Editorial

Readmission after stroke: Recurrence or infection?

Stroke is a major cause of morbidity and mortality worldwide in both developed and undeveloped countries. In 2012, it was the third leading cause of death and the leading cause of disability in elderly individuals in Taiwan.[1] Stroke constitutes a major public health problem that poses a tremendous socioeconomic burden on society. About 70% of acute stroke events result in hospitalization.[2] The duration of hospitalization is longer and rates of readmission, medical comorbidities, and expenditures are higher for stroke patients than for patients with other chronic illnesses.[2,3]

After discharge following acute hospitalization, stroke survivors usually experience persistent neurological symptoms that require ongoing medical attention. Additionally, they are at a high risk for new illness (including recurrent stroke), aggravation of known disease, and functional decline, all of which ultimately lead to a high risk of rehospitalization. Readmission rates show the ongoing challenges that stroke survivors face: 18−28% are readmitted within the first 3 months,[4,5] 26−44% within 6 months,[6] and 50% within 1 year;[4,5,7] less than 15% of survivors remain admission-free for 5 years.[7] Stroke is the second leading cause of hospital admission in elderly individuals.[8] Age, stroke severity, recurrent vascular events (e.g., stroke, cardiovascular events), other comorbidities (e.g., diabetes, hypertension), and infection were the most common reasons for readmission.

Nonvascular complications are common reasons for rehospitalization in stroke survivors. Infection (e.g., pneumonia or respiratory distress, urinary tract infection) is among the most common reasons for readmission, particularly during the early period after discharge.[7,9] These complications may be related to neurological sequelae, such as dysphagia, sphincter dysfunction, and limited motor function, as well as poor quality of care and nutritional status after discharge. Dysphagia is especially common among stroke patients with pneumonia, and it is a leading cause of nonvascular death after stroke in acute and chronic settings.[7] Although dysphagia is frequently encountered in stroke patients, it is not an independent predictor for stroke survival.[10] However, other factors such as advanced age, stroke severity, and other comorbidities might play important roles in predicting stroke outcome.

The importance of recurrent stroke is well recognized in terms of clinical outcome and high healthcare cost.[11] In addition, recurrent stroke remains a leading cause for readmission after stroke.[7] Many clinical guidelines and several medical societies, such as the Taiwan Stroke Society, have recommended therapies, such as the use of antithrombotic agents, to prevent recurrent ischemic stroke and thereby reduce the rate of readmission. However, the percentage of patients taking antiplatelet agents after stroke decreases with time,[12] which highlights the importance of bridging the often-unrecognized gap between clinical guidelines and clinical practice in poststroke care.[9]

Not surprisingly, advanced age is one of the strongest predictive factors for poststroke outcome.[9,10] Other factors affecting the risk of rehospitalization include atrial fibrillation, myocardial infarction, and other cardiovascular events. In one study, the number of readmissions for acute myocardial infarction was comparable to that for stroke,[7] demonstrating the common vascular nature of cardiovascular and cerebrovascular diseases.

The presence of medical comorbidities is also an important risk factor for rehospitalization. Diabetes is a well-known risk factor for poor prognosis of long-term survival.[10] Diabetes and impaired cognition were independent predictors of survival in elderly stroke patients. The role of hypertension in stroke survivors is controversial,[10] although it is a powerful independent risk factor for cardiovascular diseases. The difficulty of defining this role may be due to the fact that patients may receive appropriate treatment for hypertension during follow-up.[13]

In the current era of globally escalating stroke care burden, the cost effectiveness of specialized stroke services must be evaluated in each healthcare system. In 2010, 122,723 of 23 million inhabitants were hospitalized because of cerebrovascular disease (CVD), constituting 6.7% of all hospital admissions in Taiwan.[14] In that year, 10,134 individuals died from CVD, which is equivalent to a crude death rate of 43.8/100,000 persons and accounts for 7.0% of all deaths. The healthcare cost associated with CVD was US$ 401 million, which constituted 2.76% of the total annual healthcare expenditure throughout the entire National Health Insurance program in Taiwan.

In this issue of the *Journal of the Chinese Medical Association*, Lee et al[15] report on reasons for readmission, mortality rate, and medical cost during the first year after acute stroke. In an analysis of the National Health Insurance Research Database, the authors found a high rate (∼50%) of readmission during the first year after acute stroke,

irrespective of stroke subtype. This rate was higher for hemorrhagic stroke (HS; subarachnoid or intracerebral hemorrhage) than for ischemic stroke (IS). Vascular (recurrent stroke and heart/circulatory diseases) and nonvascular (late effect of previous stroke, respiratory disease/infection, and diseases of the digestive system) causes were major reasons for readmission. Advanced age, hemorrhagic stroke, and greater number of comorbidities were predictors of poor outcome. Initial hospitalization constituted nearly half (44%) of the first-year medical cost (FYMC). Of note, 29% of the FYMC was due to readmission. Patients with HS had higher FYMCs than did those with IS. This study confirmed the findings that more life years were lost and greater number of comorbidities in HS than in IS patients, which was explained by greater FYMCs for HS patients.

In conclusion, stroke survivors have tremendous neurological and nonneurological sequelae. The use of up-to-date databases is warranted to examine secular trends in stroke care and explore underlying determinants for the development of effective initiatives to improve stroke outcomes. Further studies incorporating functional status or utility measurement data from stroke survivors, collected from clinical trials or stroke registries, in cost-utility analyses of stroke management are urgently needed.

Acknowledgments

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Li-Chi Hsu
Jong-Ling Fuh*
Department of Neurology, Neurological Institute, Taipei Veterans General Hospital, Taipei, Taiwan, ROC
National Yang-Ming University School of Medicine, Taipei, Taiwan, ROC

*Corresponding author. Dr. Jong-Ling Fuh, Department of Neurology, Neurological Institute, Taipei Veterans General Hospital, 201, Section 2, Shih-Pai Road, Taipei 112, Taiwan, ROC.
E-mail address: jlfuh@vghtpe.gov.tw (J.-L. Fuh)