Effects of Nurse Staffing Ratios on Patient Mortality in Taiwan Acute Care Hospitals: A Longitudinal Study

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ABSTRACT

Background: The nurse workload in Taiwan averages two to seven times more than that in the United States and other developed countries. Previous studies have indicated heavy nursing workload as an underlying cause of preventable patient death. No studies have yet explored the relationship between nurse staffing ratio and patient mortality in Taiwan.

Purpose: This study explored the effect of nurse staffing ratios on patient mortality in acute care hospitals in Taiwan and considered the implications in terms of policy.

Methods: Using stratified random sampling, 108 hospital nursing units in 32 of Taiwan’s 441 accredited Western medicine district/regional hospitals and medical centers were included in the study. Variables were retrospectively measured from 108 wards by using monthly data during a 7-month period. A generalized estimating equation logistic model was used to obtain more precise estimates of the nurse staffing effect by controlling for hospital characteristic and patient acuity variables.

Results: The population-averaged odds ratio for the incidence of death between the low and high patient–nurse ratio groups was 3.617 (95% CI = [1.930, 6.776]). The risk of death in the high patient–nurse ratio group was significantly higher than in the low patient–nurse ratio group.

Conclusions: Nurse staffing levels affect patient outcomes. Faced with the problem of inadequate nurses for hospital healthcare needs, Taiwanese policymakers should work to implement a legislatively mandated minimum patient–nurse ratio on a shift-by-shift basis to regulate nurse staffing. In setting guidelines for nurse staffing, policymakers must consider nursing staff characteristics in addition to the number of nurses.

Key Words: nurse staffing ratio, patient mortality, generalized estimating equation (GEE).

Introduction

Nursing care is a comprehensive practice that is designed to restore the health of those who are sick and educate individuals to help maintain or improve health (International Council of Nurses, 1973). As such, measuring nursing care quality has become increasingly important. Some studies have placed a growing emphasis on the relationship between nursing care and patient outcomes (Aiken, Clarke, & Sloane, 2001; Aiken, Clarke, Sloane, Sochalski, & Silber, 2002), which involves assessing a patient’s health status or behavior after receiving treatments or nursing care. Research on nursing care quality typically only evaluated whether nurses completed nursing care plans and followed physicians’ orders until a 1960 study showed that nursing care quality declines with increasing patient numbers (Safford & Schlotfeldt, 1960). Subsequent studies continued to show a significant relationship between nurse staffing ratios and patient outcomes (Aiken et al., 2002; Virtanen et al., 2008; Yang, 2003).

Previous research showed that a 1:4 nurse-to-patient ratio increased the risk of death by 7% for patients within 30 days of hospitalization. This rose to 14% for a 1:6 ratio and 31% for a 1:8 ratio (Aiken et al., 2002). This result suggests that a heavy nurse workload contributes to preventable patient deaths. The chronic shortage of nurses further exacerbates these problems with higher rates of adverse events including medical errors, readmissions, infection, mortality, patient falls, pressure sores, and complaints from patients and their families (Parish, 2002; Unruh, 2003; Yang,