

Review

The association of nurse educational preparation and patient outcomes: Systematic review and meta-analysis



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1. Introduction

Baccalaureate nursing education has existed for more than 100 years, since 1909, when the University of Minnesota started the first nursing bachelor's program (Scheckel, 2009). In 2008, 47% of nurses working in the American health care system held a bachelor's degree or above (U.S. Department of Health and Human Services, 2010). The mean percentage of baccalaureate nurses was 54% in 12 European countries, but the percentage varied widely across countries, from 0% in Germany to 100% in Norway and Spain (Aiken et al., 2013). The wide variation may reflect inconsistent opinion about the value of nurse education on patient care quality among nursing educators, administrators, and policy makers. Although higher educational preparation, such as bachelor's degree or above, prepares nurses with more physiological, psychological, and social knowledge; better professional communication skills; and patient supervision ability, which are assumed to be more suitable to the present complex and more acute medical environment, its impact on patient outcomes is unclear.

Clarification of the impact of higher educational preparation of nurses is critical today when funding for nurse education and recruitment is

limited. Policies for funding allocation should be based on the value of nurse educational preparation on quality of care and patient safety. The issue exists not only in developed countries but also in developing countries whose governments plan to advance the educational level of nurses to improve patient care. For example, China plans to increase the percentage of nurse students enrolled in a baccalaureate program from 30% to 50% in 2015 (Ministry of Health, 2004). Before a decision is made, the impact of a nursing baccalaureate degree on patient care should be considered in depth.

The purpose of this study was to synthesize available empirical evidence to investigate the relationship between nurse educational preparation and patient outcomes. More specifically, the aims were to examine (1) whether a higher proportion of nurses with a bachelor's degree or above was associated with better patient outcomes; (2) how much the effect was of a 10% increase in the proportion of nurses with a bachelor's degree or above on patient outcomes; (3) whether the association varied by confounding factors such as diagnoses, countries, data modeling methods, and quality of the included studies; and (4) the calculated number of avoided adverse events. The independent variable for the study was nurse educational level, which was categorized as (1) associate degree or (2) bachelor's degree or above. Higher degrees, such as master's and doctor's degree in nursing, were not examined separately in primary studies. We chose patient-centered, nursing-sensitive outcomes proposed by the National Quality Forum (National Quality Forum, 2004) as the dependent variables of the study. These outcomes included (1) failure to rescue (death from a hospital-acquired complication); (2) pressure ulcer (stage 2 or greater acquired during hospitalization); (3) falls; (4) falls with injury; (5) restraint (vest or limb restraint); (6) urinary catheter-associated urinary tract infection; (7) central-line, catheter-associated bloodstream infection; and (8) ventilator-associated pneumonia. We also included 30-day patient mortality (death occurring within 30 days after hospital admission) as one dependent variable because it is an important indicator of patient safety and quality of care and is reported by most researchers.

2. Methods

2.1. Search Strategy

The systematic review was conducted according to the checklist of the "Meta-analysis of Observational Studies in Epidemiology" (MOOSE)

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(Stroup et al., 2000). Four nurse researchers searched CINAHL, MEDLINE, Cochrane databases, American Nurses Association publications, and the digital dissertation database from January to June 2015 to identify studies investigating the association between nurse educational level and patient outcomes. The search was limited to the papers published since 2003 because this year was the first time researchers divided nurse educational preparation to baccalaureate degree or above and others to investigate the relationship between nurse educational level and patient outcomes (Ridley, 2008). The search was conducted in headings, keywords, and abstracts, using “nurse educational preparation,” “nurse educational level,” “nurses with a bachelor’s degree,” “nursing skill mix,” “nursing complement,” “nurse staffing,” “patient outcomes,” “quality of care,” “mortality,” “failure to rescue,” “falls,” “pressure ulcers or bed sores,”

“restraint,” “central line infection,” “pneumonia,” and “urinary tract infection.” Each search term of nurse educational level was combined with each search term of patient outcomes. For example, “nurses with a bachelor’s degree” was used in combination with “patient outcomes,” “quality of care,” “mortality,” “failure to rescue,” “falls,” “pressure ulcers,” “bed sores,” “restraint,” “central line infection,” “pneumonia,” and “urinary tract infection,” respectively. The primary purpose of some studies was to examine the effect of other staffing or organizational attributes such as nurse-to-patient ratio and nurse practice environment on patient outcomes. Nurse educational preparation was adjusted as a covariate in the context and was not reflected in the title and abstract. Search only on titles and abstracts might miss eligible studies. Therefore, following the electronic database search, the researchers conducted a

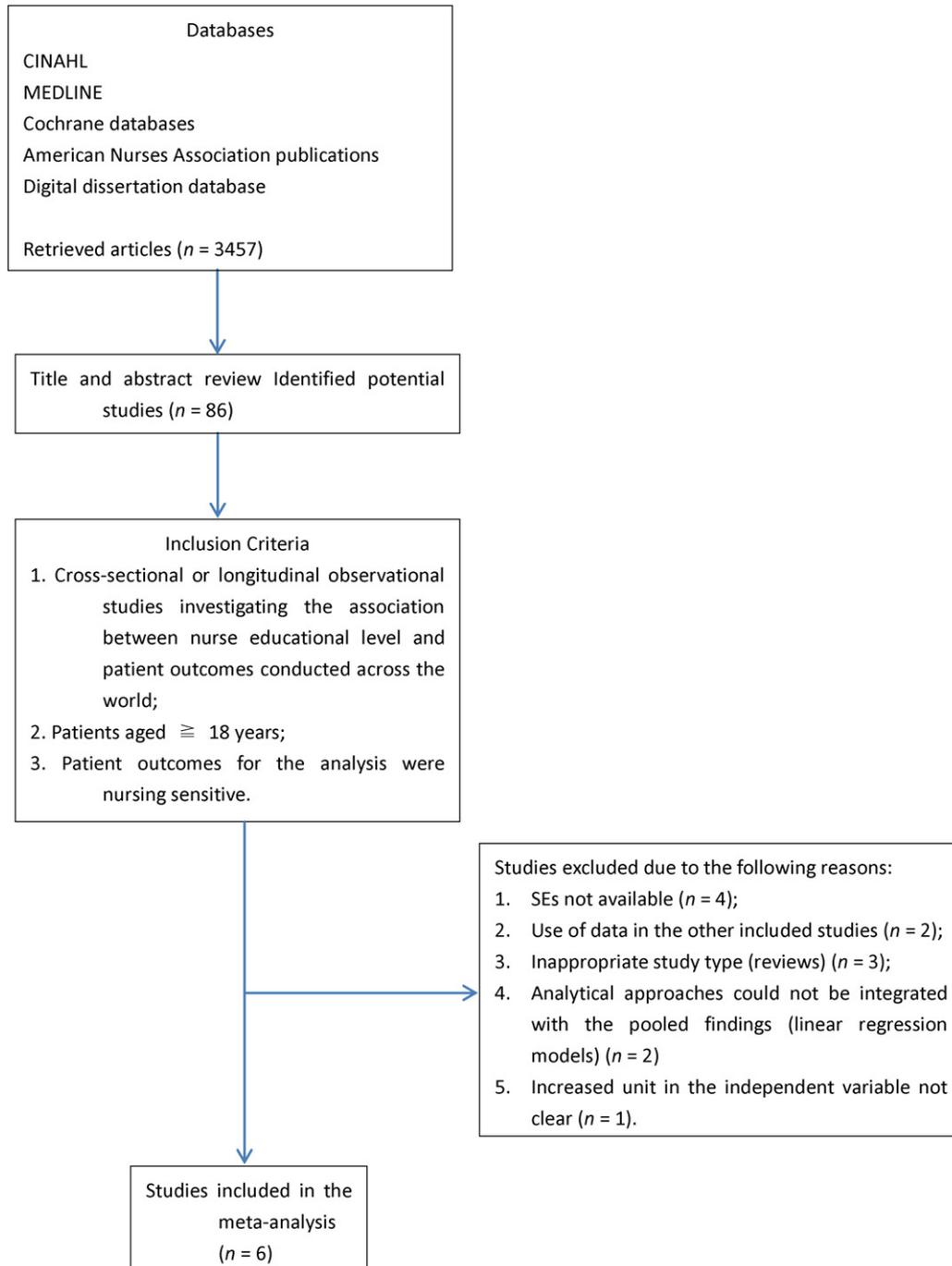


Fig. 1. Flow chart of literature search and study selection.

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