NURSE STAFFING AND PATIENT OUTCOMES IN HEMODIALYSIS UNITS: A LITERATURE REVIEW

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Abstract

The hemodialysis unit manager must be able to ensure that the high-quality services are provided to ensure patient outcomes. Several previous studies have shown that nurse staffing is one of the components that needs to be considered to improve patient outcomes, but this has not been specifically proven in hemodialysis units. The study aims to determine the effect of nurse staffing and patient outcomes in hemodialysis units. This research is a literature review where the process of article searches is carried out through the Pubmed, Emerald, Science direct and Google Scholar electronic databases using certain some keyword combinations in articles published from 2012-2022. The review process used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, and three research articles were analyzed. Results of study show that there is no significant relationship between the ratio of patient to nurses with various patient outcomes in assessed from the Standardized Hospitalization Ratio (SHR), Standardized Mortality Rate (SMR) and Standardized Readmission Ratio (SRR). Moreover, this study provides no evidence that the ratio of patients to nurses affects patient outcomes. Comparative studies with clear staffing parameters are needed to prove this.

INTRODUCTION

Several scientific evidences have shown a relationship between a lower nurse workload and better patient outcomes, including lower in-hospital mortality (Aiken et al., 2014). It can be applied in many units of the hospital, including hemodialysis units. Research conducted by Hawkins in 2008 provides evidence that the composition of the workforce in the hemodialysis unit and the care process is related to the incidence of undesirable events in patients. The significant relationship between nursing staff and patient outcomes in several studies adds to empirical evidence showing a relationship between nursing workforce and patient outcomes in hemodialysis units (Fissell et al., 2004; Saran et al., 2003; Thomas-Hawkins, Flynn, & Clarke, 2008). This evidence has led to indicate to increase the number of nursing staff in hemodialysis units to produce better outcomes and less harm to patients due to ensuring patient safety (Thomas-Hawkins et al., 2008).

Based on the description above, the manager of the hemodialysis unit must be able to ensure the quality of the services provided to ensure the quality of the patient outcomes. Several previous studies have shown that nurse staffing is one of the components that needs to be considered to improve patient outcomes, but this has not been specifically proven in hemodialysis units. However, a summary of the literature on this subject has never been done before.

METHOD

This research is a literature review where the process of article searches is carried out through the Pubmed, Emerald, Science direct and Google Scholar electronic databases. The literature search used specific keywords that matched the research topic, namely nurse staffing, patient outcome and hemodialysis. The articles reviewed are original research published in 2012-2022.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method was chosen to be used in the selection of articles in this review. Research articles that have been deemed relevant and have passed the selection process are then carried out a quality assessment process using critical appraisal tools from The Joanna Briggs Institute with a minimum score of 70%.
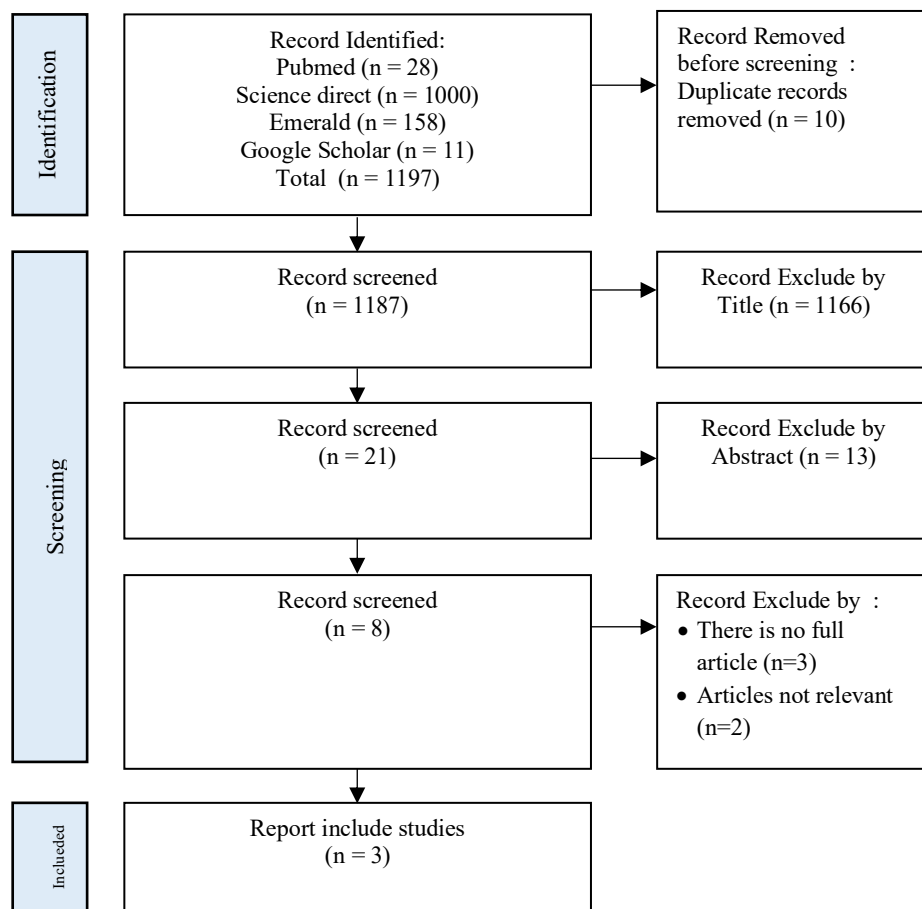
RESULTS AND DISCUSSION

Figure 1. Flowchart Data Screening Analysis

Selection of all articles using the PRISMA guideline. Total of three articles were studied which are explained further through the Table 1.

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Table 1
Selection of all articles using the PRISMA guideline

Authors, Years, Tittle	Objectives	Research Instruments	Results
Hand, Albert, and Sehgal (2018) Structural Equation Modeling to Explore Patient to Staff Ratios as an Explanatory Factor for Variation in Dialysis Facility Outcomes	To determine the relationship between the ratio of patients: registered nutritionists, social workers, nurses, and patient care technicians to standard hospitalization rates, standardized mortality rates, normal protein catabolic (nPCR) levels, and serum phosphorus in dialysis facilities.	Ratio for patients per registered dietitian, social worker, nurse, and patient care technician. Outcome was described by standardized mortality ratios, and standardized hospitalization rates, serum phosphorus and normalized protein catabolic ratios.	The mean and standard deviation for patients per FTE staff were 90.0±34.0, 88.7±32.8, 17.1±20.5 and 11.9±7.0 for RDs, social workers, nurses, and technicians, respectively. The only significant paths from staffing ratio to outcomes were for patient: FTE social worker to SMR (standardized beta=−0.09, 95% CI −0.13, −0.04) and Patients: FTE RD to SHR Days (standardized beta=0.04, 95% CI 0.001, 0.09). In the sub-analysis, there were no significant paths from staffing to outcomes.
Chen et al. (2019) Association of US Dialysis Facility Staffing with Profiling of Hospital-Wide 30-Day Unplanned Readmission	To compare the level of employment in hemodialysis units at facilities that are significantly worse (SW) or not significant (Non-Significant / NS) have readmission rates within 30 days or standardized readmission ratio (SRR).	Hemodialysis facilities were grouped into significantly worse and not significant readmission of patients within 30 days. Employment rates were calculated from the ratio of (1) percent of nurses to all staff, (2) patient-nurse, (3) patient-to-registered nurse, and (4) patient-total staff.	pproximately 3–4% of facilities were identified as having SW SRR among >5,000 facilities annually. The percent of nurses-to-total staff was significantly lower in 2010 for SW facilities than in matched NS facilities (42.5 vs. 45.6%, p = 0.012), but this disparity was attenuated by 2013 (44.8 vs. 44.7%, p = 0.949). There was a higher patient-tonurse ratio for SW facilities than for NS facilities (mean 16.4 vs. 15.2, p = 0.038) in 2010 as well, and the disparity was reduced by 2013. The trends were similar for patient-to-total staff and patient-to-registered nurse, but not statistically significant.
Bao and Bardhan (2017) Antecedents of patient health outcomes in dialysis clinics: a national study	The purpose of this study is to evaluate the determinants of health outcomes of dialysis patients, while specifically focusing on the role of dialysis process measures and dialysis practice characteristics.	The practice pattern variables include Dialyzer Reuse, Nurse-To-Patient ratio, Physician-To-Patient ratio, Dialysis Station-To-Patient ratio, PD and Late Shift. The clinical process steps consist of two general aspects, namely the adequacy of the dialysis	A larger nurse-patient ratio was not significantly associated with measures of dialysis adequacy in terms of URR and Hgb levels. The nurse-patient ratio coefficient was slightly significant in the Kt/V1.2 regression, indicating that a 10 unit increase in the nurse-patient ratio was

	process and the management of anemia. This study used URR65 and Kt/V1.2 to measure the adequacy of the dialysis process, and Hgb10 to represent the characteristics of anemia management.	associated with a 0.31 percent higher percentage of patients with Kt/V 1.2. The study also stated that nurse-patient ratio, doctor-patient ratio, station-to-patient ratio and PD were not significantly associated with SHR.

In the three researches reviewed, the calculation using the volume method was used, namely the ratio of patients to nurses and vice versa. This is allegedly because this method is the easiest calculation method to use because it only requires two data, there are the number of patients and the number of nurses. In addition, the hemodialysis unit is a unit with a fast and scheduled patient turnover rate. This makes it easier for researchers and management planners to calculate the level of staffing needs using this method. According to Griffiths (2020), although the nurse-patient ratio is easy to use, regulate and monitor, it is far from sensitive to patient complexity and tends to override professional judgment in day-to-day staffing decisions.

In the end, recent studies on staffing methodologies cannot show any superior methodology (Twigg, 2021). Accordingly, hemodialysis units around the world are adopting different methods to manage the level of nursing staff by weighing the advantages and disadvantages of each method.

In the study conducted by Chen et al, approximately 3-4% of facilities were identified as having a significantly worse Standardized Readmission Ratio (SRR) in the more than 5,000 hemodialysis facilities studied per year. There was a higher patient to nurse ratio in hemodialysis units with poor SRR (mean 16.4 vs. 15.2, p = 0.038). The average patient-nurse ratio in facilities with poor SRR and nonsignificant SRR was similar in 2011 and 2012, but in 2013 the difference between the two facilities was negligible and therefore considered no longer influential.

In 2010, the average percentage of nurses to total staff was 42.5% for facilities with poor SRR and 45.6% for facilities with insignificant SRR (p = 0.012). The observed disparity in the average percentage of nurses to total staff in both types of hemodialysis facilities decreased in 2011 and was almost the same in 2013: an average of 44.8% (15.4%) for hemodialysis facilities with poor SRR and 44.8% for hemodialysis facilities with poor SRR (p = 0.949).

This study found that dialysis facilities with poor 30-day readmissions had a lower proportion of nursing staff to total staff and a higher ratio of patients to nurses. However, the difference in staff characteristics between the two categories of facilities decreased in 2013. Although there was a trend of lower nurse staff to total staff ratios and higher patient to nurse ratios, these were considered not statistically significant.

The results of the study showed that there was no significant relationship between the patient to staff ratio and various patient outcomes, namely the Standardized Hospitalization Ratio (SHR), Standardized Mortality Rate (SMR) and Standardized Readmission Ratio (SRR).

In contrast, several reviews support that the quality of nursing staff has a relationship with improving patient outcomes in hemodialysis units.

At this point neither health facilities nor legislators have evidence to support the specific recommended staffing levels. In the end, various facilities that implement this use expert opinion advocates as the best guide (Hand et al., 2018).

This study does not definitively support or does not support the patient to nurse ratio used. Instead, this study highlights the critical need to develop an evidence base on how nursing staff in dialysis facilities can contribute to patient outcomes.

The level, quality and composition of staff in dialysis facilities are ultimately modifiable factors that can be optimized and thus improve patient outcomes (Hawkins et al, 2008; Foley et al, 2009). To develop this, Nurse Sensitive Indicators (NSI) can be used specifically for hemodialysis units.

Because of this complexity, the ability to determine the level of adequate and qualified nursing staff is indispensable in human resource management over time to provide safe, affordable care (Saville et al., 2019).

CONCLUSION

There is a logical theoretical basis for the idea that staffing increases will improve patient care, but this theory does not provide support for the hypothesis that variation in patient outcomes is determined by the patient: staff ratio, especially in hemodialysis units. The volume-based approach for staffing method using the ratio of patients to nurses in the hemodialysis unit conclude that there was no significant relationship to patient outcomes. This is assessed through the impact on the Standardized Hospitalization Ratio (SHR), Standardized Mortality Rate (SMR) and Standardized Readmission Ratio (SRR) which are not significant.

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