

# Staffing models A Literature Review of Staffing Models in an Ambulatory Surgery Unit Responding to Varying flow, Volume and Acuity: Identifying the Need for Further Research

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## Abstract

**Purpose:** To identify an optimal nursing staffing model for the ambulatory surgery unit that responds to varying flow, volume and acuity.

**Design:** A literature review.

**Methods:** In this study, a review of the literature was performed using the electronic databases Pubmed, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Embase and Web of Science focused on literature published between January 2000 up to January 2022. Studies were included if they described nursing workload or nurse staffing in the ambulatory surgical units (ASU). Studies describing medical or surgical wards staffing for hospitalization and non-surgical day hospitals (e.g. oncological, internal) were excluded.

**Findings:** The search strategy identified 418 publications. Based on the inclusion and exclusion criteria, 19 publications were included. Checking the reference list of these 19 studies resulted in six additional publications. The full text of these 25 studies was examined. There is limited evidence for ambulatory surgery discussing the number of patients per nurse. Only one study stated that it was most common to have three to four patients per nurse in phase 2 recovery unit of an ASU.

**Conclusions:** Despite the fact that there is significant research on optimal nursing staffing models for surgical and inpatient wards, this remains uncharted ground for ASUs. With rapid expansion of ambulatory surgery, there is an urgent need for evidence based research assessing optimal level of nurse staffing for high quality and cost-effective care in ASUs.

**Keywords:** ambulatory surgical procedures, nurse staffing, unit (ward), nurse-patient ratios, skill-mix.

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## Introduction

A large body of evidence based research shows the association between nurse staffing levels, skill mix in the nursing team, and patient and nurse outcomes in acute care settings and medical-surgical wards (1-4). Adverse events, fall rates, hospital-acquired infections, failure to rescue, missed nursing care and mortality are described as the patient outcomes due to inadequate nurse staffing. The impact on nurses caused by insufficient staffing are burn-out, job dissatisfaction and emotional exhaustion (5,6). Higher registered nurse (RN)-patient ratio is associated with superior patient outcomes and an increase in quality of care (5,6). The majority of the studies describing the impact of the nurse staffing models and skill mix are for hospitalized patients.

The rising costs of healthcare and advances in surgical, anesthetic and pain management techniques have caused a shift to day surgery (7,8). Day surgery is considered more cost-effective as it reduces the number of staff and avoids expensive shifts, especially at weekends, on public holidays and at night. Also, the patient makes less use of the "hotel facilities" (meals drinks, sheets, heating, etc.) of the hospital (1-5). However, the migration of medically complex patients undergoing more extensive surgical procedures to the ambulatory setting requires

nurses to have multiple skills. Nurses working in an ambulatory surgery department are expected to have a broad knowledge of all the procedures performed in day surgery. They must care for many patients and simultaneously provide proactive care during the postoperative period, ensuring that they give accurate information and high-quality care at all times (9,10).

Recent move to more complicated procedures performed in day surgery and a greater number of patients with co-morbidities requires nurses to be vigilant and responsive to signals when post-operative complications occur. One of the quality indicators for ambulatory surgery is hospital readmission and unplanned admission after day surgery (11,12). The decreased length of stay, the high patient turnover and workload reduces the time available for nurses to thoroughly prepare the discharge of patients, which also compromises the quality of discharge management: patients who are not properly prepared for discharge are more likely to return to the hospital if there are postoperative problems (13). High quality care requires adequate staffing levels (14,15). However, nurse staffing and nursing models for day surgery units are uncharted ground. For instance, in Belgium, in a Royal Decree from 1997, nurse-patient ratios are described for day surgery as one RN for every 800 additional

patients per year on the day surgery unit. These measure of the volume of patients per year do not match the staffing ratio well because especially in a day surgery unit the high patient turnover underestimate nursing workload and overestimate nursing staffing levels (16). Twenty-five years later, this nurse-patient ratio is still not changed although the patient population in day surgery has changed a lot.

These considerations highlight the importance of exploring nurse staffing models for ambulatory surgery in an evidence-based approach. The maximum capacity of what can be performed in the allotted time appears to be reached. Consequently, some of the necessary care is not provided. This is not only dangerous and/or uncomfortable for the patient, but also contributes to increasing dissatisfaction among nursing staff, which in turn leads to increased absenteeism and turnover.

## Purpose

The goal of this study was to investigate the current evidence for appropriate staffing models for day care surgery.

## Design

A systematic search was carried out on the electronic databases Pubmed, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Embase, and Web of Science from 2000 up to January 2022. The following keywords (and synonyms) were used: ambulatory surgical procedures, nurse staffing, and unit (Appendices 1). Additional articles were identified through snowballing by checking the reference list of the remaining articles. Studies were excluded if they described medical or surgical wards for hospitalization. Non-surgical day hospitals (e.g. oncological, internal) were also not included. Studies were included if they described nursing workload or nurse staffing in the ASU. Because of the explorative character of the literature review and the aim to give an overview of the current evidence, study design and methodological quality were not used as a selection criterion.

## Methods

### Selection of studies

As illustrated in Figure 1, a total of 418 articles were identified through the electronic databases of which 399 did not meet the selection criteria. Nineteen articles were retrieved for more detailed evaluation. Checking the reference list of those potentially useful publications resulted in six additional articles (Appendix 1) (Place Appendix 1 at the end of the paper). Two studies discussed the need for staff models in an ambulatory setting (17,18) and only one study (15) stated the number of patients per nurse for a day surgery unit

### Description of the included studies

Pearson and colleagues (2004) highlighted the importance of an appropriate mix of staff as a response to the rapid expansion of day surgery (17). They note the lack of quantitative evidence on staffing models in day surgery to establish the relationship between skill mix, staffing levels, and the achievement of desired health outcomes in day surgery units. Gilmartin et al (2007) reported similar conclusions and criticized the lack of evidence on which to base staffing models in ambulatory surgery as a major deficit in the contemporary climate of rapid expansion (18). Shortages of staff and the resulting higher workload have led to concerns about the quality of patient health care, as confirmed by surveys of nurses and literature reviews (1,3,19).

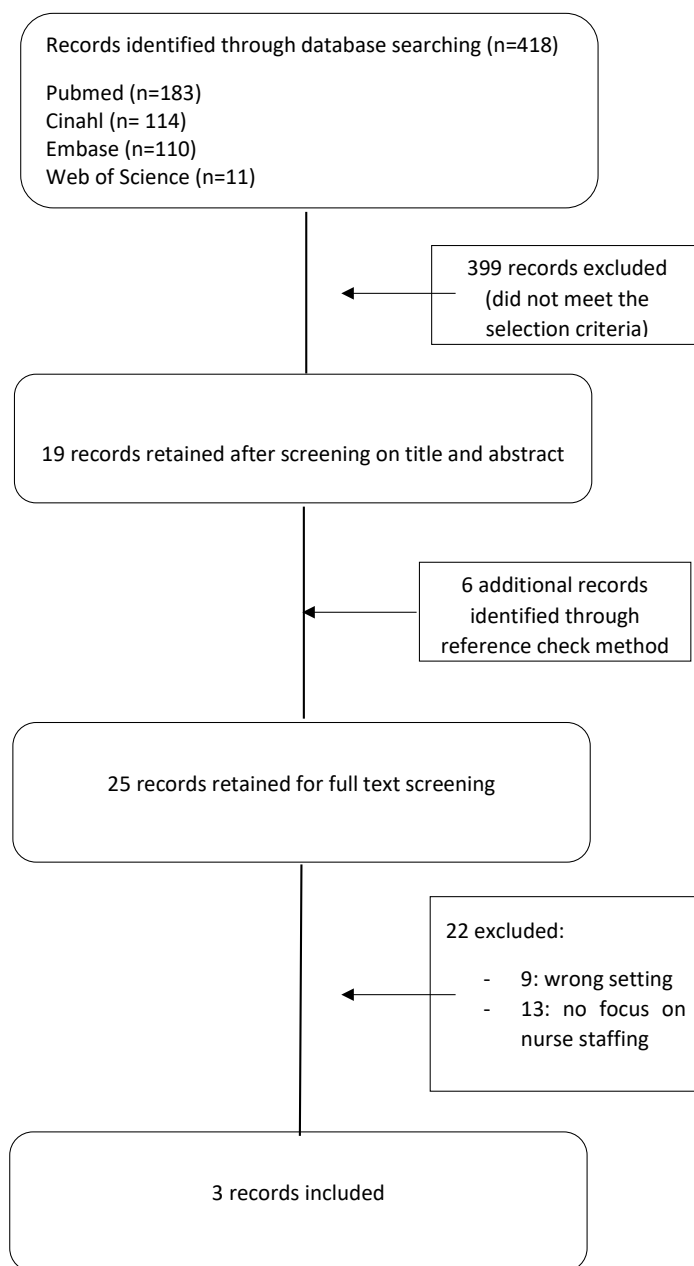


Figure 1. Flow diagram of study inclusion and exclusion.

Dahlberg et al (2021) described the education, competence, and role of perioperative nurses working in the postoperative care unit (PACU) in 11 high-income, developed countries having an established peri-anesthesia specialty nursing organization and membership on the International Collaboration of PeriAnesthesia Nurses (ICPAC). The researchers used a validated web survey (in English), consisting of 96 items covering education and training for nurses working in the PACU, other health care professions in the PACU, nurse-to-patient ratio, and job tasks performed. The perioperative nurses' area of work was phase 1 or phase 2 recovery. Phase 1 recovery is the early period of recovery from when the patient leaves the operating room until the patient is discharged from the PACU. Phase 2 recovery is the postoperative recovery time at the day surgery unit[20]. The participants completed the survey based on their country's routines and policies, but it is important to note that there were variations within each country, depending on the hospital and the patients treated there, as well on the procedures scheduled for day surgery. These in-countries variations were not analyzed in the study. Across the eleven countries, there were variations in nurse to patient ratios, but in phase 2 recovery it was most common to have up to three to four patients per nurse.

## Discussion

While there is a clear drive to increase day surgery rates in the ambulatory setting, the existence of scientific literature for nursing staffing models is limited. In an ambulatory care of the phase 2 recovery setting, nurses are often the primary caregiver with a broad range of tasks (21). For example, communication before surgery is an important aspect of patient satisfaction (22). The type of information given may reduce anxiety and enable rapid home recovery. Delivery of correct and sufficient information is important. However this is time consuming and informing patients is hence often limited, rapid, and brief (10).

Also, indirect patient related tasks such as planning and coordination of care in interaction with the clinical system are time consuming part of the nurses job at the ambulatory centers. Nevertheless, their main focus are direct patient related tasks: the continuous and qualitative care of patients (2). The association of anesthetics and the British Association of Day Surgery published guidelines in 2019 for the organizational and clinical management of anesthesia for day-case surgery in adults and children. One of their recommendations is that staff levels of nurses, anesthetic, assistants and other ancillary staff levels will depend on the design of the facility, case mix, workload, local preferences and the individual units ability to conform to national guidelines (23). But this is no indication of the number of nurses required to provide safe and quality care.

Sir et al (2015) highlighted the important tactical staffing decision to ensure sufficient number of nurses are scheduled to care for patients (7). The ultimate aim of staffing levels for the management of a hospital is assign nurses to certain shifts to decrease healthcare staffing cost, negative patient outcomes and improve nurse satisfaction (7).

The National Institute for Health Care Excellence (NICE) developed guidelines in 2014 for safe staffing standards for adult inpatient units such as general surgery, internal medicine and obstetrics, but refrained from plans for other areas (24). However, the guideline did not set minimum nurse staffing levels, and did not include the ambulatory setting. The following paragraph from the NICE guidelines could be interpreted as an indicator of risk, but did not address patient-related outcomes. It was stated that the nurse/patient ratio of '1:8' is only a general guidance and not a requirement (8) "there is evidence of increased risk of harm associated with a registered nurse caring for more than 8 patients during the day shifts. Therefore, if the available registered nurses for a particular ward (excluding the nurse in charge) are caring for more than 8 patients during the day shifts, the senior management and nursing managers or matrons should: closely monitor nursing red flag events; perform early analysis of safe nursing indicator results, take action to ensure staffing is adequate to meet the patients' nursing needs if indicated by the analysis of nursing red flag events and safe nursing indicators. In many cases, patients nursing needs, as determined by implementing the recommendations in this guideline, will require registered nurses to care for fewer than 8 patients." (25).

The application of inpatient nurse staffing models to ambulatory surgery is inappropriate because of differences in the nature and extend of specific tasks such as managing situations well in an unrestricted patient flow, ensuring patient safety in a short hospital stay setting and be able to respond appropriately to planned and unanticipated admissions (26,27). Ambulatory surgery units cover a wide range of surgical procedures such as ear, nose throat surgery, gynecology and orthopedic procedures, gastrointestinal and plastic surgery (17). Besides, in an ambulatory surgery setting one may find a mixed population: adults and children, which also requires more skills and know-how from the nurses.

Staffing patterns differ across nursing care units. This affects nursing intensity and the direct costs of the nursing care. The patient to

nurse ratio determines the main hours of care delivered on the unit considering that patients may need more or less care. The degree of variability of nursing intensity determines the amounts of nursing staff needed to care for those patients. For example, surgical wards where patients have initially the same kind of operation, the same care needs, it is easier to predict there the staffing levels needed (28).

Given the nature of the complexity and the workload of an ambulatory surgery unit, the synergy model, developed by Dr Martha Curley in 1998 is a more reasonable way to approach nurse staffing in ambulatory surgery units. The model is based on the synergy between the needs of patients (including their families) and nursing competencies. The idea is to assign, through a standardized method, a nurse patient ratio that takes into account the complexity of the patient and the level of competencies of the nurse (29). This model was implemented in 2021 in the Hamilton Health Sciences and Grand River Regional Cancer Centre: a surgical oncology inpatient unit and in an ambulatory oncology unit. The main reason for reviewing the staffing was the oncology care team noted that the intensity of care was increasing and they asked for more staff to ensure that the quality of care would be maintained. The implementation of the synergy model allowed the team to approach care complexity in a standardized manner. There was an equal assignment of patients and care was more focused on the patients' needs. Moreover, after the implementation of the Synergy model, the team felt that excessive workload had decreased (29).

Another study of this model took place in a medical unit at St. Paul's Hospital in Saskatoon (Canada) (30). This study adds important evidence that nurse-patient ratios can be calculated by linking nursing knowledge and skills to patient care needs. In addition, it enabled nurses the opportunity to track changes in workload and available staffing, and use this information as a basis for staffing (30).

If care needs vary by a wide margin, staffing becomes much more difficult to predict, potentially leading to shifts of high workload. Patients' severity of illness and a high turnover (characteristic of ambulatory surgery center) are two additional contributing factors for an increased need for high quality studies exploring and quantifying the nursing staffing levels, skill-mix and any outcomes. the application of the synergy tool can be an approach in ambulatory surgery to consider patient care needs based on the unique characteristics presented by the patient and to build nursing decision-making and resource allocation in a health care system under financial pressure.

Hospitals are under pressure to control costs and at the same time increasing patient volume at a time when patient safety and quality are on the front lines of attention (15). From a hospital's perspective, increasing nurse staffing is expensive but if more nurses on the ward can avoid longer hospitalizations, complications after surgery and even mortality, these concerns can drive discussions and influence hospitals and policy makers about nurses' contributions to the improvement of quality of care for the ambulatory surgery unit.

## Conclusions

To conclude, there is a lack of high-quality data on the desired mix of skills and staffing models in day surgery units despite the growing importance of this type of care. Further expansion of day surgery is certainly possible, but this will also require evidence-based research to establish the relationship between nursing skill mix, staffing levels and the achievement of desired health outcomes in day surgery units. Appropriate and well considered nursing staffing models in ambulatory surgery are increasingly important with the shift of surgery from inpatient wards to ambulatory care units.

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