Effects of Nurse Staffing on Surgical Patient-Outcomes with Cerebrovascular Disease in General Hospitals

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Abstract. This study was to examine the relationships between nurse staffing and patient outcomes. Data for this study were obtained from the '2008 Korea National Patients Survey' conducted by the Korea Institute for Health and Social Affairs. Hospital characteristics included size, location, ownership, and physician staffing. Patient characteristics were age, gender, primary diagnosis, admission route, type of surgery, and primary payer. Nurse staffing was not significantly associated with inpatient mortality. Government and nursing policies are required to ensure adequate nurse staffing in hospitals.

Keywords: Mortality, Patient outcomes, Nurse-staffing

1 Introduction

This study aims to objectively examine the influences of nurse staffing on patient outcomes through multilevel analysis of large-scale national data and controlling factors that affect patient outcomes patient standards. The results concluded from this study will provide evidence for the importance of the nation and medical institution’s awareness on nurse staffing and adequate maintenance and management, and will contribute to the establishment of adequate government policies regarding nursing staff in the long term.

The purpose of the study is to analyze the relationship between nurse staffing and surgical cerebrovascular disease patient outcomes (mortality). The concrete aims of the study are as follows:

1) Comprehend characteristics of hospitals and patients, and identify nurse staffing
2) Analyze the relationship between nurse staffing and the mortality of surgical cerebrovascular disease patients.

1 This manuscript is based on a part of the first author’s doctoral dissertation from Hanyang University.
2 Methods

This study is a descriptive correlation study, conducting multilevel analysis with the characteristics of hospital standards and patient standards in consideration, in order to identify the relationship between nurse staffing and the mortality of surgical cerebrovascular disease patients.

In 2008, a total of 304 general hospitals were identified out of hospital categorization of the Patients Survey, and excluding the 6 hospitals that had no nursing force (nurses and nurses’ aide), 297 hospitals were included for the analysis. Among the total of 297 general hospitals, 286 which treat cerebrovascular disease (Korean Standard Classification of Diseases·I60-I69) patients, were selected for the analysis.

To obtain a statistically reliable estimation of the selected general hospitals, the hospitals with less than 10 surgery and non-surgery patients each were omitted, using the same mechanism as the study on the Intensive Care Unit (ICU) patients conducted by Cho et al [6]. The total number of general hospitals and patients that were included in the final study sample were as follows.

Table 1. Hospitals and patients that were included in the final study sample.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Korean Standard Classification of Diseases code</th>
<th>Hospitals number</th>
<th>Patients number</th>
</tr>
</thead>
<tbody>
<tr>
<td>subarachnoid hemorrhage</td>
<td>I60</td>
<td>40</td>
<td>194</td>
</tr>
<tr>
<td>intracerebral haemorrhage</td>
<td>I61</td>
<td>38</td>
<td>133</td>
</tr>
<tr>
<td>other nontraumatic intracranial haemorrhage</td>
<td>I62</td>
<td>28</td>
<td>71</td>
</tr>
<tr>
<td>cerebral infarction occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction</td>
<td>I65</td>
<td>13</td>
<td>36</td>
</tr>
<tr>
<td>other cerebrovascular disease</td>
<td>I67</td>
<td>36</td>
<td>175</td>
</tr>
<tr>
<td>Sequelae of cerebrovascular disease</td>
<td>I69</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>41</td>
<td>728</td>
</tr>
</tbody>
</table>

SAS Ver.9.2 program was used for the data analysis in this study, and the data was compiled into statistics through multilevel regression model and descriptive statistics in order to reflect the data as assemblage data of the patients in the hospital, and the level of significance was set as p<.05.

This data utilized the original data of the 2008 Korea National Patients Survey. A request for the original data of the 2008 Korea National Patients Survey was submitted to Korean Institute for Health and Social Affairs through the internet for this. Documents requested by the institutes such as the research plan and an written oath were prepared afterwards and the original data was provided after internal evaluation. Prior to the commencement of the analysis of the provided original data, the study received approval (HYI-11-016) from the IRB of H general hospitals.
3 Study results

3.1 General characteristics of patients

Examining the general characteristics of the 728 surgical cerebrovascular disease patients, their average age was 56.8 years, and there were more male patients with 377 of them being male (51.8%). Categorized per their diseases, subarachnoid hemorrhage (I60) patients were 194 (26.7%), intracerebral hemorrhage (I61) patients were 133 (18.3%), other nontraumatic intracranial haemorrhage (I62) patients were 71 (9.8%), cerebral infarction (I63) patients were 115 (15.8%), occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction (I65) patients were 36 (5.0%), other cerebrovascular disease (I67) patients were 175 (24.0%) and sequelae of cerebrovascular disease (I69) patients were 4 (0.6%), showing that the subarachnoid hemorrhage patients consisted the majority. Among the types of operation that the patients underwent, cardiovascular surgery was the most frequent at 40.8%, followed by nervous system surgery at 40.5%.

In the case of the final patient outcome after surgery, full recovery was at 85.7%, no improvement was at 4.3%, unverifiable outcomes was at 0.7%, discharged patients with no likelihood was at 0.4% and dead patients was at 8.9%. Normal discharging was the most frequent discharging of patients at 88.1% and transfer was at 9.3%, and 265 patients (36.4%) were admitted as an outpatient and 462 (63.5%) were hospitalized through the emergency room. In the case of hospitalization route, direct visit at 73.5% was higher than request from other medical institutions, and health insurance took up the majority of primary payer of medical fees at 88.6% and medical benefit at 7.8%. The average number of days of hospitalization was at 37.9 ± 72.0 days.

3.2 Association between nurse staffing and inpatient mortality

To determine the influences of nurse staffing on inpatient mortality, models were constructed with variables of hospital standards and patient standards, as surgical cerebrovascular disease patients as subjects. Nurse staffing indicators were applied in the same way as internal medicine patients and nurse staffing variable was applied to each model. In the mortality of surgical cerebrovascular disease patients, types of their disease and the operation they received displayed a significant relationship whereas the indicators explaining mortality and nurse staffing did not have a significant relationship.

In Model 1 that includes number of beds per nurse, subarachnoid hemorrhage displayed mortality rate 15.92 times higher than other disease (Other nontraumatic intracranial haemorrhage, Occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction, Sequelae of cerebrovascular disease); Intracerebral hemorrhage displayed mortality rate 16.96 times higher than other disease; and other surgeries displayed mortality rate 0.32 times lower than cardiovascular surgery.
However, the relationship between the indicator of nurse staffing, number of beds per nurse and mortality was not significant.

In Model 2 that included number of inpatient days per nurse, subarachnoid hemorrhage displayed mortality rate 16.10 times higher than other diseases (Other nontraumatic intracranial haemorrhage, Occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction, Sequelae of cerebrovascular disease); Intracerebral haemorrhage displayed mortality rate 16.10 times higher than other diseases; cardiovascular surgery displayed mortality rate 0.33 times lower than other surgeries. However, the relationship between number of inpatient days per nurse and mortality was not significant.

5 Discussion

Upon examination of the conclusions of this study’s mortality index, it was displayed that there are no significant relationships between mortality and both the number of beds per nurse and the number of inpatient days per nurse. Such conclusion displays a contradicting result from the studies [20] on nurse staffing and inpatient mortality among patient outcomes, which have displayed that increased nurse staffing leads to decreased mortalities of patients within the hospital. This may have resulted from the limitations of data in this study and consequential lack of sufficient estimation of patient outcomes; the variables that greatly influence mortalities are patients’ characteristics, the structure and the process of treatment provision, and other various variables among which patients’ characteristics have the largest influence [23] and the effect of patient treatment and hospital structure can be measured through effective hazard estimation of patients’ characteristics. Halm et al [25] explains that the failure to reflect the severity of the patients between hospitals accounts for the absence of the significant relationship between nurse staffing and mortality of patients in studies with general surgery, orthopedics, and vascular surgery patients as subjects.

References