May 2nd, 12:00 AM

The Relationship of Creatinine, Sodium, Hematocrit and Hemoglobin A1c to 30-Day Hospital Readmission Among Older Adults with Type 2 Diabetes

Shmilah Choudhary
Rowan University

Meet Shah
Rowan University

Sanath Shetty
Rowan University

Terri Ginsberg
Rowan University

Matthew H. McLaughlin
Rowan University

The Relationship of Creatinine, Sodium, Hematocrit and Hemoglobin A1c to 30-Day Hospital Readmission Among Older Adults with Type 2 Diabetes

Shmilah Choudhary, OMS-II; Meet Shah, OMS-II; Sanath Shetty, OMS-II; Terrie Ginsberg, DO; Matthew H. McLaughlin, BS
Rowan University School of Osteopathic Medicine – New Jersey Institute for Successful Aging

ABSTRACT

Introduction: Reducing thirty-day hospital readmissions is a top healthcare priority. However, there is little research describing the risk factors of readmission among patients with diabetes, especially for older adults. Understanding what the risk factors are for 30-day hospital readmission for older adults with type 2 diabetes would help identify patients at risk of rehospitalization.

Objective: The aim of this study was to identify factors associated with 30-day unplanned hospital readmissions among older adults with T2DM. Factors to be investigated are: patient demographics and three admission laboratory values.

Methods: Participants were older adults ≥ 65 years old with T2DM, admitted to a community hospital from January 2012-January 2017. Of 843 patients, 200 were randomly selected to have their electronic medical records reviewed for this study.

Results: Patients readmitted within 30 days of discharge were similar to patients who were not readmitted on most demographic characteristics, except for hospitalization in the 12 months before admission. Readmitted and not readmitted patients also differed on their hematocrit levels at admission.

Conclusion: Older adults with T2DM who were readmitted within 30 days post-discharge were more likely to have had a previous hospitalization and lower creatinine levels at admission. Future analyses will incorporate additional potential predictors of unplanned hospital readmissions.

INTRODUCTION

- Reducing 30-day hospital readmissions is a top healthcare priority. However, despite the interest in reducing early readmissions, there is relatively little research focusing on readmissions among patients with type 2 diabetes (T2DM).[1]
- In particular, there are very few studies that investigate factors that are predictive of hospital readmission among older adults with T2DM.[2,3]
- Given that the prevalence of diabetes in the United States is highest among older adults (21.3%)[4] and the substantial costs associated with unplanned hospital readmissions,[5] it is important to identify risk factors of readmission in this population.
- An understanding of the risk factors of hospital readmission among older adults with T2DM would aid healthcare providers in identifying which patients are at highest risk of readmission. This information could potentially be used to inform interventions designed to prevent rehospitalization.

SPECIFIC AIM

- The aim of this study was to conduct retrospective reviews of electronic medical records to identify factors associated with unplanned 30-day hospital readmissions among older adults with T2DM. Factors investigated were: patient demographics and three admission laboratory values.

METHODS

- **PARTICIPANTS**
  - **Inclusion Criteria:** Participants were older adults ≥ 65 years old admitted to a community hospital from January 1, 2012 to January 1, 2017 with a diagnosis of T2DM at their index hospitalization, defined as patients' first hospitalization to occur during the study period.
  - **Exclusion Criteria:** Patients were excluded if they died during the index hospitalization or were discharged to hospice.
- **PROCEDURES**
  - Of the 843 patients who met the study's inclusion criteria, 200 were randomly selected to have their electronic medical records reviewed.
  - Factors investigated were: patients' demographics, characteristics of the index hospitalization, and patients' creatinine, sodium, hematocrit, and hemoglobin A1c at admission.

RESULTS

- **Readmission Rate:** Of the 200 patients, 15.5% (N=31) had an unplanned hospital readmission within 30 days of discharge.

Table 1. Demographic characteristics

		Readmitted		Not Readmitted		
Characteristic		N	(%)	N	(%)	*p*-value
		(N=30)		(N=154)		
Race (N=184)	African American	9	(30.0)	33	(21.4)	0.49
	White	20	(66.7)	110	(71.4)	
	Other	1	(3.3)	11	(7.2)	
		(N=31)		(N=169)		
Sex (N=200)	Female	17	(54.8)	94	(55.6)	1.00
	Male	14	(45.2)	75	(44.4)	
		(N=31)		(N=169)		
Hospitalization 12 months prior (N=200)	Yes	19	(61.3)	37	(21.9)	0.00
	No	12	(38.7)	132	(78.1)	
		N	M (SD)	N	M (SD)	*p*-value
Age (N=200)		31	78.58 (7.71)	169	77.75 (8.36)	0.61
Body Mass Index (N=198)		31	28.69 (6.33)	167	29.50 (6.79)	0.54
Length of stay (N=200)		31	6.35 (4.24)	169	6.38 (5.45)	0.98

- In general, there were no statistically significant differences between patients who were readmitted and patients who were not readmitted on demographic characteristics.
- However, a statistically significant difference was found on whether patients were hospitalized in the 12 months prior to admission. Patients who were readmitted were more likely to have been previously hospitalized than patients who had not been readmitted.

Table 2. Laboratory values obtained on admission

	Readmitted			Not Readmitted			
Laboratory test	N	M	(SD)	N	M	(SD)	*p*-value
Creatinine mg/dL (N=200)	31	2.27	(1.96)	169	1.55	(1.11)	0.06
Sodium mmol/L (N=200)	31	138.26	(3.90)	169	137.16	(3.96)	0.16
Hematocrit % (N=200)	31	32.77	(6.64)	169	36	(6.17)	0.00
Hemoglobin A1c % (N=151)	20	7.07	(1.99)	131	7.60	(2.02)	0.27

- No statistically significant differences were found between readmitted and not readmitted patients on their sodium and hemoglobin A1c at admission.
- There was a statistically significant difference on hematocrit at admission, with readmitted patients having lower hematocrit levels than patients not readmitted.
- Differences between readmitted and not readmitted patients on creatinine approached, but did not reach, statistical significance.

CONCLUSIONS

- Readmitted and not readmitted patients with T2DM were similar on most demographic characteristics.
- Patients who had been readmitted within 30 days of discharged were more likely than patients who had not been readmitted to have had a previous hospitalization in the 12 months prior to admission.
- Patients who returned to the hospital 30 days post-discharge had lower hematocrit levels than patients who did not return to the hospital.
- Future analyses of these data will incorporate other potential predictors of hospital readmission in this population.

REFERENCES

1. Rubin, D.J. Hospital readmission of patients with diabetes. *Curr Diab Rep*. 2015; 15: 17.
2. Raval, A.D., Zhou, S., Wei, W., Bhattacharjee, S., Miao, R., & Sambamoorthi, U. 30-day readmission among elderly Medicare beneficiaries with type 2 diabetes. *Popul Health Manag*. 2015 18(4): 256-264.
3. Collins, J., Abbass, I.M., Harvey, R., Suehs, B., Uribe, C., Bouchard, J., Prewitt, T., Deluzio, T., Allen, E. Predictors of all-cause 30 day readmission among Medicare patients with type 2 diabetes. *Curr Med Res Opin*. 2017; 33(8): 1517-1523.
4. Menke, A., Casagrande, S., Geiss, L., Cowie, C.C. Prevalence of and trends in diabetes among adults in the United States, 1988-2012. *JAMA*. 2015; 314(10): 1021-1029.
5. Jencks, S.F., Williams, M.V., Coleman, E.A. Rehospitalizations among patients in the Medicare fee-for-service program. *N Engl J Med*. 2009; 360(14): 1418-1428.

Funding for this project was provided by the Osteopathic Heritage Foundation.