

# Evaluating Rehabilitation Discharge Decision Indicators Among Hospitals Participating in Michigan's Ongoing Stroke Registry to Accelerate Improvement of Care [MOSAIC]

Samantha R. Wall, MPH<sup>1</sup>, Ghada Ibrahim, MS<sup>1</sup>, Adrienne V. Nickles, MPH<sup>1</sup>, Suzanne O'Brien, RN, MSN, ANVP<sup>1</sup>, Krystal Quartermus, MS, RD<sup>1</sup>, Robert Wahl, DVM, MS<sup>1</sup>, Teri Scorcia-Wilson, PhD, MPH<sup>1</sup>, Mathew J. Reeves PhD<sup>2</sup>

<sup>1</sup>Michigan Department of Health and Human Services, Lansing, MI | <sup>2</sup>Department of Epidemiology, College of Human Medicine, Michigan State University, East Lansing, MI



## BACKGROUND

Over three-quarters of a million people in the U.S. suffer a new or recurrent stroke each year making it a leading source of disability among Americans.<sup>2,3</sup> Disability burden from stroke results in millions of dollars in healthcare expenditures. There is wide variation in the use of rehabilitation facilities post stroke.<sup>2</sup> The consistency of discharge decision making i.e., the facility chosen for further care: Inpatient Rehabilitation Facility (IRF), Skilled Nursing Facility (SNF), Long-term Care Hospital (LTCH), Intermediate Care Facility (ICF), or Home with/without services varies widely not only hospitals, but also among patients.<sup>1</sup> While severity/impairment level has potential to be a leading indicator for discharge destination, it is unknown what other factors are considered during the discharge process for stroke patients.

**Objective:** To describe variability in frequency of discharge destination [acute (IRF), sub-acute (SNF), other facility type (LTCH, ICF, Home)] of stroke patients to rehabilitation facilities across hospitals participating in Michigan's Ongoing Stroke Registry to Accelerate Improvement of Care (MOSAIC), a statewide Coverdell stroke registry.

## Inpatient Rehabilitation Facility

- Acute rehabilitation
- Intensive short-term rehabilitation
- Three hours of therapy services per day required
- Generally for patients with higher level of rehabilitation need
- Rehabilitation Nursing
- Rehabilitative Therapies:
  - Physical
  - Occupational
  - Speech
- Audiology
- Prosthetics
- Orthotics
- Social/psychological services
- Subacute rehabilitation
- Less intensive longer-term rehabilitation
- Less time in therapy services required

## Skilled Nursing Facility

## Odds Ratio Estimates

Effect	Disability Facility	Point Estimate	95% Wald Confidence Limits	
Insurance (Medicare/caid with Private v. Medicare/caid only)	SNF	0.762	0.627	0.927
Insurance (Private v. Medicare/caid only)	SNF	0.608	0.466	0.793
Insurance (Self-pay v. Medicare/caid only)	SNF	0.175	0.039	0.776
Stroke Type (Hemorrhagic v. Ischemic)	Other	2.982	1.890	4.704
Functional Status [discharge] (dep v. ind)	Other	14.522	6.688	31.531
Functional Status [discharge] (dep v. ind)	SNF	2.712	1.964	3.745
Gender (Female v. Male)	SNF	1.221	1.029	1.449
Age (60-69 v. 18-49)	Other	3.116	1.148	8.460
Age (60-69 v. 18-49)	SNF	1.655	1.054	2.598
Age (70-79 v. 18-49)	SNF	2.131	1.363	3.333
Age (80+ v. 18-49)	SNF	3.890	2.488	6.082

Table 1. Results of Multinomial Logistic Regression analysis showing significant results only. Non-significant comparisons not shown.

## RESULTS

Based on the final multinomial model, 5 independent variables were significantly associated with discharge destination (IRF served as the reference group).

Patients with private insurance alone or private insurance with Medicare/Medicaid were less likely to be discharged to a SNF compared to an IRF (reference category). Those suffering from a hemorrhagic stroke were more likely to be discharged to other rehabilitation destinations (vs IRF). Functional status at discharge (independent vs. dependent physical functionality) was a major indicator of discharge destination with patients who had a dependent physical functionality status at discharge being more likely to be discharged to both SNF and other rehabilitation facility (compared to IRF). Women were more likely to be discharged to SNF compared to IRF and older patients (60+ years) were more likely to be discharged to a SNF compared to IRF.

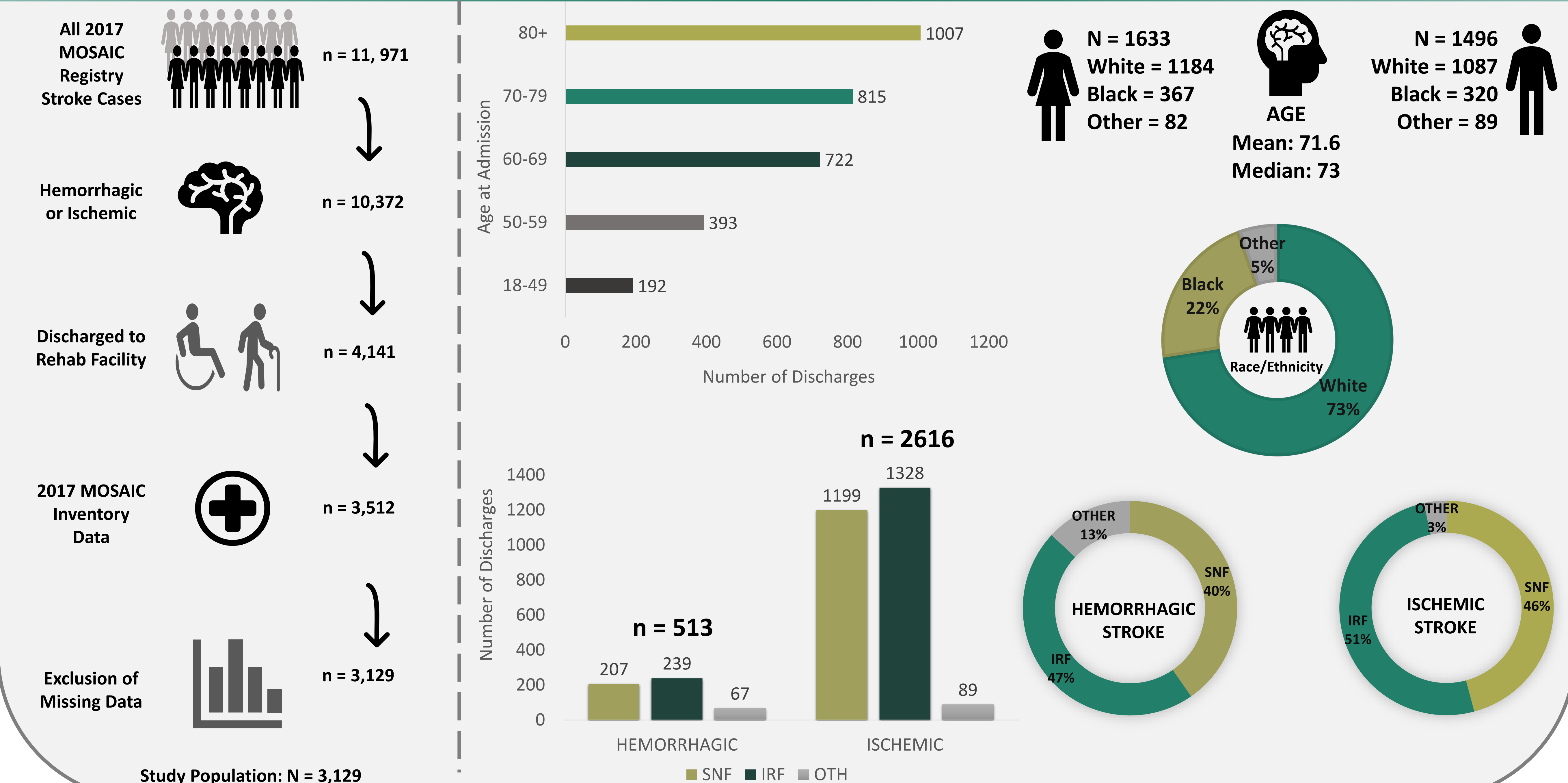
Discharge Destination	IRF	SNF	Other
Private or Paired Insurance v. Medicare/Medicaid Patients	REF	↓	↓
Hemorrhagic Stroke v. Ischemic Stroke	REF	↑	↑
Functional Status at Discharge (dependent) v. Functional Status at Discharge (independent)	REF	↑	↑
Female v. Male	REF	↑	↑
Age (60+) v. Age (18-49)	REF	↑	↑

## Conclusion

We found that insurance coverage, type of stroke, functional status at time of discharge decision, increased age, and gender were independently associated with a patient's discharge destination facility type. Determining factors associated with discharge destination after a stroke event can help to reduce variability in decision-making processes and improve outcomes for stroke patients. Previous studies have found better clinical outcomes associated with inpatient rehabilitation care compared to skilled nursing facilities including decreased length of stay and hospital readmissions, and lower mortality. However, the cost of care associated with IRF's are higher than that of care associated with other rehabilitation facilities,<sup>4</sup> yet discharge destination for stroke patients remains variable. Patients with means to pay for higher health costs (i.e., private insurance coverage) or patients with ability to achieve higher functional status (evident by higher rates of independent functional at discharged) are more often discharged to IRF's than any other type of facility. Age also plays a role in determining discharge destination – with older patients more likely to be DC to a SNF. Discharge destination still seems variable differing among patients and hospitals, however, determining factors associated with discharge destination decisions are becoming clearer.

## METHODOLOGY

Multinomial logistic regression analysis conducted to quantify associations between patient and hospital level factors related to discharge destination. Discharge destination (IRF, SNF, Other: Home with or without services) was utilized as the outcome variable with all other factors (age, gender, race, insurance, functional status- admission/discharge, stroke type, hospital size, and stroke volume) as indicator variables.



1. Bland et al. (2015). Descriptive data analysis examining how standardized assessments are used to guide post-acute discharge recommendations for rehabilitation services after stroke. *Physical Therapy*, 95(5): 710-719. 3. Mozaffarian, D., Benjamin, E.J., Go, A.S., Arnett, D.K., Blaha, M.J., Cushman, M., et al. (2016). Heart disease and stroke statistics-2016 update: A report from the American Heart Association. *Circulation*, 133(4): e38-360. 2. Chan et al. (2013). Incidence, prevalence, costs, and impact on disability of common conditions requiring rehabilitation in the United States. *Archives of Physical Medicine and Rehabilitation*, 95: 986-95. 4. Edelman, T.S. (2014). Inpatient rehabilitation facilities and skilled nursing facilities: Vive la difference! *Center for Medicare Advocacy*. Retrieved from medicareadvocacy.org

This publication was supported, in part, by the Michigan Department of Health and Human Services, as well as through the Grant #1 NU58DP006076-01-00 from the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC.