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The Different Types of Overtime Work in Nursing and Their Associations With Nurse and Patient Outcomes: A Cross-Sectional Study Protocol

Les différents types d'heures supplémentaires et leurs associations avec les résultats chez l'infirmière et le patient : un protocole d'étude transversale

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Keywords

overtime; mandatory; voluntary; nurse; quality and safety of care

Abstract

Introduction: Nurses often work overtime to fill the shortage of nurses, ensure continuity of care or prevent service breakdowns. Some studies show that working overtime has negative impacts on both nurse and patient outcomes, whereas others suggest that overtime has some beneficial outcomes for patients and nurses. Some authors suggest that these conflicting results across studies could be explained by the type of overtime performed by nurses, an aspect that has received scant research attention. **Objective**: We aim to examine the associations between the different types of overtime work (voluntary or mandatory), and nurses' perceptions of nurse and patient outcomes. **Method**: A provincial electronic cross-sectional survey will be conducted in the province of Quebec, Canada, to examine the associations between nurse overtime work and both nurse and patient outcomes. **Discussion and Research Spin-offs**: This study will likely provide deeper insights about the different types of overtime and their impacts on both nurse and patient outcomes. This may inform nursing practices and guide nursing union representatives, directors of nursing and government decision-makers.

Mots-clés

heures supplémentaires; obligatoire; volontaire; infirmière; qualité et sécurité des soins

Résumé

Introduction : Les infirmières travaillent souvent des heures supplémentaires pour combler la pénurie d'infirmières, assurer la continuité des soins ou pour prévenir des bris de services. Plusieurs études suggèrent qu'une augmentation du travail en heures supplémentaires est associée à de moins bons indicateurs de la santé au travail des infirmières, ainsi qu'à des soins de moindre qualité et moins sécuritaires; d'autres n'ont observé aucune association significative, ou encore un effet protecteur des heures supplémentaires. Certains auteurs suggèrent que ces résultats contradictoires pourraient s'expliquer par le type d'heures supplémentaires effectuées par les infirmières, un aspect qui a reçu peu d'attention dans les recherches. **Objectif** : Examiner les associations entre les différents types d'heures supplémentaires (volontaires ou obligatoires) et les perceptions des infirmières à l'égard des résultats chez les infirmières et les patients. **Méthode** : Une étude transversale sera réalisée auprès des infirmières travaillant dans les hôpitaux de la province de Québec, au Canada, pour examiner les associations entre les heures supplémentaires et les résultats des infirmières et des patients. **Discussion et retombées anticipées** : Cette étude fournira des connaissances plus approfondies sur les différents types d'heures supplémentaires et leurs conséquences sur l'infirmière et le patient, ce qui pourrait informer la pratique infirmière et guider les décisions des représentants des syndicats infirmiers, les gestionnaires et les décideurs gouvernementaux.

INTRODUCTION

Overtime work is defined as working more than the standard working hours (Anxo & Karlsson, 2019; Government of Canada, 2024). The excessive use of overtime to manage the nursing shortage and the variability in patient needs is a global issue in terms of its impacts on patient and nurse outcomes, as well as on health care system costs (Bae et al., 2014). In Canada, for example, nurses worked more than 15.2 million hours of paid overtime in 2016, which was then estimated to cost CDN $788 million (Jacobson Consulting Inc., 2017). In 2022, Canadian nurses reported an average of 8.2 overtime hours per week (Statistics Canada, 2023). In the United States, among more than 5,000 registered nurses (RNs) surveyed by Medscape (2020); 56% were working between 1 and 5 hours of overtime per week, which cost USD 9,000 in additional annual wages per nurse (Medscape, 2020).

Numerous studies show that working overtime has negative impacts on patient and nurse outcomes (Bae et al., 2024; Cha et al., 2023; Gao et al., 2023; Min et al., 2019). According to the recent findings from the Canadian Community Health Survey, working overtime decreases job satisfaction and job security for nurses, and increases work stress (48.5% reported high work stress) (Statistics Canada, 2020). Also, working overtime was associated with career choice regret (Dyrbye et al., 2020); intent to leave (Bae et al.); burnout (Cha et al.; Chen et al., 2022; Gao et al.); fatigue (Min et al.) and poor quality of sleep (Caruso et al., 2019), which might decrease vigilance and alter decision-making ability (Geiger-Brown, Tinkoff, & Rogers, 2011; Trinkoff et al., 2011). In addition, working overtime decreases the quality of nursing service (Ball et al., 2017) and increases missed nursing care (Min et al.), and the occurrence of adverse patient outcomes (e.g., medication errors (Kunaviktikul et al., 2015), infections (Beltempo et al., 2017; Stone et al., 2017), and patient mortality (Trinkoff et al.)). However, some studies found no significant or negative associations between working overtime and nurse outcomes (Bannai & Tamakoshi, 2014; Watanabe, Imamura, & Kawakami, 2016) or patient outcomes (Berney & Needleman, 2006; Stone, 2007).

There are two main types of overtime work: Voluntary overtime (when a nurse consents to working extra hours to meet daily patient requirements for nursing care) and mandatory overtime (when a nurse is forced to work overtime by her/his employer to avoid a break in service). As such, some authors have proposed that the inconsistencies across studies could be explained by the type of overtime performed by nurses (Bougie & Cara, 2008; de Castro et al., 2010; Nogues & Tremblay, 2023; Watanabe & Yamauchi, 2016; 2018; 2019). However, to the best of our knowledge, this hypothesis has received scant attention in the literature.

OBJECTIVE

The objective of this study is to examine the associations between the type of overtime work (voluntary or mandatory), and nurses' perceptions of nurse and patient outcomes.

METHOD

STUDY DESIGN

This paper is a cross-sectional study protocol and is reported according to ObsQual checklist (Low et al., 2024). Thus, using a provincial electronic survey, a cross-sectional study will be performed. We will report this study according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) criteria (von Elm et al., 2007).

POPULATION, SAMPLE AND SETTING

The study population consists of all RNs providing direct patient care in a medical, surgical, intensive care, or geriatric care unit in an acute care hospital in the province of Quebec, Canada (N = 37 819). To ensure adequate statistical power for conducting multiple regression analyses (described below), we used the G*Power software (Faul et al., 2009) to estimate the required sample size. The calculation was based on the following parameters: A small effect size ($f^2 = 0.02$), a two-tailed alpha level of 0.05, a power of 0.80 and 17

predictors (including voluntary overtime, mandatory overtime and confounders). Based on these parameters, the required sample size is estimated to range from 6,667 to 10,000 participants, assuming an expected response rate of 10-15%. This range represents the final targeted sample size for the study.

Nurses will be recruited through two steps. First, we will ask the Quebec's Board of Nurses (*Ordre des infirmières et infirmiers du Québec*) to provide us with a random sample of 10 000 nurses, based on their list of members. Second, we will follow Dillman's et al. (2014) recommendations for electronic surveys. Specifically, an initial email invitation to potential study participants will be sent (T_0). Non-responders will receive reminders on day 4, 7 and 14 (Dillman et al.). An online survey link including a cover page and an electronic consent form will be sent to each potential participant.

DATA COLLECTION

We will use the RedCap platform to build and administer the electronic survey. Data collection will occur during winter 2025 through an electronic questionnaire. This questionnaire will contain the following sections: 1) overtime work characteristics; 2) process outcomes; 3) nurse job outcomes; 4) patient outcomes; and 5) confounders.

MEASURES

1) Overtime Work (Independent Variable)

It will be defined as "any hours worked in excess of the standard hours'' (Government of Canada, 2024). Nurses will be asked to report on two overtime-related variables: a) the number of voluntary overtime hours performed over the previous 2 weeks (i.e., over the previous pay period); and b) the number of mandatory overtime hours performed over the previous 2 weeks.

2) Nurse Job Outcomes-Instruments

Nurses' perceptions on the following job outcomes will be measured:

- Job satisfaction will be measured using a single item extracted from the French version (Dupret et al., 2012) of the Copenhagen Psychosocial Questionnaire Scale (COPSQS) (International COPSOQ Network, 2025). The Job satisfaction of professional experience item will be scored on a 4-point Likert-type scale ranging from 1 (very satisfied) to 4 (very dissatisfied).
- Turnover intentions will be assessed using two items adapted from O'Driscoll & Beehr (1994): a) "I am thinking about leaving my job within the next 12 months'' (Fernet et al., 2017); b) ''I plan on searching for a new job outside the nursing profession within the next 12 months'' (Lavoie-Tremblay et al., 2014). Items will be scored on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree).
- Emotional exhaustion will be measured using the emotional exhaustion subscale of the French version of the Maslach Burnout Inventory-Human Services Survey (MBI-HSS) (Dion & Tessier, 1994). Based on previous studies, emotional exhaustion is the most useful dimension of MBI-HSS (Aiken et al., 2023; White et al., 2019). This dimension will be assessed using 9 items. Participants will be asked to rate the frequency of experiencing feelings related to emotional exhaustion by one's work (e.g., ''I feel depressed at work''); using a 7-point scale ranging from 0 (never) to 6 (daily). The emotional exhaustion subscale has excellent internal consistency (Lheureux et al., 2017).
- Fatigue will be measured using the French version of the Occupational Fatigue Exhaustion/Recovery (OFER-15) scale (Winwood et al., 2005). The OFER-15 is composed of three subscales: a) Acute Fatigue; b) Chronic Fatigue/Exhaustion; and c) Intershift recovery comprising 5 items each. Items will be scored on a 7-point Likert scale ranging from 0 (strongly disagree) to 6 (strongly agree). The OFER-15 has high internal consistency, with Cronbach alphas ranging from 0.84 to 0.86 across subscales. Also, temporal stability, construct and discriminant validity were acceptable (Winwood et al.).

3) Process Instrument

Missed nursing care is defined as care that is wholly or partially uncompleted or delayed (Kalisch & Williams, 2009). It will be measured using the MISSCARE Survey instrument (Kalisch & Williams), one of the most widely used tools in international research (Palese et al., 2020). Prior to administration, the instrument will be translated for the French-Canadian context following established translation guidelines; this process will be detailed elsewhere. The MISSCARE Survey instrument consists of two parts: A (elements of missed nursing care = 24 items) and B (reasons for missed nursing care = 17 items). As the study aims to examine the association between overtime and missed care, only part-A will be used. Participants will be asked to rate the frequency of each nursing care element on their unit over the past 2 weeks. Consistent with the original version, responses will be recorded using a 4-point Likert-type scale ranging from 1 (rarely missed) to 4 (always missed) (Kalisch & Williams). The instrument has demonstrated good internal consistency with Cronbach's alpha coefficient varying from 0.64 to 0.86 (Kalisch & Williams).

4) Patient Outcomes-Instruments

Nurses' perceptions of the frequency and quality of the following patient outcomes will be measured:

- Quality of care: Perceived quality of care on the nurses' unit over the past 14 days will be assessed using a single item of the French version (Rochefort, 2009) of the questionnaire developed by Aiken et al. (2001). Responses will be rated on a 5-point scale ranging from "poor" to "excellent".
- Safety of care: Perceived safety of care in the nurses' unit over the past 14 days will be measured by a single item from the French version (Occelli et al., 2013) of the Hospital Survey on Patient Safety Culture (Sorra & Dyer, 2010). Responses will be scored on a 5-point scale ranging from "failing" to "excellent".

CONFOUNDERS

Potential confounding variables that may influence the relationship between overtime and missed nursing care or patient outcomes will be measured. These include both **nurse-level** and **hospital-level** characteristics.

Nurses' characteristics will be assessed using 12 items: a) sex, b) gender, c) age, d) number of years of experience, e) level of education (college or bachelor's degree and above), f) marital status, g) number of children, h) personal income, i) subjective workload during the last 2 weeks, j) work position (full-time or part-time), k) work shift (day, evening, night, rotational), l) shift length (8 or 12 hours).

Hospital characteristics will be assessed using two items: a) type of hospital (teaching hospital VS. community hospital) and b) type of nursing unit.

ANALYSIS

Data analysis will be conducted with SPSS 26 (IBM, 2019). First, outliers and atypical responses will be removed from the dataset following the guidelines of Tabachnick & Fidell (2019). Missing data will be treated using multiple imputation methods, as recommended by Azur et al. (2011).

Descriptive analysis will be used to summarize participants' socio-demographic and hospital characteristics (e.g., mean, standard deviation); and to estimate the prevalence of each type of overtime. Then, correlation matrices will be computed among independent, control and outcome variables to assess potential multicollinearity and to inform the selection of variables for inclusion in subsequent linear regression models. Multiple linear regression models will be used to examine associations between each type of overtime (mandatory and voluntary) and selected nurse and patient outcomes. The assumptions of linear regression will be verified both a priori, via descriptive statistics and graphical inspection, and a posteriori, through analysis of regression residuals. To account for the clustering of nurses within units and hospitals, a Generalised Estimating Equations framework will be applied. The level of statistical significance will be set at $\alpha \leq 0.05$ with adjustments for multiple comparisons where applicable.

ETHICAL CONSIDERATIONS

This study was reviewed and approved by the research ethics committee of the *Université de*

Sherbrooke (no 2024-4590). Electronic consent will be available to participants on the RedCap platform. A cover page and an electronic information form will explain the study objective, eligibility criteria, expected participation and the principles of anonymity, confidentiality, and the right to accept, refuse or withdraw at any time. The questionnaires will be anonymous. We will assign a code for each questionnaire. Data will be stored for 10 years in a password-protected computer. Before conducting the provincial electronic survey, the adapted instrument (MISSCARE Survey) will be submitted to the research ethics committee for approval.

Discussion and Research Spin-offs

This study aims to explore the characteristics of nurse overtime and to examine the associations of voluntary and mandatory overtime with nurse and patient outcomes. Findings from this study may provide evidence for the prevention of adverse outcomes of voluntary and mandatory overtime on both nurse and patient outcomes.

To our knowledge, this study will be the first to explore this topic in the province of Quebec, which has the highest overtime rates in Canada (Fédération interprofessionnelle de la santé du Québec, 2017). Furthermore, this study will investigate the perceptions of nurses working in several hospitals in the province of Quebec, which will provide deeper information about the reality of voluntary and mandatory overtime across the province. It will enable broad descriptions and comparisons. Another strength is the use of international and validated instruments. However, this study may have some limitations. First, the cross-sectional design of this study limits causal inferences. Second, the use of self-reported measures may lead to biases (e.g., recall bias, social desirability bias and common source), which could affect the study findings. Third, this study will not be looking at some confounders (e.g., patient ratio, staffing in units, and outbreaks) that may influence the association between working overtime (mandatory and voluntary) and patient and nurse outcomes.

Regarding our dissemination plan, different methods will be used to provide the maximum visibility for our project's results. First, we will publish the study project protocol in a scientific journal. Then, study findings will be disseminated in conferences and in at least four articles published in peer-reviewed journals. We will also seek opportunities to present our results to various stakeholders, including nursing union representatives, directors of nursing and other decision-makers.

Authors' contribution: RB and CR designed the study. RB wrote the first draft of this cross-sectional study protocol. CR revised and approved the final version of the manuscript.

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Appendix 1

Table 1

Project Timeline

Activity	Dates
• The development of study design	June-July 2024
• Ethics approval	November 2024
• Translation and adaptation in the French of MISSCARE Survey instrument	December 2024-May 2025
• Cross-sectional study: Data collection	May-June 2025
• Cross-sectional study: Analysis	July-August 2025
• Cross-section study: Submission of manuscripts and communications	September 2025-February 2026