Hospital Nurse and Staff Related Length of Hospital Stay and Cost; Systematic Review

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Abstract

Study aim: This study aimed to examine the effects of hospital nurse-staffing models on patient and staff-related outcomes in the hospital setting in order to ascertain if staffing models are associated with shorter hospital stays and reduced expenditures.

Method: This study was conducted according to the preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement.We searched electronic databases (PubMed, Cochrane and Google scholar). We looked for research on hospital nurse-staffing model interventions of all kinds.We did not place any limitations on language, jurisdiction. We included studies published in the period from 2000 to 2016.

Result and conclusion: In this systematic review, four publications were included. Three studies with a total of 907 participants reported length of stay. The median length of stay was shorter for diabetic individuals receiving care from a diabetic specialist nurse. Three studies with a total of 617 participants had costs published. Studies have indicated a reduction in hospital days and length of stay costs. Nurse staff interventions lead to decrease in hospital stay duration and cost.

Keywords: Nurse, Nurse Staff, Intervention, Length of Hospital Stay, Cost

Introduction

It is well known that nurse staffing has a direct impact on patient outcomes by influencing the quality of the nursing practice environment and the care given to patients (1). One of the most important factors in achieving the Sustainable Development Goals is the availability of nurses with the necessary training and experience both domestically and internationally (2,3). A 'global health personnel crisis' is now occurring due to a shortage of nurses in several countries (4). For instance, it is predicted that there will be a global shortage of around nine million nurses and midwives by 2030, indicating that this trend is expected to persist for the foreseeable future (5). Simultaneously, as a result of variables including technological advancements, aging populations, a rise in patient co-morbidities, and advancements in community-based care, hospital patients have grown more reliant and require more sophisticated nursing care (6).

Hospitals are now using several methods to arrange their nursing personnel. On the one hand, new positions for advanced practice and specialty nurses have been created with the goal of addressing the lack of junior physicians and promoting more comprehensive and responsive patient care (7). On the other hand, the 'global health personnel crisis suggests that more effective skill-mixing be used to make better use of the current healthcare workforce. However, to complement nursing care and increase the cost-effectiveness of nurse staffing, unregistered employees such as nurse extenders, nursing assistants, and health care assistants have been introduced to the hospital workforce (8).

The organization of nurse shifts and the distribution of nursing resources among hospital units are still changing. Minimum nurse-to-patient ratios have been implemented in certain jurisdictions(9), while'safe

staffing' programs have been implemented in other jurisdictions. Comprehensive methods, like the Australia Health Workforce project, have been created in various countries.The quantity and mix of nurses needed to satisfy hospital patients' care needs are determined and distributed using nurse-staffing models (10).
In order to determine whether staffing models are linked to shorter hospital stays and lower costs, this research set out to investigate the impact of hospital nurse-staffing models on patient and staff-related outcomes in the hospital context.

Method

This study was conducted according to the preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. We searched electronic databases (PubMed, Cochrane and Google scholar). We looked for any pertinent randomized trials, non-randomized trials, and controlled before-and-after studies, both published and unpublished. Since there aren't many randomized studies on hospital nurse staffing, we included these four design types in order to evaluate the supplementary data from non-randomized designs. We did not place any limitations on language, jurisdiction. We included studies published in the period from 2000 to 2016. Any pertinent research that did not employ one of the aforementioned designs was disregarded.

Both hospital patients and nursing personnel were participants in the included studies. Public and private hospitals, small, medium, and big, teaching and non-teaching, acute and non-acute, were all included. Licensed practical nurses or their international counterparts, unlicensed assistive persons or their international equivalents, and registered nurses or their equivalents made up the staff. Studies on nurse staffing outside of hospitals were not included. We looked for research on hospital nurse-staffing model interventions of all kinds. Search terms include: nurse, outcome, nurse intervention, nurse staff, hospital nurse, length of hospital stay, cost).

Each study's eligibility was evaluated independently by two researchers using the previously listed characteristics. Each abstract that satisfied the first set of inclusion requirements was assessed as a full-text article. The articles that were deemed eligible for full text review by both extractors are included in the final analysis. Any disagreements were settled by consensus, and where necessary, the pertinent author was consulted. Data was gathered independently by four authors from the listed papers. After completing their first training, the investigators gathered data and entered it into a pre-made data collecting form. The abstracts contained the last name of the first author, the study's design, goal, key findings, and conclusion.

Results and discussion

We included 4 articles in this systematic review (Fig 1). Length of stay was reported in three trials with a total of 907 individuals. Diabetic patients getting treatment from a diabetic specialist nurse had a reduced median duration of stay, according to Davies et al. study (11). Plant et al. (12) study, indicated that the intervention likely had little to no effect on the length of stay in the emergency department or when admitted to a ward. We evaluated the evidence as having very low certainty for this outcome, thus it is unclear if their intervention shortens or lengthens the duration of stay.

Costs were reported in three trials with a total of 617 individuals. Research has shown that length of stay expenditures have decreased(11), and hospital days (a mix of length of stay and readmissions) have decreased (13). According to the authors, the intervention decreased readmissions by 60%, which was the main factor in the 69% decrease in hospital days per patient and the resultant decrease in overall healthcare expenses, which was expressed as an MD of USD 8946 between the intervention and control groups. Castro

et al. also documented a decrease in indirect expenses within the intervention group, leading to USD 3073 in cost savings for each patient. This was mostly associated with a decrease in caregiver expenses and missed workdays.

On the other hand, over the two-year research period, Ritz et al. (14) reported on charges and reimbursements obtained from hospital and clinic billing systems. The cost study did not account for all provider costs, such as those of oncologists and ED doctors. Furthermore, it's still unclear if direct expenses, indirect costs, or both were included in the cost results. Between the experimental and control groups, the adjusted mean difference was USD 2458. The researchers came to the conclusion that there was little to no difference in the costs or reimbursement between the control group and the women with breast cancer who received treatment from an advanced practice nurses.

Despite community health services nearly tripling, Plant et al. (2015)(12) found that care navigation did not enhance quality of life or decrease unscheduled hospital visits or hospitalizations. A growing body of research shows that redesigning the primary, secondary, and acute sectors of the health care delivery system to ensure equitable, proactive, culturally sensitive care, case management for complex patients, patient and caregiver empowerment and support for self-management, and community mobilization can improve outcomes for people with chronic illnesses and decrease hospital attendances (15,16).When care delivery undergoes several, coordinated enhancements, the effects of these changes are most noticeable (17). Main findings of included studies were presented in (Table 1).

In Plant et al. (2015)(12) the care navigation group's patients were referred to in-hospital diagnostic or allied health services at the same rates as the standard care group, and they spent the same length of time in the hospital. There were few plans developed for continued care after discharge, and the majority of care navigation was delivered inside the hospital.

According to a 2003 research by Castro et al., hospitalized asthma patients with a history of frequent medical usage benefit greatly from a brief nurse-directed intervention in terms of fewer readmissions, missed work or school days, and direct and indirect healthcare expenses. Prior research has either overlooked the influence of such a program on healthcare expenses or used historical control individuals, chosen cohorts, or sample sizes that were quite small (18–20).
A prospective, randomized controlled trial of an asthma education program in a hospital context has been conducted in many research (21,22). 77 asthmatic patients were randomly assigned to a nurse-directed intervention that included education and outpatient follow-up in an asthma program, according to a study by George et al. (21). They showed a considerable decrease in hospitalizations and ED visits among the individuals for whom data was available. A nurse-led education program on asthma home care was given to 201 hospitalized children with acute asthma in a related trial.

Fig 1: PRISMA consort chart of selection process

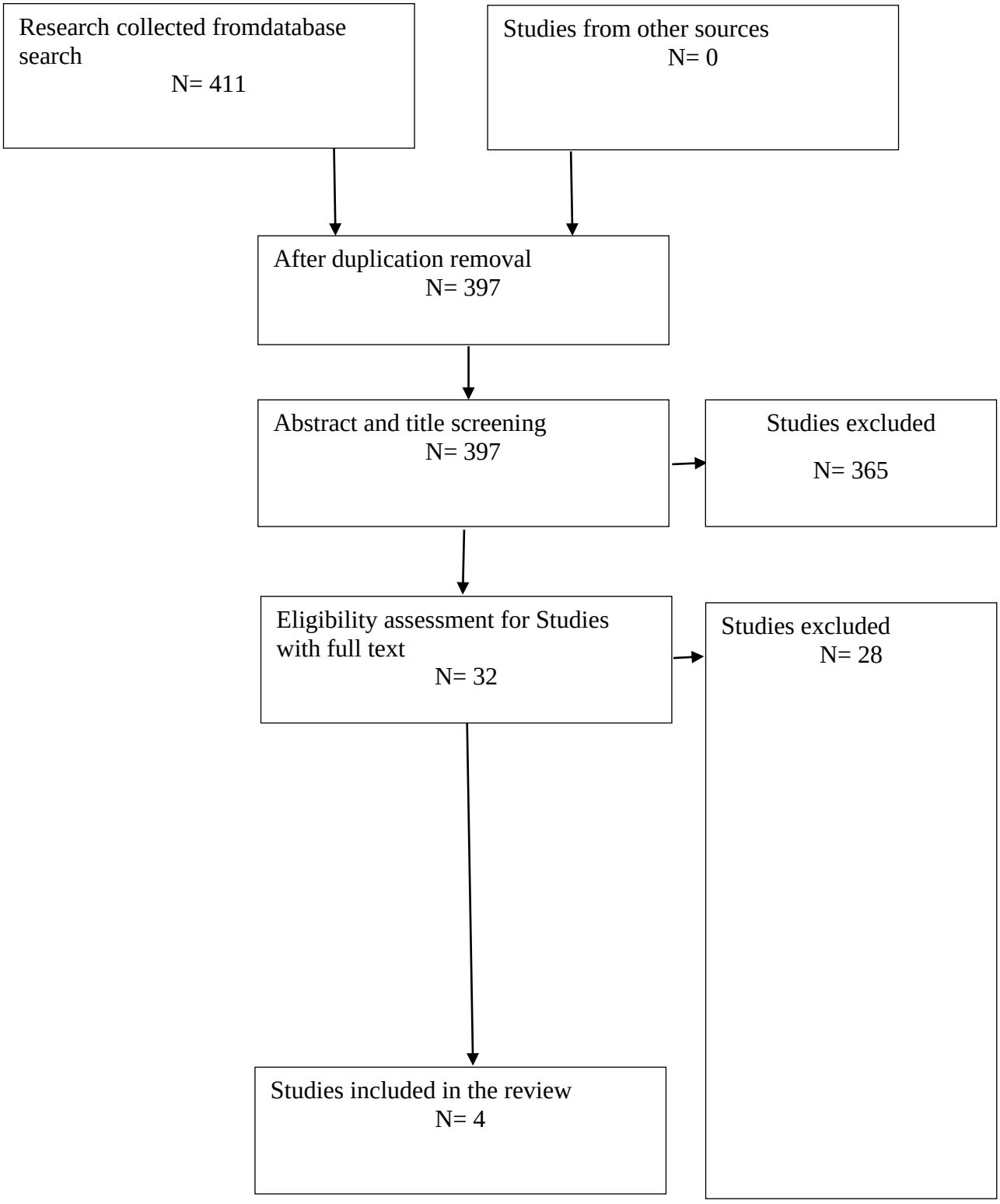

Table 1: characteristics of studies included

Citation	Study aim	Method	Intervention	Main findings	Conclusion
Davies et al., 2001(11)	To assess a hospital's diabetic specialist nursing service's efficacy and financial effects.	Routine in-patient treatment for persons with diabetes, both with and without the involvement of a diabetes specialist nurse service, in a prospective, open, randomized, controlled study.	Diabetes specialist nursing service	The intervention group's median duration of stay was shorter. The two groups had equal readmission rates (25%), and the control group had a somewhat shorter mean time to readmission than the other two groups. Nursing input cost 38.94 pounds sterling per patient. When the shorter duration of stay was taken into consideration, the intervention resulted in a mean cost per admission that was 436 pounds sterling less than the control group. Patients in the intervention group expressed greater satisfaction with their care and more understanding of their diabetes.	Diabetes specialty nurses have the potential to save money by shortening hospital stays. Reduced length of stay did not appear to have a negative impact on re-admissions, community resource utilization, or patient satisfaction with care quality.
Plant et al., 2015 (12)	To ascertain if Care Navigation, a coordinated care intervention centered in hospitals and supervised by nurses, enhanced the quality of life for patients with chronic illnesses and decreased hospital service utilization.	Randomized controlled trial	Care Navigation, a coordinated care intervention	There were no statistically significant changes in the number of readmissions, re-presentations, quality of life at 24 months, or other variables between the intervention group and patients getting standard care, despite the intervention group receiving more community health services.	Despite community health services nearly tripling, the intervention did not enhance quality of life or decrease unexpected hospital presentations or hospitalizations. The possible advantages of connecting guided intrahospital treatment to continuous, proactive community-based care planning and delivery should be

					investigated in future service development.
Castro et al., 2003 (13)	To lower readmission rates within six months after hospital release, lower expenses, and enhance quality of life in relation to health.	Clinical trial	Short health care delivery intervention program	With no discernible change in ED visits, the statistics show a 60% decrease in overall hospitalizations. Asthma readmissions decreased by 54%. There is a significant decrease in the number of missed work or school days: 246 compared to 1040 days in the control group. Each patient saved more than 6 thousand dollars as a consequence of the intervention's significant decrease in direct and indirect healthcare expenditures.	For high healthcare users with asthma, a short intervention program can lead to better asthma control, less hospitalization, and significant cost savings.
Ritz et al., 2000 (14)	To assess the economic and quality of life effects of advanced practice nurses' interventions for breast cancer patients	Randomized clinical trial	advanced practice nurses	At one, three, and six months following diagnosis, the intervention group's level of uncertainty dropped considerably more than the control group's baseline, with the subscales of complexity, inconsistency, and unpredictability seeing the most effects. Nurse interventions improved the emotional states and general well-being of unmarried women and those without a family history of breast cancer. There were no discernible cost variations.	Interventions did neither increase or decrease expenditures, but they did enhance quality of life metrics.

Conclusion

Diabetes specialty nurses have the potential to save money by shortening hospital stays. Reduced duration of stay did not appear to have a negative impact on patient perceptions of treatment quality, or re-admissions. Despite community health services nearly tripling, care navigation did not enhance quality of life or decrease unexpected hospital presentations or hospitalizations. For high healthcare users with asthma, a short intervention program can lead to better asthma control, less hospitalization, and significant cost savings. Advanced practice nursestreatments can enhance quality of life results during the crucial first six months following a breast cancer diagnosis. To identify cost-effective solutions, more study is required.

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