

## Caring for the Vulnerable and Disadvantaged

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### Abstract

Readmission after ischemic stroke is common and poses immense social and financial burden on the patient, family, and healthcare system. It is therefore crucial for caregivers to recognize the most vulnerable patient population to provide targeted intervention. The study using recent State Inpatient Database demonstrated that patient socioeconomic status and discharge destination are associated with the risk of readmission. Patients living in the zip code area where household income are at the bottom quartile in the United States are at significantly higher risk for readmission. Compared to those being discharged to home, patients leaving against medical advice and discharged to a skilled nursing or rehabilitation facility are at higher risk of readmission.

Ischemic stroke carries a high readmission rate [1]. Among Medicare beneficiaries hospitalized for acute ischemic stroke, 14.1% were readmitted within 30 days, 29.2% within 90 days, and 55.3% within 1 year [1]. Readmission is associated with significantly increased costs and lower chance of survival [2]. In order to conduct targeted intervention, healthcare providers and stroke system managers need to know the population at risk. The authors examined multiple social, economic, hospital- and discharge-related factors in association with 30-day all-cause readmission after IS in 2016 and 2017 using the State Inpatient Database of Arkansas, Iowa, Wisconsin, and New York [3]. It added new insight on the weight of socioeconomic factors on readmission risk.

Among the factors associated with readmission, some were more intuitive than others. Patients with the lowest median household income at ZIP code level were more likely to get readmitted, a consistent finding throughout the literature [4-6]. Another study has shown that living in a neighborhood with high poverty and low education increases rates of readmission in general [7]. The reason behind this association is complex. Representing the socioeconomic situation using median household income at ZIP code level probably reflects neighborhood-related factors such as less access to pharmacies, healthy produce, fitness education and environment, transportation, as well as social support.

Distinguishing between individual- and neighborhood-level socioeconomic status would be an important factor to explore in further studies. Some study showed that minority populations seem to be at increased risk of readmission after stroke [8]. In the current study, Native Americans, although constituted only 0.38% of this study population, were more likely to be readmitted. Black patients showed high readmission risk in unadjusted analysis, but this association dissipated after risk adjustment. The authors dived further into this question with an interaction analysis which showed that Black patients were disproportionately represented in the lowest income neighborhood, suggesting that low income was a higher relative effect for Black patients. Compared to patients with private insurance, those on Medicaid or Medicare were more likely to get readmitted. This is in line with a prior study which demonstrated that patients with Medicare insurance had higher 30-day readmission rate than privately-insured patients in many disease conditions including heart attack, heart failure, pneumonia and gastrointestinal condition [9]. Further studies are needed to investigate the reason underlying higher readmission rate among Medicare and Medicaid patients. It is possible that patients on Medicare or Medicaid are older and have more complex medical issues resulting in higher readmission rates. Another hypothesis is that privately insured patients are more likely to be treated at Emergency department or under rapid observation to avoid

high medical payment or work interruption.

The hospital Readmissions Reduction Program (HRRP) is a program that incentivizes hospitals to reduce avoidable readmissions, by encouraging them to revamp coordination of care and communication, by engaging patients and families in discharge planning [10]. As part of this program, the centers for Medicare and Medicaid services are currently focused on the 30-day risk-standardized unplanned readmission measures for the following conditions: acute myocardial infarction, chronic obstructive pulmonary disease, heart failure, pneumonia, coronary artery bypass graft surgery and elective primary total hip arthroplasty and/or total knee arthroplasty. The concept and strategies recommended by HRRP have been applied to stroke care by many hospitals. Patients being discharged to home are often prioritized for post-stroke follow up phone calls and office visits with the assumption that these patients, unlike those in the facilities, do not have direct access to health care services or monitoring. Our study demonstrated that this prioritization should be revised because patients who left against medical advice, and those discharged to skilled nursing and rehabilitation facilities are at higher risk of readmission than those being discharged to home [3]. Patients discharged home without home health care were less likely to be readmitted. We postulate that patients discharged to home might have less severe stroke and disabilities, less comorbidities, stronger family and community support, and earlier resumption of normal lifestyle. This seems to support the notion to use discharge-to-home rate as an outcome measure by the U.S. News & World Report for "Best Hospitals" ranking [11]. This finding needs to be further confirmed by a national level study in the United States since it was in agreement with some studies but different from others [6,12,13]. In a recent Australian study on 90-day readmission after ischemic stroke or transient ischemic attack, discharge-to-home, compared to discharge-to-facilities, was associated with higher readmission rates [6]. The selection of discharge destination and the post-acute care in the facility and community have been evolving in each country and are significantly affected by non-clinical factors and policies [11,14-17]. Timely real-world data of each country or region are important to inform the effect of these changes on patient outcomes, as matching a patient more accurately with their appropriate discharge location can prevent unnecessary readmissions [18]. In addition, multiple interventions may hold promise for reducing readmission rates, and consist not only of intensified secondary risk factors interventions and continued post-discharge rehabilitation, but also fall risk assessments, vaccinations, and meticulous catheter care [19].

Another finding that needs to be further investigated is whether the risk of readmission is different between skilled nursing facilities (SNF) and inpatient rehabilitation facilities (IRF). A few studies have attempted to compare the mortality or readmission rates among different post-acute care settings but reached mixed results [20,21]. Unfortunately,

the discharge destination in the State Inpatient Database or National Inpatient Sample does not distinguish SNF vs IRF. This information can be found in Medicare database and some commercial administrative databases but the cost of obtaining these data have limited their usage.

In summary, our research, along with other studies in the literature, showed that the rate of readmission in the first month post-ischemic stroke is heavily affected by socioeconomic factors. The clinical implications of stroke readmission are numerous and include hospitalization-associated complications and mortality as well as further financial burden on all parties involved. Patients living in the most disadvantaged neighborhood are at particularly increased risk, which dictates the need for directed efforts towards those communities. Readmission rate is intimately associated with discharge destination, with those left against medical advice being the highest, a population that has not received sufficient attention from researchers and hospital care planning team. Patients being discharged to facilities should also become a focus of discharge planning because they have higher readmission rates than those being discharged home. This study also raised a number of questions for further research, for example, whether patients being discharged to IRF have the same readmission risk as those discharged to SNF, and whether the care for patients in facilities represents an opportunity for further quality improvement.

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