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Burnout and its relationship to self-reported quality of patient care and adverse events during COVID-19: A cross-sectional online survey among nurses

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Abstract

Aims: To assess nurses' burnout and its association with their perceived quality of patient care and occurrence of adverse events (AEs) during COVID-19.

Background: Burnout is a serious problem among nursing staff internationally with negative impacts on the quality of care and patient safety.

Methods: We conducted a cross-sectional online study among 1,004 Iranian nurses through the convenience sampling technique. Data were collected using the Maslach Burnout Inventory, five items of questions related to self-reported poor patient care quality and estimated occurrence of AEs.

Results: Prevalence of high burnout among nurses was 31.5%. The risk of AEs ranged from 26.1% to 71.7%. Self-reported quality of patient care was found to be poor. A positive correlation was found between emotional exhaustion and depersonalization scores and patient care quality, whereas a negative correlation was found between personal accomplishment scores and all poor care item scores. Depersonalization was found to increase the risk of the onset of all AEs (odds ratio [OR] = 1.06–1.08). Also, Personal accomplishmentreduced the risk of occurrence of 'medication errors' (OR = 0.99) and the onset of 'patient and their family verbal abuse' (OR = 0.97).

Conclusions: Our findings confirmed the hypothesis that a higher degree of burnout is correlated with a perceived higher number of AEs and reduced perceived patient care quality.

Implications for Nursing Management: Reducing burnout among nurses through implementing interventions may be an effective strategy to enhance patient care quality and reduce the number of AEs in Iranian public hospitals. Therefore, in order to minimize work burnout, primary approaches include access to psychosocial support, including Web-based services, psychological first aid, mental support hotlines and self-care techniques during the COVID-19 pandemic.

KEYWORDS
adverse event, burnout, patient safety, quality of care

1 | INTRODUCTION

The COVID-19 pandemic has subjected health care staff worldwide to unprecedented stress due to a heavy caseload. In the face of limited resources, extended shifts, disturbances to sleep and work-life balance, and longer exposure to patients with COVID-19 have resulted in adverse psychological outcomes among health care staff, including insomnia, stress, anxiety and depression (Albott et al., 2020; Hong et al., 2021; Walton et al., 2020). Burnout among the nursing staff is one of the serious consequences of COVID-19 (Restauri & Sheridan, 2020).

Burnout is a psychological syndrome arising out of managing work stress. It is a combination of emotional exhaustion (EE), depersonalization (DP) and low personal accomplishment (PA) (Maslach et al., 2001). On the other hand, burnout is a long and continued reaction to prolonged emotional and interpersonal job stress and stressful events that can influence both personal and organisational aspects (Mbanga et al., 2018; Molero Jurado et al., 2018). EE due to an individual's experience of stress involves a decline in emotional and physical resources. DP is defined as one's detachment from work as a means of managing exhaustion and regaining the loss of enthusiasm and passion in one's work. PA refers to developing the feeling of low professional efficiency and lack of work productivity (Maslach et al., 2001).

High-level burnout may impair nurses' ability to provide safe and high-quality care, while providing high-quality services should still be a core priority of the health care system, even during disasters such as pandemics (Denning, Goh, Clarke, et al., 2020). Previous studies reported a substantial decrease in the average incidence reporting rate after the emergence of COVID-19 (Denning, Goh, Clarke, et al., 2020). It was also proposed that there is an established relationship between burnout levels and the poor quality of patient care, resulting in errors (Garcia et al., 2019). In fact, the burnout of nurses not only impacts their own condition and health but also affects the quality of patient care (Mahmoudi et al., 2020).

To date, there has been no study directed at investigating the relationship between burnout and quality of patient care and number of adverse events (AEs) during the COVID-19 outbreak. However, several studies have been carried out before the onset of COVID-19. A study conducted in Italian paediatric settings found that the level of burnout influences the perception of patient safety and AEs (Bagnasco et al., 2020). Another study at an Irish non-consultant hospital showed that burnout is associated with the frequency of the quality of patient care and self-reported AEs (Sulaiman et al., 2017). A newly released systematic review revealed that out of 21 analysed studies, most of them show a relationship between burnout and the deterioration of patient safety (Garcia et al., 2019). Furthermore, the results of the study showed that AEs were positively related to nurse burnout in the United States (Vogus et al., 2020).

Although several studies have already been conducted concerning the health care workers' burnout during the COVID-19 pandemic, there is still some lacking present in the available literature, to the best of our knowledge. First, nurses by far constitute the largest part of the workforce in an outbreak and are assigned to perform almost all infectious disease containment activities. Second, the mechanisms behind the connection between these variables during a pandemic such as COVID-19 still remain unaddressed. Third, the results of studies exploring the association between burnout and quality of patient care and occurrence of AEs have been equivocal. While numerous studies have indicated a link, this result is often not replicated and verified (Hall et al., 2016).

2 | AIMS

We assumed that a higher burnout level would be linked to a higher perception of AEs and a lowered perception of patient care quality. Therefore, this study aimed to explore the relationship between burnout and quality of patient care and the prevalence of AEs among clinical nurses during the COVID-19 pandemic in Iranian public hospitals.

3 | METHOD

3.1 | Design and setting

A national cross-sectional online survey was conducted in an Iranian public hospital between September 15 and November 15, 2020.

3.2 | Participants

Nurses who delivered nursing services were invited to participate in this study. To be eligible, participants should be (a) full-time nurses, (b) nurses working in clinical wards and (c) nurses with more than a year's experience at work in the current hospital. A convenient sampling technique was used to select participants.

3.3 | Instruments

A single-survey instrument involving of three sections, with a total of 36 items, was used to collect data. These parts were as follows:

1. Demographic characteristics: The demographic characteristics section encompassed age, gender, marital status, education level, work experience in nursing, working unit, shift work, work hours per week and region.
2. Burnout: The self-reporting Persian edition of the Maslach Burnout Inventory-Human Services Survey (MBI-HSS) questionnaire was used to assess burnout (Maslach et al., 1986). The MBI-HSS includes of 22 items covering three subscales of EE (9 items), DP (5 items) and PA (8 items). Each of the items is rated based on

the frequency of occurrence on a 7-point Likert scale ranging from 'never' to 'every day' (Maslach & Jackson, 1981). Psychometric properties of the MBI (i.e., reliability coefficients, construct validity, convergent validity and discriminant validity) among Iranian nurses have recently been approved (Moalemi et al., 2018). In current study, Cronbach's alpha coefficient for EE, DP and PA was 0.87, 0.88 and 0.89, respectively. If the scores in the EE and DP subscales are high, and the scores are low in the PA subscale, a high level of burnout will occur. In line with similar studies (de Oliveira Jr et al., 2013; Sulaiman et al., 2017), the values for the subscales are as follows: low level (EE ≤ 16, DP ≤ 6, PA ≥ 39); moderate level (EE = 17–26, DP = 7–12, PA = 32–38); and high level (EE ≥ 27, DP ≥ 13, PD ≤ 31). As there are more potential variations than the MBI guidelines, high burnout was considered as follows: three 'high' subscales, or two 'high' subscales, and one 'moderate' subscale (Colby et al., 2018).

3. Self-reported quality of patient care: We used the questions from the (de Oliveira Jr et al., 2013) study. The questionnaire consists of five statements relating to the measurement, in the previous year or less, of the self-reported level of patient care. The nurses reported the perceived quality of care on a 5-point Likert-type scale response (never, once, a couple of times, multiple times, often). Content validity was assessed by seven experts, including two experts in quality improvement, two experts with expertise in patient safety and three nurses. Furthermore, Cronbach's alpha coefficient was 0.71 in this study.

4. Adverse events: We considered nursing perceptions as appropriate estimates of AEs, as in previous international studies (Bagnasco et al., 2020; Van Bogaert et al., 2014; Wang et al., 2014). We identified the most common AEs that often occur with hospital nurses and evaluated them on an individual level. AEs included 'Pressure ulcer', 'Patient fall', 'Medication errors', 'Surgical wound infection', 'Infusion or transfusion reaction', 'Patient and family verbal abuse' and 'Patients or family complaints'. Nurses were asked to rate the frequency of these events over the last year on a 7-point Likert scale (0 = 'never', 1 = 'a few times a year or less', 2 = 'once a month or less', 3 = 'a few times a month', 4 = 'once a week', 5 = 'a few times a week', 6 = 'every day'). These events were reviewed and approved by three expert panels, consisting of senior researchers from health care quality and patient safety and nursing. To determine whether burnout is attributed to the prevalence of AEs, we dichotomized the responses by coding 'never' as 'never happened = 0' and the rest of the responses as 'had happened = 1' (Wang et al., 2014).

3.4 | Data collection

The questionnaire was administered online through Avalform (https://form.avalform.com), which is a survey tool widely used in Iran. The survey started with explanations on how to complete the questionnaire and objectives of the study. After reading this, if they chose the 'yes'

option, a single question indicating their willingness to participate led them to access the survey. Otherwise, they were led to the thank you page, without being allowed to see the items of the survey. All items had fixed answers, and participants were not able to proceed with the survey unless all items were completed. Therefore, there were no missing data. We used the criteria that only one answer could be sent to any phone or computer account. The questionnaire link was sent to nurses through nursing channels or groups of the medical universities. The nurses were asked to forward the questionnaire link to other nurses in their department or hospital. To improve the response rate, the questionnaire was sent to the channel several times and then notified by the admin channel to draw attention. The online link of the questionnaire was available for 2 months.

3.5 | Data analysis

All data were then imported into SPSS 20.0 (IBM Corp., Armonk, NY, USA) for analysis. Descriptive statistics were presented to describe the demographic characteristics of the respondents and the main variables. Pearson's correlation coefficient was used to evaluate the relationship between quality of patient care items and dimensions of burnout. A binary logistic regression was utilized to determine the relationship of dimensions of burnout on seven AEs following the adjustments for the demographic characteristics. All tests were performed at the 0.05 level of significance.

4 | RESULTS

A total of 1,004 nurses completed the survey. Demographic characteristics of the respondents are shown in Table 1.

Table 2 demonstrates the status of burnout among nurses during the COVID-19 pandemic. High degrees of burnout could be shown for 48.3% (n = 485) of the nurses in EE, for 25.9% (n = 260) of the nurses in DP and for 56.0% (n = 562) in PA. Thus, the most prominent burnout symptoms were high EE and lack of PA. According to the classification, 31.5% (n = 316) had a high burnout (three subscales 'high', or two subscales 'high' and one subscale 'moderate').

The percentages of overall responses for each self-reported quality of patient care item among nurses who participated in this study are given in Table 3. The majority of nurses (72.7%) stated that they make mistakes without negative consequences to patients, while only 33.5% of the sample reported that they make mistakes with negative consequences to patients. A total of 51% of the participants reported that they do not have enough time to pay attention to my patients. Nearly half of the respondents (44.7%) stated that they perform procedures without appropriate training. Only 26.2% of the nurses claimed that they fall short in terms of the quality of care they provide to their patients (Table 3).

Table 4 shows the prevalence of AEs. After integrating seven groups of AEs' occurrences into a binomial parameter, the

TABLE 1 Characteristics of the sample (N = 1,004)

Variable	Subcategory	N (%)	Mean (SD)
Gender	Male	258 (25.7)	
	Female	746 (74.3)	
Age	≤30	496 (49.4)	33.3 (7.8) years
	>30	508 (50.6)	
Marital status	Single	316 (31.5)	
	Married	688 (68.5)	
Educational level	Bachelor degree	923 (91.9)	
	Master or PhD	81 (8.1)	
Work experience in nursing	≤10	652 (64.9)	9.1 (7.1) years
	>10	352 (35.1)	
Current working unit	Emergency	208 (20.7)	
	Critical care units	250 (24.9)	
	General wards	546 (54.4)	
Shift work	Fixed	203 (20.2)	
	Rotating	801 (79.8)	
Work hours per week	≤42	278 (27.7)	51.41 (13.23) hours
	>42	726 (72.3)	
Region	North	91 (9.1)	
	South	58 (5.8)	
	West	123 (12.2)	
	East	505 (50.3)	
	Center	227 (22.6)	

nurse-estimated AEs 'had happened' ranged from 26.1% (infusion or transfusion reaction) to 71.7% (patient and family verbal abuse) during the past year, and 48.6% were for 'medication errors', 48.5% for 'patients or family complaints', 35.4% for 'pressure ulcer', 29.0% for 'surgical wound infection', and 28.2% for 'patient fall'.

Results of correlational analysis between burnout dimensions and quality of patient care items are presented in Table 5. A positive association was found between EE and DP scores and all five qualities of patient care items ($r = 18$–36; $p < .001$). On the other hand, a negative correlation was found between PA scores and all poor care item scores ($r = -0.06$ to -0.26; $p < .05$) (Table 5).

Table 6 shows the results explaining associations between dimensions of burnout and the nurses' 'perception of AEs'. DP was found to increase the risk of the onset of 'pressure ulcers' (OR = 1.07), 'patient fall' (OR = 1.07), 'medication errors' (OR = 1.06), 'surgical wound infection' (OR = 1.08), 'infusion or transfusion reaction' (OR = 1.06), 'patients or family complaints' (OR = 1.07) and 'patient and family verbal abuse' (OR = 1.07). PA reduced the risk of the occurrence of 'medication errors' (OR = 0.99) and the onset of 'patient and their family verbal abuse' (OR = 0.97); EE had no impact on any of the AEs.

5 | DISCUSSION

The aim of the current research was to explore the prevalence of burnout among nursing staff and its association with the quality of patient care and the number of AEs during COVID-19.

TABLE 2 Scores on the MBI subscales

Maslach Burnout Inventory subscales	Mean ± SD	Low N (%)	Moderate N (%)	High N (%)
Emotional exhaustion (0–54)	25.94 ± 15.33[m]	301 (30.0)	218 (21.7)	485 (48.3)
Depersonalization (0–30)	8.30 ± 7.43[m]	523 (52.1)	221 (22.0)	260 (25.9)
Personal accomplishment (0–48)	29.39 ± 10.41[h]	233 (23.2)	209 (20.8)	562 (56.0)

Abbreviations: h, high level; l, low level; m, medium level.

TABLE 3 The frequency for each of the five qualities of patient care items among nurses

Statements	Never % (n)	Once a year or less % (n)	A couple of times a year % (n)	Multiple times a year % (n)	Often % (n)
"I make mistakes without negative consequences to patients"	247 (27.3)	434 (43.2)	102 (10.2)	144 (14.3)	50 (5.0)
"I perform procedures without appropriate training"	555 (55.3)	187 (18.6)	56 (5.6)	74 (7.4)	132 (13.1)
"I make mistakes with negative consequences to patients"	668 (66.5)	248 (24.7)	42 (4.2)	30 (3.0)	16 (1.6)
"I fall short in the quality of care I provide to my patients"	741 (73.8)	150 (14.9)	49 (4.9)	39 (3.9)	25 (2.5)
"I do not have enough time or attention for my patients"	484 (48.2)	200 (19.9)	82 (8.2)	112 (11.2)	126 (12.5)

TABLE 4 Estimated adverse events in the past year among nurses (n = 1,004)

Adverse events	Never happened n (%)	Had happened n (%)					
		Several times a year	Once a month or less	Several times a month	Once a week	Several times a week	Everyday
Pressure ulcer	649 (64.6)	190 (18.9)	83 (8.3)	42 (4.2)	16 (1.6)	13 (1.3)	11 (1.1)
Patient fall	721 (71.8)	200 (19.9)	39 (3.9)	18 (1.8)	8 (0.8)	9 (0.9)	9 (0.9)
Medication errors	516 (51.4)	294 (29.3)	114 (11.4)	43 (4.3)	19 (1.9)	12 (1.2)	6 (0.6)
Surgical wound infection	713 (71.0)	155 (15.4)	65 (6.5)	32 (3.2)	17 (1.7)	12 (1.2)	10 (1.0)
Infusion or transfusion reaction	742 (73.9)	177 (17.6)	42 (4.2)	20 (2.0)	9 (0.9)	7 (0.7)	7 (0.7)
Patients or family complaints	517 (51.5)	253 (25.2)	84 (8.4)	60 (6.0)	21 (2.1)	31 (3.1)	38 (3.8)
Patient and family verbal abuse	284 (28.3)	236 (23.5)	151 (15.0)	113 (11.3)	56 (5.6)	77 (7.7)	87 (8.7)

TABLE 5 Results of correlational analysis between burnout dimensions and poor quality of patient care items

Statements	Emotional exhaustion		Depersonalization		Personal accomplishment	
	R	p	r	p	r	p
"I make mistakes without negative consequences to patients"	0.21	<.001	0.28	.001	−0.11	<.001
"I perform procedures without appropriate training"	0.18	<.001	0.22	.001	−0.07	.027
"I make mistakes with negative consequences to patients"	0.21	<.001	0.33	.001	−0.06	.007
"I fall short in the quality of care I provide to my patients"	0.22	<.001	0.34	.001	−0.16	<.001
"I do not have enough time or attention for my patients"	0.34	<.001	0.36	.001	−0.26	<.001

Note: r = Pearson's correlation coefficient.

TABLE 6 Binary logistic regression: the relationship of burnout dimensions with adverse events

	Emotional exhaustion		Depersonalization		Personal accomplishment	
	OR (p)	95% CI	OR (p)	95% CI	OR (p)	95% CI
Pressure ulcer	1.00	[0.99–1.01]	1.07**	[1.04–1.09]	1.00	[0.98–1.09]
Patient fall	0.99	[0.98–1.01]	1.07**	[1.04–1.09]	0.99	[0.98–1.00]
Medication errors	0.99	[0.98–1.01]	1.06**	[1.03–1.08]	0.99*	[0.97–1.00]
Surgical wound infection	0.99	[0.98–1.01]	1.08**	[1.05–1.11]	0.99	[0.98–1.01]
Infusion or transfusion reaction	0.99	[0.98–1.01]	1.06**	[1.03–1.08]	0.99	[0.98–1.01]
Patients or their complaints	0.99	[0.98–1.01]	1.07**	[1.04–1.09]	0.99	[0.98–1.00]
Patient and their verbal abuse	1.00	[0.99–1.02]	1.07**	[1.04–1.09]	0.97**	[0.96–0.99]

Note: Models adjusted for age, gender, marital status, educational level, work experience in nursing, current working unit, shift work and work hour.
*p ≤ .05.; **p ≤ .001.

The findings demonstrated that 31.5% of nurses had experienced a high burnout during COVID-19. The findings of a systematic review on 21 studies before the COVID-19 pandemic revealed that the overall burnout prevalence among Iranian nurses was 36% (Rezaei et al., 2018). A study conducted in Iran demonstrated that 64.6% of nurses in Shiraz hospitals during the COVID-19 pandemic suffered high burnout (Kamali et al., 2020). The prevalence of high burnout during the COVID-19 pandemic has been reported to be 44.6% among Indian health care workers, including nurses (Khasne et al., 2020). The overall prevalence of burnout among frontline health care workers being in close contact with COVID-19 patients in Japan was found to be 31.4% (Matsuo et al., 2020). The high level of burnout may be due to the health care workers being exposed to COVID-19 patients for longer periods of time and subjected to more stress due to heavy caseload (Shoja et al., 2020).

The findings also indicate that around half of the nurses reported a high EE, and more than half reported low PA. Previous studies in Iran have demonstrated that high job stress and workload, low quality of work-life balance and extended working hours are a routine affair for nurses working in public hospitals (Kakemam, Kalhor, et al., 2019; Kakemam, Raeissi, et al., 2019). This may clarify why nurses experience emotional and physical energy drainage, develop uncaring attitudes towards patients and/or even harbour the sense of incompetence and dead-end job prospect. This study was conducted in the public hospitals of Iran, which are frontline hospitals providing the Iranian population with basic health care services during COVID-19. Another qualitative study conducted in Iran has also found that the nurses have to deal with unusual situations while dealing with the COVID-19 pandemic on account of having little experience or ability to deal with the epidemic (Sadati et al., 2020).

The burnout of the health care staff is a burning issue worldwide. As the health care system is increasingly strained for nurses, this result is not unexpected, and the shortage of nurses is becoming a major global concern. The findings of this research confirm previous studies' findings, indicating that when nurses encounter insufficiency of resources in the practice setting or staffing, they can experience emotional distress, disengagement and reduced personal achievement, contributing to negative attitudes and feelings towards their jobs, decreasing job performance (Dyrbye et al., 2019) and possibly negative outcomes for patients (Letvak et al., 2012).

The proportion of nurses who experienced the risk of AEs varied between 26.1% and 71.7%. While studies investigating the occurrences of AEs among the health care staff during the COVID-19 pandemic are limited, a review of the studies conducted before the COVID-19 pandemic revealed that 29.1% of the surveyed nurses had experienced AEs in the last 6 months (Kakemam, Kalhor, et al., 2019). Findings of a study conducted in China show the occurrence of AEs ranging from 47.8% to 75.6% (Wang et al., 2014), which is higher than the findings of a study conducted among Italian paediatric nurses that showed the occurrence of AEs ranging from 1.3% to 12.4% (Bagnasco et al., 2020). One study found that the rate

of AEs reporting has reduced following the onset of the COVID-19 pandemic (Denning, Goh, Scott, et al., 2020). Therefore, approaches are necessary to manage such human, administrative and job-related factors that can affect the incidence of AEs. Several strategies have been proposed such as wristband bar-code medication scanning, computerized physician order entry, voluntary error reporting systems and root cause analysis to reduce AEs (Kakemam et al., 2021). Among the strategies mentioned above, the voluntary error reporting system and root cause analysis have been implemented in Iranian hospitals (Kakemam et al., 2021).

The findings demonstrated that DP had increased the risk of the onset of AEs. Nonetheless, PA reduced the risk of occurrence of 'medication errors' and the onset of 'patient and their family verbal abuse'. This may be explained by the assumption that higher DP of employees widens the emotional gap in the relationship between patient and provider and higher levels of EE reduce emotional tolerance, thereby directly influencing the relationship between patient and provider. Different dimensions of burnout can be associated with different outcomes, according to previous research (Tsiga et al., 2017). A study conducted among doctors working in a large teaching hospital in Greece found no connection between burnout and medical errors for surgeons, and for internists and paediatricians, there was just a moderate association between burnout and DP (Tsiga et al., 2017).

The findings of the study are congruent with similar ones in the literature in which high levels of burnout are reported to correlate with increased medication errors and increased patient falls (Nantsupawat et al., 2016; Van Bogaert et al., 2014), increased patient and family verbal abuse, as well as patient and family complaints (Van Bogaert et al., 2014), and increased infections (Cimiotti et al., 2012; Nantsupawat et al., 2016; Van Bogaert et al., 2014) and revealed a similar association between nurse burnout and AEs in the Iranian setting. A study in the Italian paediatric context has consistently shown that nurse burnout is associated with higher AEs (Bagnasco et al., 2020). Burnout was found to raise medical errors among health care staff, particularly in physicians (Fahrenkopf et al., 2008; Shanafelt et al., 2010).

Moreover, our findings revealed that there is a significant association between the frequency of low quality of care for patients, a high rate of EE, a high rate of DP and a low level of PA, which is associated with burnout. Close interpersonal interaction with patients in complicated practice environments can lead to nurses experiencing burnout, thereby affecting their job performance and quality of care. These results are in line with recent findings in the literature, demonstrating that elevated burnout levels are correlated with lowered quality of care (Nantsupawat et al., 2016; Van Bogaert et al., 2010, 2013, 2014). Also, our findings are in harmony with previous studies where it was found that an increase in the number of errors and poor quality of patient care among physicians was associated with high levels of burnout (Fahrenkopf et al., 2008; Hayashino et al., 2012; Sulaiman et al., 2017).

In addition, a research work involving six countries revealed that higher burnout levels were correlated with lower quality of

care rates irrespective of nurses' practice environmental ratings (Poghosyan et al., 2010). Nurses who suffer from burnout might display less skill or desire to provide high-quality care and work in places where the quality of care is at a poor level, which often results in emotional discomfort and disengagement (Poghosyan et al., 2010). A recent systematic review study has also shown that the burnout of health care workers is often linked to low-quality care (Tawfik et al., 2019).

An unpleasant workplace environment that causes burnout and facilitates error conditions can be unsafe to patients and costly to the organisation. If the work environment is not conducive or unpredictable, and errors are most probable to happen, the safety of the patient is compromised. Errors can prove to be very expensive to an organisation financially. Damage that happens as a result of an error and the subsequent care taken to remedy the condition are also not reimbursed. This amounts to huge expenses for the health care system.

6 | LIMITATIONS

As far as we know, this is the first study on nursing staff burnout and its relationship to self-reported quality of patient care and occurrence of AEs during COVID-19 in the context of public hospitals in Iran. Our study faced several limitations. The first limitation of our research is its cross-sectional design, which does not confirm determining a causal link between burnout, quality of patient care and occurrence of AEs. This correlation should be explored in future research, and longitudinal studies could provide stronger evidence. The second limitation is that the data were collected using a self-reported questionnaire, and, like all questionnaires, there is a probability of deliberate and unintentional misrepresentation that could compromise the validity and reliability of the findings. Nevertheless, the study participants were assured of data confidentiality to reduce potential bias. Finally, based on previous studies, we have estimated only a few incidents, while there may be other incidents that may have occurred for nurses.

7 | CONCLUSION

The current study showed that one-third of the nurses enrolled in this study presented high levels of burnout. As a result, the quality of patient care was poor, and the risk of occurrence of AEs was high. The risk of developing highly negative perceptions for quality of patient care and occurrence of AEs is greater for nurses experiencing high levels of burnout. It is unclear, however, whether this was caused by a pessimistic state of mind and whether poor patient care quality and a growing number of AEs severely affected the well-being of nurses, contributing to burnout. As one study has shown, AEs could lead to nurse burnout in caregiving units (Vogus et al., 2020). Regardless of the association between nurses' burnout, quality of patient care and AEs, further studies are warranted to

evaluate the generalizability of these findings covering a wide range of hospitals and to identify interventions that could reduce burnout so as to protect the health of nurses, to reduce AEs and to maintain quality of patient care.

8 | IMPLICATIONS FOR NURSING MANAGEMENT

Nursing managers urgently need to create a favourable working atmosphere and an environment that enables the professional development of the nurses within the workplace. Therefore, in order to minimize work burnout, primary approaches include access to psychosocial support, including Web-based services, psychological first aid, mental support hotlines and self-care techniques. Patient safety and quality improvement teams may assist the health care staff in their fight against a pandemic. One of the studies Gurses et al. (2020) identified the significance and possible advantages of using experts on human factors as part of a pandemic response. They proposed that the application of human factor values might support the health care staff to 'design, adapt and reconfigure work systems, maximize individual and team performance under high-risk, high-stakes environments while minimizing the introduction of new significant safety risks or unintended consequences into the work system'. A study of Staines et al. (2020) has suggested five-step methodologies to enhance the response of organisations during the COVID-19 pandemic, which, in turn, can lead to improved quality of care.

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