Missed nursing care during the COVID-19 pandemic: a comparative observational study

Running title: Missed nursing care during the pandemic

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Missed nursing care during the COVID-19 pandemic:
a comparative cross-sectional study

ABSTRACT

Aim: To evaluate frequencies, types of, and reasons for missed nursing care during the COVID-19 pandemic at inpatient wards in a highly specialized university hospital.

Background: Registered nurse/patient ratio and nursing competence is known to affect patient outcomes. The first wave of the COVID-19 pandemic entailed novel ways for staffing to meet the expected increased acute care demand, which potentially could impact on quality of care.

Methods: A comparative cross-sectional study was conducted, using *the MISSCARE Survey.* A sample of nursing staff during the first wave of the COVID-19 pandemic (n=130) was compared with a reference sample (n=157).

Results: Few differences between samples concerning elements of missed care, and no significant differences concerning reasons for missed care were found. Most participants perceived the quality of care and the patient safety to be good.

Conclusion: The results may be explained by three factors: maintained registered nurse/patient ratio, patients' dependency levels and that nursing managers could maintain the staffing needs with a sufficient skill mix.

Implications for nursing management: Nursing managers impact on the occurrence of MNC; to provide a sufficient registered nurse/patient ratio and skill mix when staffing. They play an important role in anticipatory planning, and during infectious diseases outbreaks.

Key words: COVID-19; Nursing care; Patient safety; Quality of care; Workload

1. BACKGROUND

From a patient safety perspective, international studies have reported a correlation between registered nurses (RNs) being responsible for a high number of patients and an impaired patient outcome. Aiken and colleagues (2014) showed that if the nurse/patient ratio increased by one patient (over the ratio 1:6) the mortality increased by 7%. The impact of having lower educated personnel, e.g. nursing assistants (NAs), has been reported to have a less prominent effect on mortality, in comparison to the nurse/patient ratio (Ball et al., 2016; Ball et al., 2014). The reason why the nurse/patient ratio affects patient mortality is not fully understood but missed nursing care (MNC) has been suggested to be the mediator for this association (Ball et al., 2018). There are several factors that contribute to the variation concerning MNC, such as the patient mix (frequency of monitoring and level of dependency) (Ball et al., 2016), and nursing skill mix, where adding support workers and diluting the skill mix can increase MNC (Griffiths et al., 2018).

MNC, also referred to as care left undone or unfinished care, is defined as any aspect of required patient care that is omitted (in part or in whole) or delayed (Kalisch et al., 2009). MNC significantly impacts patient safety and has been associated with higher 30-day mortality (Ball et al., 2018), higher in-hospital mortality (Schubert et al., 2012), lower perceived quality of care (Ball et al., 2014) and other negative outcomes such as falls (Kalisch et al., 2012), increased occurrence of pneumonia, urinary infections, sepsis, errors in medical management (Ausserhofer et al., 2013) and an increasing number of pressure ulcers and nosocomial infections (Schubert et al., 2008). Reasons for MNC are often described as relating to three factors: lacking labor resources, material resources and communication (Kalisch et al., 2009).

The 11th of March 2020, the World Health Organization (WHO) declared COVID-19 as a pandemic. During this first wave of the pandemic, the description of the clinical course was incomplete, the understanding of the incubation period was limited and risk factors for severe illness was uncertain. Healthcare systems and society were reported to be challenged (Cucinotta & Vanelli, 2020) by insufficient preparedness for a pandemic, shortage of personal protection equipment (PPE), and a shortage of nurses (Catton, 2020). Before the first wave of the COVID-19 pandemic, Sweden had the lowest number of in-hospital beds per capita and a growing population with complex health care needs (The Swedish National Board of Health and Welfare, 2020). In comparison with 14 other European countries, Sweden has the lowest accessibility to intensive care beds (Bauer et al., 2020). A recent study on prognostic COVID-19 disease burden among Swedish regions showed that over two million individuals have an increased risk of severe COVID-19 (Gémes et al., 2020). Thus, in the beginning of the first COVID-19 wave, novel ways for staffing in-hospital wards were needed to meet the expected increased acute care demand in many Swedish hospitals. Nursing staff were relocated to new departments to work with new colleagues and new tasks within only a few weeks (Ahlsson, 2020).

To meet the expected demand for intensive care, the Karolinska University Hospital increased the intensive care unit (ICU) bed capacity by 500%, partly by redistributing RNs and other staff (e.g. NAs, specialized nurses, physicians and physiotherapists) from non-ICU wards to the ICU wards. All non-imperative elective surgery was postponed. RNs from across the hospital (e.g. research nurses, nurses with administrative duties, nurses working in out-patient care or from children wards) were redistributed to several of the adult inpatient wards across the hospital. In addition, wards were staffed with assistants, some with previous clinical experience and some without. Some units prepared to double their usual number of patients by converting single patient rooms to double rooms. Because of the actions taken to increase patient beds, the university hospital did not suffer a shortage of patient beds during the first COVID-19 wave.

During the first pandemic wave there was a lack of knowledge concerning how to care for hospitalized patients with COVID-19. The most common reported symptoms such as fever, cough, dyspnea, myalgia and fatigue (Hassan et al., 2020) were not considered problematic. More stressing was that disease progression in the literature was described to be rapid in patients with respiratory decompensation (Keller et al., 2020) and that reported complications among COVID-19 patients included acute respiratory distress syndrome (ARDS), acute cardiac injury,

acute renal injury, secondary infections and multiple organ failure. Moreover, there was a growing number of studies presenting new or atypical clinical manifestations, new laboratory findings and new treatment outcomes (Tahvildari et al., 2020).

The COVID-19 pandemic entailed novel ways of staffing, relocating nursing staff to other units, forced them to work in new roles with new tasks and new colleagues. Increased numbers of patients were expected, and there was insufficient knowledge on how to care for patients with COVID-19. These circumstances could potentially impact on quality of care and patient safety.

The aim of the study was to evaluate frequencies, types of, and reasons for MNC during the COVID-19 pandemic at inpatient wards in a highly specialized university hospital.

2. METHODS

This cross-sectional study had a comparative approach, comparing the findings with a reference sample from the same university hospital.

2.1 Setting and samples

The study was conducted at the Karolinska University Hospital in Stockholm, Sweden, across two sites (south and north) and before the pandemic held a total of 980 hospital beds.

COVID-19 sample

This sample consist of nursing staff at inpatient wards within the departments of cardiology, heart surgery, vascular surgery, neurology and neurosurgery. Some wards were converted to be 'COVID-19 units', which in some wards meant that they solely cared for fairly stable COVID-19 patients (requiring monitoring and non-invasive respiratory treatment), while other wards cared for the ordinary patient mix as well as COVID-19 patients. Also, other wards (that normally treated heart or stroke patients at an intermediate level) were reorganized to manage patients that were originally treated at the medical high dependency unit. At the time for data collection there were 235 RNs and 289 NAs working at the inpatient wards, and all were asked to fill in the

MNC survey in relation to caring for COVID-19 patients in the period May - June 2020. A total of 130 choose to participate (24.8%).

Reference sample

The reference sample was obtained from a baseline MISSCARE survey in October 2019 where a total of 915 nursing staff (approx. 50% were RNs) working within the departments of cardiology, heart surgery, vascular surgery, intensive care, acute and emergency care were invited to participate and 248 answered the questionnaire (27.1%). From this sample, RNs and NAs working in intensive care or emergency departments were excluded, resulting in a reference sample of n=157. This selection was made to only include RNs and NAs working in inpatient wards, with a similar level of care and mix of medical/surgical patients as the COVID-19 sample.

2.2 Measures

The instrument *MISSCARE Survey* was developed in the United States by Kalisch and Williams (2009) and has been translated into several languages. For this study, the *MISSCARE Survey-Swedish version* was used (Nymark et al., 2020).

The *MISSCARE Survey* has three sections; firstly, a background section with questions on demographic data such as age and sex, and background data on for instance educational level, working role, hours of overtime, number of absent shifts due to illness the past three months and whether they perceive the unit staffing as adequate. Also, numbers of patients cared for and numbers of admissions and discharges during the last shift are asked for. Further, there is one question regarding satisfaction with the level of teamwork on the unit, with the answering options 'very satisfied', 'satisfied', 'neutral', 'dissatisfied' and 'very dissatisfied' (Kalisch et al., 2011). Section A comprises 24 questions on elements of MNC, answered using a five-point Likert scale: 'always missed', 'frequently missed', 'occasionally missed', 'rarely missed' and 'never missed'. Section B comprises 17 questions on reasons for missed nursing care answered with a four-point Likert scale: 'significant reason', 'moderate reason', 'minor reason' and 'not a reason for missed care' (Bragadottir & Kalisch, 2018). No time reference is given for the items

in section A or B, the items concerning overtime hours and absent shifts has the time frame 'the past 3 months'.

The psychometric properties of the Swedish version of the *MISSCARE Survey* have been evaluated, where test-retest reliability for section A was 0.907 and for section B 0.514. Internal consistency for section B was measured with Cronbach's alpha and was 0.769 (Nymark et al., 2020).

We also included two study-specific questions: "How do you perceive the quality of care on the ward?" and "How do you perceive patient safety on the ward?" to be answered using a five-point Likert scale, with the answering options 'very good', 'good', 'neutral', 'poor' and 'very poor'

2.3 Procedure

For the COVID-19 sample, paper questionnaires including study information and contact information of the investigators were distributed at all inpatient units within the before mentioned departments. Paper surveys were used to enable to reach nursing staff working within inpatient care, but not those relocated to other units. The survey was distributed once, and the nursing staff filled in the questionnaires anonymously and put them in designated mailboxes. The data collection period continued for three weeks in the period May – June 2020.

The reference sample received an email at their work email address in which they were asked to participate. The email had an individual link to the *MISSCARE Survey*, a web survey, and included study information and contact information of the investigators. One reminder was sent to non-responders' e-mail addresses after about one week. The data collection continued for two weeks and was concluded in October 2019.

2.4 Data analysis

Similar to how the instrument originator, Professor Kalisch and colleagues (Kalisch et al., 2011) defined MNC and answering options, we define MNC in section A when reported 'occasionally',

'frequently' or 'always' missed. Reported 'significant' and 'moderate' reasons in section B were considered reasons for missed nursing care. All items in sections A and B were subsequently treated dichotomously. In accordance with Bragadottir & Kalisch, (2018) we also ranked the most frequently reported missed elements of MNC.

In the analysis of numbers of patient admissions and patient discharges per shift, only RNs were included since only RNs perform these nursing activities in Sweden. Satisfaction with the level of teamwork was categorized into three categories: satisfied (including answering options 'very satisfied' and 'satisfied'), neutral, and dissatisfied (including 'dissatisfied' and 'very dissatisfied').

For the study-specific questions on perception of quality of care and patient safety, the answering options were categorized into three categories: good, poor and neutral.

Chi-square were used to explore differences in background characteristics (sex, unit type, academic degree, experience in role and at current unit, over time hours and absent days), satisfaction with the level of teamwork, perceptions of adequate staffing, quality of care and patient safety. Fisher's exact test was used to examine differences between samples concerning the background characteristic professional role, missed elements of care (section A) and reasons for MNC (section B). Valid percentages were used, thus excluding missing data from calculations. Missing numbers are given when presenting results in section A and B. An independent samples median test was used to compare age between samples. A Mann-Whitney U-test was used to compare the distribution of numbers of patients cared for, patient admissions and patient discharges. The internal consistency for section B was evaluated with Cronbach's alpha. A two-tailed significance level was set at 0.05. The statistical software used was IBM SPSS Statistics version 25 (IBM, US, 2017).

2.5 Ethical considerations

The study followed the principles outlined in the 'Declaration of Helsinki' from 1964 and its later amendments and was approved by the National Ethical Review Authority. Written information about the study was given as an introductory text to the survey, where voluntariness

was emphasized, and confidentiality guaranteed. By answering the questionnaire, the participants consented to participation. The researchers had access only to unidentified data.

3. RESULTS

The COVID-19 sample reported significantly more overtime hours and more absence from work due to illness (**Table 1**). There were significant differences between the COVID-19 and the reference sample concerning unit type, since the majority of those in the COVID-19 sample comprised nursing staff from neurology or neurosurgery units who were not included in the reference sample. Characteristics of participants and background data are presented in **Table 1**.

The number of patients cared for during the last shift was similar between samples: median 5 (IQR=2-6) in the COVID-19 sample and median 6 (IQR=4-6) in the reference sample (p=1.0). Either the number of admitted patients or the number of discharged patients per shift differed significantly between the samples. In the COVID-19 sample, patient admissions varied between none to 7 (md=0, IQR=0-2) in comparison to the reference sample where admissions varied between none to 20 (md=1, IQR=0-3) p=0.644. The median number of patients discharged per shift in the COVID-19 sample was 0 (IQR=0-2), and md=1 (IQR=0-2) in the reference sample (p=0.649).

Missed nursing care in section A was ranked by most frequently reported element of MNC (ranked 1) and the results are presented in **Table 2**, including missing data. There were few significant differences when comparing missed elements of care between the samples. The COVID-19 sample reported less MNC in the item 'setting up meals for patients who feed themselves' in comparison with the reference sample, and also less MNC in the item 'mouth care'. Significantly more MNC in the COVID-19 sample was found in the item 'response to call light is initiated within 5 minutes'.

Reasons for MNC were ranked from the most frequently reported reason (lowest rank) to the least frequently reported (highest rank) and are presented in **Table 3**. The internal consistency for section B was good in both samples, with an alpha value of 0.898 in the COVID-19 sample

and 0.881 in the reference sample. No significant differences were found between samples concerning reasons for MNC.

Satisfaction with the level of teamwork and perceptions of staffing, quality of care and patient safety is presented in **Table 4**.

4. DISCUSSION

We only found significant differences within three items on elements of MNC, and no significant differences concerning reasons for MNC. Missed nursing care is complex, and several factors have been found having significant relationship with the occurrence of MNC (Ball et al., 2016). In this study we found some factors that may explain why the levels of MNC were similar between the samples. Firstly, the registered nurse/patient ratio, which is a factor that significantly increase MNC (Ball et al., 2014). In this study the registered nurse/patient ratio was similar between our samples, and both samples also perceived the staffing to be adequate most of the time. These results can be understood by the fact that there were fewer of the ordinary patients to care for. The expected massive influx of patients was mitigated due to that some of the ordinary patients avoided seeking medical care during the first wave of the pandemic. Within the neurology and cardiology departments, we found decreasing numbers of patients with stroke and acute coronary syndromes, in some patient groups there was a 20% decline (Ahlsson, 2020; Ntaios et al., 2020). Avoidance of seeking medical care during the COVID-19 pandemic has also been seen internationally, specifically in stroke and acute coronary syndrome patients (Boukhris et al., 2020; Nguyen-Huynh et al., 2020).

Secondly, the patient mix the COVID-19 sample cared for. Ball et al. (2016) have shown that the numbers of patients requiring assistance with all activities of daily living and the frequency of monitoring are factors having significant relationships with MNC. In the COVID-19 sample, most of the COVID-19 patients being treated at the participating wards were found to be in a fairly stable condition, but in need of oxygen treatment (i.e. including optiflow treatment and non-invasive ventilation). The patients' symptoms corresponded to those listed by Hassan et al. (2020), such as fever, cough, fatigue, dyspnea and requiring acute care while patients that contracted complications described by Tahvildari et al. (2020), such as ARDS and organ failure

were treated at the ICU. Thus, the COVID-19 patients treated outside the ICU needed medical and nursing care but were not as highly dependent as some of the ordinary patients treated at those wards, for instance patients with acute strokes or complete spinal cord injuries. The nurses subsequently reported that many COVID-19 patients were able to maintain their own self-care and to do so to a greater extent than the nurses' ordinary patients.

Thirdly, the skill mix among the nursing staff in the COVID-19 sample. Griffiths et al. (2018) found that if support workers are added to the work force, MNC may not decrease. On the contrary MNC may even increase if the skill mix is diluted. In our study, the experience in the roles as RNs and NAs were similar between the samples, as were the item 'experience at the current unit' (table 1), leading to that the skill mix seemed to be constant across the samples. This, along with the perception that staffing was adequate, indicate that the nursing managers successfully could maintain the staffing needs during the first wave of the pandemic, despite having to accept that some of their ordinary staff was relocated to for instance ICU.

Our results revealed that there were significantly more instances of MNC reported in the COVID-19 sample in the item 'response to call light is initiated within 5 minutes'. The delay in responding could be explained by the use of contact precautions and the need for the nursing staff to ensure that relevant PPE was available for the purpose of the individual situation, and to put it on. Rather surprisingly, we found that two elements of care were reported to be significantly better when caring for COVID-19 patients: 'setting up meals for patients who feed themselves' and 'mouth care'. These results may be also be interpreted as due to a different patient mix, with fewer patients needing assistance with activities of daily living.

Despite lower influx of patients than expected, and not working with critically ill COVID-19 patients, caring for the completely new group of COVID-19 patients increases the strain on the nursing staff at inpatient wards (Cai et al., 2020). This can be visualized in our study by the fact that the COVID-19 sample worked significantly more overtime. Other factors contributing to emotional stress, such as rapid organizational changes, relocation to new departments, and constantly being needed to work in new multidisciplinary teams due to that previous colleagues had become ill (Catania et al., 2020) were also likely evident for the nursing staff in our study.

Although our results show that the pandemic did not result in an increased patient load (numbers of patients cared for were similar between samples), caring for a completely new patient group required new skill performances to keep up with the COVID-19 patients' specific care needs and possible new treatments (Hassan et al., 2020; Tahvildari et al., 2020).

Hospital management and nursing managers play an important role for the mental health of healthcare workers during infectious diseases outbreaks. Zaçe et al. (2021) have in a systematic review summarized four categories of interventions that also may be useful for anticipatory planning: (1) provision of informational support (for instance in-service training on guidelines and how to use PPE), (2) provision of equipment and supplies, (3) organizational support (i.e. informative leadership, transparency, realism and positive messages, to provide sufficient rest areas), (4) provision of emotional and psychological interventions (i.e. strategies for mental health protection and mental health teams).

This study has some limitations that need to be addressed. The data collection in the COVID-19 sample was concluded at the beginning of June 2020, while the peak in admission of COVID-19 patients at Karolinska university hospital during the first pandemic wave was in April (Ahlsson, 2020). However, a large number of patients were still being treated for COVID-19 on the wards until June.

It can be questioned whether the two samples are comparable since they differ significantly. The majority of the nursing staff in the reference sample were staff working at medical and/or surgical short stay units, while the majority of participants in the COVID sample consisted of nursing staff within neurology and neurosurgery. These units have higher levels of specialization than the short stay units. However, due to the extensive redistribution of nursing staff during the pandemic, a large proportion of the nursing staff were scheduled to work outside their ordinary workplace, unable to care for the patient groups they had experience of. We therefore believe that the difference in sample compositions plays a minor role when interpreting our results.

The samples in this study were small and could be interfering with the lack of variance in the study's outcomes. It would have been preferable to include the units that cared for most of the

COVID-19 patients – the intensive care units and the infectious diseases units. However, due to the high pressure on the nursing staff at these units we judged that asking them to participate would further increase their stress level and this would probably likely lead to low participation. In order to make the samples comparable in size and composition, we excluded nursing staff working in intensive care or emergency departments from the reference sample. The included units in the COVID-19 sample varied considering numbers of patients being treated for COVID-19. Still, the staff were asked to answer the survey in the perspective of caring for patients with COVID-19 in general on the ward.

The samples also differed concerning hours of overtime in the past three months and in numbers of working shifts missed due to illness. These differences are explained by the pandemic; the staff were required to work more overtime and longer shifts to compensate for absent colleagues. There were more absent shifts among the nursing staff during the pandemic due to confirmed SARS-CoV-2, while others were quarantined at home with symptoms and with no possibility of obtaining viral testing. A recent study on COVID-19 among health workers in Germany showed that nurses were predominant among suspected and confirmed cases of SARS-CoV-2 (Nienhaus & Hod, 2020).

A possible shortcoming, when evaluating MNC with the *MISSCARE Survey* during the pandemic, is that the instrument (Kalisch & Williams, 2009) has no items reflecting the care of patients with infectious illnesses. Thus, there may be other reasons for MNC not covered in part B of the instrument. Some items in section A (table 2) have rather high numbers of missing data. When analyzing those items, it was evident that the reason were predominantly NAs not answering on elements of care they rarely or not at all were involved in (for instance administration of medications, assessment of effectiveness of medications and attending interdisciplinary care conferences). The Swedish version of the *MISSCARE Survey* does not include the answering option 'not relevant' (Nymark et al., 2020), which we believe contributed to the number of missing data. A further development of the Swedish version may therefore be valuable in future studies. Moreover, we used two study-specific questions to evaluate perceptions on quality of care and patient safety, that were not psychometric evaluated. The

range of perceptions of satisfaction with quality of care and patient safety may not be captured with those two single items.

Another consideration is the use of different data collection methods between the samples (paper survey versus web survey). Previous research has pointed out significant differences between these data collection methods; study invitations sent to digital mailboxes have lower response rate in comparison to paper surveys. On the other hand, paper surveys more frequently have missing items (Ebert et al., 2018). In our study the response rate was about the same between the samples and we saw no difference concerning missing items. Paper surveys were used to enable to reach out to nursing staff working within inpatient care, including those relocated from outpatient care, but not those relocated to for instance ICU. At the time of data collection in the COVID-19 sample there were no possibilities to distinguish that a web survey would reach the intended nursing staff.

5. CONCLUSION

The level of MNC at highly specialized wards during the COVID-19 pandemic was about the same as before the pandemic, as were the perceived reasons for MNC. The quality of care and patient safety was maintained. Three possible factors were found explaining the results; the registered nurse/patient ratio was at the same level as before the pandemic due to a lower influx of ordinary patients, most COVID-19 patients cared for were in a fairly stable condition and had a lower level of dependency than their ordinary patients, and that the nursing managers successfully could maintain the staffing needs with a sufficient skill mix of the nursing staff.

6. IMPLICATIONS FOR NURSING MANAGEMENT

Nursing managers impact on the occurrence of MNC in several ways, for instance to provide a sufficient nurse/patient ratio and skill mix when staffing. They should be aware of that MNC significantly impacts patient safety and quality of care. Hospital management and nursing managers play an important role in anticipatory planning and throughout infectious diseases outbreaks. Their planning and eventual interventions can impact on the nursing staffs' mental health.

What is already known about the topic?

- MNC is any aspect of required patient care that is omitted or delayed.
- MNC has been associated with several negative patient outcomes and lower perceived quality of care.
- Several factors contribute to the variation of MNC, for instance the registered nurse/patient ratio, the nursing skill mix and the patient mix.

What new knowledge this paper adds

- The level of MNC, perceptions of quality of care and patient safety were about the same as before the pandemic, although the nursing staff reported significantly more overtime hours and absent shifts during the first wave of the pandemic.
- The results could be explained by that the nursing managers could successfully maintain the staffing needs with a sufficient skill mix of the nursing staff, the registered nurse/patient ratio was the same between the data collection periods, and that most COVID-19 patients had a lower level of dependency than ordinary patients.
- Nursing managers should be aware of how MNC impact on quality of care, and that they play an important role in anticipatory planning and throughout infectious diseases outbreaks.

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Table 1. Characteristics of participants

Characteristic	COVID-19 sample (n=130) n (%)	Reference sample (n=157) n (%)	*P*
Age (years)			
Median (IQR)	34.0 (27-45)	35.5 (28-47)	0.536[‡]
Range	20 - 64	20 - 64	
Sex			0.388[§]
Male	17 (13.1)	30 (19.1)	
Female	112 (86.2)	126 (80.3)	
Missing	1 (0.8)	1 (0.6)	
Unit type			<0.001[§]
Heart or vascular	59 (45.4)	77 (49.0)	
Neurology or neurosurgery	71 (54.6)	0 (0.0)	
Short stay medical[†]	0 (0.0)	31 (19.7)	
Short stay surgical	0 (0.0)	10 (6.4)	
Mixed medical-surgical short stay	0 (0.0)	39 (24.8)	
Professional role			0.238[¶]
Registered nurse	59 (45.4)	79 (50.3)	
Nurse assistant	71 (54.6)	78 (49.7)	
Highest academic degree for RNs			0.104[§]
Without academic degree	4 (6.8)	7 (8.9)	
Bachelor	46 (78.0)	55 (69.6)	
Master one-year	6 (10.2)	15 (19.0)	
Master two-year	2 (3.4)	2 (2.5)	
Licentiate	1 (1.7)	0 (0.0)	
Experience in role			0.617[§]
≤ 6 months	6 (4.6)	6 (3.8)	
6-24 months	22 (16.9)	17 (10.8)	
2-5 years	29 (22.3)	36 (22.9)	
6-10 years	30 (23.1)	36 (22.9)	
> 10 years	41 (31.5)	58 (36.9)	
Missing	2 (1.5)	4 (2.5)	
Experience at current unit			0.117[§]
≤ 6 months	19 (14.6)	16 (10.2)	

6-24 months	38 (29.2)	39 (24.8)	
2-5 years	33 (25.4)	59 (37.6)	
6-10 years	15 (11.5)	23 (14.6)	
> 10 years	24 (18.5)	19 (12.1)	
Missing	1 (0.8)	1 (0.6)	
Hours of overtime the past 3 months			
None	34 (26.6)	40 (25.6)	0.006[§]
1-12 hours	46 (35.9)	82 (52.6)	
More than 12 hours	48 (37.5)	34 (21.8)	
Number of absent days or shifts due to illness, injury etc. past 3 months			<0.001[§]
None	35 (27.1)	95 (60.5)	
1 day or shift	7 (5.4)	10 (6.4)	
2-3 days or shifts	27 (20.9)	35 (22.3)	
4-6 days or shifts	18 (14.0)	11 (7.0)	
Over 6 days or shifts	42 (32.6)	6 (3.8)	

[†] Includes high dependency unit

[‡] Independent samples median test

[§] Chi-square test

[¶] Fischer's exact test

Table 2. Missed nursing care by rank[†], numbers and valid percentages

Items in Section A	COVID-19 sample n=130				Reference sample n=157				
	Rank[†]	n	(%)	Missing, n	Rank[†]	n	(%)	Missing, n	*P*
Attend interdisciplinary care conference whenever held	1	50	(54.3)	38	2	74	(54.8)	22	1.000
Turning patient every 2 hours	2	67	(54.0)	6	1	87	(57.2)	5	0.627
Ambulation 3 times per day or as ordered	3	57	(45.2)	4	3	80	(52.2)	4	0.279
Assess effectiveness of medications	4	32	(38.6)	47	9	36	(27.3)	25	0.098
Patient discharge planning and teaching	5	40	(36.4)	20	5	62	(42.5)	11	0.367
Mouth care	6	38	(30.4)	5	4	74	(48.4)	4	0.003
IV/central line site care and assessments according to hospital policy	7	28	(30.4)	38	10	37	(26.8)	19	0.554
Emotional support to patient and/or family	8	36	(29.8)	9	6	44	(29.3)	7	1.000
Wound care	9	35	(28.7)	8	12	33	(22.3)	9	0.261
Monitoring intake/output	10	29	(23.2)	5	15	31	(20.3)	4	0.561
Patient teaching about procedures, tests, and other diagnostic studies	11	26	(22.2)	13	16	28	(18.8)	8	0.540
Feeding patient when the food is still warm	12	27	(21.6)	5	8	44	(28.9)	5	0.170
PRN medication requests acted on within 15 minutes	13/14	16	(20.3)	51	18	24	(18.5)	27	0.856
Medications administered within 30 minutes before or after scheduled time	13/14	16	(20.3)	51	7	38	(29.2)	27	0.192
Assist with toileting needs within 5 minutes of request	15	23	(18.5)	6	13	32	(21.3)	7	0.650
Patient assessments performed each shift	16	21	(18.1)	14	19	27	(18.0)	7	1.000
Patient bathing/skin care	17	21	(16.7)	4	14	32	(21.1)	5	0.363
Focused reassessments according to patient condition	18	17	(15.5)	20	17	27	(18.6)	12	0.616

Response to call light is initiated within 5 minutes	19	19	(15.4)	7	22	9	(6.0)	7	0.015
Full documentation of all necessary data	20	16	(13.0)	7	21	19	(12.8)	9	1.000
Nursing staffs' hand washing	21	15	(12.0)	5	20	20	(13.2)	5	0.857
Setting up meals for patients who feed themselves	22	9	(7.1)	3	11	36	(23.8)	6	<0.001
Bedside glucose monitoring as ordered	23	6	(4.8)	4	24	6	(4.0)	6	0.775
Vital signs assessed as ordered	24	3	(2.3)	2	23	7	(4.6)	5	0.353

† Rank: The ranking of reported most missed (1) to least missed nursing care elements

Table 3. Significant and moderate reasons for missed nursing care by rank[†], numbers and valid percentages

Items in section B	COVID-19 sample n=130			Reference sample n=157			
	Rank[†]	n (%)	Missing n	Rank[†]	n (%)	Missing n	*P*
Unexpected rise in patient volume and/or acuity on the unit	1	91 (79.8)	16	1	102 (69.4)	10	0.065
Urgent patient situations (e.g. a patient's condition worsening)	2	86 (72.9)	12	2	91 (63.2)	13	0.112
Inadequate number of staff	3	84 (68.9)	8	3	86 (58.5)	10	0.099
Unbalanced patient assignments	4	68 (58.1)	13	5	72 (50.3)	14	0.260
Heavy admission and discharge activity	5	56 (52.3)	23	4	75 (53.6)	17	0.898
Lack of back-up support from team members	6	52 (44.4)	13	7	65 (45.5)	14	0.901
Nursing assistant did not communicate that care was not done	7	49 (43.4)	17	6	66 (46.2)	14	0.705
Medications were not available when needed	8	35 (41.7)	46	10	55 (42.3)	27	1.000
Tension or communication breakdowns within the nursing team	9	47 (39.8)	12	9	63 (44.4)	15	0.529
Supplies/equipment not available when needed	10	45 (39.8)	17	16	43 (31.6)	21	0.186
Tension or communication breakdowns with other support departments	11	44 (37.6)	13	11	59 (41.8)	16	0.525
Inadequate hand-off from previous shift or sending unit	12	44 (37.0)	11	15	47 (32.6)	13	0.515
Supplies/equipment not functioning properly	13	41 (35.7)	15	17	37 (27.0)	20	0.171
Inadequate number of assistive personnel (e.g. nursing assistants, techs etc.)	14	40 (35.1)	16	14	47 (32.9)	14	0.791
Caregiver off unit or unavailable	15	39 (33.9)	15	12	52 (37.1)	17	0.602
Other departments did not provide the care needed	16	38 (32.5)	13	13	48 (34.0)	16	0.895

Tension or communication breakdowns with the medical staff	17	36 (32.4)	19	8	63 (45.3)	18	0.051

† Rank: The ranking most frequently reported reason (1) to less frequently reported reason for missed care

Table 4. Satisfaction with teamwork, perceptions of staffing, quality of care and patient safety

Item	COVID-19 sample (n=130) n (%)	Reference sample (n=157) n (%)	P
Satisfaction with the level of teamwork on the unit			0.981
Satisfied	100 (76.9)	116 (76.3)	
Neutral	22 (16.9)	27 (17.8)	
Dissatisfied	8 (6.2)	9 (5.9)	
Perception of adequate staffing on the unit			0.469
100% of the time	29 (22.7)	44 (28.4)	
75% of the time	66 (51.6)	79 (51.0)	
50% of the time	19 (14.8)	23 (14.8)	
25% of the time	11 (8.6)	8 (5.2)	
0% of the time	3 (2.3)	1 (0.6)	
Perception of quality of care on the unit			0.650
Good	110 (85.3)	138 (87.9)	
Neutral	10 (7.8)	12 (7.6)	
Poor	9 (7.0)	7 (4.5)	
Perception of patient safety on the unit			0.671
Good	105 (82.0)	126 (81.3)	
Neutral	14 (10.9)	21 (13.4)	
Poor	9 (7.0)	8 (5.2)	