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Patient Safety Culture and its Determinant among Healthcare Professionals at a Cluster Hospital in Malaysia

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1 **Title of Manuscript: Patient Safety Culture and its Determinant among**
2 **Healthcare Professionals at a Cluster Hospital in Malaysia**

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1   **Manuscript Type: Original Article**

2   **Title of Manuscript: Patient Safety Culture and its Determinants among**

3   **Healthcare Professionals at a Malaysian Cluster Hospital.**

4

5   **Abstract:**

6   **Objective:**

7   To assess the level of patient safety culture among healthcare professionals at a

8   cluster hospital in Malaysia and to determine the predictive factors of positive patient

9   safety culture.

10   **Methods:**

11   This cross-sectional study was conducted at a cluster hospital comprising one state

12   and two district hospitals in Malaysia. The safety culture was assessed using the

13   Safety Attitude Questionnaire (SAQ), which is a validated questionnaire. Using

14   proportionate stratified random sampling, 1814 respondents were recruited, and we

15   used the independent t-test, Pearson chi-square test, and multiple logistic regression

16   analysis for data assessment.

17   **Results:**

18   Only 23.9% of the respondents had positive patient-safety culture levels (SAQ score $\geq$

19   75%); the overall mean score was 67.82 ± 10.53. The job satisfaction dimension had

20   the highest percentage of positive responses (67.0%), with a mean score of $76.54 \pm$

21   17.77. The factors associated with positive patient-safety culture were age (odds ratio

22   (OR) 1.03, $p < 0.001$), gender (OR 1.67, $p = 0.001$), education level (OR 2.51, $p <$

23   0.001), work station (OR 2.02, $p < 0.001$), participation in patient safety training (OR

24   1.64, $p = 0.007$), good perception of the incident reporting system (OR 1.71, $p =$

25   0.038), and a non-blaming (OR 1.36, $p = 0.013$) and instructive (OR 3.31, $p = 0.007$)

26   incident reporting system.

2

1 **Conclusions:**

2 Healthcare professionals at the cluster hospital showed unsatisfactory patient-safety

3 culture levels. Most of the respondents appreciated their jobs, despite experiencing

4 dissatisfaction with their working conditions. The priority for changes should involve

5 systematic interventions to focus on patient safety training, address the blame culture,

6 improve communication, exchange information about errors, and improve working

7 conditions.

8

9 **Keywords:** patient safety culture; patient safety; safety attitude questionnaire; cluster

10 hospital

11

12 **Strengths and limitations of this study:**

13 - This is the first study on patient safety culture among healthcare professionals

14 conducted in our state. We believe our study's findings to provide a reasonably

15 representative view of the patient safety culture that can be expected in the

16 other two cluster hospitals in Kedah since the other two clusters' setting was

17 identical to our cluster.

18 - Our study's response rate was good compared to most of the international

19 studies, which could be an obvious indication of employee commitment and

20 dedication to quality issues, all of which signify responsible conduct. It was

21 also attributable partly to the administered questionnaire which has positive

22 features, compared to other tools. Among those features are self-administered

23 questionnaires with clear terms and limited number of items that only require a

24 short time for respondents to complete.

25 - We didn't explore the connection between patient safety culture and the

26 number of events reported by respondents and the patient outcome. Further

27 research is required to identify the complicated relationship between patient

28 safety culture and incident reporting system, the number of reporting and

29 patient outcome, and how the data produced can be translated into action and

30 learning. The findings are crucial and can guide us on interventions and

31 improvements that can be taken to create a safe healthcare system and reduce

32 adverse medical outcomes.

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- Although a useful tool, SAQ has its limitation in which it assesses staffs believe about safety culture rather than their real safety behaviour. It should be noted that SAQ tests the current attitude of patient safety, but there may be differences between attitudes and actual practice. Therefore, to explore the dimensions which influence patient safety in more detail, a combination of SAQ with qualitative methods such as peer observation, group discussions, analysis of organization's incident history, and audits of the safety management system is recommended and worth considering.

- There is still a wide gap in research about how data obtained from different methods are related and how to combine them to get a complete safety culture view. Despite these limitations, we believe this research offers useful insight into our organisation's baseline patient safety culture.

4

1 **BACKGROUND**

2 The healthcare system is extremely complex, wherein healthcare delivery is founded

3 on patient safety. Patient safety entails avoiding preventable harm to patients during

4 the health care process and reducing the risk of unnecessary injury associated with

5 health care to an acceptable minimum. The World Health Organization (WHO)

6 reports that approximately 1 in 10 patients are harmed while receiving health care,

7 and approximately 43 million patient safety incidents occur annually.(1) Little can be

8 accomplished if a patient feels, or is, unsafe when receiving medical treatment at

9 healthcare facilities.(2) Thus, ensuring patient safety requires tremendous efforts from

10 every member of a healthcare team.

11   The patient safety movement hit a milestone after the Institute of Medicine

12 (IOM).(3) Since then, patient safety has been at the forefront of health care. In

13 Malaysia, for example, the Ministry of Health (MOH) formed the Patient Safety

14 Council of Malaysia in January 2003 to ensure that people receive safe health care.

15 Malaysia Patient Safety Goals were then introduced on June 24, 2013, outlining 13

16 essential areas in patient safety, with specific goals and targets. Since then, multiple

17 programs and efforts have been organized at both national and state levels to improve

18 the awareness of healthcare staff regarding patient safety.

19   In the interest of patient safety, numerous studies have examined the causes of

20 medical errors. Over the years, health care organizations' approaches to errors have

21 shifted from person-centered to system-centered. The system-centered approach

22 focuses on working conditions, rather than individual mistakes.(4) Further, the WHO

23 Patient Safety Methods and Measures Working Group identified the need to

24 understand a range of human factors such as managerial, team, and individual

25 characteristics that influence healthcare staff behavior concerning patient safety. A

26 WHO report identified safety culture as one of the 10 key human factors relevant to

27 patient safety.(5) Safety culture or attitude influences the typical behaviors of workers

28 in a particular ward or unit. It affects patient safety as it determines the accepted

29 practices within an organization. Thus, evaluating the safety attitude and

30 understanding the components and influencers of safety culture is important to

31 develop strategies for creating a culture committed to providing patients with the

32 safest possible care.

5

1   Furthermore, reported patient-safety-related incidents have increased over the
2   years. In England, the number of patient-safety-related incidents reported to the
3   National Reporting and Learning System in 2018 increased by 3.5%.(6) In Malaysia,
4   patient-safety-related incidents such as medication errors, transfusion errors, and
5   patient falls have increased since 2014.(7) An outpatient geriatric pharmacy reported
6   20 cases of medication errors daily, costing approximately RM111 924 per year. This
7   increasing trend in medical errors raises concern, as it indicates that our healthcare
8   facilities may not be safe for patients. It also has the potential to lead to medico-legal
9   repercussions, which would tarnish the reputation of the MOH and create a financial
10   burden on the patients and the ministry.

11   The present study was conducted at a cluster hospital in the state of Kedah,
12   Malaysia. A cluster hospital is defined as a group of hospitals in the same
13   geographical location within a state that collaborate and operate as one organization;
14   it is an MOH Malaysia initiative aimed at transforming healthcare service delivery in
15   the country. Additionally, it has been recognized as a Government Transformation
16   Program, a high-impact initiative by the Public Service Department, and one of the
17   top 10 priorities of the MOH Plan of Action (2016–2020). The objective of the cluster
18   hospital is to optimize resource utilization. The hospitals collaborate and have an
19   aligned flow of patients and services. A typical cluster hospital consists of a lead
20   hospital (LH), usually a state hospital or major specialist hospital. Meanwhile, non-
21   LHs (NLH) are usually the district non-specialist hospitals that provide specialist
22   services based on the cluster hospital concept.

23   Thus, this study's main objective was to assess the baseline level and mean score
24   of every domain of patient-safety culture among healthcare professionals at a cluster
25   hospital. It identified the determinants associated with patient-safety culture and
26   developed a model for the predictive factors of positive patient-safety culture.

27   **METHODS**

28   **Study design and sampling**

29   This cross-sectional study was conducted at a cluster hospital consisting of a state
30   hospital and two district hospitals in Malaysia. As all three hospitals are public
31   hospitals, they implement similar patient-safety practices and policies. Data were
32   collected from December 2019 to February 2020. All doctors, pharmacists, nurses,

6

1 and assistant medical officers (AMO) who were involved directly with patient care

2 processes and who had been working at the hospitals for at least four weeks were

3 included in the study. Those who worked in management and who were on a long

4 leave were excluded from the study.

5 The samples were selected through proportionate stratified random sampling to

6 ensure that, throughout the population, the sample size selected from each subgroup

7 was proportional to the size of that subgroup. The same sampling method was used to

8 determine how many representatives from each professional category would be

9 selected. The sample size required, which was calculated using StatCalc Epi Info 7.2,

10 was 778, at 95% confidence interval (CI) and with 80% power. However, considering

11 a dropout rate of 20%, the final sample size required was 934.

12 **Measures**

13 One of the ubiquitously used tools for measuring patient-safety culture in healthcare is

14 the Safety Attitude Questionnaire (SAQ), which has been adapted for various clinical

15 settings such as intensive care units, general inpatient settings, emergency services,

16 operation theatres, and pharmacies. Here, we used both English and Malay versions of

17 the SAQ. The Malay version has been validated in the Malaysian healthcare

18 setting,(8) with good construct validity and internal consistency.(9)

19 The SAQ comprises 36 items for assessing six safety culture domains: teamwork

20 climate (items 1–6), safety climate (items 7–13), job satisfaction (items 15–19), stress

21 recognition (items 20–23), perceptions of management (items 24–28), and working

22 conditions (items 29–32). Items 14 and 33–36 are not among the abovementioned

23 scales. All items are closed-ended questions, and respondents are required to indicate

24 their agreement level on a 5-point Likert scale ranging from 1 (disagree strongly) to 5

25 (agree strongly). The respondents' demographic information such as age, gender,

26 race, profession, education level, current working hospital and unit, length of service,

27 and working hours per week were obtained as well. Information on patient safety

28 training and the incident reporting system in the organization was also added to the

29 questionnaire to assess the factors affecting patient-safety culture levels among

30 healthcare professionals.

31 Data were analyzed using SPSS 21, and the respondents' demographic

32 characteristics and patient-safety culture level were determined using univariate

7

1 analysis. Before the analysis, three negatively worded items (items 2, 11, and 36) in

2 the SAQ were reversed. Each item's score was calculated by converting the 5-point

3 Likert scale into a 100-point scale: $1 = 0$, $2 = 25$, $3 = 50$, $4 = 75$, and $5 = 100$. Each

4 item's score within the same dimension was summed and divided by the number of

5 items available for that dimension to obtain a score of 0–100. If a respondent's mean

6 score was ≥ 75, they had a positive safety culture for a given dimension. The

7 respondent's overall score for the patient-safety culture level was calculated using the

8 same method.

9   The differences between two independent groups of normally distributed numerical

10 data were analyzed using an independent t-test; the association between two sets of

11 categorical data was examined using Pearson's chi-square test for independence.

12 Multiple logistic regression was used to examine the association between risk factors

13 and two outcome categories. All probability values were 2-sided, and a level of

14 significance of <0.05 ($p < 0.05$) was considered as statistically significant. Finally, the

15 model fitness was tested using the Hosmer-Lemeshow test and classification table.

16

17 **Ethical issues/statement**

18 This study received ethics approval from the Universiti Kebangsaan Malaysia (UKM)

19 Ethics Committee and the MOH Medical Research Etiquette Committee (MREC).

20 Respondents were informed about the background and aim of the study and the

21 confidentiality of the data submitted in the questionnaire, and their consent was

22 obtained prior to answering the questionnaire.

23

24 **Patient and Public Involvement**

25 Patients or the public were not involved in the design, or conduct, or reporting, or

26 dissemination plans of our research.

27 **RESULTS**

28 After 2000 questionnaires were distributed to the healthcare professionals who met

29 the inclusion criteria, 1814 completed questionnaires were returned, resulting in an

30 overall response rate of 90.7%.

8

1   **Descriptive analysis**

2   Demographic Characteristics

3   Table 1 shows the respondents' general demographic characteristics. Most

4   respondents were female and Malay, with a mean age of 34.29 years. The majority

5   were from the non-doctor group, diploma holders and had been working at their

6   current departments or units for approximately five years. Most respondents (95.6%)

7   agreed that patient safety training was available at their organization, and 81% had

8   attended such programs at least once. More than half the respondents felt that the

9   incident reporting system was punitive.

10

11

Table 1: Demographic characteristics of the respondents

Demographic characteristics	Overall	
	Frequency (n=1800)	Percent (%)
Age; mean (SD), median	34.29 (7.223), 33.00	
Gender		
Male	373	20.7
Female	1427	79.3
Race		
Malay	1567	87.1
Non-Malay	233	12.9
Profession		
Doctor	479	26.6
Non-doctors	1321	73.4
Education level		
Diploma	1189	66.1
Degree and above	611	33.9
Current working hospital		
Lead Hospital	1532	85.1
Non-Lead Hospital	268	14.9
Location of work/ department		
Medical based	549	30.5
Surgical based	589	32.7
Others	662	36.8
Length of service; mean (SD), median	63.65 (61.266), 48.00	
Working hours per week		
≤ 48 hours	1258	69.9
> 48 hours	542	30.1
Availability of training on patient safety		
Yes	1720	95.6
No	80	4.4
Participation in patient safety program or training		
Yes	1458	81
No	342	19
The overall perception of the incident reporting system		
Good	1619	89.9
Poor	181	10.1
The incident reporting system is punitive		
Yes	1128	62.7
No	672	37.3
Learned something from the incidence reported (Instructive incident reporting system)		
Yes	1707	94.8
No	93	5.2
Will report patient safety incidents to the higher authority		

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| | Yes | | | | 1750 | 97.2 |
| | No | | | | 50 | 2.8 |

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2   Patient Safety Culture Level

3   The patient-safety culture levels among the respondents are shown in Table 2.

4   Overall, less than a quarter of the respondents (23.9%) had a positive patient-safety

5   culture. Notably, more than half the respondents had a negative attitude for most of

6   the dimensions tested, except for job satisfaction. NLH respondents had a higher

7   percentage of positive responses for the overall patient safety culture, compared to LH

8   respondents.

9

10   Table 2: Patient safety culture levels among healthcare professionals

Patient Safety Culture Level	Overall		LH		NLH	
	Frequency (n=1800)	Percent (%)	Frequency (n=1532)	Percent (%)	Frequency (n=268)	Percent (%)
Teamwork Climate						
Negative	1133	62.9	975	63.6	158	59.0
Positive	667	37.1	557	36.4	110	41.0
Safety Climate						
Negative	1149	63.8	1000	65.3	149	55.6
Positive	651	36.2	532	34.7	119	44.4
Job Satisfaction						
Negative	594	33.0	518	33.8	76	28.4
Positive	1206	67.0	1014	66.2	192	71.6
Stress Recognition						
Negative	1049	58.3	864	56.4	185	69.0
Positive	751	41.7	668	43.6	83	31.0
Perceptions of Management						
Negative	1279	71.1	1099	71.7	180	67.2
Positive	521	28.9	433	28.3	88	32.8
Working Conditions						
Negative	1389	77.2	1165	76.0	224	83.6
Positive	411	22.8	367	24.0	44	16.4
Overall Safety Culture						
Negative	1370	76.1	1179	77.0	191	71.3
Positive	430	23.9	353	23.0	77	28.7

11

12   The mean scores for each patient-safety culture dimension are presented in **Error!**

13   **Reference source not found.**. The cluster hospital's overall mean score was 67.82,

14   and the LH and NLH had comparable mean scores. The job satisfaction dimension

10

1 had the highest mean score (76.54), followed by safety climate (69.36), teamwork

2 climate (69.18), perception of management (64.87), stress recognition (62.80), and

3 working condition (62.27). The NLH had higher mean scores than the LH for most

4 dimensions, except stress recognition and working condition.

Table 3: Mean scores of patient safety culture by dimension

Patient Safety Culture Domains	Overall		LH		NLH	
	Mean (SD)	Positive response (≥75) (%)	Mean (SD)	Positive response (≥75) (%)	Mean (SD)	Positive response (≥75) (%)
Teamwork climate	69.18 (12.83)	37.1	69.03 (12.84)	36.4	70.08 (12.75)	41.0
Safety climate	69.36 (12.55)	36.2	69.03 (12.42)	34.7	71.25 (13.17)	44.4
Job satisfaction	76.54 (17.77)	67.0	76.27 (17.90)	66.2	78.10 (16.96)	71.6
Stress recognition	62.80 (24.68)	41.7	63.70 (24.41)	43.6	57.65 (25.58)	31.0
Perception of management	64.87 (16.24)	28.9	64.68 (16.26)	28.3	65.93 (16.13)	32.8
Working condition	62.27 (12.64)	22.8	62.57 (12.73)	24.0	60.56 (11.97)	16.4
Overall safety culture	67.82 (10.53)	23.9	67.80 (10.53)	23.0	67.90 (10.54)	28.7

Bivariate Analysis

9 Table 4 shows the result of the analysis to determine the associated factors for the

10 patient safety culture among healthcare professionals in a cluster hospital. Overall, a

11 significant association was noted between patient safety culture level and race (p =

12 0.004), profession (p < 0.05), education level (p < 0.001), current working hospital (p

13 = 0.044), current department or unit (p < 0.001), and working hours per week (p =

14 0.0001). There was also a significant association between patient safety culture level

15 and patient safety-related questions.

11

1 2

Table 4: Factors associated with patient safety culture

Variable	Patient safety culture		
	Negative n (%)	Positive n (%)	*p*-value
Age: Median (IQR)	32.00 (10.0)	35.00 (11.0)	< 0.05
Gender			
Male	281 (75.3)	92 (24.7)	0.693
Female	1089 (76.3)	338 (23.7)	
Race			
Malay	1175 (75.0)	392 (25.0)	0.004
Non-Malay	195 (83.7)	38 (16.3)	
Profession			
Doctor	405 (84.6)	74 (15.4)	< 0.05
Non-doctors	965 (73.1)	356 (26.9)	
Education level			
Diploma	843 (70.9)	346 (29.1)	< 0.001
Degree and above	527 (86.3)	84 (13.7)	
Current working hospital			
LH	1179 (77.0)	353 (23.0)	0.044
NLH	191 (71.3)	77 (28.7)	
Location of work/ department			
Medical	406 (74.0)	143 (26.0)	< 0.001
Surgical	411 (69.8)	178 (30.2)	
Others	553 (83.5)	109 (16.5)	
Length of service; Median (IQR)	48.00 (85.0)	50.50 (91.0)	0.069
Working hours per week			
≤ 48 hours	926 (73.6)	332 (26.4)	0.0001
> 48 hours	444 (81.9)	98 (18.1)	
Availability of training on patient safety			
Yes	1296 (75.3)	424 (24.7)	0.0004
No	74 (92.5)	6 (7.5)	
Participation in patient safety program or training			
Yes	1074 (73.7)	384 (26.3)	< 0.05
No	296 (86.5)	46 (13.5)	
The overall perception of the incident reporting system			
Good	1209 (74.7)	410 (25.3)	< 0.05
Poor	161 (89.0)	20 (11.0)	
The incident reporting system is punitive			
Yes	862 (76.4)	266 (23.6)	0.692
No	508 (75.6)	164 (24.4)	
Learned something from the incidence reported (Instructive incident reporting system)			
Yes	1283 (75.2)	424 (24.8)	0.0001
No	87 (93.5)	6 (6.5)	
Will report patient safety incidents to the higher authority			
Yes	1325 (75.7)	425 (24.3)	0.019
No	45 (90.0)	5 (10.0)	

12

1 **Multivariate analysis**

2 Multiple logistic regression was conducted to identify a model of the predictive

3 factors that are associated with a positive patient-safety culture (Table 5). The factors

4 included in the model and that were significantly associated with positive patient-

5 safety culture were age, gender, education level, working department/unit,

6 participation in patient safety training, good perception of incident reporting and

7 learning systems, and non-blaming and instructive incident reporting systems in the

8 organization. The model fitness was tested using the Hosmer-Lemeshow test (p =

9 0.788) and the classification table (76.5%). Nagelkerke's R^2 showed that this logistic

10 model explained 11.4% of the variation in the outcome variable.

11
12 Table 5: Multiple logistic regression
13

Variable	Overall safety culture			
	Wald	Adj. OR	(95% CI)	*p*-value
Age; median (IQR)	13.046	1.03	(1.02, 1.05)	< 0.001
Gender				0.001
Male	11.896	1.67	(1.25, 2.24)	
Female		1.00		
Education level				< 0.001
Diploma	35.547	2.51	(1.85, 3.34)	
Degree and above		1.00		
Location of work/ department				< 0.001
Medical based	7.136	1.49	(1.11, 2.00)	
Surgical based	23.059	2.02	(1.51, 2.68)	
Others		1.00		
Participation in patient safety program or training				0.007
Yes	7.321	1.64	(1.15, 2.34)	
No		1.00		
The overall perception of the incident reporting system				0.038
Good	4.303	1.71	(1.03, 2.83)	
Poor		1.00		
The incident reporting system is punitive				0.013
Yes		1.00		
No	6.107	1.36	(1.07, 1.73)	
Learned something from the incidence reported (Instructive incident reporting system)				0.007

13

Yes	7.405	3.31	(1.40, 7.85)
No		1.00	

DISCUSSION

The response rate of the present study is 90.7%; thus, it is considered good and positive compared with that of previous local studies that used the same instrument, which was 58.0–83%.(8, 10-12) Further, other local studies have used tools other than the SAQ, and recorded lower response rates (i.e. 78–81%), compared to that of the present study.(13, 14) Furthermore, the response rate in our study was higher compared to international benchmarking data in the US, UK, and New Zealand, which was 65.7–72.2%,(15) and other studies conducted across the world.(16-19) The greater response rate in our study may be potentially because this is the first study on patient safety conducted in our cluster hospital community; therefore, most departments were interested in participating. The high response rate could also be an obvious indication of employee commitment and dedication to quality issues, all of which signify responsible conduct. Further, the administered questionnaire has positive features, which makes it more user-friendly, compared to other tools. Among those features are self-administered questionnaires with clear terms and limited number of items that only require a short time for respondents to complete.

At our cluster hospital, the respondents lacked a patient safety culture, far below the international benchmarking standard, which is appropriately 60%,(15) and that of other previous international studies.(16, 20-23) However, compared to previous local studies, we recorded a higher percentage of positive responses than Sarifulnizam et al. (2019) and comparable responses to Samsuri et al. (2015). We noted that the NLH had a greater proportion of respondents with a positive patient-safety culture. This finding correlates with Samsuri et al. (2015), who found that respondents in smaller institutions had a more positive safety culture than those working in hospitals. Other studies have also stated that smaller institutions tend to have a better safety culture compared to large institutions.(24) The reason could be that small institutions, such as NLH, have more similar environments and smaller work communities, whereby workers are more likely to hold and share the same climate. Only the job satisfaction dimension had a high percentage of positive responses (>60%), similar to other previous local studies.(10, 12) The other five dimensions showed low positive responses, between 22% and 41%.

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1   In the present study, the overall mean score was slightly higher than that of a study

2   conducted among pharmacists in Melaka (67.82 versus 65.6). Five out of six

3   dimensions had higher mean scores compared to those recorded by Samsuri et al.

4   (2015); in increasing score order, they were working condition (62.27 versus 54.8),

5   perception of management (64.87 versus 62.20), teamwork climate (69.18 versus

6   67.6), safety climate (69.36 versus 66.8), and job satisfaction (76.54 versus 67.3).

7   Compared with international benchmarking data, safety climate, job satisfaction,

8   perception of management, and working condition dimensions had higher mean

9   scores, while the teamwork climate mean score was comparable to the benchmarking

10   data.(15)

11   In the study, the stress recognition dimension had a lower mean score compared to

12   international benchmarking data by Sexton et al. (2006) (62.80 versus 65.90), other

13   international studies,(15, 21, 22) and the local research by Samsuri et al. (2015). The

14   stress recognition dimension is defined as an acknowledgement of how stressors

15   influence performance; a lower score means that the surveyed staff members have

16   relatively low recognition of the performance consequences of stress and fatigue. This

17   sense of invulnerability can also be observed in several other professions such as in

18   the aviation industry, and appears to be more prevalent in healthcare settings.(25, 26)

19   Our results showing that medical workers do not fully understand the impact of stress

20   and exhaustion mirror the findings of others,(17, 27) as they are too accustomed to

21   busy work schedules and heavy workloads. Therefore, staff members should admit

22   that stress, high workload, and sleep deprivation are among the causes of reduced job

23   performance and increased risk of medical errors.

24   Although higher than the international benchmarking scores, the mean score of the

25   working condition dimension reported in our study was the lowest among the six

26   dimensions examined. This finding is similar to that of some studies.(8, 12, 21, 25)

27   The mean score and positive response rate were lowest in the NLH, compared to the

28   LH. This finding reflects employees' frustration with work environment quality and

29   logistic support such as staffing and equipment. Further analysis of the items under

30   this dimension revealed that most respondents from both the LH and NLH disagreed

31   with the statement "the level of staffing in this clinical area is sufficient to handle the

32   number of patients." This finding is expected from respondents in the LH, which is a

33   state tertiary hospital with a high workload. However, the NLH respondents also

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1   indicated insufficient levels of staffing at their hospitals. This observation may be

2   because although the NLH is a non-specialist district hospital, the workload has risen

3   following the extension of specialist services to the NLH after the cluster hospital

4   model was introduced; however, the number of staff remained the same. Lack of staff,

5   increased patient volume, expansion of clinical services, and higher expectations from

6   other healthcare professionals may have contributed to the increased workload, which

7   could jeopardize patient safety.

8   The job satisfaction dimension had the highest positive response rate among all

9   dimensions in the SAQ, despite most staff being dissatisfied with their working

10 conditions. Our finding is congruent with that of local studies conducted at a teaching

11 hospital and at public hospitals.(10, 12) Here, 67.0% of the respondents had a positive

12 response (score > 75%) for this dimension, which is higher than that reported in local

13 studies (8, 10) as well as international benchmarking data,(15) wherein the positive

14 response rate was 46.2–62.7%. Our finding is also consistent with other previous

15 studies.(17, 22) Job satisfaction positivity indicates that most of the cluster hospital

16 staff, especially the NLH staff, are relatively pleased with their jobs and that they

17 have positive work experiences. This finding is based on the high percentage of

18 participants who answered positively for the item "I like my job" (82.6%), the highest

19 scored item in the SAQ. The value of job satisfaction cannot be overlooked because it

20 is imperative that it increases workers' enthusiasm and enhances work efficiency and

21 quality, indirectly improving patient safety. Those with higher job satisfaction would

22 more likely be actively involved in accepting and implementing future quality-

23 enhancement strategies.

24   Our study also reveals that teamwork climate and safety climate had the second

25 highest mean scores after the job satisfaction dimension, with 37.1% and 36.2%

26 positive responses, respectively, which is similar to other studies.(8, 15, 27, 28) Two

27 items scored lowest under these dimensions: The respondents perceived difficulty in

28 reporting problems with patient care, and it was also difficult to discuss errors in their

29 clinical area, indicating that the existing culture in that area was unreliable and

30 discouraging toward a patient safety culture and incident reporting. Experts state that

31 the influence of teamwork should not be underestimated.(29) Many studies have

32 shown that teamwork can dramatically enhance patient outcomes and reduce

33 preventable errors.(30, 31) In the current dynamic medical climate, healthcare

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1 professionals have recognized the value of knowledge and complementary skills.

2 However, mutual confidence and two-way communication capabilities between team

3 members should be strengthened. A survey also concluded that the principal

4 characteristics of a safety culture are teamwork within the unit and honest and open

5 communication among healthcare professionals and with patients.(32) Thus,

6 improvements should be made to encourage staff to communicate, particularly when

7 patient care and safety are concerned.

8 The predictive factors identified as significantly associated with positive patient-

9 safety culture are similar for most studies. Those working in surgery- and medical-

10 based departments were more likely to have a positive patient-safety culture, relative

11 to other categories. The findings may be linked to their working environment, which

12 may cause them to perceive safety issues differently. Other departments may not

13 consider some of these issues as relevant.(20) Those in surgery-based departments

14 deal with surgical procedures; thus, they are more susceptible to patient safety

15 concerns, as they could face medicolegal implications for an error or incident such as

16 incorrect surgery and retained foreign bodies such as gauze.

17 Patient safety-related training and education were identified as other important

18 factors in achieving improved patient safety.(33) This finding is congruent with a

19 study conducted in Kuwait, which found that the perception of patient safety culture

20 decreased among those who did not attend patient safety courses or lectures.(20, 34)

21 Further, healthcare professionals who did not receive any information about patient

22 safety, either during their initial professional education or throughout their

23 professions, had more negative attitudes to most of the dimensions of patient safety,

24 compared to those who had received the information. A study that examined the effect

25 of training on nurses' attitudes towards patient safety found that training had a

26 significant positive impact on nurses' safety attitudes, particularly on the perception

27 of management, job satisfaction, and safety climate dimensions.(35) Our finding is

28 also in line with that of other studies.(36, 37)

29 Consequently, we may conclude that patient safety education is vital in healthcare

30 professionals' patient safety attitudes. Organizational learning and continuous

31 development such as staff training are reported as strengths due to the capacity of

32 healthcare organizations to create a knowledge-enhancing environment for learning.

33 Realizing the importance of training, the MOH Patient Safety Unit has incorporated a

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1 patient safety-training module for house officers during their orientation programs

2 before they begin their graduate training. The course, which is inspired by the WHO

3 Multi-professional Curriculum Guide, is intended to provide house officers with

4 relevant exposure and information to enhance patient safety. For the other healthcare

5 professional categories, our cluster hospital has developed an initiative to conduct

6 multiple courses regularly to ensure continuous awareness and updated patient safety

7 knowledge.

8 Incident reporting, root causes, and risk analyses were also identified as the most

9 critical factors for achieving positive patient safety culture. Our study shows a

10 significant association between the incident reporting system and positive patient

11 safety culture. The association between a non-punitive reporting system and patient

12 safety culture is in line with most studies on patient safety factors.(33, 36-40) Most

13 studies also mention a lower response toward non-punitive responses to error.(34, 39,

14 41) Such findings indicate that a blame-and-shame culture in the workplace hinders

15 accountability and causes workers to feel insecure and become prone to hiding their

16 shortcomings, rather than sharing their concerns related to patient safety. Working in

17 such an atmosphere would hinder learning from mistakes; individuals would only be

18 criticized and punished, while system errors are overlooked.

19 Another study conducted in Beijing found that effective safety culture had not been

20 achieved, as the incidents reported did not receive useful feedback, and openly

21 discussing errors and incidents in the department was not encouraged.(17) This

22 situation is similar to that of our study, in which 36.0% of respondents agreed that

23 discussing errors in their clinical areas was challenging. However, most of our

24 respondents agreed that they learned from the incidents reported. This was achieved

25 by ensuring that staff members were informed about the incidents or errors and

26 advised on the changes implemented. The practices and guidelines for preventing

27 errors were also reviewed appropriately. Health care organizations should use incident

28 reporting to strengthen patient safety culture and improve service quality. This can

29 transform an organization's existing blame culture, from one where an error is viewed

30 as a personal failure to one where errors are considered potential areas for

31 improvement.

32 It is noteworthy that the multivariate analysis model developed in the present study

33 only explained 11.4% of the variance in the positive patient safety culture

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1   (Nagelkerke R^2 = 0.114, p < 0.001). Our finding is similar to that of Alqattan et al.

2   (2018), but the variance is lower than that of other studies.(37, 42) Perhaps the R^2

3   could have been increased if we had included more predicted variables in this study.

4   Several factors in previous studies with high R^2 are worth considering for inclusion in

5   our study. The most common factor is the number of events reported by the

6   respondents.(8, 39, 41, 42) The details regarding the implementation of an incident

7   reporting system are also crucial.(24, 37, 42, 43) It is also beneficial to obtain input on

8   whether staff are exposed to information on patient safety during their initial

9   education.(20)

10   **LIMITATIONS**

11   Few limitations were noted in this study. First, our study's data were only collected

12   from a cluster hospital; our state has two other cluster hospitals located in the central

13   and southern regions of Kedah. However, we consider that our study's findings

14   provide a reasonably representative view of the patient safety culture that can be

15   expected in the other two cluster hospitals in Kedah, as their settings were identical to

16   those in our cluster. Another drawback is that we did not explore the connection

17   between patient safety culture and the number of events reported by respondents and

18   the patient outcome. Further research is required to identify the complicated

19   relationship between patient safety-culture and incident reporting system, the number

20   of reporting, patient outcome, and how the data produced can be translated into action

21   and learning points. The findings are crucial and can guide us in interventions and

22   improvements to create a safe healthcare system and reduce adverse medical

23   outcomes.

24   The use of a questionnaire to evaluate safety culture or a particular safety

25   environment plays an essential role in planning the evaluation of an institution's safety

26   culture. Although a useful tool, SAQ has its limitation; it assesses staff's beliefs

27   regarding the safety culture, rather than their real safety behavior.(28) Notably, SAQ

28   tests the current attitude regarding patient safety; however, there may be differences

29   between attitudes and actual practice. Therefore, to explore the dimensions that

30   influence patient safety in more detail, SAQ should be combined with qualitative

31   methods such as peer observation, group discussions, analysis of organization's

32   incident history, and audits of the safety management system.(25, 34, 44) A wide gap

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1 in research remains regarding how data obtained from different methods are related

2 and how to combine them to get a complete safety culture view. Despite these

3 limitations, we believe this research offers useful insight into our organizations'

4 baseline patient safety culture.

5 **CONCLUSIONS**

6 Overall, only a minority of the healthcare professionals at our cluster hospital have a

7 positive patient-safety culture (SAQ score ≥ 75%), which is far below the

8 international benchmarking standard. Attention should be paid to most of the safety

9 culture dimensions: working condition, perception of management, safety climate,

10 teamwork climate, and stress recognition. Although the mean scores of the

11 dimensions were mostly higher than the international standards, no dimension reached

12 the 75% minimum score to be recognized as an area of strength. The significant

13 findings include employees' frustration with work environment quality and logistics,

14 particularly staffing levels in the clinical area. There is also much room for

15 improvement in communication regarding patient safety issues and errors, indicating

16 that the organization's existing culture is not reliable and encouraging toward patient

17 safety culture and incident reporting. Staff were also overly accustomed to busy work

18 schedules and heavy workloads; thus, they did not recognize the impact of stress on

19 their work performance and patient safety. Staff members should admit that stress,

20 high workload, and sleep deprivation are among the causes of reduced job

21 performance and increased risk of medical errors. Despite that, most respondents

22 expressed satisfaction with their job; this presents an opportunity, as those with higher

23 job satisfaction are more likely to be actively involved in accepting and implementing

24 future quality-enhancement strategies.

25   Meanwhile, management commitment towards patient safety-improvement

26 activities is vital in nurturing healthcare professionals' positive culture. Patient safety

27 training and the incident reporting system are two critical factors that should be

28 emphasized to improve patient safety culture. Organizations should consider and

29 implement a non-punitive and instructive incident reporting system as an instrument

30 that can strengthen the patient safety culture.

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1   **Contributorship statement:** Aniza Ismail and Siti Norhani Mazrah Khalid led the

2   conceptualization and design of the study, Siti Norhani Mazrah Khalid conducted data

3   collection, analysed the data and drafted the manuscript. Aniza Ismail provided

4   intellectual input, supervised and revised the manuscript.

5   **Competing interest:** None declared.

6   **Funding:** No funding was received for the conduct of this study.

7   **Ethics approval:** This study has received approval from the Research Ethics

8   Committee, Universiti Kebangsaan Malaysia, Medical Research Etiquette Committee

9   (MREC), Ministry of Health (NMRR-19-2366-50240), and the Head of Cluster of

10   Hospital Kluster Kedah Utara.

11   **Data sharing statement:** No additional data are available.

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STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	*6*
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	8
		(*c*) Explain how missing data were addressed	8
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	8
		(*e*) Describe any sensitivity analyses	8
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	8
		(b) Give reasons for non-participation at each stage	-
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8-9
		(b) Indicate number of participants with missing data for each variable of interest	8-9
Outcome data	15*	Report numbers of outcome events or summary measures	9
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-13

		(*b*) Report category boundaries when continuous variables were categorized	-	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10-13	

Discussion

Key results	18	Summarise key results with reference to study objectives	14-20	
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	21	
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14-20	
Generalisability	21	Discuss the generalisability (external validity) of the study results	14-20	

Other information

Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	-	

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Patient Safety Culture and its Determinant among Healthcare Professionals at a Cluster Hospital in Malaysia: a cross-sectional study

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1 **Title of Manuscript: Patient Safety Culture and its Determinant among**
2 **Healthcare Professionals at a Cluster Hospital in Malaysia: A Cross-sectional**
3 **Study**

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9 **Keywords:** Patient safety, safety culture, healthcare quality improvement, attitudes
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1   **Manuscript Type: Original Article**

2   **Title of Manuscript: Patient Safety Culture and its Determinants among**
3   **Healthcare Professionals at a Malaysian Cluster Hospital: A Cross-sectional**
4   **Study**

5

6   <u>**Abstract:**</u>

7   **Objective:**

8   To assess the baseline level and mean score of every domain of patient-safety culture

9   among healthcare professionals at a cluster hospital and identify the determinants

10   associated with patient-safety culture.

11   **Methods:**

12   This cross-sectional study was conducted at a cluster hospital comprising one state

13   and two district hospitals in Malaysia. The safety culture was assessed using the

14   Safety Attitude Questionnaire (SAQ), which is a validated questionnaire. Using

15   proportionate stratified random sampling, 1814 respondents were recruited, and we

16   used the independent t-test, Pearson chi-square test, and multiple logistic regression

17   analysis for data assessment.

18   **Results:**

19   Only 23.9% of the respondents had positive patient-safety culture levels (SAQ score $\geq$

20   75%); the overall mean score was 67.82 ± 10.53. The job satisfaction dimension had

21   the highest percentage of positive responses (67.0%), with a mean score of $76.54 \pm$

22   17.77. The factors associated with positive patient-safety culture were age (odds ratio

23   (OR) 1.03, $p < 0.001$), gender (OR 1.67, $p = 0.001$), education level (OR 2.51, $p <$

24   0.001), work station (OR 2.02, $p < 0.001$), participation in patient safety training (OR

25   1.64, $p = 0.007$), good perception of the incident reporting system (OR 1.71, $p =$

26   0.038), and a non-blaming (OR 1.36, $p = 0.013$) and instructive (OR 3.31, $p = 0.007$)

27   incident reporting system.

Conclusions:

Healthcare professionals at the cluster hospital showed unsatisfactory patient-safety culture levels. Most of the respondents appreciated their jobs, despite experiencing dissatisfaction with their working conditions. The priority for changes should involve systematic interventions to focus on patient safety training, address the blame culture, improve communication, exchange information about errors, and improve working conditions.

Keywords: Patient safety, safety culture, healthcare quality improvement, attitudes

Strengths and limitations of this study:

- This study reports the outcomes of patient safety culture in cluster hospitals in Malaysia.
- The study has a good response rate.
- The study covers both types of hospitals in Malaysia (specialist and non-specialist hospital).
- The respondents were from various categories of healthcare professionals.
- A combination of SAQ with qualitative methods such as peer observation, group discussions, analysis of the incident history of the organization, and audits of the safety management system is recommended to explore the main dimensions that influence patient safety culture.

BACKGROUND

The healthcare system is extremely complex, wherein healthcare delivery is founded on patient safety. Patient safety entails avoiding preventable harm to patients during the health care process and reducing the risk of unnecessary injury associated with

3

1 health care to an acceptable minimum. The World Health Organization (WHO)

2 reports that approximately 1 in 10 patients are harmed while receiving health care,

3 and approximately 43 million patient safety incidents occur annually.(1) Little can be

4 accomplished if a patient feels, or is, unsafe when receiving medical treatment at

5 healthcare facilities.(2) Thus, ensuring patient safety requires tremendous efforts from

6 every member of a healthcare team.

7 The patient safety movement hit a milestone after the Institute of Medicine

8 (IOM).(3) Since then, patient safety has been at the forefront of health care. In

9 Malaysia, for example, the Ministry of Health (MOH) formed the Patient Safety

10 Council of Malaysia in January 2003 to ensure that people receive safe health care.

11 Malaysia Patient Safety Goals were then introduced on June 24, 2013, outlining 13

12 essential areas in patient safety, with specific goals and targets. Since then, multiple

13 programs and efforts have been organized at both national and state levels to improve

14 the awareness of healthcare staff regarding patient safety.

15 In the interest of patient safety, numerous studies have examined the causes of

16 medical malpractices. Over the years, health care organizations' approaches to errors

17 have shifted from person-centered to system-centered. The system-centered approach

18 focuses on working conditions, rather than individual mistakes.(4) Further, the WHO

19 Patient Safety Methods and Measures Working Group identified the need to

20 understand a range of human factors such as managerial, team, and individual

21 characteristics that influence healthcare staff behavior concerning patient safety. A

22 WHO report identified safety culture as one of the 10 key human factors relevant to

23 patient safety.(5) Safety culture is defined as "the product of individual and group

24 values, attitudes, perceptions, competencies, and patterns of behaviour that determine

25 the commitment to, and the style and proficiency of an organisation's health and

26 safety management. Organisations with a positive safety culture are characterised by

27 communications founded on mutual trust, by shared perceptions of the importance of

28 safety and by confidence in the efficacy of preventive measures". (6) It influences the

29 typical behaviors of workers in a particular ward or unit and determines the accepted

30 practices within an organization. Thus, evaluating the safety attitude and

31 understanding the components and influencers of safety culture is important to

32 develop strategies for creating a culture committed to providing patients with the

33 safest possible care. Furthermore, reported patient-safety-related incidents have

4

1   increased over the years. In Malaysia, patient-safety-related incidents such as

2   medication errors, transfusion errors, and patient falls have increased since 2014.(7)

3   An outpatient geriatric pharmacy reported 20 cases of medication errors daily, costing

4   approximately RM111 924 per year. This increasing trend in medical malpractices

5   raises concern, as it indicates that our healthcare facilities may not be safe for patients.

6   It also has the potential to lead to medico-legal repercussions, which would tarnish the

7   reputation of the Ministry of Health Malaysia and create a financial burden on the

8   patients and the ministry.

9   Nevertheless, there remains a lack of published investigations of the level of

10   patient safety culture among healthcare professionals in Malaysia. Few studies were

11   conducted to assess the perception of different categories of healthcare professionals

12   in Malaysia, using different instruments and at a different setting (8-12). However, no

13   study to date has assessed the patient safety culture in a cluster hospital setting in

14   Malaysia. Therefore, it is crucial to evaluate the safety culture level among healthcare

15   professionals and identify the associated factors.

16   The present study was conducted at a cluster hospital in the state of Kedah,

17   Malaysia. A cluster hospital is defined as a group of hospitals in the same

18   geographical location within a state that collaborate and operate as one organization;

19   it is an MOH Malaysia initiative aimed at transforming healthcare service delivery in

20   the country. Additionally, it has been recognized as a Government Transformation

21   Program, a high-impact initiative by the Public Service Department, and one of the

22   top 10 priorities of the MOH Plan of Action (2016–2020). The objective of the cluster

23   hospital is to optimize resource utilization. The hospitals collaborate and have an

24   aligned flow of patients and services. A typical cluster hospital consists of a lead

25   hospital (LH), which is usually a state hospital or major specialist hospital. Non-LHs

26   (NLH) are typically the district non-specialist hospitals that provide specialist services

27   based on the cluster hospital concept.

28   Thus, this study's main objective was to assess the baseline level and mean score

29   of every domain of patient-safety culture among healthcare professionals at a cluster

30   hospital and identify the determinants associated with patient-safety culture.

5

1 **METHODS**

2 **Study design and sampling**

3 This cross-sectional study was conducted at a cluster hospital consisting of a state

4 hospital and two district hospitals in Malaysia. As all three hospitals are public

5 hospitals, they implement similar patient-safety practices and policies. Data were

6 collected from December 2019 to February 2020. All doctors, pharmacists, nurses,

7 and assistant medical officers (AMO) who were involved directly with patient care

8 processes and who had been working at the hospitals for at least four weeks were

9 included in the study. Those who worked in management and who were on a long

10 leave were excluded from the study. Each hospital is detailed in Table 1.

11 Table 1: Characteristic of LH and NLH

Parameter	LH	NLH1	NLH2
Type of hospital	State, specialist hospital	District, non-specialist hospital	District, non-specialist hospital
Number of beds	1108	91	80
Number of healthcare professionals	2799	184	159

12 LH – Lead hospital
13 NLH1 – Non lead hospital 1
14 NLH2 – Non lead hospital 2
15

16 The samples were selected through proportionate stratified random sampling to

17 ensure that, throughout the population, the sample size selected from each subgroup

18 was proportional to the size of that subgroup. The same sampling method was used to

19 determine how many representatives from each professional category would be

20 selected. The sample size required, which was calculated using StatCalc Epi Info 7.2,

21 was 778, at 95% confidence interval (CI) and with 80% power. However, considering

22 a dropout rate of 20%, the final sample size required was 934.

23 **Measures**

24 One of the ubiquitously used tools for measuring patient-safety culture in healthcare is

25 the Safety Attitude Questionnaire (SAQ), which has been adapted for various clinical

26 settings such as intensive care units, general inpatient settings, emergency services,

27 operation theatres, and pharmacies. Here, we used both English and Malay versions of

28 the SAQ. The Malay version has been validated in the Malaysian healthcare

29 setting,(8) with good construct validity and internal consistency.(13)

6

1 The SAQ comprises 36 items for assessing six safety culture domains: teamwork

2 climate (items 1–6), safety climate (items 7–13), job satisfaction (items 15–19), stress

3 recognition (items 20–23), perceptions of management (items 24–28), and working

4 conditions (items 29–32). Items 14 and 33–36 are not among the abovementioned

5 scales. All items are closed-ended questions, and respondents are required to indicate

6 their agreement level on a 5-point Likert scale ranging from 1 (disagree strongly) to 5

7 (agree strongly). The respondents' demographic information such as age, gender,

8 race, profession, education level, current working hospital and unit, length of service,

9 and working hours per week were obtained as well. Information on patient safety

10 training and the incident reporting system in the organization was also added to the

11 questionnaire to assess the factors affecting patient-safety culture levels among

12 healthcare professionals. The questionnaire was distributed physically to the

13 respondents during respondents continues medical education (CME) session. One of

14 the researchers worked in one of the hospitals and was in charge of the other two

15 hospitals.

16 Data were analyzed using SPSS 21, and the respondents' demographic

17 characteristics and patient-safety culture level were determined using univariate

18 analysis. Before the analysis, three negatively worded items (items 2, 11, and 36) in

19 the SAQ were reversed. Each item's score was calculated by converting the 5-point

20 Likert scale into a 100-point scale: 1 = 0, 2 = 25, 3 = 50, 4 = 75, and 5 = 100. Each

21 item's score within the same dimension was summed and divided by the number of

22 items available for that dimension to obtain a score of 0–100. If a respondent's mean

23 score was ≥75, they had a positive safety culture for a given dimension. The

24 respondent's overall score for the patient-safety culture level was calculated using the

25 same method.

26 The differences between two independent groups of normally distributed numerical

27 data were analyzed using an independent t-test and the association between two sets

28 of categorical data was examined using Pearson's chi-square test for independence.

29 Multiple logistic regression was used to examine the association between risk factors

30 and two outcome categories. All probability values were 2-sided, and a level of

31 significance of <0.05 (p < 0.05) was considered as statistically significant. Finally, the

32 model fitness was tested using the Hosmer-Lemeshow test and classification table.

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1 **Ethical issues/statement**

2 This study received ethics approval from the Universiti Kebangsaan Malaysia (UKM)

3 Ethics Committee and the MOH Medical Research Etiquette Committee (MREC).

4 Respondents were informed about the background and aim of the study and the

5 confidentiality of the data submitted in the questionnaire, and their consent was

6 obtained prior to answering the questionnaire.

7

8 **Patient and Public Involvement**

9 Patients or the public were not involved in the design, or conduct, or reporting, or

10 dissemination plans of our research.

11 **RESULTS**

12 After 2000 questionnaires were distributed to the healthcare professionals who met

13 the inclusion criteria, 1814 completed questionnaires were returned, resulting in an

14 overall response rate of 90.7%.

15 **Descriptive analysis**

16 Demographic Characteristics

17 Table 2 shows the respondents' general demographic characteristics. Most

18 respondents were female and Malay, with a mean age of 34.29 years. The majority

19 were from the non-doctor group, diploma holders and had been working at their

20 current departments or units for approximately five years. Most respondents (95.6%)

21 agreed that patient safety training was available at their organization, and 81% had

22 attended such programs at least once. More than half the respondents felt that the

23 incident reporting system was punitive.

24
25

Table 2: Respondents 'characteristics and patient safety activities

Demographic characteristics	Overall	
	(n=1800)	%
Age; mean (SD), median	34.29 (7.223), 33.00	
Gender		
Male	373	20.7
Female	1427	79.3
Race		
Malay	1567	87.1
Non-Malay	233	12.9
Profession		
Doctor	479	26.6
Non-doctors	1321	73.4
Education level		
Diploma	1189	66.1

8

	N	%
Degree and above	611	33.9
Current working hospital		
Lead Hospital	1532	85.1
Non-Lead Hospital	268	14.9
Location of work/ department		
Medical based	549	30.5
Surgical based	589	32.7
Others	662	36.8
Length of service; mean (SD), median	63.65 (61.266), 48.00	
Working hours per week		
≤ 48 hours	1258	69.9
> 48 hours	542	30.1
Availability of training on patient safety		
Yes	1720	95.6
No	80	4.4
Participation in patient safety program or training		
Yes	1458	81
No	342	19
The overall perception of the incident reporting system		
Good	1619	89.9
Poor	181	10.1
The incident reporting system is punitive		
Yes	1128	62.7
No	672	37.3
Learned something from the incidence reported (Instructive incident reporting system)		
Yes	1707	94.8
No	93	5.2
Will report patient safety incidents to the higher authority		
Yes	1750	97.2
No	50	2.8

1 N= frequency, %= percentage

2 Patient Safety Culture Score

3 The patient-safety culture scores among the respondents are shown in Table 3.
4 Overall, less than a quarter of the respondents (23.9%) had a positive patient-safety
5 culture. Notably, more than half the respondents had a negative attitude for most of
6 the dimensions tested, except for job satisfaction. NLH respondents had a higher
7 percentage of positive responses for the overall patient safety culture, compared to LH
8 respondents.

9 Table 3: Patient safety culture levels among healthcare professionals

Patient Safety Culture Score by domain	Overall		LH		NLH	
	(n=1800)	**%**	**(n=1532)**	**%**	**(n=268)**	**%**
Teamwork Climate						
Negative	1133	62.9	975	63.6	158	59.0
Positive	667	37.1	557	36.4	110	41.0
Safety Climate						
Negative	1149	63.8	1000	65.3	149	55.6
Positive	651	36.2	532	34.7	119	44.4
Job Satisfaction						

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Negative	594	33.0	518	33.8	76	28.4
Positive	1206	67.0	1014	66.2	192	71.6
Stress Recognition						
Negative	1049	58.3	864	56.4	185	69.0
Positive	751	41.7	668	43.6	83	31.0
Perceptions of Management						
Negative	1279	71.1	1099	71.7	180	67.2
Positive	521	28.9	433	28.3	88	32.8
Working Conditions						
Negative	1389	77.2	1165	76.0	224	83.6
Positive	411	22.8	367	24.0	44	16.4
Overall Safety Culture						
Negative	1370	76.1	1179	77.0	191	71.3
Positive	430	23.9	353	23.0	77	28.7

N= frequency, %= percentage
LH – Lead hospital
NLH – Non lead hospital

The mean scores for each patient-safety culture dimension are presented in Table 4. The cluster hospital's overall mean score was 67.82, and the LH and NLH had comparable mean scores. The job satisfaction dimension had the highest mean score (76.54), followed by safety climate (69.36), teamwork climate (69.18), perception of management (64.87), stress recognition (62.80), and working condition (62.27). The NLH had higher mean scores than the LH for most dimensions, except stress recognition and working condition.

Table 4: Mean scores of patient safety culture by dimension

Patient Safety Culture Domains	Overall		LH		NLH	
	Mean (SD)	Positive response (≥75) (%)	Mean (SD)	Positive response (≥75) (%)	Mean (SD)	Positive response (≥75) (%)
Teamwork climate	69.18 (12.83)	37.1	69.03 (12.84)	36.4	70.08 (12.75)	41.0
Safety climate	69.36 (12.55)	36.2	69.03 (12.42)	34.7	71.25 (13.17)	44.4
Job satisfaction	76.54 (17.77)	67.0	76.27 (17.90)	66.2	78.10 (16.96)	71.6
Stress recognition	62.80 (24.68)	41.7	63.70 (24.41)	43.6	57.65 (25.58)	31.0
Perception of management	64.87 (16.24)	28.9	64.68 (16.26)	28.3	65.93 (16.13)	32.8
Working condition	62.27 (12.64)	22.8	62.57 (12.73)	24.0	60.56 (11.97)	16.4
Overall safety culture	67.82 (10.53)	23.9	67.80 (10.53)	23.0	67.90 (10.54)	28.7

10

1 **Bivariate Analysis**

2 Table 5 shows the result of the analysis to determine the associated factors for the

3 patient safety culture among healthcare professionals in a cluster hospital. Overall, a

4 significant association was noted between patient safety culture level and race (p =

5 0.004), profession (p < 0.05), education level (p < 0.001), current working hospital (p

6 = 0.044), current department or unit (p < 0.001), and working hours per week (p =

7 0.0001). There was also a significant association between patient safety culture score

8 and patient safety-related questions.

9

10 Table 5: Factors associated with patient safety culture

11

Variable	Patient safety culture		
	Negative n (%)	Positive n (%)	*p*-value
Age: Median (IQR)	32.00 (10.0)	35.00 (11.0)	< 0.05
Gender			
Male	281 (75.3)	92 (24.7)	0.693
Female	1089 (76.3)	338 (23.7)	
Race			
Malay	1175 (75.0)	392 (25.0)	0.004
Non-Malay	195 (83.7)	38 (16.3)	
Profession			
Doctor	405 (84.6)	74 (15.4)	< 0.05
Non-doctors	965 (73.1)	356 (26.9)	
Education level			
Diploma	843 (70.9)	346 (29.1)	< 0.001
Degree and above	527 (86.3)	84 (13.7)	
Current working hospital			
LH	1179 (77.0)	353 (23.0)	0.044
NLH	191 (71.3)	77 (28.7)	
Location of work/ department			
Medical	406 (74.0)	143 (26.0)	< 0.001
Surgical	411 (69.8)	178 (30.2)	
Others	553 (83.5)	109 (16.5)	
Length of service; Median (IQR)	48.00 (85.0)	50.50 (91.0)	0.069
Working hours per week			
≤ 48 hours	926 (73.6)	332 (26.4)	0.0001
> 48 hours	444 (81.9)	98 (18.1)	
Availability of training on patient safety			
Yes	1296 (75.3)	424 (24.7)	0.0004
No	74 (92.5)	6 (7.5)	
Participation in patient safety program or training			
Yes	1074 (73.7)	384 (26.3)	< 0.05
No	296 (86.5)	46 (13.5)	

11

The overall perception of the incident reporting system			
Good	1209 (74.7)	410 (25.3)	< 0.05
Poor	161 (89.0)	20 (11.0)	
The incident reporting system is punitive			
Yes	862 (76.4)	266 (23.6)	0.692
No	508 (75.6)	164 (24.4)	
Learned something from the incidence reported (Instructive incident reporting system)			
Yes	1283 (75.2)	424 (24.8)	0.0001
No	87 (93.5)	6 (6.5)	
Will report patient safety incidents to the higher authority			
Yes	1325 (75.7)	425 (24.3)	0.019
No	45 (90.0)	5 (10.0)	

1   **Multivariate analysis**

2   Multiple logistic regression was conducted to identify a model of the predictive

3   factors associated with a positive patient-safety culture (Table 6). The factors included

4   in the model and that were significantly associated with positive patient-safety culture

5   were age, gender, education level, working department/unit, participation in patient

6   safety training, good perception of incident reporting and learning systems, and non-

7   blaming and instructive incident reporting systems in the organization. The model

8   fitness was tested using the Hosmer-Lemeshow test ($p = 0.788$) and the classification

9   table (76.5%). Nagelkerke's R^2 showed that this logistic model explained 11.4% of

10 the variation in the outcome variable.

11
12   Table 6: Multiple logistic regression
13

Variable	Overall safety culture			
	Wald	**Adj. OR**	**(95% CI)**	***p*-value**
Age; median (IQR)	13.046	1.03	(1.02, 1.05)	< 0.001
Gender				0.001
Male	11.896	1.67	(1.25, 2.24)	
Female		1.00		
Education level				< 0.001
Diploma	35.547	2.51	(1.85, 3.34)	
Degree and above		1.00		
Location of work/ department				< 0.001
Medical based	7.136	1.49	(1.11, 2.00)	
Surgical based	23.059	2.02	(1.51, 2.68)	
Others		1.00		

12

Participation in patient safety program or training				0.007
Yes	7.321	1.64	(1.15, 2.34)	
No		1.00		
The overall perception of the incident reporting system				0.038
Good	4.303	1.71	(1.03, 2.83)	
Poor		1.00		
The incident reporting system is punitive				0.013
Yes		1.00		
No	6.107	1.36	(1.07, 1.73)	
Learned something from the incidence reported (Instructive incident reporting system)				0.007
Yes	7.405	3.31	(1.40, 7.85)	
No		1.00		

DISCUSSION

The response rate of the present study is 90.7%; thus, it is considered good and positive compared with that of previous local studies that used the same instrument, which was 58.0–83%.(8, 11, 12, 14) Further, other local studies have used tools other than the SAQ, and recorded lower response rates (i.e. 78–81%), compared to that of the present study.(15, 16) Furthermore, the response rate in our study was higher compared to international benchmarking data in the US, UK, and New Zealand, which was 65.7–72.2%,(17) and other studies conducted across the world.(18-21) The greater response rate in our study may be potentially because this is the first study on patient safety conducted in our cluster hospital community; therefore, most departments were interested in participating. The high response rate could also be an obvious indication of employee commitment and dedication to quality issues, all of which signify responsible conduct. Further, the administered questionnaire has positive features, which makes it more user-friendly, compared to other tools. Among those features are self-administered questionnaires with clear terms and limited number of items that only require a short time for respondents to complete.

At our cluster hospital, the respondents lacked a patient safety culture, far below the international benchmarking standard, which is appropriately 60%,(17) and that of other previous international studies.(18, 22-26) However, compared to previous local studies, we recorded a higher percentage of positive responses than Sarifulnizam et al. (2019) and comparable responses to Samsuri et al. (2015). We noted that the NLH

13

1   had a greater proportion of respondents with a positive patient-safety culture. This

2   finding correlates with Samsuri et al. (2015), who found that respondents in smaller

3   institutions had a more positive safety culture than those working in hospitals. Other

4   studies have also stated that smaller institutions tend to have a better safety culture

5   compared to large institutions.(27) The reason could be that small institutions, such as

6   NLH, have more similar environments and smaller work communities, whereby

7   workers are more likely to hold and share the same climate. Only the job satisfaction

8   dimension had a high percentage of positive responses (>60%), similar to other

9   previous local studies.(11, 12) The other five dimensions showed low positive

10 responses, between 22% and 41%.

11   In the present study, the overall mean score was slightly higher than that of a study

12 conducted among pharmacists in Melaka (67.82 versus 65.6). Five out of six

13 dimensions had higher mean scores compared to those recorded by Samsuri et al.

14 (2015); in increasing score order, they were working condition (62.27 versus 54.8),

15 perception of management (64.87 versus 62.20), teamwork climate (69.18 versus

16 67.6), safety climate (69.36 versus 66.8), and job satisfaction (76.54 versus 67.3).

17 Compared with international benchmarking data, safety climate, job satisfaction,

18 perception of management, and working condition dimensions had higher mean

19 scores, while the teamwork climate mean score was comparable to the benchmarking

20 data.(17)

21   In the study, the stress recognition dimension had a lower mean score compared to

22 international benchmarking data by Sexton et al. (2006) (62.80 versus 65.90), other

23 international studies,(17, 23, 24) and the local research by Samsuri et al. (2015). The

24 stress recognition dimension is defined as an acknowledgement of how stressors

25 influence performance; a lower score means that the surveyed staff members have

26 relatively low recognition of the performance consequences of stress and fatigue. This

27 sense of invulnerability can also be observed in several other professions such as in

28 the aviation industry, and appears to be more prevalent in healthcare settings.(28, 29)

29 Our results showing that medical workers do not fully understand the impact of stress

30 and exhaustion mirror the findings of others,(10, 19) as they are too accustomed to

31 busy work schedules and heavy workloads. Therefore, staff members should admit

32 that stress, high workload, and sleep deprivation are among the causes of reduced job

33 performance and increased risk of medical malpractices.

14

1   Although higher than the international benchmarking scores, the mean score of the

2   working condition dimension reported in our study was the lowest among the six

3   dimensions examined. This finding is similar to that of some studies.(8, 12, 23, 28)

4   The mean score and positive response rate were lowest in the NLH, compared to the

5   LH. This finding reflects employees' frustration with work environment quality and

6   logistic support such as staffing and equipment. Further analysis of the items under

7   this dimension revealed that most respondents from both the LH and NLH disagreed

8   with the statement "the level of staffing in this clinical area is sufficient to handle the

9   number of patients." This finding is expected from respondents in the LH, which is a

10   state tertiary hospital with a high workload. However, the NLH respondents also

11   indicated insufficient levels of staffing at their hospitals. This observation may be

12   because although the NLH is a non-specialist district hospital, the workload has risen

13   following the extension of specialist services to the NLH after the cluster hospital

14   model was introduced; however, the number of staff remained the same. Lack of staff,

15   increased patient volume, expansion of clinical services, and higher expectations from

16   other healthcare professionals may have contributed to the increased workload, which

17   could jeopardize patient safety.

18   The job satisfaction dimension had the highest positive response rate among all

19   dimensions in the SAQ, despite most staff being dissatisfied with their working

20   conditions. Our finding is congruent with that of local studies conducted at a teaching

21   hospital and at public hospitals.(11, 12) Here, 67.0% of the respondents had a positive

22   response (score > 75%) for this dimension, which is higher than that reported in local

23   studies (8, 11) as well as international benchmarking data,(17, 30) wherein the

24   positive response rate was 46.2–62.7%. Our finding is also consistent with other

25   previous studies.(19, 24) Job satisfaction positivity indicates that most of the cluster

26   hospital staff, especially the NLH staff, are relatively pleased with their jobs and that

27   they have positive work experiences. This finding is based on the high percentage of

28   participants who answered positively for the item "I like my job" (82.6%), the highest

29   scored item in the SAQ. The value of job satisfaction cannot be overlooked because it

30   is imperative that it increases workers' enthusiasm and enhances work efficiency and

31   quality, indirectly improving patient safety. Those with higher job satisfaction would

32   more likely be actively involved in accepting and implementing future quality-

33   enhancement strategies.

15

1   Our study also reveals that teamwork climate and safety climate had the second

2   highest mean scores after the job satisfaction dimension, with 37.1% and 36.2%

3   positive responses, respectively, which is similar to other studies.(8, 10, 17, 31) Two

4   items scored lowest under these dimensions: The respondents perceived difficulty in

5   reporting problems with patient care, and it was also difficult to discuss errors in their

6   clinical area, indicating that the existing culture in that area was unreliable and

7   discouraging toward a patient safety culture and incident reporting. Experts state that

8   the influence of teamwork should not be underestimated.(32) Many studies have

9   shown that teamwork can dramatically enhance patient outcomes and reduce

10 preventable errors.(33, 34) In the current dynamic medical climate, healthcare

11 professionals have recognized the value of knowledge and complementary skills.

12 However, mutual confidence and two-way communication capabilities between team

13 members should be strengthened. A survey also concluded that the principal

14 characteristics of a safety culture are teamwork within the unit and honest and open

15 communication among healthcare professionals and with patients.(35) Thus,

16 improvements should be made to encourage staff to communicate, particularly when

17 patient care and safety are concerned.

18 The predictive factors identified as significantly associated with positive patient-

19 safety culture are similar for most studies. Those working in surgery- and medical-

20 based departments were more likely to have a positive patient-safety culture, relative

21 to other categories. The findings may be linked to their working environment, which

22 may cause them to perceive safety issues differently. Other departments may not

23 consider some of these issues as relevant.(22) Those in surgery-based departments

24 deal with surgical procedures; thus, they are more susceptible to patient safety

25 concerns, as they could face medicolegal implications for an error or incident such as

26 incorrect surgery and retained foreign bodies such as gauze.

27 Patient safety-related training and education were identified as other important

28 factors in achieving improved patient safety.(36) This finding is congruent with a

29 study conducted in Kuwait, which found that the perception of patient safety culture

30 decreased among those who did not attend patient safety courses or lectures.(22, 37)

31 Further, healthcare professionals who did not receive any information about patient

32 safety, either during their initial professional education or throughout their

33 professions, had more negative attitudes to most of the dimensions of patient safety,

16

1   compared to those who had received the information. A study that examined the effect

2   of training on nurses' attitudes towards patient safety found that training had a

3   significant positive impact on nurses' safety attitudes, particularly on the perception

4   of management, job satisfaction, and safety climate dimensions.(38) Our finding is

5   also in line with that of other studies.(39, 40)

6   Consequently, we may conclude that patient safety education is vital in healthcare

7   professionals' patient safety attitudes. Organizational learning and continuous

8   development such as staff training are reported as strengths due to the capacity of

9   healthcare organizations to create a knowledge-enhancing environment for learning.

10   Realizing the importance of training, the MOH Patient Safety Unit has incorporated a

11   patient safety-training module for house officers during their orientation programs

12   before they begin their graduate training. The course, which is inspired by the WHO

13   Multi-professional Curriculum Guide, is intended to provide house officers with

14   relevant exposure and information to enhance patient safety. For the other healthcare

15   professional categories, our cluster hospital has developed an initiative to conduct

16   multiple courses regularly to ensure continuous awareness and updated patient safety

17   knowledge.

18   Incident reporting, root causes, and risk analyses were also identified as the most

19   critical factors for achieving positive patient safety culture. Our study shows a

20   significant association between the incident reporting system and positive patient

21   safety culture. The association between a non-punitive reporting system and patient

22   safety culture is in line with most studies on patient safety factors.(36, 39-43) Most

23   studies also mention a lower response toward non-punitive responses to error.(37, 42,

24   44) Such findings indicate that a blame-and-shame culture in the workplace hinders

25   accountability and causes workers to feel insecure and become prone to hiding their

26   shortcomings, rather than sharing their concerns related to patient safety. Working in

27   such an atmosphere would hinder learning from mistakes; individuals would only be

28   criticized and punished, while system errors are overlooked.

29   Another study conducted in Beijing found that effective safety culture had not been

30   achieved, as the incidents reported did not receive useful feedback, and openly

31   discussing errors and incidents in the department was not encouraged.(19) This

32   situation is similar to that of our study, in which 36.0% of respondents agreed that

33   discussing errors in their clinical areas was challenging. However, most of our

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respondents agreed that they learned from the incidents reported. This was achieved by ensuring that staff members were informed about the incidents or errors and advised on the changes implemented. The practices and guidelines for preventing errors were also reviewed appropriately. Health care organizations should use incident reporting to strengthen patient safety culture and improve service quality. This can transform an organization's existing blame culture, from one where an error is viewed as a personal failure to one where errors are considered potential areas for improvement.

The coronavirus disease 2019 (COVID-19) pandemic has severely affected the world since 2020, imposing extraordinary burdens and challenges on the medical system and healthcare workers worldwide. Healthcare workers have had to deal with the uncertainties of the diagnosis and management of this unknown emergent disease, unfamiliarity with new job scopes resulting from redeployment and changes in care delivery models, and increased workload, which all contribute to stress. (45) Working in such demanding conditions impairs the capacity of hospital staff to provide safe and effective treatment, magnifies weariness, and contributes to poor patient safety. (46) During this time of crisis, the quality of care for non-COVID patients was also greatly affected, mostly as the consequence of medical staff being redeployed to attend to the rapid surge of COVID-19 cases. A study on the impact of the COVID-19 pandemic on safety culture reported decrease SAQ scores among nurses compared to before pandemic era. (47) Incident reporting, which is one of the important factors in achieving a positive patient safety culture, was also reduced significantly during the COVID-19 pandemic. (47)

It is noteworthy that the multivariate analysis model developed in the present study only explained 11.4% of the variance in the positive patient safety culture (Nagelkerke $R^2 = 0.114$, $p < 0.001$). Our finding is similar to that of Alqattan et al. (2018), but the variance is lower than that of other studies.(40, 48) Perhaps the R^2 could have been increased if we had included more predicted variables in this study. Several factors in previous studies with high R^2 are worth considering for inclusion in our study. The most common factor is the number of events reported by the respondents.(8, 42, 44, 48) The details regarding the implementation of an incident reporting system are also crucial.(27, 40, 48, 49) It is also beneficial to obtain input on

18

1 whether staff are exposed to information on patient safety during their initial
2 education.(22)

3 **LIMITATIONS**

4 Few limitations were noted in this study. First, our study's data were only collected
5 from a cluster hospital; our state has two other cluster hospitals located in the central
6 and southern regions of Kedah. However, we consider that our study's findings
7 provide a reasonably representative view of the patient safety culture that can be
8 expected in the other two cluster hospitals in Kedah, as their settings were identical to
9 those in our cluster. Another drawback is that we did not explore the connection
10 between patient safety culture and the number of events reported by respondents and
11 the patient outcome. Further research is required to identify the complicated
12 relationship between patient safety-culture and incident reporting system, the number
13 of reporting, patient outcome, and how the data produced can be translated into action
14 and learning points. The findings are crucial and can guide us in interventions and
15 improvements to create a safe healthcare system and reduce adverse medical
16 outcomes.

17   The use of a questionnaire to evaluate safety culture or a particular safety
18 environment plays an essential role in planning the evaluation of an institution's safety
19 culture. Although a useful tool, SAQ has its limitation; it assesses staff's beliefs
20 regarding the safety culture, rather than their real safety behavior.(31) Notably, SAQ
21 tests the current attitude regarding patient safety; however, there may be differences
22 between attitudes and actual practice. Therefore, to explore the dimensions that
23 influence patient safety in more detail, SAQ should be combined with qualitative
24 methods such as peer observation, group discussions, analysis of organization's
25 incident history, and audits of the safety management system.(28, 37, 50) A wide gap
26 in research remains regarding how data obtained from different methods are related
27 and how to combine them to get a complete safety culture view. Despite these
28 limitations, we believe this research offers useful insight into our organizations'
29 baseline patient safety culture.

19

1   **CONCLUSIONS**

2   Overall, only a minority of the healthcare professionals at our cluster hospital have a

3   positive patient-safety culture (SAQ score $\geq$ 75%), which is far below the

4   international benchmarking standard. Attention should be paid to most of the safety

5   culture dimensions: working condition, perception of management, safety climate,

6   teamwork climate, and stress recognition. Although the mean scores of the

7   dimensions were mostly higher than the international standards, no dimension reached

8   the 75% minimum score to be recognized as an area of strength. The significant

9   findings include employees' frustration with work environment quality and logistics,

10   particularly staffing levels in the clinical area. There is also much room for

11   improvement in communication regarding patient safety issues and errors, indicating

12   that the organization's existing culture is not reliable and encouraging toward patient

13   safety culture and incident reporting. Staff were also overly accustomed to busy work

14   schedules and heavy workloads; thus, they did not recognize the impact of stress on

15   their work performance and patient safety. Staff members should admit that stress,

16   high workload, and sleep deprivation are among the causes of reduced job

17   performance and increased risk of medical malpractices. Despite that, most

18   respondents expressed satisfaction with their job; this presents an opportunity, as

19   those with higher job satisfaction are more likely to be actively involved in accepting

20   and implementing future quality-enhancement strategies.

21   Meanwhile, management commitment towards patient safety-improvement

22   activities is vital in nurturing healthcare professionals' positive culture. Patient safety

23   training and the incident reporting system are two critical factors that should be

24   emphasized to improve patient safety culture. Organizations should consider and

25   implement a non-punitive and instructive incident reporting system as an instrument

26   that can strengthen the patient safety culture.

27

20

1   **Ethics approval:** This study has received approval from the Research Ethics

2   Committee, Universiti Kebangsaan Malaysia, Medical Research Etiquette Committee

3   (MREC), Ministry of Health (NMRR-19-2366-50240), and the Head of Cluster of

4   Hospital Kluster Kedah Utara.

5   **Data sharing statement:** No additional data are available.

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STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	*6*
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	8
		(*c*) Explain how missing data were addressed	8
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	8
		(*e*) Describe any sensitivity analyses	8
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	8
		(b) Give reasons for non-participation at each stage	-
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8-9
		(b) Indicate number of participants with missing data for each variable of interest	8-9
Outcome data	15*	Report numbers of outcome events or summary measures	9
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-13

		(*b*) Report category boundaries when continuous variables were categorized	-
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10-13
Discussion			
Key results	18	Summarise key results with reference to study objectives	14-20
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	21
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14-20
Generalisability	21	Discuss the generalisability (external validity) of the study results	14-20
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	-

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.