Identifying Opportunities to Improve Hypertension Management among Hospitals Participating in Michigan's Ongoing Stroke Registry to Accelerate Improvement of Care (MOSAIC)

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INTRODUCTION

Hypertension is a leading risk factor for stroke, and its management is key for stroke prevention. Michigan's Ongoing Stroke Registry to Accelerate Improvement of Care (MOSAIC), a Program funded by the CDC Paul Coverdell National Acute Stroke Registry, collects stroke care data including patient history of hypertension and discharge medications.

The objectives of this study were to:

- Identify the independent predictors of NOT receiving an antihypertensive medication prescribed at discharge (AMPD) in stroke and transient ischemic attack (TIA) patients with a history of hypertension

- Assess hospital-level performance of AMPD in order to focus future quality improvement efforts

METHODS

Between 2016-2017 32 hospitals throughout Michigan contributed data to MOSAIC via the *Get With The Guidelines–Stroke* Patient Management Tool. AMPD is a data element required by the CDC Paul Coverdell National Acute Stroke Registry, and is unique to data collection among states funded by this Program. Patients were excluded from the analysis if they did not have a recorded history of hypertension, received comfort measures only, expired prior to discharge or were discharged to hospice.

Descriptive statistics, including means and percents, were generated to describe the study population patient characteristics. (Table) Chi-square statistics were used to compare characteristics between patients that-did NOT have an antihypertensive medication prescribed vs. those that did have a prescribed antihypertensive medication at discharge.

Independent factors associated with no AMPD vs. receiving an antihypertensive medication were identified using multivariable logistic regression. Potential confounding variables with a significant bivariate association (P<0.2 to enter) were included in multivariable models and retained if they remained significant in the final model (P<0.05 to stay).

All analyses were conducted using SAS (Statistical Analysis Software) Version 9.4.

RESULTS

Patient-level Characteristics:

- 77.3% of all MOSAIC stroke and TIA cases had a history of hypertension

- Of cases with a history of hypertension, 83.5% arrived on a medication

- Of the 12,707 (83.3%) cases that met all inclusion criteria, the mean age was 72 years, 48.9% were female, 19.9% were Black and 6.3% were a race other than Black or White (Table)

- 7.4% of eligible cases had no AMPD

- Results from the final adjusted multivariable model showed that those that were younger and had a hemorrhagic stroke or TIA were significantly less likely to be discharged home on AMPD (Table)

- No difference of AMPD were identified in sex, discharge disposition or insurance status

- Whites were significantly more likely to be discharged home without AMPD compared to Blacks

Hospital-level Results:

- Rates of no AMPD vary widely among MOSAIC hospitals ranging from 0.0*-70.0%

- Six hospitals had no AMPD rates higher than 15%

*all eligible patients received an antihypertensive medication

Table. Characteristics of Patients with a History of Hypertension and their Association with Not Having Antihypertensive Medication Prescribed at Discharge (AMPD) in the Michigan Coverdell Stroke Registry 2016-2017 (n= 12,707)
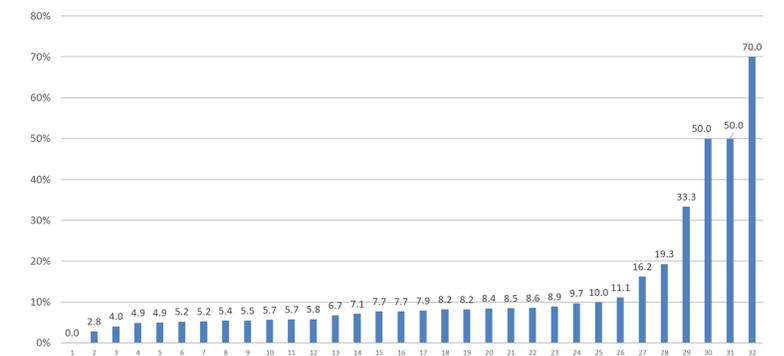
	Total N = 12,707 (%)	Antihypertensive NOT Prescribed N (%) 934 (7.4%)	Antihypertensive Prescribed N (%) 11,773 (92.6%)	Adjusted OR (95%CI)* (NOT Prescribed)
Age years (median)	72.0	69.0	72.0	--
Age				
18-49 years	741 (5.8)	71 (9.6)	670 (90.4)	1.69 (1.28, 2.24)
50-59 years	1797 (14.1)	176 (9.8)	1621 (90.2)	1.71 (1.39, 2.10)
60-69 years	2982 (23.5)	231 (7.8)	2751 (92.2)	1.30 (1.08, 1.57)
70-79 years	3318 (26.1)	205 (6.2)	3113 (93.8)	0.97 (0.80, 1.18)
>/=80 years	3869 (30.5)	251 (6.5)	3618 (93.5)	Ref
Sex				
Male	6218 (48.9)	444 (7.1)	5774 (92.9)	NS
Female	6489 (51.1)	490 (7.6)	5999 (92.4)	
Race				
Caucasian	9386 (73.8)	728 (7.8)	8658 (92.2)	Ref
Black	2525 (19.9)	156 (6.2)	2369 (93.8)	0.71 (0.59, 0.85)
Other Race	796 (6.3)	50 (6.3)	746 (93.7)	0.78 (0.58, 1.05)
Insurance Status**				
Medicare/Medicaid	6122 (48.3)	437 (7.1)	5685 (92.9)	NS
Private only	2602 (20.6)	228 (8.8)	2374 (91.2)	
Medicare and Private	3759 (29.7)	244 (6.5)	3515 (93.5)	
Self-Pay or No Insurance	175 (1.4)	18 (10.3)	157 (89.7)	
Stroke Type				
Ischemic	9447 (74.3)	621 (6.6)	8826 (93.4)	Ref
Hemorrhagic	1200 (9.5)	102 (8.5)	1098 (91.5)	1.64 (1.39, 1.94)
TIA	2060 (16.2)	211 (10.2)	1849 (89.8)	1.28 (1.03, 1.59)
Discharge Disposition				
Home	7282 (57.3)	567 (7.8)	6715 (92.2)	NS
Other Healthcare Facility	5425 (42.7)	367 (6.8)	5058 (93.2)	

* Adjusted odds ratios and 95% confidence intervals generated from a **multivariable logistic regression model.**
** 49 Cases had missing insurance information
NS= non-significant (P> 0.05). Variable dropped from final multivariable model

Figure. Percent of Patients with a History of Hypertension NOT Prescribed an Antihypertensive Medication at Discharge by Hospital, 2016-2017

Each bar represents an individual hospital enrolled in the MOSAIC registry. The mean number of patients who were discharged with no AMPD was 7.4% (range 0.0– 70.0%).

CONCLUSIONS AND FUTURE WORK

- **Antihypertensive medications were not prescribed in 7.4% of cases.**

- Prescribing antihypertensive medications to patients with a history of hypertension at discharge was high across the MOSAIC registry but use was lower in younger patients, and those with hemorrhagic stroke or TIA.

- Hospital-level data shows substantial variability in AMPD performance.

- The MOSAIC Program identified hospitals for follow-up education and quality improvement efforts as well as high performing facilities to share best practices.

- In order to increase AMPD rates, MOSAIC will assist hospitals in identifying cases that did not receive AMPD through review of their data, and perform chart reviews to identify areas to improve performance.

- Next steps will involve a review of patient records to identify areas to target where cases did not receive antihypertensive medications.