diabetes Association.; *Diabetes Care*. 2006;29(suppl 1):S43-48.