Received: 24 June 2021 | Revised: 18 August 2021 | Accepted: 16 September 2021

DOI: 10.1111/jocn.16068

Journal of Clinical Nursing WILEY

ORIGINAL ARTICLE

Hospital work environment, nurse staffing and missed care in Chile: A cross-sectional observational study

Marta Simonetti PhD, RN, Profesora Asociada[1] | Consuelo Cerón MSC, RN, Profesora Asociada[1] | Alejandra Galiano MPH, RN, Enfermera Coordinadora de Práctica Basada en Evidencia[2] | Eileen T. Lake PhD, RN, FAAN, Professor of Nursing and Sociology and Associate Director, Center for Health Outcomes and Policy Research[3] | Linda H. Aiken PhD, RN, FAAN, Professor of Nursing and Sociology and Founding Director, Center for Health Outcomes and Policy Research[3]

[1]Universidad de los Andes, Chile, Escuela de Enfermería, Chile

[2]Clínica Universidad de los Andes, Chile

[3]Center for Health Outcomes and Policy Research, School of Nursing, University of Pennsylvania, Pennsylvania, USA

Correspondence
Marta Simonetti, Escuela de Enfermería, Universidad de los Andes, Chile.
Email: msimonetti@uandes.cl

Funding information
University of Pennsylvania Global Engagement Fund and Sigma Theta Tau International Global Nursing Research Grant

Abstract

Aims and Objectives: To characterise the problem of missed nursing care in Chilean hospitals and to test associations with hospital organisational variables.

Background: Missed nursing care is a common problem in different countries, but it has not been studied in Chile.

Design: Multihospital cross-sectional study (Supplementary file 1: STROBE guideline).

Methods: Study population of 45 adult high-complexity hospitals and 1853 registered nurses (RN) working on medical-surgical units. Primary data were collected through a nurse survey. Nurses reported, out of a list of nursing care activities, the ones left undone during their last shift. The main independent variables were the work environment, measured through the Practice Environment Scale of the Nursing Work Index, patient-to-nurse ratios and RN skillmix. Adjusted logistic regression analyses were used to test associations, accounting for clustering of nurses working in the same hospital.

Results: The hospital response rate was 88.9% and, for nurses, 88.1%. The mean patient-to-nurse ratio was 14.5 (range 6–23). The average skillmix was 31% RN. Eighty-six percent of nurses missed at least one activity. The activities most frequently missed included patient education, comforting patients and surveillance. The adjusted model showed a significant association between the work environment, staffing ratios and missed care. The RN skillmix was not associated.

Conclusions: Missed care is highly prevalent problem in Chilean hospitals. Clinical activities were the least missed. It is necessary to improve work environments and reduce the number of patients per nurse to improve the safety and quality of care.

Relevance for clinical practice: The study results are relevant since they provide new data to Chile. Better work environments and adequate human resources are modifiable factors that can be addressed from a managerial perspective, with low-cost strategies to effectively reduce missed care and improve safety and quality.

KEYWORDS
health services research, nursing activity, nursing care, nursing workforce, outcomes, quality and safety, work organisation

1 | INTRODUCTION

Nurses are the main healthcare providers coordinating and providing patient care. In fact, few care processes reach patients without the participation of a registered nurse (RN) (Jones et al., 2015). As a result, nurses are key in terms of maximising quality outcomes. (Jones et al., 2015). To date, there is a large body of evidence that shows that nurses' workloads, the quality of their work environment and patient care demands influence patient outcomes (Kalisch et al., 2009). This evidence is congruent with theoretical frameworks that explain quality as depending from structural and procedural aspects of the delivery of care (Donabedian, 1988a, 1988b). When nurses are faced with multiple patient demands, lack of sufficient resources and when they are working in less supportive environments, they may be confronted with situations in which they have to decide how to best care for their patients. These decisions may include the need to omit certain aspects or activities in the patient's care plan, thus, they lead to what is known as *missed care* (Kalisch et al., 2009). Missed care is considered as a process indicator for assessing quality (Lake et al., 2020).

What does this paper contribute to the wider global clinical community?

- This study contributes to the global understanding of the problem of missed care since, to our knowledge, this is the first national study on the topic in Chile and in South America. It shows that the prevalence of missed care in Chile is high, and it is comparable to the prevalence reported in other continents.
- For countries with more constraint economies, where achieving staffing ratios closer to international standards is very difficult, this study suggest that improvements to hospital work environments may open a path to decrease the prevalence of missed care and improve quality. Strategies to improve work environments may be less costly than increasing the workforce.

2 | BACKGROUND

Missed nursing care is defined as any aspect of required patient care that is delayed or either partially or completely omitted (Kalisch et al., 2009; Recio-Saucedo et al., 2018). Nursing care activities omitted may be clinical, emotional or administrative (Recio-Saucedo et al., 2018). The authors also talk about care left undone or care rationing (Rochefort et al., 2016; Zhao et al., 2019). The problem is highly prevalent. A recent systematic review reports an 88% of nurses, across twelve European countries, omitting some care on their last shift (Griffiths et al., 2018). Similarly, in Asian countries, high percentages of nurses being unable to complete all care activities patients needed were reported (Griffiths et al., 2018). In the United States, a longitudinal study of hospitals in four states reported an increase from 67% to 75% of nurses missing one or more activities on their last shift from 2006 to 2016 (Lake et al., 2020). In Latin America, however, evidence is scarce; results from small studies in Mexico and Brazil, pertaining to single healthcare institutions, have been reported (Hernández-Cruz et al., 2017; Dutra et al. 2019; Valles et al., 2016).

Researchers have used different approaches to measure missed care. The Basel Extent of Rationing of Nursing Care (BERNCA) survey asks nurses how often, in the previous seven days, they had been unable to carry out certain nursing tasks (Schubert et al., 2007). The MISSCARE survey measures, at the unit level, frequency of activities being missed and reasons for missing care (Kalisch & Williams, 2009). The RN4CAST survey measures individual nurses' reports of having omitted care on their last shift (Recio-Saucedo et al., 2018; Sermeus et al., 2011). All these measures of missed care have in common the inclusion of activities that can be categorised as *clinical* activities or activities more related to *communication*, such as comforting or educating patients.

Most frequently, nurses leave undone activities pertaining to communication with patients (Lake et al., 2020; Zárate-Grajales & Mejías, 2019). There may be two possible explanations. First, nurses may be more likely to omit activities that receive less regulatory attention, leaving patients more vulnerable to unmet psychosocial, emotional and educational needs (Jones et al., 2015). Second, when self-reported measures of missed care are being used, which is the most common way of measuring the problem, nurses may be more willing to report these activities as being missed as compared to others that may seem more essential to hospital authorities (Jones et al., 2015).

The problem of missed care has been attributed to different factors that affect the nursing workforce and it has capture researchers' attention because it can affect quality, leading to poor patient outcomes, including satisfaction. Regarding contributing factors, a large body of evidence highlights the importance of work environments and patient-to-nurse staffing ratios (Cho et al., 2015; Griffiths et al., 2018; Kalisch et al., 2011; Lake et al., 2016; Lucero et al., 2009). To the cross-sectional evidence on these associations, a panel study added evidence by showing that improvements to the work environment or to the staffing ratios decrease missed care significantly (Lake et al., 2020). There is also initial evidence about the association between RN skillmix and missed care that suggests that

adding more support workers to the nursing staff does not lower the level of missed care and may even increase it (Griffiths et al., 2018).

In terms of patient outcomes, Schubert et al. (2008), more than a decade ago, already established an association between missed care and nurse-reported adverse patient outcomes, such as falls or medication errors. More recently, authors have reported association of missed care with outcomes such as mortality (Ball et al., 2018). Recio-Saucedo et al. (2018) reported that missed care significantly decreased patient satisfaction. However, most of the available evidence comes from Europe and the United States (Zárate-Grajales & Mejías, 2019). Evidence from Latin American countries can contribute to have a better understanding of the magnitude of the problem across the world.

2.1 | Chile

Chile has a mix of private and public hospitals. Seventy percent of hospital beds are allocated in public hospitals, and most private beds (70%) are in Santiago. Thus, provision of care outside the capital city relies mostly on public providers. There is a single educational pathway to become an RN in Chile; all nurses hold a bachelor's degree and they are well regarded as healthcare providers. Even though, compared to other countries, Chile has a low number or nurses in relation to the total population, 2.9 RNs per 1000 people (Organization for Economic Cooperation and Development, 2020), the number of graduating nurses has increased significantly in the last decade and hospital nurse vacancies fill quickly. Most of hospital patient care is coordinated and provided by nurses, and even more when we refer to public hospitals, where there are afternoon and night hours that lack the sufficient physician support (Vergara, 2015). Under these circumstances, *last-minute* decisions related to patient care rely heavily on nurses' professional judgement. It becomes particularly relevant nurses' ability to organise patient care and to set priorities appropriately in order to meet patients' care needs.

In the priority-setting process, nurses may be confronted with the need of implicitly rationing care given the presence of multiple factors that may prevent them from finishing patients' care plans thoroughly. First, regarding nurse staffing resources, recent Chilean data show problems of hospital understaffing. Average patient-to-nurse staffing ratios are significantly high as compared to those in North American and European countries (Aiken et al., 2014; Simonetti et al., 2020). The average patient assignment across hospitals is of 14 patients per nurse, ranging from 9 to 23, and patient assignments increase during night shifts (Simonetti et al., 2020). It has been reported that hospitals, especially public hospitals, do not open all positions that will be needed to sufficiently staff their units; this cost-containment measure mostly affects the nursing workforce (Vergara, 2015). Second, the quality of hospital work environments reported in a previous study (Aiken et al., 2021) may also negatively contribute to the completion of patient care in those hospitals with worse assessments. Third, the low RN skillmix also warrants attention to the problem of missed care; in Chile, RNs comprise only a medium to small percentage of the total nursing personnel, with reported skillmix of 19% to 36% RNs (Aiken et al., 2021; Simonetti et al., 2020).

Patients' care demands may also challenge nurses' possibilities of providing complete care. As in many other countries, hospitalised patients are increasingly complex. Chile, as compared to other OECD countries, has a shortage of hospital beds and of physicians, which has led to long wait lists of patients that need to be admitted to the hospital (Ministerio de Salud de Chile, 2017a, 2017b, 2019; Organization for Economic Cooperation & Development, 2017). As a result, the sickest patients, many of them having developed severe complications from chronical conditions, are the ones being admitted to the hospital.

Under these circumstances, it is reasonable to have concerns about missed care in Chilean hospitals. However, to date, there are no studies in the area.

The aim of this study is to measure and characterise the problem of missed nursing care in Chilean hospitals and to test associations with hospital organisational variables: staffing ratios, RN skillmix and work environment. This study derives from a large research project on nursing organisation in Chilean hospitals called RN4CAST-Chile. The project followed the RN4CAST research protocol of the University of Pennsylvania that has been implemented in more than 30 countries and that, for the first time, was developed in a South American country (Linda H. Aiken, Principal Investigator).

3 | AIMS

1. To measure the prevalence of missed nursing care in general high-complexity Chilean private and public hospitals.
2. To measure the frequency and to characterise the type of activities more frequently left undone by Chilean nurses.
3. To analyse the association between missed care and hospital organisational variables: work environment, patient-to-nurse staffing ratios and skillmix.We hypothesise, that missed care will be more prevalent in Chile as compared to the United States or countries in Europe, but we expect to find coherence with international evidence in terms of the type of activities more frequently missed (those related to the more communicational aspects of care). To the already existing evidence on the association between staffing ratios and the work environment and missed care, we expect to add more conclusive evidence on the association between skillmix and missed care.

4 | METHODS

4.1 | Design

This project followed a multi-hospital observational cross-sectional design (Strengthening the Reporting of Observational Studies in Epidemiology Guideline in Supplementary File 1).

4.2 | Data collection

4.2.1 | Setting and participants

The study setting comprised adult general, either public or private, high-complexity hospitals in Chile. Hospitals were selected as per the following inclusion criteria: high-complexity general hospitals, with more than 100 beds, and reporting 3 M International Refined Diagnosis Related Groups (IR-GRD) data to the Ministry of Health (this last inclusion criteria were relevant in the context of the parent study, but not for the results presented here). The Chilean Ministry of Health categorises hospitals as low, medium or high-complexity hospitals and has reports on hospital bed sizes. Thus, ministerial data were used for hospital selection. Children and specialty hospitals were excluded. In each hospital, data were collected from RNs. Participants needed to meet two inclusion criteria: to be working in a medical, surgical or med-surgical unit and to be providing direct care to patients. The research team, by approaching Chief Nurse Officers in each targeted hospital, performed a census of RNs to calculate the RN population. Considering the inclusion criteria, a study population of 45 hospitals and 1,853 RNs was defined. The aim of the study was to study the total hospital and RN populations. Thus, no sampling methods were used. Data collection lasted from May 2017 to October 2018.

4.2.2 | Data sources

Primary data were collected through surveys completed by nurses. The survey, designed for the multinational RN4CAST research protocol (Linda Aiken, PI), is described in detail elsewhere (Aiken et al., 2018; Sermeus et al., 2011a). It comprises four sections, with questions about the work environment, hospital safety and quality of care, patient assignments and nursing team compositions, and demographic and educational data. The specific questions on missed care pertain to the quality and safety section.

The research team travelled to all participant hospitals and met with Chief Nurse Officers and bedside nurses in the targeted units to explain them the purpose of the study. When needed, more than one visit was scheduled to foster nurses' participation. The instrument was distributed by the researchers to all nurses on each unit, who then answered the survey anonymously, prior signature of an informed consent form. Afterwards, the research team collected the surveys, which were handed in by the RNs in a sealed envelope within a period no longer than three weeks.

4.2.3 | Variables

The main variables of interest were missed nursing care and three nursing organisational variables: the nurse work environment, patient-to-nurse staffing ratios and RN skillmix.

4.2.4 | Missed care

Missed care was measured through the question: 'On your most recent shift, which of the following activities were necessary but left undone because you lacked the time to complete them?' Nurses could check, from a list of 10 possible activities, all the ones they had left undone. The list of possible answers included activities such as patient surveillance, patient education and pain management, amongst others (see Table 3 for the complete list). The variable was operationalised in two different ways. First, the number of activities left undone by each nurse was measured as a numeric discrete variable, ranging from 0 to 10. Second, a dummy variable 0/1 was created, where 0 represented nurses that had done all nursing activities and 1 represented nurses reporting 1 or more activities missed. Missed care responses of nurses that did not leave any activity undone, thus, did not check any box of the list of activities, looked the same as nurses who might be intended not to respond the question. In the analysis, all these cases were included as nurses who did not missed any activity. This decision might have introduced some bias in the analysis, by underestimating the prevalence of missed care.

4.2.5 | Nurse work environment

The nurse work environment was measured using the Practice Environment Scale of the Nursing Work Index (PES-NWI) (Lake, 2002), the instrument most widely used to measure environment (Swiger et al., 2017). The instrument has 31 questions that measure five dimensions of nurses' work environments: nurse participation in hospital affairs, nursing foundations for quality of care, nurse manager ability, leadership, and support of nurses, staffing and resource adequacy, and collegial nurse–physician relations (Lake, 2002). The instrument had been validated in Spanish with a scale-level content validity score of 0.82 (range across subscales from 0.69 to 0.93) (Orts-Cortés et al., 2013). A recent systematic review on the use of the PES-NWI reports Cronbach's alpha values above 0.70 for studies representing all continents, but Africa (Swiger et al., 2017).

All instrument questions are measured through a Likert scale that goes from 1 to 4, where 1 represents 'strongly disagree', 2 'somewhat disagree', 3 'somewhat agree' and 4 'strongly agree'. From the responses pertaining to each subscale, nurse-level means were derived. Amongst all nurses belonging to the same hospital, for each subscale, a hospital-level average was again obtained. Of the five hospital-level subscales averages, a final average per hospital was obtained. For the regression analyses, a new hospital average score was calculated out of only four subscales, removing the one of staffing and resources. This subscale was excluded to avoid multicollinearity problems with the staffing variable in the regression analyses. This form of analysis of the work environment scale has been described in previous research (Aiken et al., 2012). For regression analyses, the continuous variable with the hospital-level work environment score average was standardised to take it to a mean of 0 and a standard deviation of 1.

4.2.6 | Nurse staffing

This variable was measured by asking nurses how many patients and nurses, including themselves, were in the unit on their last shift. The patient-to-nurse ratio was calculated by dividing total number of patients by the total number of RNs. From all nurses working in the same hospital, a hospital-level measure was obtained by averaging the number of patients per nurse reported by each nurse in that hospital.

4.2.7 | Nurse skillmix

The RN skillmix was measured by asking nurses how many RNs, nurse technicians, and nursing aids were in the unit on their last shift. For the total number of RNs, nurses needed to report the total count including themselves. The RN skillmix was calculated as either the proportion or the percent of RNs out of the total nursing personnel.

4.2.8 | Other covariates

Other covariates included hospital characteristics, such as ownership (either public or private), and bed size. Data on nurse demographic characteristics, such as sex and age, and years of professional experience, were also collected. Regarding patient characteristics, patient level of dependency was measured through the following questions in the nurse survey: *Of all the patients you were directly responsible for on your most recent shift*: *How many required assistance with all activities of daily living?* A proportion of patients requiring assistance, out of the total number of patients, was calculated. Thus, values could range from 0 to 1.

4.3 | Analysis

Percentages of missing data were very low for all the variables of interest (less than 3%); thus, no technics to handle missing data were needed. For the descriptive analyses, the nature of each variable was considered. For continuous variables, means and standard deviations were calculated. For categorical variables, percentages were used. We first described hospital and registered nurse characteristics. Then, we described the independent variables: work environment, patient-to-nurse ratios and skillmix. All these variables were measured at the hospital level, aggregating responses from nurses working in the same hospital. The underlying rationale is that organisational variables refer more to the organisation, in this case hospitals, rather than to individual nurses. We calculated average, standard deviation, minimum and maximum values across the 40 hospitals. For the work environment subscales, we calculated two reliability measures: Cronbach's alpha and intraclass correlation coefficients (ICC(1,k)). Cronbach's alpha values were calculated to assess the extent to which each subscale items were measuring the same construct (interrelatedness of items of the same subscale) (Tavakol & Dennick, 2011). ICC was calculated to establish the degree of agreement of responses given by nurses working in the same hospital (Koo & Li, 2016).

For aims 1 and 2, we calculated the prevalence of missed care as the percentage of RNs that reported having missed at least one activity in patients' care plan during their last shift. We also calculated the average number and standard deviation of activities left undone. For each nursing care activity, we calculated the percentage of nurses reporting omission of that specific activity. At last, for each hospital and for each type of activity, we calculated the proportion of missed care and we represented it graphically through boxplots.

For aim 3, we first analysed the correlation matrix between the outcome and independent variables at the hospital level. The Pearson correlation coefficient was used to assess the correlation between hospital mean number of activities left undone and scores of the work environment, patient-to-nurse ratios and skillmix. We represented these correlations graphically through scatterplots. Then, depending on the operationalisation of the outcome variable, logistic and Poisson regression analyses were used to test associations. Poisson regressions were run with missed care as a discrete variable, representing the number of activities missed by nurses, which had a rightly skewed distribution. Logistic regressions were run with missed care as a binary outcome. Given the consistency of results between these two types of analyses, and for conciseness in their presentation, only logistic regression analyses were presented. Unadjusted and adjusted models were run, considering clustering of nurses belonging to the same hospital. Adjustment variables included hospital ownership (private or public), nurses' age and patient level of dependency. The standardised work environment variable was used in logistic regression models, so that effect sizes could be interpreted as variations in the outcome for each standard deviation increase in the work environment score.

A significance level of 0.05 was established. Stata 15.1 was used for analyses.

5 | RESULTS

Out of the forty-five hospitals that met the inclusion criteria, 40 participated in the study (88.9%). Two hospitals declined the invitation to join the study and the other three accepted the invitation once data collection was finished. Most participating hospitals were public, and 40% were in the capital city, Santiago. This is congruent with the Chilean population distribution. Most hospitals (80%) had bed sizes ranging from 200 to 600 beds; the largest hospital had 754 beds. From a universe of 1853 nurses, 1632 participated in the study (88.1%). Nurse respondents averaged 41 per hospital. About 60% of nurses were 30 years old or younger, with less than 7 years of professional experience. Almost 95% of RNs were doing 12-h shifts, rotating between day and night shifts. Close to 25% of RNs have a clinical specialisation or master's degree. Table 1 summarises hospital and nurse characteristics.

The mean work environment score was 2.6 (SD 0.19). The subscale related to staffing and resources had the lowest score, whilst the one on quality of care had the highest. All subscales performed adequately in terms of their reliability measures, with Cronbach's alpha values above 0.70 and ICC (1, k) above 0.80. The mean patient-to-nurse ratio was 14.5, ranging from an average of 6–23 patients per nurse across hospitals. On average, one third of all nursing personnel was represented by RNs, with one hospital having only one fifth of RNs. Table 2 provides summary measures on the work environment, patient-to-nurse ratios and skillmix.

Table 3 provides missed care descriptive results. Eighty-six percent of nurses missed, at least, one activity. There are some hospitals where all RNs reported missing care. Nurses reported missing, on average, 2.8 out of 10 essential care activities during their last shift (SD 2.4). Nursing care activities more frequently missed included education to patient and families, comforting and talking to patients, and adequate patient surveillance. Clinical activities like medication administration, pain management and procedural activities were the least frequently missed. There were even some hospitals with no omissions of clinical activities reported. Figure 1 represents the distribution of hospital means for each type of nursing care activity missed. It provides a visual representation of the activities that nurses leave undone more frequently.

The correlation matrix between the main predictors and the outcome variable showed a moderate correlation between hospital mean number of activities left undone and hospital mean work environment scores ($r = -0.49$, $p = 0.0013$), patient-to-nurse ratios ($r = 0.48$, $p < 0.0019$) and skillmix ($r = -0.34$, $p = 0.0345$). Figure 2 represents these correlations.

Table 4 presents unadjusted and adjusted logistic regression models to test association between missed care and the nurse work environment, patient-to-nurse staffing ratios and skillmix. The adjusted model showed significant association between missed care and nurse work environments and patient-to-nurse ratios. One standard deviation increase in the quality of the work environment leads to a 20% reduction in the odds of missed care ($p < 0.05$). Regarding staffing ratios, an increase of one patient to the average patient-to-nurse ratio increases the odds of missed care in 7% ($p < 0.05$). Skillmix showed no association with missed care.

TABLE 1 Hospital and nurse characteristics

Hospital characteristics ($n = 40$)	
Public (n, %)	34 (85%)
Location in Santiago (n, %)	16 (40%)
Bed size ($\bar{x}$, SD)	398 (165)
Nurse characteristics ($n = 1632$)	
Women (n, %)	1.433 (88,3)
Age ($\bar{x}$, SD)	31,8 (7,3)
Nurses aged 30 or younger (n, %)	935 (57,3)
Years of professional experience ($\bar{x}$, SD)	6,25 (6,7)
Number of hours worked in last shift ($\bar{x}$, SD)	12,5 (3,2)
Shift type	756 (47,0)
12 h shift, day (n, %)	756 (47,0)
12 h shift night (n, %)	762 (47,3)
Other type of shift (n, %)	92 (5,7)
Nursing specialty (n, %)	402 (24,9)
Master's degree (n, %)	38 (2,4)

Abbreviation: SD, standard deviation.

6 | DISCUSSION

This study is the first one addressing the problem of missed care in Chilean hospitals. It is also unique in terms of the number of participating hospitals and registered nurses. Even though there are other

TABLE 2 Hospital PES-NWI subscales' scores and reliability measures, RN staffing ratios and Skillmix ($n = 40$)

PES-NWI subscale scores	Mean	SD	Min	Max	ICC	Cronbach's alpha
Nurse participation in hospital affairs	2.32	0.25	1.75	2.94	0.90	0.83
Nursing foundations for quality of care	2.93	0.22	2.48	3.65	0.90	0.77
Nurse manager leadership and support	2.72	0.27	1.88	3.13	0.84	0.80
Staffing and resource adequacy	2.25	0.24	1.71	2.77	0.85	0.71
Collegial nurse–physician relations	2.80	0.23	2.39	3.25	0.83	0.88
Average hospital PES-NWI score	2.60	0.19	2.10	3.11	0.88	
Patients-to-RN	14.5	4.1	6.0	23.0		
Skillmix	31.1	6.2	20.2	48.1		

Abbreviation: ICC, intraclass correlation coefficient (1, k).

studies on the subject in South America, they are smaller and do not provide a national perspective.

The prevalence of missed care in Chile, found to be 86%, is similar to the one reported in other international studies, which reveals a widespread problem globally. Using the same RN4CAST protocol, a large study conducted in twelve European countries reported an average prevalence of missed care of 88% across nations (Ausserhofer et al., 2014). In the United States, authors have found a 73% of nurses omitting care (Lake et al., 2016) whilst in Korea, another group of researchers, reported a prevalence of 81% (Cho et al., 2016). In South America, to our knowledge, there is only a smaller study in Brazil that found 74% of nurses leaving at least one care activity undone; however, this study includes professional and non-professional nursing personnel (dos Reis Dutra et al., 2019). When comparing the average number of activities being missed by nurses, in Chile, we found 2.8 (28%) out of 10 essential activities. In Europe, an average of 3.6 (28%) out of 13 activities, in the United States 2.7 (22%) out of 12, and in Korea 8.9 (37%) out of 24 (Ausserhofer et al., 2014; Cho et al., 2020; Lake et al., 2016). In Chile, the list of essential activities included in the analysis was shorter, as compared to the list in other studies, because some activities are normally performed by licenced practical nurses (i.e. oral hygiene) and, thus, we did not include them in our measures of missed care.

TABLE 3 Prevalence of missed care and type of nursing care activities left undone (n = 40)

	%	Range across hospitals (%)
Overall prevalence of missed care	86.0	73.3–100.0
Nurses who missed 1 activity	19.6	
Nurses who missed 2 activities	19.1	
Nurses who missed 3 or more activities	47.3	
Type of nursing care activities being missed		
Educating patients and family	57.4	23.5–83.3
Comfort and talk with patients	50.2	27.3–70.3
Adequate patient surveillance	40.8	22.0–70.0
Adequately document nursing care	29.2	11.1–100.0
Develop or update nursing care plans / care pathways	27.4	10.7–75.0
Prepare patients and families for discharge	26.5	11.1–58.3
Planning care	16.8	5.4–40.4
Administer medications on time	16.3	0.0–41.7
Pain management	10.4	0.0–25.0
Treatments and procedures	9.9	0.0–24.1

The three activities most frequently missed were patient education, talking or comforting patients, and patient surveillance. In the early incepts of missed care research, authors identified the lack of time as one of the frequent causes of missed care (Kalisch, 2006). Thus, activities that are time-consuming, like patient education, are likely to be omitted (Kalisch, 2006). The lack of time worsens in the context of staff insufficiency, which is another frequent cause of omissions or care (Kalisch, 2006; Recio-Saucedo et al., 2018). It is noteworthy that the three types of activities more frequently missed by Chilean nurses are activities whose immediate consequences are less apparent, and which may be less subjected to evaluation or to physician supervision. However, it is known that missing these care activities may be harmful to patients. For example, the lack of patient education is associated with poor outcomes such as readmissions and adverse events (Recio-Saucedo et al., 2018). The finding of patient surveillance amongst the top three activities being missed is

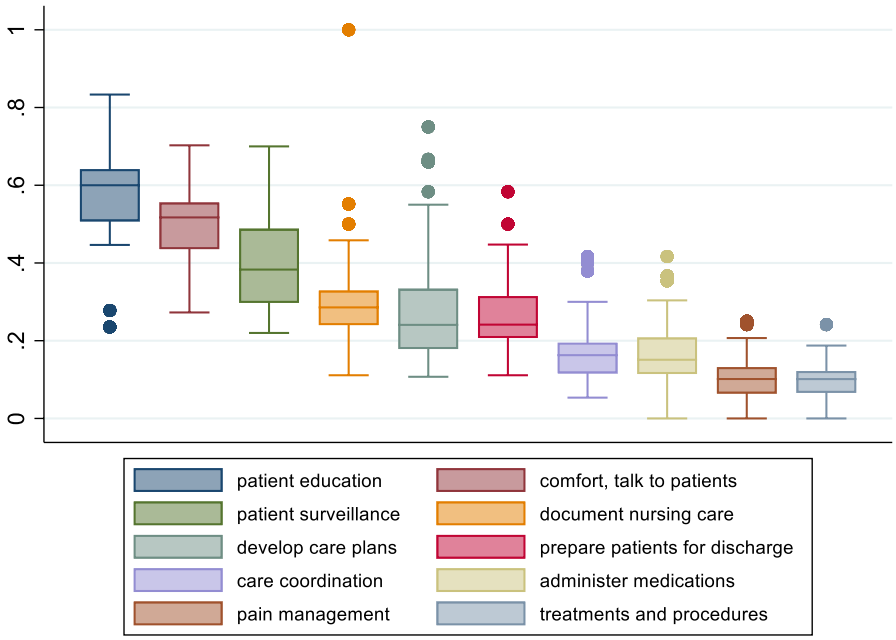

FIGURE 1 Hospital-level missed care distribution, per type of nursing care activity left undone (n = 40)

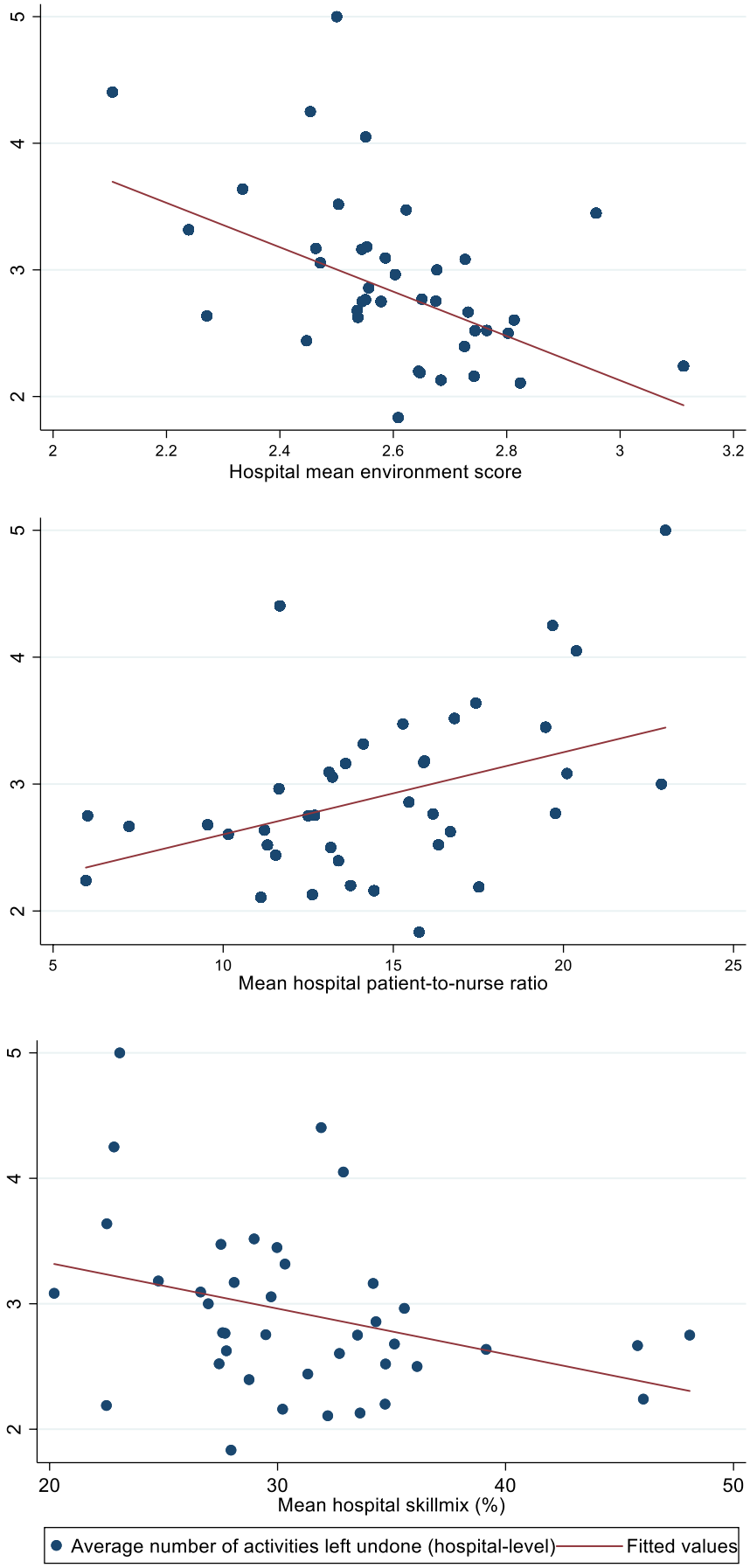

FIGURE 2 Correlation between mean number of activities left undone, work environment scores, patient-to-nurse ratios and skillmix by hospital ($n = 40$)

TABLE 4 Association between work environment, patient-to-nurse staffing ratios and missed care. Unadjusted and adjusted models (n = 1632)

	Nurse work environment[a]			Nurse staffing			Skillmix		
Model	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Unadjusted	0.78	0.67–0.91	0.002**	1.04	0.97–1.12	0.279	1.02	0.98–1.07	0.297
Fully adjusted	0.76	0.65–0.90	0.001**	1.07	1.01–1.13	0.026*	1.00	0.96–1.06	0.824

Notes: *$p < 0.05$, **$p <$ 0,01. The unadjusted and adjusted models account for the clustering of nurses working in the same hospital. Adjustment variables include hospital ownership, nurses' age and patient level of dependency.

Abbreviations: CI, confidence interval; OR, Odds ratio.

[a]The work environment variable was standardised; thus, effect sizes should be interpreted as variations in the outcome variable produced by one standard deviation increase in the work environment score.

consistent with international literature (Recio-Saucedo et al., 2018). This finding suggests that patient safety may be compromised, especially since many Chilean hospitals rely almost solely on registered nurses as professional providers to take care of patients during certain hours of the day, like in the evening or at night. Poor surveillance can threaten patient safety, by failures in timely detecting patient complications or deterioration. Even though not physically harmful, the lack of emotional support can lead to poor outcomes in terms of patients' experiences during their hospital stay. There is consistent evidence that shows that the interpersonal nurse–patient relationship is an important predictor of patient satisfaction (Batbaatar et al., 2017). The literature emphasises the importance of nurses' affective behaviours such as friendliness, respect and demonstrations of concern for patients (Batbaatar et al., 2017).

Consistent results have shown the association between missed care and the quality of nurses' work environment. Most studies exploring this association show that better work environments reduce missed care (Ausserhofer et al., 2014; Lake et al., 2020; Zhao et al., 2019). As seen in other studies, comparatively, the work environment has a larger effect on missed care than staffing ratios (Ausserhofer et al., 2014; Lake et al., 2020). This result is relevant from a managerial perspective, since there might be low-cost strategies that may prove to be effective in improving the work environment and, consequently, reducing the prevalence of missed care. Even though hospitals in Chile should aim at improving staffing ratios (Aiken et al., 2021; Simonetti et al., 2020), nurse executives normally deal with very constrained hospital budgets and they may be more successful at getting resources to improve the work environment rather than increasing the fixed costs of a larger nursing workforce. The panel study conducted by Lake et al. (2020) provides valuable evidence on the effectiveness of improving hospital work environments in reducing missed care. This is the first study with longitudinal data that allows to draw causal inferences on this topic (Lake et al., 2020). Authors reported variations in missed nursing care at two different time points due to work environment and staffing changes and showed a lower prevalence of missed care in hospitals that improved the quality of their work environment and staffing ratios over time (Lake et al., 2020).

For staffing, we also found a significant association between patient-to-nurse ratios and nurses not being able to provide all the care patients needed. However, it has a smaller effect size as compare to that of the environment. A systematic review analysing the association between staffing ratios and missed care found that most studies on this problem report significant association between low RN staffing and increased prevalence of missed care (Griffiths et al., 2018). Regarding the effect size of the environment, as compared to the patient workload, on missed care, there is international evidence showing that the quality of works environments may be more determinant (Ausserhofer et al., 2014). The panel study conducted by Lake et al. (2020) showed that improvements to the work environment over time yielded greater effects on reducing missed care than reductions of the patient-to-nurse ratio.

In our study, we found no association between RN skillmix and missed care. Internationally, there are fewer studies addressing this association. Griffiths et al. (2018), in a systematic review, found only four studies exploring associations between skill mix and missed care. Overall, the conclusion is that adding support workers may even increase the problem of missed care if the RN skillmix is diluted (Griffiths et al., 2018). This dilution seems to be the case for Chile, where the percentage of RNs in the total nursing personnel is very low as compared to skillmix measures in North America or Europe, where the RN skillmix is above 40% and oftentimes above 50% (Aiken et al., 2017). However, as noted before, our results did not reach statistical significance.

One of the limitations of this study is its cross-sectional design, which limits any analysis of causality. However, it provides valuable evidence that is new to Chile about the problem of missed care in our national network of hospitals and the association to work environments and staffing levels.

The results of the present study are generalisable to all adult high-complexity hospitals in Chile. In the context of the parent RN4CAST-Chile study, we establish the universe of hospitals with the inclusion criteria of having IR-GRD reports. However, there are no reasons to believe that high-complexity hospitals that did not have these reports at the time of data collection differ significantly from the ones included in the study. Smaller Chilean hospitals may have differences, mostly related to the availability of resources, and thus generalisation of results to these hospitals should be done cautiously. Further research to explore these smaller hospitals is needed. Finally, since, to our knowledge, this is the largest study on

missed care in a South American country, we believe that our results may provide insight to the extent of the problem in a continent with less robust economies, where health systems may be subject to important financial constraints.

7 | CONCLUSION

As in many other countries, missed care in Chilean hospitals is a common problem. The activities more frequently missed are those that can be more time-consuming, like patient education, and that may have less immediate consequences on patients' physical well-being. However, further studies are needed to explore how nurses in Chile prioritise nursing care. The odds of nurses leaving care undone in hospitals with better work environment and lower patient-to-nurse ratios are lower as compare to nurses in hospital with poorer environment and higher patient assignments. However, the work environment has a larger effect on the problem of missed care, suggesting that in context of care that are supportive of nurses, where there is good communication between providers, and good leadership of nurse managers' nurses can better organise their work and better complete patient care.

8 | RELEVANCE TO CLINICAL PRACTICE

This study provides valuable evidence for hospital administrators and nurse executives in Chile that now have empirical evidence on the problem of missed care. Even though further research needs to be conducted to understand how care left undone is compromising patient care quality and safety in Chilean hospital, international evidence shows that missed care impacts patient well-being and needs to be addressed. The improvement of hospital work environments may be an effective strategy to reduce missed care in Chile, moreover, if combined with strategies to reduce patient-to-nurse ratios. Hospital nurse executives should, with some periodicity, perform assessments of the quality of their institutional work environments and nurses' workloads that may help them identify areas of problem. With an accurate assessment, plans to improve the work environment will be more effective in supporting the nursing workforce to facilitate completeness of care. When prioritising patient care, nurse executives and bedside nurses should be aware of the importance of care activities more related to communication with patients and surveillance, understanding that they have an important role in providing safe and high-quality care.

CONFLICT OF INTEREST

We have no known conflicts of interest to disclose.

AUTHOR CONTRIBUTIONS

Contribution of study design, data collection, data analysis and manuscript writing: Marta Simonetti, Consuelo Cerón and Alejandra Galiano; Contribution of study design, data analysis and manuscript revision: Linda Aiken and Eileen Lake.

ETHICAL APPROVAL

The study was approved by Universidad de los Andes' Institutional Review Board (approval number CEC201613) on 29 August 2016. Nurses' participation was voluntary and anonymous, prior signature of an informed consent form.

ORCID

Marta Simonetti https://orcid.org/0000-0001-8194-8968

REFERENCES

Aiken, L. H., Cerón, C., Simonetti, M., Lake, E. T., Galiano, A., Garbarini, A., Soto, P., Bravo, D., & Smith, H. L. (2018). Hospital nurse staffing and patient outcomes. *Revista Médica Clínica Las Condes*, *29*(3), 322–327. https://doi.org/10.1016/j.rmclc.2018.04.011

Aiken, L. H., Cimiotti, J. P., Sloane, D. M., Smith, H. L., Flynn, L., & Neff, D. (2012). The effects of nurse staffing and nurse education on patient deaths in hospitals with different nurse work environments. *Medical Care*, *49*(12), 1047–1053. https://doi.org/10.1097/MLR.0b013e3182330b6e

Aiken, L. H., Simonetti, M., Sloane, D. M., Cerón, C., Soto, P., Bravo, D., Galiano, A., Behrman, J. R., Smith, H. L., McHugh, M. D., & Lake, E. T. (2021). Hospital nurse staffing and patient outcomes in Chile: a multilevel cross-sectional study. *The Lancet Global Health*, *9*(8), e1145–e1153.

Aiken, L. H., Sloane, D. M., Bruyneel, L., Van den Heede, K., Griffiths, P., Busse, R., Diomidous, M., Kinnunen, J., Kózka, M., Lesaffre, E., McHugh, M. D., Moreno-Casbas, M. T., Rafferty, A. M., Schwendimann, R., Scott, P. A., Tishelman, C., van Achterberg, T., & Sermeus, W. (2014). Nurse staffing and education and hospital mortality in nine European countries: A retrospective observational study. *The Lancet*, *383*(9931), 1824–1830. https://doi.org/10.1016/S0140-6736(13)62631-8

Aiken, L. H., Sloane, D., Griffiths, P., Rafferty, A. M., Bruyneel, L., McHugh, M., Maier, C. B., Moreno-Casbas, T., Ball, J. E., Ausserhofer, D., & Sermeus, W. (2017). Nursing skill mix in European hospitals: Cross-sectional study of the association with mortality, patient ratings, and quality of care. *BMJ Quality and Safety*, *26*(7), 559–568. https://doi.org/10.1136/bmjqs-2016-005567

Ausserhofer, D., Zander, B., Busse, R., Schubert, M., De Geest, S., Rafferty, A. M., Ball, J., Scott, A., Kinnunen, J., Heinen, M., Strømseng Sjetne, I., Moreno-Casbas, T., Kózka, M., Lindqvist, R., Diomidous, M., Bruyneel, L., Sermeus, W., Aiken, L. H., & Schwendimann, R. (2014). Prevalence, patterns and predictors of nursing care left undone in European hospitals: Results from the multicountry cross-sectional RN4CAST study. *BMJ Quality and Safety*, *23*(2), 126–135. https://doi.org/10.1136/bmjqs-2013-002318

Ball, J. E., Bruyneel, L., Aiken, L. H., Sermeus, W., Sloane, D. M., Rafferty, A. M., Griffiths, P. (2018). Post-operative mortality, missed care and nurse staffing in nine countries: A cross-sectional study. *International Journal of Nursing Studies*, *78*, 10–15. https://doi.org/10.1016/j.ijnurstu.2017.08.004

Batbaatar, E., Dorjdagva, J., Luvsannyam, A., Savino, M., & Amenta, P. (2017). Determinants of patient satisfaction: A systematic review. *Perspectives in Public Health*, *137*(2), 89–101. https://doi.org/10.1177/1757913916634136

Cho, E., Lee, N. J., Kim, E. Y., Kim, S., Lee, K., Park, K. O., & Sung, Y. H. (2016). Nurse staffing level and overtime associated with patient safety, quality of care, and care left undone in hospitals: A cross-sectional study. *International Journal of Nursing Studies*, *60*, 263–271. https://doi.org/10.1016/j.ijnurstu.2016.05.009

Cho, E., Sloane, D. M., Kim, E.-Y., Kim, S., Choi, M., Yoo, I. Y., Lee, H. S., & Aiken, L. H. (2015). Effects of nurse staffing, work environments, and education on patient mortality: An observational study. *International Journal of Nursing Studies*, *52*(2), 535–542. https://doi.org/10.1016/j.ijnurstu.2014.08.006

Cho, S. H., Lee, J. Y., You, S. J., Song, K. J., & Hong, K. J. (2020). Nurse staffing, nurses prioritization, missed care, quality of nursing care, and nurse outcomes. *International Journal of Nursing Practice*, *26*(1), 1–9. https://doi.org/10.1111/ijn.12803

Donabedian, A. (1988a). Quality assessment and assurance: Unity of purpose, diversity of means. *Inquiry*, *25*(1), 173–192.

Donabedian, A. (1988b). The Quality of Care: How Can It Be Assessed? *JAMA*, *260*(12), 1743–1748. https://doi.org/10.1001/jama.1989.03420080065026

Dutra, C. K. R., Salles, B. G., & Guirardello, E. B. (2019). Situations and reasons for missed nursing care in medical and surgical clinic units. *Revista Da Escola De Enfermagem*, *53*, e03470. http://dx.doi.org/10.1590/S1980-220X2017050203470

Griffiths, P., Recio-Saucedo, A., Dall'Ora, C., Briggs, J., Maruotti, A., Meredith, P., Smith, G. B., & Ball, J. (2018). The association between nurse staffing and omissions in nursing care: A systematic review. *Journal of Advanced Nursing*, *74*(7), 1474–1487. https://doi.org/10.1111/jan.13564

Hernández-Cruz, R., Moreno-Monsiváis, M. G., Cheverría-Rivera, S., & Díaz-Oviedo, A. (2017). Factors influencing the missed nursing care in patients from a private hospital. *Revista Latino-Americana De Enfermagem*, *25*, https://doi.org/10.1590/1518-8345.1227.2877

Jones, T. L., Hamilton, P., & Murry, N. (2015). Unfinished nursing care, missed care, and implicitly rationed care: State of the science review. *International Journal of Nursing Studies*, *52*(6), 1121–1137. https://doi.org/10.1016/j.ijnurstu.2015.02.012

Kalisch, B. J. (2006). Missed Nursing Care. *Journal of Nursing Care Quality*, *21*(4), 314–315. https://doi.org/10.1097/00001786-200610000-00007

Kalisch, B. J., Landstrom, G. L., & Hinshaw, A. S. (2009). Missed nursing care: A concept analysis. *Journal of Advanced Nursing*, *65*(7), 1509–1517. https://doi.org/10.1111/j.1365-2648.2009.05027.x

Kalisch, B. J., Tschannen, D., Lee, H., & Friese, C. R. (2011). Hospital variation in missed nursing care. *American Journal of Medical Quality*, *26*(4), 291–299. https://doi.org/10.1177/1062860610395929

Kalisch, B. J., & Williams, R. A. (2009). Development and psychometric testing of a tool to measure missed nursing care. *Journal of Nursing Administration*, *39*(5), 211–219. https://doi.org/10.1097/NNA.0b013e3181a23cf5

Koo, T. K., & Li, M. Y. (2016). A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. *Journal of Chiropractic Medicine*, *15*(2), 155–163. https://doi.org/10.1016/j.jcm.2016.02.012

Lake, E. T. (2002). Development of the practice environment scale of the nursing work index. *Research in Nursing and Health*, *25*(3), 176–188. https://doi.org/10.1002/nur.10032

Lake, E. T., Germack, H. D., & Viscardi, M. K. (2016). Missed nursing care is linked to patient satisfaction: A cross-sectional study of US hospitals. *BMJ Quality and Safety*, *25*(7), 535–543. https://doi.org/10.1136/bmjqs-2015-003961

Lake, E. T., Riman, K. A., & Sloane, D. M. (2020). Improved work environments and staffing lead to less missed nursing care: A panel study. *Journal of Nursing Management*, *January*, 1–9. https://doi.org/10.1111/jonm.12970

Lucero, R. J., Lake, E. T., & Aiken, L. H. (2009). Variations in nursing care quality across hospitals. *Journal of Advanced Nursing*, *65*(11), 2299–2310. https://doi.org/10.1111/j.1365-2648.2009.05090.x

Ministerio de Salud de Chile (2017). Informe sobre brechas de personal de salud por Servicio de Salud.

Ministerio de Salud de Chile (2017). Lista de espera no GES y Garantías de Oportunidad GES retrasadas. Retrieved from http://web.minsal.cl/wp-content/uploads/2017/04/GLOSA_06_ENERO_DE_2017.pdf

Ministerio de Salud de Chile (2019). Recursos para la salud [Resources in healthcare]. Retrieved from http://www.deis.cl/estadisticas-recursossalud/

Organization for Economic Cooperation and Development (2017). Health at a Glance. Retrieved from https://www.health.gov.il/publicationsfiles/healthataglance2017.pdf

Organization for Economic Cooperation and Development (2020). Health at a glance: Latin America and the Caribbean 2020. *Health at a Glance: Latin America and the Caribbean*, *2020*, https://doi.org/10.1787/6089164f-en

Orts-Cortés, M. I., Moreno-Casbas, M. T., Squires, A., Fuentelsaz-Gallego, C., Maciá-Soler, L., González-María, E., & Sebastián-Viana, T. (2013). Content validity of the Spanish version of the practice environment scale of the nursing work index. *Applied Nursing Research*, *26*(4), e5–e9. https://doi.org/10.1016/j.apnr.2013.08.006

Recio-Saucedo, A., Dall'Ora, C., Maruotti, A., Ball, J., Briggs, J., Meredith, P., Redfern, O. C., Kovacs, C., Prytherch, D., Smith, G. B., & Griffiths, P. (2018). What impact does nursing care left undone have on patient outcomes? Review of the literature. *Journal of Clinical Nursing*, *27*(11–12), 2248–2259. https://doi.org/10.1111/jocn.14058

Rochefort, C. M., Rathwell, B. A., & Clarke, S. P. (2016). Rationing of nursing care interventions and its association with nurse-reported outcomes in the neonatal intensive care unit: A cross-sectional survey. *BMC Nursing*, *15*(1), 1–8. https://doi.org/10.1186/s12912-016-0169-z

Schubert, M., Glass, T. R., Clarke, S. P., Schaffert-Witvliet, B., & De Geest, S. (2007). Validation of the basel extent of rationing of nursing care instrument. *Nursing Research*, *56*(6), 416–424. https://doi.org/10.1097/01.NNR.0000299853.52429.62

Schubert, M., Glass, T. R., Clarke, S. P., Aiken, L. H., Schaffert-Witvliet, B., Sloane, D. M., & De Geest, S. (2008). Rationing of nursing care and its relationship to patient outcomes: The Swiss extension of the International Hospital Outcomes Study. *International Journal for Quality in Health Care*, *20*(4), 227–237. https://doi.org/10.1093/intqhc/mzn017

Sermeus, W., Aiken, L. H., Van den Heede, K., Rafferty, A. M., Griffiths, P., Moreno-Casbas, M. T., Busse, R., Lindqvist, R., Scott, A. P., Bruyneel, L., Brzostek, T., Kinnunen, J., Schubert, M., Schoonhoven, L., & Zikos, D. (2011). Nurse forecasting in Europe (RN4CAST): Rationale, design and methodology. *BMC Nursing*, *10*(1), 6. https://doi.org/10.1186/1472-6955-10-6

Simonetti, M., Soto, P., Galiano, A., Cerón, C., Lake, E. T., & Aiken, L. H. (2020). Dotaciones, skillmix e indicadores laborales de enfermería en Hospitales Públicos chilenos. *Revista Medica De Chile*, *148*, 1444–1451. https://doi.org/10.4067/S0034-98872020001001444

Swiger, P. A., Patrician, P. A., Miltner, R. S., Raju, D., Breckenridge-Sproat, S., & Loan, L. A. (2017). The Practice Environment Scale of the Nursing Work Index: An updated review and recommendations for use. *International Journal of Nursing Studies*, *74*, 76–84. https://doi.org/10.1016/j.ijnurstu.2017.06.003

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, *2*, 53–55. https://doi.org/10.5116/ijme.4dfb.8dfd

Valles, J. H. H., Monsiváis, M. G. M., Guzmán, M. G. I., & Arreola, L. V. (2016). Nursing care missed in patients at risk of or having pressure ulcers. *Revista Latino-Americana De Enfermagem*, *24*, e2817. https://doi.org/10.1590/1518-8345.1462.2817

Vergara, M. (2015). Propuesta de reformas a los prestadores públicos de servicios médicos en Chile: Fortaleciendo la opción pública [A reform proposal to strengthen public health care]. *Revista Médica De Chile*, *143*(2), 237–243. https://doi.org/10.4067/s0034-98872015000200011

Zárate-Grajales, R. A., & Mejías, M. (2019). *Cuidado perdido de enfermería. Estado del arte para la gestión de los servicios de salud*, Vol. *16* (pp. 436–451). Enfermería Universitaria.

Zhao, Y., Ma, D., Wan, Z., Sun, D., Li, H., & Sun, J. (2019). Associations between work environment and implicit rationing of nursing care: A systematic review. *Journal of Nursing Management*, *28*(8), 1841–1850. https://doi.org/10.1111/jonm.12895

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

How to cite this article: Simonetti, M., Cerón, C., Galiano, A., Lake, E. T., & Aiken, L. H. (2021). Hospital work environment, nurse staffing and missed care in Chile: A cross-sectional observational study. *Journal of Clinical Nursing*, 00, 1–12. https://doi.org/10.1111/jocn.16068