Outcomes after Stroke in Patients with Previous Pressure Ulcer: A Nationwide Matched Retrospective Cohort Study

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Background: Factors associated with poststroke adverse events were not completely understood. The purpose of this study was to investigate whether stroke patients with previous pressure ulcers had more adverse events after stroke. *Methods:* Using the claims data from Taiwan's National Health Insurance Research Database, we conducted a retrospective cohort study matched by propensity score. Three thousand two first-ever stroke patients with previous pressure ulcer and 3002 first-ever stroke patients without pressure ulcer were investigated between 2002 and 2009. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) of complications and 30-day mortality after stroke associated with previous pressure ulcer were calculated in the multivariate logistic regressions. *Results:* Patients with pressure ulcer had significantly higher risk than control for poststroke urinary tract infection (OR: 1.56, 95% CI: 1.38-1.78), pneumonia (OR: 1.35, 95% CI: 1.16-1.58), gastrointestinal bleeding (OR: 1.31, 95% CI: 1.04-1.66), and epilepsy (OR: 1.84, 95% CI: 1.83-1.85). Stroke patients with pressure ulcer had increased 30-day poststroke mortality (OR: 2.01, 95% CI: 1.55-2.61), particularly in those treated with debridement (OR: 2.87, 95% CI: 1.85-4.44) or high quantity of antibiotics (OR: 4.01, 95% CI: 2.10-7.66). Pressure ulcer was associated with poststroke mortality in both genders and patients aged 60 years or older. *Conclusions:* This study showed

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Dr. Chun-Chuan Shih contributed equally with the first author; Prof. Ta-Liang Chen contributed equally with the corresponding author.

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increased poststroke complications and mortality in patients with previous pressure ulcer, which suggests the urgent need for monitoring stroke patients for pressure ulcer history. **Key Words:** Complications—mortality—outcomes—pressure ulcer—stroke.

Introduction

Pressure ulcer is a worldwide health problem presenting in 50% of critically ill patients and in more than 70% of elderly patients in U.S. nursing homes.[1,2] Risk factors for pressure ulcer include age, altered level of consciousness, limited mobility or immobility, sensory impairment, severe chronic or terminal disease, vascular disease, malnutrition, or dehydration.[3] Psychosocial as well as medical complications may develop in patients with pressure ulcers. Loss of daily activity, being isolated, and economic burden for family and society contribute to deterioration of psychosocial function in patients with pressure ulcers.[4] These patients also face risk of chronic inflammation, infection, sepsis, and even death from septicemia.[5-7]

Stroke remains a leading cause of death worldwide, with an estimated 16 million people affected by stroke annually.[8] Poststroke outcomes are critical for patients, families, caregivers, and clinicians, particularly because poststroke disabilities increase health-care costs and keep about half of survivors from returning to their careers.[9,10] Dementia, prestroke dependency, atrial fibrillation, cancer, coronary artery disease, heart failure, renal dysfunction, and dialysis have been considered as predictors for poststroke morbidity and mortality.[11] Previous studies showed that using the U.S. National Institutes of Health Stroke Scale on presentation is more predictive than models involving patient demographics and comorbidities.[12] However, the application of predictive models of stroke prognosis has not been well validated and their generalizability is limited. Investigation of factors that would affect poststroke morbidity and mortality is important so that clinicians can offer optimal care for patients with higher risks.

Although pressure ulcer is considered a common complication after stroke,[13] limited information is available on the association between prestroke pressure ulcer and poststroke complications. Based on the reimbursement claims from Taiwan's National Health Insurance Research Database, we conducted a nationwide retrospective cohort study to investigate the impact of prestroke pressure ulcer on outcomes after stroke.

Methods

Source of Data

Research data were obtained from reimbursement claims of Taiwan's National Health Insurance Program, which was implemented in March 1995 and covers more than 99% of the nation's 22.6 million residents. The National Health Research Institutes established the National Health Insurance Research Database to record for public research purposes all beneficiaries' medical services, including inpatient and outpatient demographics, primary and secondary diagnoses, procedures, prescriptions, and medical expenditures. The validity of this database has been favorably evaluated, and research articles based on it have been accepted in prominent scientific journals worldwide.[14-18]

Ethical Approval

Insurance reimbursement claims from the National Health Insurance Research Database are available for public access. To protect personal privacy, the electronic database with patient identifications was decoded and scrambled for further research access. Although informed consent was not required because of this privacy protection, the study was evaluated and approved by the National Health Research Institutes (NHIRD-103-121).[14-18]

Study Population

We examined medical claims and identified 3002 patients aged 20 years or older with pressure ulcer before stroke from among 403,857 hospitalized first-ever stroke patients between 2002 and 2009 in Taiwan. Patients with previous stroke, cerebral palsy, and brain tumor as physicians' primary diagnosis were excluded until 1996. To strictly identify patients with pressure ulcer, this study considered patients with pressure ulcer as those who had made at least 1 visit for inpatient or outpatient care for pressure ulcer within the 24-month period before stroke hospitalization. Using propensity score-matched pair procedure, we matched each stroke patient with pressure ulcer with a randomly selected 3002 stroke patient without previous pressure ulcer by gender, age, low-income status, urbanization, index admission or nonadmission in a teaching hospital, types of stroke, length of hospital stay before stroke admission within 24 months, stay in intensive care unit before stroke admission within 24 months, and coexisting medical conditions.

Measures and Criteria

Income status was identified by defining low-income patients as those qualifying for waived medical copayment, because this status is verified by the Taiwan Bureau of National Health Insurance. Also recorded were whether