



BMJ Open Attitudes towards patient safety among physicians and nurses in Iranian governmental teaching hospitals: a cross-sectional survey

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To cite: Kakemam E, Miri F, Sadeghpour S, *et al.* Attitudes towards patient safety among physicians and nurses in Iranian governmental teaching hospitals: a cross-sectional survey. *BMJ Open* 2024;**14**:e089328. doi:10.1136/bmjopen-2024-089328

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<https://doi.org/10.1136/bmjopen-2024-089328>).

Received 27 May 2024
Accepted 21 October 2024



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ABSTRACT

Objectives To assess and compare attitudes towards patient safety among physicians and nurses in Iranian governmental teaching hospitals and to identify factors associated with attitudes towards patient safety.

Design An institution-based, cross-sectional survey was carried out from July to August 2023.

Setting 10 governmental teaching hospitals in Tehran, Iran.

Participants The study participants comprised a random sample of 186 nurses and 90 physicians who had worked for at least 6 months in their current hospitals.

Outcome measures The primary outcome measures were mean and SD scores for individual items and the nine main patient safety domains assessed by the Attitudes Toward Patient Safety Questionnaire-III. The secondary outcome measure was the proportion of physicians and nurses who responded positively to each item, expressed as percentages for each group.

Results Physicians and nurses exhibited moderately positive attitudes towards patient safety (mean scores of 3.79 ± 0.33 and 3.83 ± 0.36 , respectively). Both professional groups reported the most positive attitudes in the same dimensions: 'team functioning' and 'working hours as a cause for error' (mean scores of >4 out of 5). Conversely, the lowest scores were observed in 'importance of patient safety in the curriculum', indicating potential gaps in their understanding of patient safety (mean scores of <3.5 out of 5). Physicians displayed significantly more positive attitudes in the domain of 'error inevitability', while nurses held more positive attitudes in 'error reporting confidence' and 'disclosure responsibility' ($p < 0.05$). Multiple linear regression analysis demonstrated that the factors associated with more positive attitudes towards patient safety included lower workload ($B = 0.131$; 95% CI 0.047 to 0.215; $p = 0.002$), reporting of adverse events ($B = 0.100$; 95% CI 0.009 to 0.191; $p = 0.030$) and receiving patient safety training ($B = 0.134$; 95% CI 0.019 to 0.249; $p < 0.023$).

Conclusion Both professional groups demonstrated moderately positive attitudes towards patient safety. However, the findings highlighted the need for future patient safety training to prioritise enhancement of healthcare professionals' understanding of medical errors. Such training initiatives should be engaging and directly relevant to the specific needs of both nurses and

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The strengths of the current study include its recruitment via random sampling and the reasonable quality control.
- ⇒ Data collection was conducted using a self-reporting questionnaire; thus, recall bias is inevitable.
- ⇒ The study focused solely on the attitudes of physicians and nurses, not their behaviours or outcomes.
- ⇒ The calculated target sample size was not achieved.

physicians, ensuring its perceived value to their ongoing professional development. Furthermore, fostering a supportive and blame-free environment that encourages the reporting of medical errors is crucial.

INTRODUCTION

Despite significant technological advancements and ongoing research in healthcare, ensuring patient safety remains a persistent challenge.¹ Patient safety refers to a characteristic of healthcare systems that reduces the occurrence and effects of adverse events (AEs) while enhancing recovery from these incidents.² In developed nations with abundant resources and advanced technology, patient safety continues to be a concern, with 1 in 10 patients experiencing AEs.³ A systematic review of in-hospital AEs across 27 countries revealed various AEs, ranging from 2.9% to 21.9%.⁴ The issue is particularly concerning in the Iranian health context, with a systematic review indicating a prevalence of medical errors as high as 50%.⁵

Health policymakers and professionals have long advocated for a systemic approach that addresses the underlying factors contributing to medical errors and accidents.¹ Identifying the root causes of patient harm through behavioural and systemic modifications is one way forward to improve safety.⁶ A pivotal element of safety culture is the attitude of

healthcare professionals towards patient safety and AEs.^{17,8} The Patient Safety 2030 report shows that failure to secure patient safety became a substantial hindrance to providing high-quality and safe healthcare. This report suggests enhancing the patient care practices of healthcare providers, as well as their understanding and attitudes regarding patient safety, over the next 15 years.⁹ An attitude consists of human beliefs and behaviours that can affect decision-making and influence conduct.¹⁰ Consequently, assessing the attitudes of healthcare providers, in particular physicians and nurses, towards patient safety can simplify the identification of strategies and measures directed at improving attitudes and boosting better patient outcomes and organisational competencies.¹¹ Likewise, determining safety attitudes helps reveal more aspects of patient safety and can help boost a healthcare setting where AEs are known and handled suitably.¹²

Positive attitudes are characterised by a commitment to collaborative work environments, the use of error reduction systems and a willingness to learn from mistakes.^{13–15} There is evidence to suggest that positive attitudes towards patient safety are associated with improved patient outcomes and that negative attitudes, such as disregarding potential risks or failing to view patient safety as a shared responsibility, are linked to poorer patient outcomes.¹³ Studies have shown that enhancing healthcare workers' attitudes towards patient safety can lead to positive outcomes, including reduced morbidity and mortality rates and reduced hospital stay.^{9,16} Furthermore, research demonstrates a link between attitudes towards patient safety and factors influencing work, such as burnout, employee well-being,¹⁷ citizenship behaviour,¹⁸ workplace violence, job satisfaction,¹⁹ workplace bullying²⁰ and total quality management practices.²¹ Hence, boosting patient safety attitudes and awareness among healthcare professionals may contribute significantly to better patient and staff outcomes.

Despite plenty of research on patient safety culture being conducted among healthcare professionals in Iran,^{22–24} patient safety attitudes among physicians and nurses, associated factors, and potential barriers to a positive understanding of patient safety in these groups remain unknown. Previous research has mainly focused on cultural or organisational factors instead of individual knowledge and understanding of patient safety. In addition, patient safety education has been incorporated into numerous postgraduate programmes across the globe, but is rarely provided in postgraduate education for medical and nursing students in Iranian medical universities.^{25,26}

To date, there has been limited knowledge on the attitudes of doctors and nurses towards patient safety as the vital pillar of healthcare providers in Iran's healthcare system and their significance in patient safety and quality improvement efforts. Hence, there is a need for further research on patient safety attitudes and their related factors to boost awareness of patient safety. To fill this gap, the present study sought to assess and compare

the attitudes of physicians and nurses towards patient safety using the Attitudes Toward Patient Safety Questionnaire-III (APSQ-III) in Iranian governmental teaching hospitals. Furthermore, the study sought to explore the association of demographic characteristics, workload, reporting of AEs and participation in patient safety activities and patient safety training with patient safety attitudes. This study has the potential to provide practical recommendations for health policymakers and professionals to enhance patient safety within Iran's teaching hospitals.

METHODS

Study design and setting

The current cross-sectional study was conducted across 10 governmental teaching hospitals in Tehran, Iran, between July and August 2023. These hospitals serve a dual function, providing both primary and specialised healthcare alongside medical and nursing student education. The Consensus-Based Checklist for Reporting of Survey Studies²⁷ was used to guide the reporting of this survey study (online supplemental file 1).

Study population and sample

This study targeted all full-time physicians and nurses with a minimum of 6 months employment ($n=2500$, including 2000 nurses and 500 physicians). All other hospital personnel and those on maternity, extended sick or study leave were excluded.

A sample of 334 individuals were selected using simple random sampling and proportional allocation based on hospital size. The sample size was calculated based on the Cochran formula, with a 95% confidence level and a 0.05 error. A computer program was employed to generate random samples. This approach minimised selection bias and yielded a diverse, representative sample of hospital staff's experiences and perspectives.

Study tool

The study employed a self-administered two-part questionnaire. The first section collected participants' demographic data, including gender, age, department, workload (weekly work hours), years of experience, prior involvement in patient safety training and activities, and reporting of AEs. The second section included the validated APSQ-III to collect data on participants' attitudes towards patient safety.²⁸ The APSQ-III comprises 30 items evaluating nine dimensions: 'patient safety training received', 'error reporting confidence', 'working hours as a cause of errors', 'error inevitability', 'incompetence as a cause of error disclosure', 'disclosure responsibility', 'team functioning', 'patient involvement in reducing error' and 'importance of patient safety in the curriculum'. Originally designed for medical students, the APSQ-III has been adapted for broader use in healthcare settings.¹⁸ A key advantage of the APSQ-III is its focus on individual healthcare professionals' attitudes compared

with organisational culture. Furthermore, it allows for comparisons of patient safety attitudes across different hospital staff groups.^{8,28}

The participants' responses to each item were scored using a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). A score of higher than 3 indicated a positive attitude, a score of 3 indicated a neutral attitude and a score below 3 indicated a negative attitude.⁸ As instructed by the instrument's developer, eight items were reverse-scored for analysis.²⁸ To assess each dimension, the mean scores were calculated by summing the scores on the relevant items and dividing by the number of items in that dimension. The overall APSQ-III score reflected participants' general patient safety attitudes on a Likert scale with a maximum score of 5. This score was obtained by dividing the total APSQ-III score by the total number of items. In addition, the percentage of positive responses (defined as scores of 4 or 5) for each item was calculated.⁸

Translation, validity and reliability of APSQ-III

To ensure cultural appropriateness, the APSQ-III underwent a rigorous translation process using a stepwise back translation model, a common practice in cross-cultural research. Initially, two healthcare professionals fluent in both English and Farsi, with expertise in health research, patient safety and questionnaire design, translated the instrument. This Farsi version was then back-translated into English by two additional healthcare professionals to confirm its accuracy and consistency. The research team carefully compared the back-translated version with the original English version, resulting in minor revisions to enhance clarity and coherence.

To assess content validity, five experts from the nursing and medicine faculties affiliated with a local university evaluated the instrument. Their assessment yielded an item-level content validity index of 0.82, indicating a satisfactory level of content validity. This suggests that the items in the APSQ-III are relevant and representative of the constructs being measured. Furthermore, to evaluate the reliability of the instrument within the target population, the Persian version was pilot-tested with 20 experienced physicians and nurses from the study hospitals, who were not included in the final sample. The results demonstrated a Cronbach's α value of 0.71, indicating acceptable internal consistency. Test-retest reliability was also established at 0.83, reflecting the stability of the instrument over time. These findings collectively affirm that the APSQ-III is a valid and reliable tool for assessing patient safety in the Persian-speaking context.

Data collection

Within each participating hospital, a designated project coordinator facilitated data collection. Questionnaires and sealed envelopes were distributed to clinical departments for dissemination among eligible participants. Participants were granted 4 weeks to complete the questionnaires, which were placed in sealed plastic envelopes

and deposited anonymously in designated secure collection boxes. After the 4 weeks, the project coordinators retrieved the collection boxes and transported them to the research team. Informed consent procedures ensured that participants understood the voluntary and anonymous nature of the study. Participants were explicitly informed that their responses would be kept confidential, and hospital management would not have access to individual data.

Statistical analysis

Data analysis was performed using SPSS V.24 software. Descriptive statistics, including frequencies and percentages, were used to summarise the demographic variables and were compared using χ^2 test. In addition, the scores for individual APSQ-III items and subscales were presented as mean, SD and percentage of positive response within each professional group (physicians and nurses). Independent sample t-tests were used to compare the mean scores on perceived items and subscales between physicians and nurses. In addition, independent sample t-tests and analysis of variance were employed to explore potential associations between patient safety attitudes and demographic variables. Finally, a multiple linear regression analysis was conducted to identify factors contributing to patient safety attitude scores. Statistical significance was set at $p \leq 0.05$.

Patient and public involvement

None.

RESULTS

A total of 334 questionnaires were distributed to all potential participants and 294 questionnaires were returned (response rate=88.02%). 18 questionnaires with incomplete data were excluded, resulting in a final sample of 276 participants (186 nurses and 90 physicians).

Characteristics of the participants

Majority of the participants (60.5%, $n=167$) were female and over 42.4% were above 40. The mean age of nurses was 32.1 years, with an SD of 8.2 years. A higher proportion of nurses (61.2%) reported having received patient safety training compared with physicians (44.4%). Moreover, a higher percentage of nurses (68.3%) had participated in patient safety activities compared with physicians (40.0%). [Table 1](#) outlines the demographic characteristics of the participants.

Nurses' and physicians' patient safety attitudes

[Table 2](#) presents a comparative analysis of the APSQ-III subscale scores and item responses between physicians and nurses. The highest mean score across all nine domains was observed for the 'working hours as a cause of errors' subscale, with a mean score of 4.40 for physicians and 4.54 for nurses. The second highest score was recorded for the 'team functioning'

Table 1 Characteristics of the participants and comparison by profession

Characteristics	Total (N=276)	Physicians (n=90)	Nurses (n=186)	P value
Gender				
Male	109 (39.5)	64 (71.1)	45 (24.2)	<0.001
Female	167 (60.5)	26 (28.9)	141 (75.8)	
Age (years)				
<30	63 (22.8)	4 (4.4)	59 (31.7)	<0.001
30–39	96 (34.8)	24 (26.7)	72 (38.7)	
≥40	117 (42.4)	62 (68.9)	55 (29.6)	
Years of experience				
≤5	69 (25.0)	17 (18.9)	52 (28.0)	0.186
6–10	70 (25.4)	22 (24.2)	48 (25.8)	
>10	137 (49.6)	51 (56.7)	86 (46.2)	
Department				
Intensive care units	69 (25.0)	14 (15.6)	55 (29.6)	0.005
Emergency	54 (19.6)	26 (28.9)	28 (15.1)	
General wards	153 (55.4)	50 (55.6)	103 (55.4)	
Participation in patient safety activities				
Yes	163 (59.1)	36 (40.0)	127 (68.3)	<0.001
No	113 (40.9)	54 (60.0)	59 (31.7)	
Previous patient safety training received				
Yes	209 (75.7)	40 (44.4)	169 (61.2)	<0.001
No	67 (24.3)	50 (55.6)	17 (25.4)	
Workload (hours per week)				
≤44	102 (37.0)	38 (42.2)	64 (34.4)	0.207
>44	174 (63.0)	52 (57.8)	122 (65.6)	
Adverse events reporting				
Yes	94 (34.1)	29 (32.2)	65 (34.9)	0.379
No	182 (65.9)	61 (67.8)	121 (65.1)	

subscale, with an average score of 4.21 for physicians and 4.14 for nurses. In contrast, the subscale with the lowest mean score was ‘importance of patient safety in the curriculum’, with an average score of 3.31 for nurses and 3.20 for physicians (table 2).

Comparison of patient safety attitudes among physicians and nurses

Both nurses and physicians generally exhibited similar attitudes towards patient safety, with an average score of 3.79 for physicians and 3.82 for nurses ($p=0.637$). Their responses to 20 of the APSQ-III items and six of the nine subscales were also aligned. Specifically, they shared similar perspectives on six dimensions: ‘patient safety training received’, ‘working hours as a cause of errors’, ‘team functioning’, ‘patient involvement in reducing error’, ‘incompetence as a cause of error disclosure’ and ‘importance of patient safety in the curriculum’ (table 2). On the contrary, physicians displayed more positive attitudes in the domains of ‘error inevitability’, while nurses held more positive attitudes in ‘error reporting confidence’ and ‘disclosure responsibility’ ($p<0.05$).

Association between participants’ characteristics and overall APSQ-III scores

Table 3 summarises the correlational analysis between the demographic characteristics and patient safety attitudes among physicians and nurses. Among nurses, female nurses demonstrated significantly more positive attitudes towards patient safety compared with their male counterparts. For both professional groups, older participants exhibited more positive attitudes towards patient safety than younger participants. The results indicate that participants with more work experience generally held higher overall patient safety attitude scores ($p<0.05$). Nurses who participated in patient safety activities and received patient safety training exhibited more positive attitudes towards patient safety ($p<0.05$).

Factors associated with patient safety attitudes

Multiple linear regression analysis was carried out to determine the contribution of factors to the patient safety attitudes among participants. The model was statistically significant and identified three variables (workload, patient safety training received and AEs reporting) that explained the 13.3% variance in patient safety attitude ($F=6.266$, $p<0.001$). Physicians and nurses with lower

Table 2 Comparison of mean scores and percentage of positive response to each item and the APSQ subscale scores between professions

Items and domains of APSQ-III	Physicians		Nurses		t	P value
	Mean±SD	% of positive response	Mean±SD	% of positive response		
Patient safety training received (Cronbach's $\alpha=0.75$)	4.03±0.78		3.97±0.82		0.55	0.580
My training has prepared me to understand the causes of medical errors.	4.19±0.88	86.7	4.09±0.87	87.6	0.87	0.386
I have a good understanding of patient safety issues as a result of my undergraduate medical training.	3.88±0.92	71.2	3.86±0.92	77.4	0.15	0.883
Error reporting confidence (Cronbach's $\alpha=0.89$)	3.21±0.71		3.53±0.99		-2.74	0.002*
I would feel comfortable reporting any errors I had made no matter how serious the outcome had been for the patient.	3.15±0.88	34.5	3.59±1.18	61.8	-3.10	0.001*
I would feel comfortable reporting any errors other people had made, no matter how serious the outcome had been for the patient.	2.99±0.85	22.3	3.46±1.14	54.3	-3.85	<0.001*
I am confident I could talk openly to my supervisor about an error I had made if it had resulted in potential or actual harm to my patient.	3.53±1.07	56.7	3.72±1.14	68.8	-1.30	0.193
I feel confident I could report an error I had made without feeling I would be blamed.	3.34±1.02	46.7	3.45±1.24	55.4	-0.71	0.477
Medical errors are handled appropriately in my workplace.	3.03±0.99	34.5	3.42±1.95	50.5	-2.21	0.028*
Working hours as a cause of errors (Cronbach's $\alpha=0.77$)	4.40±0.69		4.54±0.66		-1.62	0.106
The number of hours physicians/nurses work increases the likelihood of making medical errors.	4.53±0.78	93.3	4.65±0.72	95.2	-1.23	0.219
Shorter shifts will reduce medical errors.	4.15±0.82	88.9	4.39±0.94	87.6	-2.04	0.033*
By not taking regular breaks during shifts, physicians/nurses are at an increased risk of making errors.	4.51±0.75	95.6	4.57±0.76	93.5	-0.66	0.511
Error inevitability (Cronbach's $\alpha=0.72$)	4.19±0.65		3.91±0.65		3.33	0.001*
I don't think I make errors. (R)	3.91±1.21	68.8	3.39±1.18	55.9	3.39	0.001*
Even the most experienced and competent physicians and nurses make errors.	4.56±0.50	100.0	4.31±0.82	88.2	2.58	0.003*
A true professional does not make mistakes or errors. (R)	4.17±1.08	86.7	4.00±1.07	78.0	1.17	0.244
Human error is inevitable.	4.11±1.05	78.9	3.93±1.05	74.2	1.34	0.183
Team functioning (Cronbach's $\alpha=0.75$)	4.21±0.70		4.14±0.67		0.75	0.452
Better multidisciplinary teamwork will reduce medical errors.	4.22±0.82	91.1	4.15±0.83	84.4	0.63	0.531
Teaching teamwork skills will reduce medical errors.	4.22±0.76	91.2	4.28±0.71	90.3	-0.61	0.540
Personal input about patient care is well received at my workplace.	2.66±0.85	17.8	3.38±1.06	50.0	-5.57	<0.001*
Patient involvement in reducing error (Cronbach's $\alpha=0.80$)	3.81±0.62		3.64±0.83		1.76	0.078
Patients have an important role in preventing medical errors.	3.60±0.78	66.8	3.35±1.09	49.9	1.92	0.033*
Encouraging patients to be more involved in their care can help to reduce the risk of medical errors occurring.	4.02±0.65	91.2	3.92±0.88	75.3	0.98	0.326
Incompetence as a cause of error disclosure (Cronbach's $\alpha=0.76$)	3.34±0.65		3.45±0.77		-1.17	0.243
Medical errors are a sign of incompetence. (R)	4.29±0.72	93.3	4.09±1.03	80.1	1.59	0.113
Most medical errors result from careless nurses. (R)	3.38±1.00	48.9	3.97±1.16	73.1	-4.14	<0.001*

Continued

Table 2 Continued

Items and domains of APSQ-III	Physicians		Nurses		t	P value
	Mean±SD	% of positive response	Mean±SD	% of positive response		
Most medical errors result from careless physicians. (R)	3.51±0.84	48.9	3.44±1.28	54.3	0.47	0.637
If people paid more attention at work, medical errors would be avoided. (R)	2.20±0.66	4.4	2.31±0.98	11.3	-0.98	0.328
Disclosure responsibility (Cronbach's $\alpha=0.78$)	3.75±0.72		3.95±0.80		-2.07	0.040
Physicians and nurses have a responsibility to disclose errors to patients only if they result in patient harm. (R)	3.73±0.98	68.9	3.77±1.22	65.2	-0.24	0.810
All medical errors should be reported.	3.75±1.04	73.3	4.20±1.05	81.7	-3.32	0.001*
It is not necessary to report errors which do not result in adverse outcomes for the patient. (R)	3.69±1.08	62.2	3.83±1.22	66.6	-0.92	0.357
It is the responsibility of all healthcare professionals to formally report all medical errors which occur.	3.84±0.95	71.1	4.02±1.06	77.9	-1.34	0.181
Importance of patient safety in the curriculum (Cronbach's $\alpha=0.80$)	3.20±0.55		3.31±0.51		-1.72	0.095
Patient safety issues cannot be taught and can only be learnt by clinical experience when qualified. (R)	2.18±0.97	15.5	2.23±1.09	17.2	-0.35	0.724
Patient safety issues cannot be taught and can only be learnt by clinical experience when qualified.	3.89±1.10	85.6	4.09±0.88	81.7	0.715	0.403
Learning about patient safety issues is not as important as learning other more skill-based aspects of being a doctor/a nurse. (R)	3.52±1.15	65.5	3.61±1.32	64.5	0.46	0.771
Total score on APSQ-III (Cronbach's $\alpha=0.71$)	3.79±0.33		3.82±0.36		-0.47	0.637

The bolded are domains of APSQ and the total score on APSQ.
 *Statistically significant.
 APSQ-III, Attitudes Toward Patient Safety Questionnaire-III; R, reverse-scored item.

workload (B=0.131, 95% CI 0.047 to 0.215), those who reported AEs (B=0.100, 95% CI 0.009 to 0.191) and those receiving patient safety training (B=0.134, 95% CI 0.019 to 0.249) exhibited more positive attitudes towards patient safety (table 4).

DISCUSSION

Despite ongoing research and technological improvements, ensuring patient safety remains a persistent challenge in healthcare settings. The global prevalence of medical errors underscores the vital role of a constructive safety culture and positive patient safety attitudes among healthcare professionals. This study aimed to investigate the attitudes and perceptions regarding patient safety held by physicians and nurses working in 10 governmental hospitals in Tehran, Iran. Furthermore, the study explored factors potentially associated with patient safety attitudes within these two professional groups.

Attitudes of nurses and physicians towards patient safety

Our study revealed that nurses and physicians generally held positive attitudes towards patient safety. Additionally, it was observed that nurses were significantly more engaged in patient safety training and activities than physicians. In contrast, physicians expressed a more favourable

view of patient safety education. This finding diverges from previous research conducted in different countries. For instance, a study conducted in Palestinian hospitals indicated physicians were more favourable towards patient safety than nurses.⁸ A survey in Cyprus reported negative attitudes towards patient safety among physicians and nurses.⁹ Similarly, another study in China found that physicians had a higher average score on patient safety attitudes than nurses.¹⁶ Conversely, a study by Kow *et al*²⁹ reported lower patient safety attitudes among nurses than physicians. The disparity in prioritising critical patient safety between physicians and nursing staff underscores the need for hospital management to address areas that require improvement to foster a safe and healthy work environment. Educational level, training, organisational culture, teamwork and years of work experience contribute to varying attitudes towards patient safety. Nurses' direct involvement in patient care and active participation in safety activities and training courses may explain their positive attitude towards patient safety. Despite the pressing need, patient safety education still needs to be formally incorporated into the curricula of nursing and medical schools.

Working schedule

This study identified shared concerns among physicians and nurses regarding the significant contribution of long

Table 3 Association between participants' characteristics and overall APSQ-III scores

Variables	Physicians		Nurses		Total APSQ-III score Mean±SD	P value
	Total APSQ-III-score Mean±SD	P value	Total APSQ-III score Mean±SD	P value		
Gender						
Male	3.80±0.31	0.372	3.71±0.41	0.018*	3.77±0.35	0.109
Female	3.72±0.48		3.86±0.34		3.84±0.37	
Age (years)						
<30	2.93±0.68	<0.001*	3.75±0.41	0.066	3.70±0.47	0.017*
30–39	3.85±0.24		3.82±0.37		3.82±0.34	
≥40	3.81±0.31		3.91±0.28		3.86±0.32	
Years of experience						
<5	3.57±0.52	0.013*	3.74±0.44	0.026*	3.69±0.46	0.001*
5–10	3.77±0.31		3.78±0.36		3.77±0.34	
>10	3.86±0.30		3.90±0.30		3.88±0.30	
Department						
Intensive care unit	3.67±0.67	0.331	3.79±0.36	0.741	3.76±0.44	0.461
Emergency	3.77±0.30		3.84±0.34		3.81±0.32	
General wards	3.82±0.82		3.83±0.37		3.83±0.34	
Participation in patient safety activities						
Yes	3.81±0.32	0.582	3.89±0.33	<0.001*	3.87±0.32	<0.001*
No	3.76±0.39		3.67±0.41		3.72±0.40	
Previous patient safety training received						
Yes	3.85±0.34	0.125	3.86±0.33	<0.001*	3.85±0.33	<0.001*
No	3.73±0.38		3.48±0.54		3.67±0.43	
Workload (hours per week)						
≤44	3.89±0.31	0.027*	3.94±0.36	0.001*	3.92±0.32	<0.001*
>44	3.71±0.9		3.76±0.36		3.75±0.37	
Adverse events reporting						
Yes	3.85±0.29	0.240	3.95±0.32	<0.001*	3.92±0.34	<0.001*
No	3.75±0.39		3.75±0.37		3.75±0.36	

*Statistically significant.

APSQ-III, Attitudes Toward Patient Safety Questionnaire-III.

working hours, extended shifts and irregular rest periods to medical errors in hospital settings. These findings align with previous research conducted in Iranian and Palestinian hospitals.^{24 30} The study underscores the challenges posed by heavy workloads, staff shortages and inadequate infrastructure in maintaining patient safety within the Iranian hospital context. These limitations are particularly amplified during crises, where increased workloads can potentially compromise patient care. Prioritising patient safety measures necessitates considering the firsthand experiences and insights of healthcare workers regarding these constraints.³¹ Furthermore, resource-constrained healthcare facilities require heightened attention to addressing these issues.³² The immense pressure and extended work hours faced by healthcare workers necessitate a shift in practice to prioritise patient safety. Failure to address these concerns can lead to a decline in patient safety outcomes. During challenging times, providing

support and appreciation to healthcare workers is crucial to maintaining their morale and well-being.

Team functioning

Both nurses and physicians ranked teamwork as the second most important factor for patient safety. Effective teamwork is recognised as critical to ensuring patient safety and fostering a culture that prioritises it.⁷ Seamless communication within and across teams is a cornerstone of successful collaboration.³³ A study conducted among Iranian nurses revealed a positive attitude towards their organisation's safety culture, with the most favourable response associated with the 'teamwork in units' dimension.²³ The healthcare professionals in this study exhibited a better outlook on teamwork than their counterparts in Lithuania³⁴ and Palestine.^{1 7 8} Clinical staff participated in teamwork training programmes, encompassing trauma care, resuscitation teams and unit teams. These training

Table 4 Factors associated with patient safety attitude scores among physicians and nurses

	B	SE	95% CI		P value
			Lower	Upper	
Intercept	3.683	0.0603	3.565	3.801	0.000
Gender (reference: female)	-0.054	0.0443	-0.141	0.032	0.219
Age (years) (reference: ≥40 years)					
<30	-0.090	0.0783	-0.243	0.064	0.253
30–39	0.008	0.0558	-0.101	0.118	0.880
Years of experience (reference: >10 years)					
<5	-0.101	0.0707	-0.240	0.037	0.152
5–10	-0.038	0.0621	-0.160	0.084	0.540
Department (reference: general wards)					
Intensive care unit	-0.046	0.0495	-0.143	0.051	0.356
Emergency	0.032	0.0549	-0.076	0.139	0.564
Workload (reference: >44 hours per week)	0.131	0.0429	0.047	0.215	0.002*
Patient safety training received (reference: no)	0.134	0.0587	0.019	0.249	0.023*
Participation in patient safety activities (reference: no)	0.038	0.0512	-0.063	0.138	0.461
Adverse events reporting (reference: no)	0.100	0.0462	0.009	0.191	0.030*

*Statistically significant.

programmes aimed to equip employees with the skills and knowledge necessary to collaborate effectively under pressure, contributing to a more positive attitude towards teamwork. Healthcare teams encompass diverse configurations, including short-term, permanent and long-term teams. They share common characteristics such as clearly defined roles and goals, shared responsibilities and integrated work processes.^{35 36} The significance of these factors varies depending on the team type and objectives.^{35 37} Training that considers the skills of individuals and teams within various team contexts can significantly enhance team effectiveness.^{35–38}

Patient safety education

Despite the documented importance of patient safety education and its inclusion in healthcare professional curricula,^{25 39 40} However, participants in this study exhibited the least favourable attitude towards this domain. This negative perception might be attributed to the 'hidden curriculum' phenomenon.^{25 40–42} This refers to the disconnect between theoretical principles taught in safety courses and the realities encountered in clinical practice. This discrepancy can lead trainees to perceive coursework as irrelevant and inapplicable to their daily work. Addressing this critical issue necessitates collaboration between medical and nursing educators in Iranian universities and clinical leaders within teaching hospitals. Curriculum development should integrate patient safety education, ensuring content closely aligns with the complexities of clinical practice. Furthermore, educators can employ innovative teaching methods that bridge the gap between theory and practice. These methods could include simulation training, e-learning modules,

problem-based learning exercises, self-reflection activities, critical thinking exercises and gamification.^{29 43 44}

Interestingly, participants who had received patient safety training exhibited a more positive attitude towards patient safety. The absence of formal training, as suggested by Bari *et al*,⁴⁵ can lead to under-reporting of AEs and hinder the development of a safety-oriented culture. Studies have shown that training focused on safety culture and error reporting fosters a positive attitude towards error reporting among nurses, ultimately enhancing reporting behaviour.⁴⁶ Patient safety training remains paramount for healthcare professionals, as it can positively influence attitudes towards error reporting, leading to improved reporting practices. Additionally, it facilitates the identification of potential hazards and promotes a culture of safety within healthcare organisations.

Differences in attitudes towards patient safety between physicians and nurses

Our findings revealed that nurses held a more positive attitude towards 'error reporting confidence' and 'disclosure responsibility' than physicians. This suggests a deeper understanding of the root causes and consequences of medical errors among nurses, leading them to take greater ownership of reporting. The authors propose that distinct professional cultures contribute to this disparity. Additionally, nurses in Iranian hospitals, along with their counterparts in other countries, demonstrate a more proactive role in patient safety initiatives.⁸⁹ These findings suggest a broader trend: the nuanced cultural and functional differences between nurses and physicians within healthcare settings influence their perspectives on error reporting. Nurses, due to their heightened responsibility

within the treatment team, tend to adopt a more proactive approach to patient safety and error disclosure. This research underscores the importance of positive attitudes and strong accountability for error reporting. Cultural and functional factors significantly influence these aspects. Therefore, healthcare institutions should establish robust disclosure systems and provide tailored training programmes for different professions. Such measures can foster continuous learning and ultimately enhance patient care. The absence of these systems, as alluded to in other research, could have negative consequences for patient safety attitudes.⁴⁷

This study unveiled a significant difference in how physicians and nurses perceive 'error inevitability' and the inherent nature of errors within their field. The findings indicated a higher acceptance of inevitable errors among physicians. Interestingly, this contradicts Bottcher *et al*'s⁸ research, where nurses displayed a similar acceptance. The authors posit that this divergence in attitudes likely stems from the distinct training, experience and roles each profession holds within the healthcare team. However, the most critical factor for substantial error reduction is a cultural shift within hospitals. Both physicians and nurses need to embrace the inevitability of errors as an inherent human characteristic, even for conscientious professionals with high standards.⁴⁸ Shifting the focus from individual blame to viewing errors as indicators of systemic flaws is crucial to a meaningful progress in minimising medical errors. This acknowledgement serves as a cornerstone for creating a culture of learning and improvement within healthcare institutions.⁴⁹

Associated factors of attitudes towards patient safety

This study reinforces existing research demonstrating a positive correlation between healthcare professionals' error reporting and their patient safety attitudes.^{9,22} These findings highlight the importance of cultivating a patient-centred mindset among healthcare providers. Additionally, establishing a culture of non-punishment within hospitals is crucial to encouraging error disclosure. This aligns with recent research suggesting that a stronger patient focus and a non-retaliatory environment within hospitals can significantly incentivise error reporting.⁵⁰ Hospitals that foster a culture of error reporting as a learning and improvement opportunity are more likely to motivate staff to report incidents. This approach not only promotes a deeper understanding of the root causes of errors but also allows for the implementation of effective preventive strategies. This positive cycle, where increased reporting leads to improved patient safety practices, ultimately benefits all stakeholders within the healthcare system.

Our research corroborates existing findings across multiple countries demonstrating a clear link between extended workweeks (over 44 hours) and negative patient safety attitudes among healthcare professionals.^{9 51–53} Excessive workloads have a demonstrably detrimental impact on healthcare providers, leading to a decline in

service quality and potentially compromising patient care itself.^{54 55} This burden can have serious ramifications, potentially contributing to hospital-acquired injuries. Furthermore, it creates a significant barrier to implementing solutions that enhance both staff well-being and patient care. Indeed, research conducted in Tunisia suggests a direct correlation: reduced workloads lead to a significant increase in patient safety culture, a cornerstone for ensuring optimal patient outcomes.⁵⁶

Strengths and limitations

This study represents the first of its kind in Iran, exploring the comparative patient safety attitudes of physicians and nurses. The researchers implemented a meticulously designed sampling method to ensure a representative sample of these professionals working within Iranian teaching hospitals. While the study boasts significant strengths, a few limitations are worth acknowledging.

First, the investigation focused solely on physicians and nurses, neglecting other crucial hospital personnel such as pharmacists, rehabilitation technicians and administrative staff. A more comprehensive understanding would require including these additional positions. Second, the estimated sample size was not fulfilled due to non-participation of nurses and doctors in our study. Although we applied various strategies to improve response rate, more participants did not respond than originally planned. Future research should be conducted using a larger sample size to reduce the likelihood of sampling errors and provide a more accurate representation of the population. Third, the self-reported nature of the APSQ-III and most covariates introduces the possibility of memory bias. Finally, the study focused solely on attitudinal assessments, not delving into healthcare workers' actual behaviours or the resulting patient outcomes. Therefore, future research should investigate interventions designed to enhance patient safety attitudes, evaluate their impact on healthcare worker behaviour and ultimately assess their influence on patient outcomes. By addressing these limitations, future studies can build on this pioneering work and contribute significantly to improving patient safety in Iranian hospitals.

CONCLUSIONS

This study underscores the importance of data analysis in identifying strengths and weaknesses within patient safety protocols. By leveraging these data, hospitals can develop targeted strategies, optimise resource allocation and ultimately enhance patient well-being. A crucial shift in perspective is necessary: viewing medical errors as indicators of systemic issues, rather than individual failings, is paramount to minimising their occurrence. Well-defined protocols, comprehensive training programmes and a robust error reporting system are essential tools for bolstering patient safety. Furthermore, integrating patient safety training into the core curriculum of both nursing and medical education is vital. The study's findings

highlighted the significance of fostering collaborative teamwork within healthcare teams. This collaborative approach is key to optimising team performance and ultimately delivering the highest quality of care to patients. The insights gleaned from this research provide a valuable framework for hospitals to address errors proactively and achieve continuous improvement in patient safety.

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Acknowledgements The authors would like to thank all participants in the survey for their time and effort. They are grateful for the trust and enthusiasm the participants have brought to this study. The authors would also like to thank Abdolvahab Baghbanian for editing and proof-reading the paper. The authors are truly thankful to the reviewers whose comments and suggestions improved the quality of the paper.

Contributors EK and JS were responsible for conceptualisation and methodology. EK, FM and SS collected the data. EK, AM and FM performed the formal analysis with contributions from SS. EK and AM wrote the original draft. EK, FM and JS reviewed and edited the original draft. JS was responsible for planning and executing the research activity, including mentorship external to the core team. EK is responsible for the overall content as the guarantor. All authors read and approved the final manuscript. The corresponding author attests that all listed authors meet the authorship criteria and that no others meeting these criteria have been omitted.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not required.

Ethics approval The study was conducted in adherence to the highest ethical standards, as laid out by the Declaration of Helsinki. The Ethics Committee of Tehran University of Medical Sciences (IR.TUMS.SPH.REC.1401.238) reviewed and approved the protocol of the study, ensuring that all participants were fully informed and provided written consent. We made it clear that participation was entirely voluntary and that responses would remain anonymous. We encouraged our participants to withdraw at any time, and for any reason, without fear of repercussion.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request.

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REFERENCES

- 1 Abu-El-Noor NI, Abu-El-Noor MK, Abuowda YZ, *et al*. Patient safety culture among nurses working in Palestinian governmental hospital: a pathway to a new policy. *BMC Health Serv Res* 2019;19:550.
- 2 Emanuel L, Berwick D, Conway J, *et al*. Advances in patient safety: new directions and alternative approaches. In: *Assessment*. In: *What exactly is patient safety*. 1. Bethesda MD, USA: U.S. National Library of Medicine, 2008.
- 3 Andermann A, Ginsburg L, Norton P, *et al*. Core competencies for patient safety research: a cornerstone for global capacity strengthening. *BMJ Qual Saf* 2011;20:96–101.
- 4 Schwendimann R, Blatter C, Dhaini S, *et al*. The occurrence, types, consequences and preventability of in-hospital adverse events - a scoping review. *BMC Health Serv Res* 2018;18:521.
- 5 Vaziri S, Fakouri F, Mirzaei M, *et al*. Prevalence of medical errors in Iran: a systematic review and meta-analysis. *BMC Health Serv Res* 2019;19:622.
- 6 de Vries EN, Ramrattan MA, Smorenburg SM, *et al*. The incidence and nature of in-hospital adverse events: a systematic review. *Qual Saf Health Care* 2008;17:216–23.
- 7 Alfaqawi M, Böttcher B, Abuowda Y, *et al*. Treating patients in a safe environment: a cross-sectional study of patient safety attitudes among doctors in the Gaza Strip, Palestine. *BMC Health Serv Res* 2020;20:388.
- 8 Böttcher B, Abu-El-Noor N, Abuowda Y, *et al*. Attitudes of doctors and nurses to patient safety and errors in medical practice in the Gaza-Strip: a cross-sectional study. *BMJ Open* 2019;9:e026788.
- 9 Al-Mugheed K, Bayraktar N, Al-Bsheish M, *et al*. Patient Safety Attitudes among Doctors and Nurses: Associations with Workload, Adverse Events, Experience. *Healthcare (Basel)* 2022;10:631:631:.
- 10 Pickens J. Attitudes and perceptions. *Org Behav Health Care* 2005;4:43–76.
- 11 Alzahrani N, Jones R, Abdel-Latif ME. Attitudes of doctors and nurses toward patient safety within emergency departments of two Saudi Arabian hospitals. *BMC Health Serv Res* 2018;18:736.
- 12 Makary MA, Daniel M. Medical error-the third leading cause of death in the US. *BMJ* 2016;353:i2139.
- 13 DiCuccio MH. The Relationship Between Patient Safety Culture and Patient Outcomes: A Systematic Review. *J Patient Saf* 2015;11:135–42.
- 14 Kruk ME, Gage AD, Arsenault C, *et al*. High-quality health systems in the Sustainable Development Goals era: time for a revolution. *Lancet Glob Health* 2018;6:e1196–252.
- 15 Singer S, Lin S, Falwell A, *et al*. Relationship of safety climate and safety performance in hospitals. *Health Serv Res* 2009;44:399–421.
- 16 Huang C-H, Wu H-H, Lee Y-C. The perceptions of patient safety culture: A difference between physicians and nurses in Taiwan. *Appl Nurs Res* 2018;40:39–44.
- 17 Hall LH, Johnson J, Watt I, *et al*. Healthcare Staff Wellbeing, Burnout, and Patient Safety: A Systematic Review. *PLoS One* 2016;11:e0159015.
- 18 Jafarpanah M, Rezaei B. Association between organizational citizenship behavior and patient safety culture from nurses' perspectives: a descriptive correlational study. *BMC Nurs* 2020;19:24:24:.
- 19 Liu J, Zheng J, Liu K, *et al*. Workplace violence against nurses, job satisfaction, burnout, and patient safety in Chinese hospitals. *Nurs Outlook* 2019;67:558–66.
- 20 Lin Y-H, Hsiao S-T, Lin C-F, *et al*. Exploration of the Association Between Workplace Bullying and Attitudes Toward Patient Safety in Female Nurses. *Hu Li Za Zhi* 2018;65:51–60.
- 21 Wang KY, Chou CC, Lai J-Y. A structural model of total quality management, work values, job satisfaction and patient-safety-culture attitude among nurses. *J Nurs Manag* 2019;27:225–32.
- 22 Kakemam E, Albelbeisi AH, Davoodabadi S, *et al*. Patient safety culture in Iranian teaching hospitals: baseline assessment, opportunities for improvement and benchmarking. *BMC Health Serv Res* 2022;22:403.
- 23 Kakemam E, Gharaee H, Rajabi MR, *et al*. Nurses' perception of patient safety culture and its relationship with adverse events: a national questionnaire survey in Iran. *BMC Nurs* 2021;20:60.

- 24 Khoshakhlagh AH, Khatooni E, Akbarzadeh I, *et al.* Analysis of affecting factors on patient safety culture in public and private hospitals in Iran. *BMC Health Serv Res* 2019;19:1009.
- 25 Nabilou B, Feizi A, Seyedin H. Patient Safety in Medical Education: Students' Perceptions, Knowledge and Attitudes. *PLoS One* 2015;10:e0135610.
- 26 Vaismoradi M, Bondas T, Jasper M, *et al.* Nursing students' perspectives and suggestions on patient safety--implications for developing the nursing education curriculum in Iran. *Nurse Educ Today* 2014;34:265–70.
- 27 Sharma A, Minh Duc NT, Luu Lam Thang T, *et al.* A Consensus-Based Checklist for Reporting of Survey Studies (CROSS). *J Gen Intern Med* 2021;36:3179–87.
- 28 Carruthers S, Lawton R, Sandars J, *et al.* Attitudes to patient safety amongst medical students and tutors: Developing a reliable and valid measure. *Med Teach* 2009;31:e370–6.
- 29 Kow AWC, Ang BLS, Chong CS, *et al.* Innovative Patient Safety Curriculum Using iPad Game (PASSED) Improved Patient Safety Concepts in Undergraduate Medical Students. *World J Surg* 2016;40:2571–80.
- 30 Janatolmakan M, Khatony A. Explaining the experience of nurses on missed nursing care: A qualitative descriptive study in Iran. *Appl Nurs Res* 2022;63:151542.
- 31 Taylor JA, Dominici F, Agnew J, *et al.* Do nurse and patient injuries share common antecedents? An analysis of associations with safety climate and working conditions. *BMJ Qual Saf* 2012;21:101–11.
- 32 Ginsburg LR, Dhingra-Kumar N, Donaldson LJ. What stage are low-income and middle-income countries (LMICs) at with patient safety curriculum implementation and what are the barriers to implementation? A two-stage cross-sectional study. *BMJ Open* 2017;7:e016110.
- 33 Azyabi A, Karwowski W, Davahli MR. Assessing Patient Safety Culture in Hospital Settings. *Int J Environ Res Public Health* 2021;18:2466.
- 34 Brasaite I, Kaunonen M, Martinkenas A, *et al.* Health care professionals' attitudes regarding patient safety: cross-sectional survey. *BMC Res Notes* 2016;9:177.
- 35 Reeves S, Xyrichis A, Zwarenstein M. Teamwork, collaboration, coordination, and networking: Why we need to distinguish between different types of interprofessional practice. *J Interprof Care* 2018;32:1–3.
- 36 Weller J, Boyd M, Cumin D. Teams, tribes and patient safety: overcoming barriers to effective teamwork in healthcare. *Postgrad Med J* 2014;90:149–54.
- 37 Weller JM, Barrow M, Gasquoin S. Interprofessional collaboration among junior doctors and nurses in the hospital setting. *Med Educ* 2011;45:478–87.
- 38 Najjar S, Nafouri N, Vanhaecht K, *et al.* Improving patient safety in Palestinian hospitals: a cross-sectional and retrospective chart review study. *The Lancet* 2018;391:S44.
- 39 Alper E, Rosenberg EI, O'Brien KE, *et al.* Patient safety education at U.S. and Canadian medical schools: results from the 2006 Clerkship Directors in Internal Medicine survey. *Acad Med* 2009;84:1672–6.
- 40 Kiesewetter I, Könings KD, Kager M, *et al.* Undergraduate medical students' behavioural intentions towards medical errors and how to handle them: a qualitative vignette study. *BMJ Open* 2018;8:e019500.
- 41 Kamran R, Bari A, Khan RA, *et al.* Patient safety awareness among Undergraduate Medical Students in Pakistani Medical School. *Pak J Med Sci* 2018;34:305–9.
- 42 Leung GKK, Ang SBL, Lau TC, *et al.* Patient safety culture among medical students in Singapore and Hong Kong. *Singapore Med J* 2013;54:501–5.
- 43 Eltony SA, El-Sayed NH, El-Araby SE-S, *et al.* Implementation and evaluation of a patient safety course in a problem-based learning program. *Educ Health (Abingdon)* 2017;30:44–9.
- 44 Steven A, Magnusson C, Smith P, *et al.* Patient safety in nursing education: contexts, tensions and feeling safe to learn. *Nurse Educ Today* 2014;34:277–84.
- 45 Bari A, Jabeen U, Bano I, *et al.* Patient safety awareness among postgraduate students and nurses in a tertiary health care facility. *Pak J Med Sci* 2017;33:1059–64.
- 46 Kim M. The effectiveness of error reporting promoting strategy on nurse's attitude, patient safety culture, intention to report and reporting rate. *J Korean Acad Nurs* 2010;40:172–81.
- 47 Kim Y, Lee E. The relationship between the perception of open disclosure of patient safety incidents, perception of patient safety culture, and ethical awareness in nurses. *BMC Med Ethics* 2020;21:104.
- 48 Leape LL. *It's not bad people: error in medicine. making healthcare safe: the story of 14 the patient.* Safety Movement: Springer, 2021:17–30.
- 49 Leape LL. *Making healthcare safe: the story of the patient safety movement.* Springer, 2021.
- 50 Woo MWJ, Avery MJ. Nurses' experiences in voluntary error reporting: An integrative literature review. *Int J Nurs Sci* 2021;8:453–69.
- 51 Kakemam E, Kalhor R, Khakdel Z, *et al.* Occupational stress and cognitive failure of nurses and associations with self-reported adverse events: A national cross-sectional survey. *J Adv Nurs* 2019;75:3609–18.
- 52 Magalhães AMM de, Costa DG da, Riboldi C de O, *et al.* Association between workload of the nursing staff and patient safety outcomes. *Rev esc enferm USP* 2017;51:e03255.
- 53 Jarrar M, Al-Bsheish M, Dardas LA, *et al.* Adverse events in Malaysia: Associations with nurse's ethnicity and experience, hospital size, accreditation, and teaching status. *Health Planning & Management* 2020;35:104–19.
- 54 Alkhazali MN, Bayraktar N, Al-Mugheed KA, *et al.* Knowledge and Barriers of Critical Care Nurses Regarding Evidence-Based Practices in Ventilator-Associated Pneumonia Prevention. *Cyprus J Med Sci* 2021;6:185–91.
- 55 Jarrar M, Al-Bsheish M, Aldhmadi BK, *et al.* Effect of Practice Environment on Nurse Reported Quality and Patient Safety: The Mediation Role of Person-Centeredness. *Healthcare (Basel)* 2021;9:1578.
- 56 Tlili MA, Aouicha W, Sahli J, *et al.* A baseline assessment of patient safety culture and its associated factors from the perspective of critical care nurses: Results from 10 hospitals. *Aust Crit Care* 2021;34:363–9.