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Emergency department utilization after hospitalization discharge for acute stroke: The COMprehensive Post-Acute Stroke Services (COMPASS) study

Each year nearly 800,000 people in the United States experience a stroke.[1] Those that survive are at high risk for complications after hospital discharge. Providing appropriate care during the recovery from this complex condition is a challenge for patients, caregivers, and health care providers. Understanding emergency department (ED) utilization after a stroke may provide insights into long-term management of stroke, inform interventions, improve patient outcomes, and reduce medical costs. A comprehensive transitional care model for post-acute stroke care may influence the need to seek ED care for downstream events after a stroke. To date, most transitional care trials exploring post-stroke healthcare utilization were conducted outside of the U.S. health-care system.[2] We examined data from the Comprehensive Post-Acute Stroke Services (COMPASS) study, a cluster-randomized pragmatic trial of a post-discharge transitional care model for stroke survivors and their caregivers compared with usual care.[3,4]

The COMPASS transitional care intervention was designed to integrate medical and community resources to meet the needs of stroke survivors and caregivers and optimize outcomes.[3,4] As part of a pre-planned analysis of secondary outcomes,[4] we used Medicare fee-for-service (FFS) claims files linked with COMPASS study data to characterize ED utilization during the first year after initial hospitalization for patients with acute stroke who were discharged home. Descriptive statistics were generated according to study arm and subgroups of interest. We analyzed data from 648 patients from 19 hospitals randomized to implement the COMPASS intervention and 702 patients from 20 hospitals randomized to usual care. Patient characteristics were similar according to study arm, except the intervention group had a greater proportion of women, whites, and individuals living outside of metropolitan areas. The distributions of the two groups were similar with respect to stroke severity, medical history and comorbidities, hospital length of stay, and ambulatory status at discharge. Analysis of time-to-event endpoints focused on estimation of the cause-specific hazard and, thus, censored patients who died. Analyses were performed with Cox proportional hazards regression, adjusted for covariates selected a priori: age, sex, race, stroke type, NIH Stroke Scale score, history of transient ischemic attack, and history of stroke. Further adjustment for additional covariates did not meaningfully change estimands of interest.

Overall, more than half of patients had an ED visit during the 1-yr follow-up period, and 47% had a stand-alone ED visit that did not result in subsequent hospitalization (Table 1). The vast majority of all ED visits (67%) did not lead directly to admission to the hospital. The total number of visits to the ED was comparable between usual care and intervention groups. The rate (per person-year) of stand-alone ED visits during the 1-yr follow-up was also similar between usual care and intervention groups (1.23 per person-year and 1.10 per person-year, respectively). Similarly, the median number of days

TABLE 1 ED visits during 1-yr follow-up, by treatment assignment

ED utilization metric	Usual care (*N* = 702)	Intervention (*N* = 648)	Total (*N* = 1350)
ED visits not associated with admission			
Time to first visit (median days, IQR)	88 (24–187)	103 (26–198)	94 (25–192)
Number of visits (average rate per person-year)	781 (1.23)	654 (1.10)	1435 (1.17)
n (%) with 1+ visits during follow-up	328 (46.7)	305 (47.1)	633 (46.9)
n (%) with 3+ visits during follow-up	90 (12.8)	70 (10.8)	160 (11.9)
Any ED visit			
Time to first visit (median days, IQR)	78 (23–171)	68 (16–175)	74 (19–172)
Number of visits (average rate per person-year)	1146 (1.80)	996 (1.68)	2142 (1.74)
n (%) with 1+ visits during follow-up	405 (57.7)	375 (57.9)	780 (57.8)
n (%) with 3+ visits during follow-up	143 (20.4)	137 (21.1)	280 (20.7)

Abbreviation: IQR, interquartile range.

until first stand-alone ED visit was comparable between usual care and intervention groups (88 and 103 days, respectively). Patterns for any ED visit (including those linked to hospital admission) were similar (Table 1).

The hazard ratio for the intervention compared to usual care for being seen in the ED during the 1-yr follow-up period was 1.06 (95% confidence interval: 0.89, 1.25). This suggests no difference in ED utilization according to treatment assignment after adjusting for patient baseline covariates. Stratified analysis of ED visits according to geographic region (urban, rural) and dual Medicaid coverage showed a general trend for higher rates in usual care compared to intervention, although none of the differences were statistically significant. Of note, the subgroup with the highest ED utilization rate was seen among patients dually eligible for Medicaid coverage in the usual care group (3.5 visits per-person year). The most common specific reason for an ED visit was for a cerebrovascular disease episode (70% ischemic stroke, 8% hemorrhagic stroke, 21% other) followed by injuries, accounting for 11% and 10% of all visits, respectively. Non-specific signs and symptoms accounted for 19% of all visits. There were no statistically significant differences in ED diagnosis between intervention and usual care groups.

Post-hospitalization is often a period of increased vulnerability for patients, and stroke survivors are at particularly high risk for post-discharge complications.[5] We found that it is common for stroke patients to be seen in the ED within 1 yr of being discharged home and that the vast majority were not readmitted to the hospital. More than 20% were seen in the ED three or more times within the first year after being discharged home. A post-discharge transitional care approach was not associated with fewer ED visits compared to usual care. A further understanding of the urgent and emergency care needs of stroke survivors may inform future care models for patients with complex conditions such as stroke.

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CONFLICT OF INTEREST

All other authors report no conflicts.

AUTHOR CONTRIBUTIONS

WR and PD conceived of this study; WR, PD, SJ, AKN, MP, BL, SC, and AJ participated in obtaining funding for this study; AKN, SJ, and WR led data acquisition; SJ, MP, AKN, WR, AJ, and SS conducted statistical analysis and data management; all authors participated in interpretation of the data, drafting of the manuscript, editing, and revision.

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