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Attitudes of Doctors and Nurses to Patient Safety and Errors in Medical Practice in the Gaza-Strip: A cross-sectional study

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Abstract:

Objectives: This study examined the attitudes of nurses and doctors to key patient safety concepts, evaluated differences and similarities between both professional groups as well as strengths and weaknesses in their attitudes to identify target areas for future training.

Setting: Four major governmental hospitals in the Gaza-Strip.

Participants: A convenience sample of 424 nurses and 150 physicians working for at least six months at governmental hospitals in the Gaza-Strip.

Primary and secondary outcome measures: The primary outcome measures were mean scores with standard deviations as measured for individual items as well as nine main domains by the Attitudes to Patient Safety Questionnaire (APSQ-III). Secondary outcome measures were the proportions of doctors and nurses, that gave a positive response to each item, represented as percentage of each group.

Results: Both nurses and doctors held positive attitudes towards patient safety. Doctors showed slightly more positive attitudes than nurses, despite a significantly smaller proportion of doctors having received patient safety training with 37.5% compared to 56.1% of nurses. Both professions showed a high level of similarity in patient safety attitudes with their most positive scores in the same domains ('team functioning' and 'working hours as a cause for error'), as well as their two most negative scores, ('importance of patient safety in the curriculum' and 'professional incompetence as a cause of error'), demonstrating significant deficits in understanding medical errors. A specific challenge will be the negative attitudes of both

professions towards patient safety training for wider dissemination of this content in the postgraduate curriculum.

Conclusion: Patient safety training has to be more consistently included in the professional curriculum, focusing on understanding and dealing with medical errors. Healthcare policy makers and educators need to deliver training, which is both motivating and relevant for clinicians, demonstrating its importance in ongoing professional learning.

Strengths and weaknesses of this study

- Recruitment of a diverse sample from different governmental hospitals and areas in the Gaza-Strip and assessment of patient safety attitudes irrespective of workplace allows a view of shared or disparate attitudes present among local professionals.
- Use of a convenience sample might limit generalizability of the findings.
- The high response rate and low proportion of missing values may be due to face-to-face distribution and collection of questionnaires to participants by members of the research team as well as express urge of professionals to share their views.
- The APSQ-III used in this study was originally designed for medical students and does not enable direct comparison to most other studies in this area, which often use other questionnaires that assess patient safety attitudes in an institutional context.

Background

In hospitals, one out of 150 patients have been reported to die as a consequence of an adverse event.[1] A survey using a global trigger tool found that one in seven patients admitted to hospitals in Palestine suffered from harm and 59.3% of these had been preventable.[2] It has been shown that positive patient safety attitudes are associated with better patient outcomes as well as conversely, negative attitudes are associated with poorer patient outcomes.[3 4] Furthermore, patient safety training and education can improve patient safety attitudes and thus also patient outcomes, creating a safer healthcare environment for patients.[1 5 6] Moreover, patient safety attitudes have been shown to be associated with staff wellbeing, bullying in the workplace, quality of delivered care and job satisfaction.[7-10] Thus, patient safety has a wide reaching influence on professionals' and patients' experiences in healthcare systems. Healthcare professionals with positive attitudes towards patient safety are more likely to display patient safety related behaviours than those with a negative attitude towards patient safety.[11 12] Patient safety education has been integrated in many postgraduate curricula across the world.[13-15]

Over the last decade efforts have been made to increase patient safety standards in Palestinian hospitals with some improvements seen in the West Bank.[16] So far, patient safety education only had a small, however expanding, presence in postgraduate education in Gaza.[17] Therefore, it is not surprising that patient safety attitudes among healthcare professionals in Gaza appear to be lagging behind that of regional and international colleagues.[17-22]

This study aims to compare the patient safety attitudes among doctors and nurses working at governmental hospitals in the Gaza-Strip and examine differences and similarities, as well as evaluate their weak and strong points in order to identify areas to be targeted by future training.

Methods

A descriptive, cross-sectional study, using a self-administered questionnaire was conducted in four major governmental hospitals that represent the governorates of the Gaza-Strip. A convenience sample of 600 doctors and nurses was recruited by personal invitation to participate in this study. Professionals were eligible to participate if they had worked at one of the four governmental hospitals for at least six months prior to participating in this study. The data were collected by some members of the research team who are not working in the governmental health system. Each potential participant was handed the questionnaire by a member of the research team and completed the questionnaire alone and anonymously before returning it to the research team member. The survey instrument used was the Attitudes to Patient Safety Questionnaire III (APSQ-III).[23] This had been translated into Arabic by three different professionals, fluent in both English and Arabic. Then it was back translated from Arabic to English by two other professionals, ensuring consistency. Following this, it was reviewed by five professionals and modified slightly to better address local healthcare personnel, resulting in a 30-item questionnaire. Finally, this Arabic version of the questionnaire was completed by 20 experienced professionals, who were not included in the study. The reliability of the instrument was assessed with Cronbach's α, which was 70.5 showing acceptable reliability.

The APSQ-III examines patient safety attitudes over nine domains; patient safety training received, error reporting confidence, working hours as an error cause, error inevitability,

professional incompetence as an error cause, disclosure responsibility, team functioning, patient involvement to reduce error and importance of patient safety training. It had originally been developed for use in medical students with the intent to be used in a wider context.[23] Its advantage in this context was that it examines healthcare professionals' attitudes and does not focus on organizational culture, giving the opportunity to compare different professional groups working across Gaza in different hospitals.

Responses to each item were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A higher score indicated a more affirmative or positive response to the factor concerned; a score of 3 reflects a neutral attitude and anything below 3 shows negative attitudes. Several items had a reverse score, according to the instructions of the original creators of the instrument.[23] Each participant's response was summed up into nine sub-scores that corresponded to the nine key domains.

Approval for the present study was obtained from the ethics committee of the Palestinian Ministry of Health prior to conducting the study. The purpose of the study was fully explained to all participants, all data was collected and kept completely anonymously and informed consent had been taken from all participants prior to filling out the questionnaire.

Data Analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) for Windows version 22.0. The results are given in means ± standard deviation as well as percentage of positive responses to each item among each professional group. Significance was tested by the t-test. Although the use of parametric tests with Likert scales has been

controversial, as no exact scale exists between 'strongly agree' and 'agree' or 'strongly disagree' and 'disagree', it has been shown to be a more robust test than non-parametric tests, especially in larger sample sizes, as in this study.[24 25] A p-value of ≤ 0.05 was considered statistically significant.

Patient and Public Involvement

Patients or community members have not been involved in the design or conduct of this study.

Results

In total 600 healthcare professionals were invited to complete the Attitudes to Patient Safety Questionnaire III (APSQ-III). Questionnaires were given personally to potential participants by research team members, as well as collected again, yielding a high response rate of (97.2%), where 583 professionals completed the questionnaire. The information if the participant was a doctor or a nurse was missing in nine questionnaires. Therefore, these were excluded from the study, leaving 424 nurses and 150 doctors to be included in the study.

The number of total missing values was low with 296 unanswered questions out of 17 220 (1.6%) in the 574 x 30-item questionnaire. These were randomly distributed among all items, ranging from two of 574 unanswered questions (0.3%) to 33 (5.6%). Missing values were replaced by the mean for each item., for calculation of the mean score.

Characteristics of Participants

Participants' mean age was 33.1 ± 9.2 years for nurses and 36.6 ± 9.8 for doctors (table 1). No significant differences were found between the two professional groups in their work experience

or the hours of patient safety training they had received previous to filling out the questionnaire (table 1). However, the proportion of participants who had benefited from patient safety education was higher among the nurses with 56.2% (n=247) reporting not to have received any patient safety education, compared to 61.3% (n=92) of doctors (table 1).

Table 1: Characteristics of Participants

	Doctors (n=150)		**Nurses (n=424)**		**p-value**
Age in years	36.6 ± 9.8		33.1 ± 9.2		<0.001
Work experience in years	9.5 ± 8.2		9.4 ± 7.8		0.954
Previous patient safety training in hours	7.9 ± 22.5		7.5 ± 15.9		0.828
Previous patient safety training received	**YES**	**NO**	**YES**	**NO**	<0.001
Number	56	92	177	247	
Percentage	37.3%	61.3%	41.9%	56.2%	
Missing		**2**		**8**	

Attitudes of doctors and nurses towards patient safety

Significant differences were found in 16 individual items of the APSQ-III in the response between doctors and nurses (table 2).

The areas with non-significant responses in both professions are displayed in table 3 and include 14 individual items of the APSQ-III. Both professional groups displayed very positive attitudes (mean > 4) on the items 'Even the most experienced and competent doctors make errors', 'Even the most experienced and competent nurses make errors' and 'Better multi-disciplinary teamwork will reduce medical errors' with >80% of participants giving a positive response.

Doctors also had very positive attitudes on the items 'Teaching teamwork skills will reduce medical error', 'Encouraging patients to be more involved in their care can help to reduce the risk of medical errors occurring', 'Shorter shifts will reduce medical errors' 'By not taking regular breaks during shifts doctors / nurses are at an increased risk of making errors' and 'I like

Table 2: Results for individual items in means ± standard deviation (SD) as well as percentage of positive responses to each item with significant differences between both professions.

	Doctors (n=150)		Nurses (n=424)		p-value
	Means ± SD	% of positive responses	Means ± SD	% of positive responses	
I would feel comfortable reporting any errors I had made no matter how serious the outcome had been for the patient.	3.5 ± 1.0	**55.3%**	3.7 ± 1.0	**65.6%**	0.025
I feel confident I could report an error I had made without feeling I would be blamed.	3.5 ± 1.1	**58.7%**	3.8 ± 1.0	**69.1%**	0.001
I would feel comfortable reporting any errors other people had made, no matter how serious the outcome had been for the patient.	3.1 ± 1.1	**38.0%**	3.5 ± 1.0	**57.3%**	<0.001
Medical errors are handled appropriately in my workplace	3.0 ± 1.0	**35.5%**	3.3 ± 1.1	**48.3%**	0.001
The number of hours doctors / nurses work increases the likelihood of making medical errors.	4.2 ± 1.0	**70.6%**	3.9 ± 1.2	**66.0%**	0.003
Shorter shifts will reduce medical errors.	4.1 ± 1.0	**78.7%**	3.9 ± 1.1	**66.7%**	0.016
By not taking regular breaks during shifts doctors / nurses are at an increased risk of making errors.	4.3 ± 0.9	**85.3%**	4.0 ± 1.0	**78.3%**	0.014
I don't think I make errors.	2.9 ± 1.1	**31.3%**	3.4 ± 1.1	**52.4%**	< 0.001
A true professional does not make mistakes or errors. (R)	3.9 ± 1.1	**74.0%**	3.6 ± 1.1	**60.1%**	0.006
Medical errors are a sign of incompetence. (R)	3.7 ± 1.0	**64.7%**	3.4 ± 1.1	**48.2%**	<0.001
Most medical errors result from careless doctors. (R)	3.3±1.2	**46.7%**	2.7±1.1	**24.1%**	< 0.001
Better multi-disciplinary teamwork will reduce medical errors.	4.3 ± 0.9	**86.7%**	4.1 ± 0.8	**82.2%**	0.017
Personal input about patient care is well received at my workplace	3.4 ± 1.0	**50.7%**	3.6 ± 1.0	**60.4%**	0.013
Encouraging patients to be more involved in their care can help to reduce the risk of medical errors occurring.	4.0 ± 0.8	**84.0%**	3.9 ± 0.9	**74.3%**	0.047
Patient safety issues cannot be taught and can only be learned by clinical experience when qualified (R)	3.6 ± 1.1	**57.3%**	3.2 ± 1.2	**42.0%**	<0.001
Learning about patient safety issues is not as important as learning other more skill based aspects of being a doctor / a nurse	2.3 ± 1.1	**16.7%**	2.7 ± 1.2	**25.7%**	0.001

Table 3: Results for individual items in means ± standard deviation (SD) as well as percentage of positive responses to each item without significant differences between both professions.

	Doctors (n=150)		Nurses (n=424)		p-value
	Means ± SD	% of positive responses	Means ± SD	% of positive responses	
My training has prepared me to understand the causes of medical errors	3.3 ± 1.0	**47.2%**	3.4 ± 1.2	**54.7%**	0.082
I am confident I could talk openly to my supervisor about an error I had made if it had resulted in potential or actual harm to my patient.	3.5 ± 1.1	**59.3%**	3.7 ± 1.0	**67.2%**	
I like my job	4.1 ± 0.9	**80.7%**	4.0 ± 1.0	**76.4%**	0.205
Most medical errors result from careless nurses. (R)	3.4 ± 0.9	**50.7%**	3.6 ± 1.3	**56.6%**	0.051
If people paid more attention at work, medical errors would be avoided. (R)	2.1 ± 0.8	**4.7%**	2.1 ± 0.9	**7.3%**	0.918
Even the most experienced and competent doctors make errors.	4.2 ± 0.9	**86.7%**	4.2 ± 0.9	**84.0%**	0.505
Even the most experienced and competent nurses make errors.	4.2 ± 0.8	**88.0%**	4.1 ± 0.9	**80.7%**	0.325
Doctors / nurses have a responsibility to disclose errors to patients only if they result in patient harm	2.8 ± 1.1	**28.7%**	3.0 ± 1.1	**34.7%**	0.139
All medical errors should be reported	3.9 ± 0.9	**68.7%**	3.9 ± 1.0	**72.6%**	0.931
It is not necessary to report errors which do not result in adverse outcomes for the patient. (R)	3.4 ± 1.1	**47.6%**	3.2 ± 1.2	**43.6%**	0.060
It is the responsibility of all health care professionals to formally report all medical errors which occur	3.7 ± 1.0	**64.5%**	3.7 ± 1.0	**65.1%**	0.822
Teaching teamwork skills will reduce medical errors.	4.1 ± 0.8	**84.7%**	4.1 ± 0.8	**79.2%**	0.800
Patients have an important role in preventing medical errors.	3.4 ± 1.0	**53.3%**	3.6 ± 1.0	**59.2%**	0.082
Learning about patient safety issues before I qualify will help me to become a more effective doctor / nurse.	3.9 ± 1.0	**74.0%**	3.8 ± 0.9	**71.7%**	0.858

my job'. While the participating nurses had no other item with a positive response rate of >80% of participants. (tables 2 and 3).

The most negative attitudes with scores below 3 were displayed by both professional groups on items 'learning about patient safety issues is not as important as learning other more skill based aspects of being a doctor / a nurse' and 'if people paid more attention at work, medical errors would be avoided ' The latter yielded an especially low proportion of participants with positive response in both professions of less than 8%. Furthermore, only 31.1% of doctors gave a positive response to the item 'I don't think I make errors', compared to 52.4% of nurses. Similarly low were the positive responses by doctors on 'Doctors / nurses have a responsibility to disclose errors to patients only if they result in patient harm' with 28.7%, compared to 34.7% of nurses (table 3).

Patient Safety Domains

Table 4: Results for each domain as means ± standard deviation

Domain	Doctors	Nurses	p-value
Patient safety training received	4.1±1.0	3.4±1.1	<0.001
Error reporting confidence	3.3±0.7	3.6± 0.7	<0.001
Working hours as a cause of error	4.2± 0.7	3.9±0.8	0.001
Error inevitability	3.7±0.6	3.9±0.6	0.033
Professional incompetence as a cause of error	3.3±0.5	3.1±0.6	<0.001
Disclosure responsibility	3.5±0.6	3.5±0.6	0.711
Team functioning	3.9±0.6	3.9±0.6	0.914
Patient involvement in reducing errors	3.7±0.7	3.7±0.7	0.958
Importance of patient safety in the curriculum	3.2±0.6	3.2±0.6	0.673

Table 4 shows the mean score and standard deviation for each dimension examined in the questionnaire along with the p-value, testing for significant differences between both professional groups. Significant differences were found in five domains, while four domains showed no significant differences between the responses by doctors and nurses (table 4).

Doctors showed more positive attitudes in three domains 'patient safety training received', 'working hours as a cause of error' and 'professional incompetence as a cause of error', while the group of participating nurses demonstrated a more positive attitude in the domains of 'error reporting confidence' and 'error inevitability'. However, both groups showed their most positive attitude in the domain 'working hours as a cause of error' (table 4). The two most negative attitudes were also shared by both professional groups with 'professional incompetence as a cause of errors' and 'importance of patient safety in the curriculum' (table 4). Furthermore, doctors also had another low score in the domain of 'error reporting confidence'.

Discussion

In general, doctors showed more positive attitudes towards patient safety than the group of nurses who participated in this study, although significantly more nurses had received patient safety training than doctors (41.9% versus 37.3% respectively), but conversely doctors displayed a significantly more positive attitude towards the patient safety training they had received (table 4). Both professional groups showed their most negative as well as their most positive attitudes in the same domains and even on most items, resulting in high levels of agreement between both professions, which is in contrast to some international studies on patient safety attitudes including doctors and nurses,[26-28] but similar to a recent study from the West Bank.[16]

Team Functioning

Good functioning of the team has been recognized as one of the most important factors in securing patient safety and establishing a safe patient culture.[15] M Leonard et al. investigated 2455 sentinel events reported to the Commission on Accreditation of Healthcare Organizations and found that 70% of these were due to a breakdown in the team functioning.[29] Teamwork also gathered the most positive attitudes in different studies in other contexts, as among nurses in Iran,[30] operating department teams in Sweden,[27] medical students in Taiwan[21] and Pakistan[28] or medical interns in Korea.[31] Physicians and nurses in Gaza showed more positive attitudes towards team work than nurses in Lithuania[26] or medical students in Hong Kong and Singapore.[13]

It is encouraging that both physicians and nurses showed equally positive attitudes towards team functioning and recognized this as important to ensure patient safety. Although participants of this study were recruited from different specialties and departments all over the Gaza-Strip, they displayed agreement on this issue, demonstrating commonly shared and agreed values towards this important factor. This offers potential to be translated into a culture of shared values when they work together in one unit.[27 32]

The actual teamwork climate in Palestinian hospitals is lagging behind this attitude demonstrated by doctors and nurses Within the Arab context, a systematic review by Elmonstrsi et al., which included a Palestinian study from the West Bank, examined patient safety culture within hospital units and found actual team work culture was rated better within units, (71% in the Palestinian study), than across hospitals (44% in Palestine) and this was worse than in most of the studies

from other Arab countries.[20] The fact that both professions found teamwork important, might make improvements easier to achieve in this crucial domain.[27 32]

Working Schedule

The working hours received the second highest patient safety ratings in both professions with doctors' attitudes significantly more positive than nurses. Heavy workload, poor staffing levels and unsatisfactory facilities have been identified as challenges to the provision of safe care in Gaza Hospitals in other studies.[6 18 33 34] In times of crises such pressures are often further exacerbated. Therefore, it is safe to assume that both doctors and nurses have experienced excessive working hours and workload before and are able to judge the effect this might have on patient safety based on their own experiences. This is an important factor to consider when planning and delivering services in order to promote job satisfaction in the work force as well as ensure patient safety.[7 8]

Understanding and Dealing with Medical Error

A main threat to patients are medical errors that have been reported to be the third leading cause of death in the USA[35] and affect one in seven patients admitted to Palestinian hospitals.[2] Therefore, one of the most important concepts in patient safety is the causation of and learning from errors. This includes the understanding that errors are often not individual failings, but system failures, which can be of vital importance for an organization to learn and develop systems that keep patients safer in the future.[35 36] It is vital that individual professionals, teams as well as managers and organizations such opportunities for improvement of safe patient management.

One component of this is the realization that errors are inevitable and any professional can make mistakes, as a human being,[36] but it is the responsibility of a well-designed system to prevent them causing actual harm to patients. In this study, the professional groups displayed positive attitudes in the domain 'error inevitability' with nurses having higher scores than doctors, showing a degree of understanding of human factors and their contribution to possible errors and realizing that even the most competent doctors or nurses may make mistakes. Conversely, however, in the domain 'professional incompetence as a cause of error' nurses showed the most negative and doctors the second most negative attitudes, demonstrating deficient understanding in this area. One reason for this can be the relatively small proportion of participants who had received patient safety training. Another factor might be the way that management and the Palestinian Ministry of Health actually deal with mistakes in practice, showing also poor understanding of this concept. In the assessment of Elsous et al., 34.5% of participants reported difficulties in discussing and learning from error, confirming a cultural problem in this area affecting a large proportion of healthcare professionals.[6] This was also found by a report investigating maternal mortality in the Gaza-Strip, where clinicians reported that in case of complications they felt unsupported by management; but on the contrary, accused of wrongdoing and blamed for the event.[37] However, similar discrepancies between the acknowledgment that errors are inevitable, but that professionals should not make mistakes were also found internationally,[23 26 28 30 38 39] possibly illustrating the ideal for professionals not to make mistakes. The understanding of this discrepancy between the fact that humans cannot avoid mistakes and the ideal of professionals avoiding them, needs to be focused on in further training with developing more effective systems to deal with errors openly and learn from them.[40]

Both professions also showed lower mean scores in the domain of disclosure responsibility and error reporting confidence, where doctors held significantly more negative attitudes than nurses. These results reflect the poor understanding of error as a tool of learning and underline the poor confidence of both professional groups in this study in reporting errors and their responsibility in disclosure of mistakes. Similar findings were shown in other studies in the Palestinian and wider Arab context, as well as other countries.[6 18 37 41] In order to achieve ongoing organizational learning and continuous improvement in care, a disclosure system for errors is essential to facilitate learning from mistakes. This is largely missing in Gaza and therefore offers no anonymous system of incident reporting, adding to the difficulties of disclosure of errors and learning from mistakes.

Patient Safety Education

It has been acknowledged widely that patient safety is an important component of the undergraduate as well as postgraduate curricula.[42-44] However, neither nurses nor doctors, participating in this study, found training in patient safety particularly important for healthcare professionals. This could be partly due to the 'hidden curriculum' that has been described and discussed by several researchers.[45 46] This describes the fact that students and professionals witness behaviours in clinical practice, possibly on a daily basis, which are contradicting their learning. Many healthcare professionals might feel demotivated and therefore find that patient safety training has no value.

This is a big challenge to overcome, as only the motivated students might have full benefit from any delivered teaching.[47] Therefore, delivering patient safety training should be regarded as a priority and use novel ways of its teaching in order to keep a close link to clinical practice as

well as capture the learners' imagination and interest. Many different ways have been investigated and described, including simulation training, e-learning, problem based learning, self-reflection and critical thinking and even an iPad game.[42 48-52] Developing such curricula content requires leadership, resources and commitment, which can be difficult to mobilize, especially in the context of low and middle income countries like Palestine who have many other challenges to cope with.[14] A study examining the impact of patient safety interventions undertaken in West Bank Hospitals by several bodies, including the WHO and the Patient Friendly Hospitals Initiative showed a 9.1% improvement in patient safety attitudes of healthcare staff in the area with the largest improvement; incidence reporting frequency. Despite the fact that, a large volume of monies was spent on this improvement over a 3-year period from 2011 – 2014, it only showed this small to moderate impact.[16] This finding underlines the significance of identifying those interventions with the greatest effect, in order to ensure not only impact, but also cost effectiveness. Nonetheless, such investment might in the future pay off in terms of improved patient safety and a more satisfied workforce.

Strengths and Limitations

Strengths of this study include the high response rate, which might express the fact that clinicians feel the urge to share their thoughts. This is also supported by the small proportion of missing values. However, the high response rate could also be a result of the personal distribution and collection of questionnaires by members of the research team. The main strengths of this study are however the sample size and the fact that participants were able to be recruited from different hospitals, giving a representative account of the situation across the Gaza-Strip.

Limitations of the study include the fact that the questionnaire had originally been designed for use in medical students. However, as it offered a way to assess patient safety attitudes independent of organizational culture, it was found to be a suitable tool for this study. Most other available studies in this area look at institutional cultures and use different questionnaires, making direct comparisons of values impossible. Another limitation to this study is the use of a convenience sample which may limit the generalizability of the findings.

Conclusion

Wide concordance was found in the patient safety attitudes of nurses and doctors with positive attitudes in the same domains ('importance of teamwork and working hours') as well as the most negative attitudes in the same domains ('importance of patient safety training' and 'professional incompetence as a cause for error'). Healthcare policy makers and educators have to focus on the development of patient safety training, which is both motivating and relevant for clinicians and demonstrates the importance of this content in ongoing professional learning. Furthermore, the occurrence of medical errors, their impact and constructive ways to deal with them are an essential part of undergraduate as well as postgraduate training and have to be more consistently included in the actual curriculum delivery.

Authors' Contributions

BB designed the study, performed the statistical analysis, contributed to and supervised data collection, contributed to interpretation of results, drafted and revised the manuscript. NAEN and MAEN contributed to the design of the study and the statistical analysis as well as interpretation of results and contributed to revision of the manuscript. YA and MA contributed substantially to

the data collection, supervised the process of data collection and data entry, participated in interpretation of results and statistical analysis and revision of the manuscript. EA, SEH and IAN conducted the data collection and supported interpretation of results and revision of the manuscript.

Competing interests

None of the authors have any competing interests to declare.

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Ethical approval and Consent

Approval was received from the ethics committee of the Human Resources Department of the Palestinian Ministry of Health. Formal written consent was obtained from all participants in this study. All data were kept completely anonymously.

Data Sharing Statement

No additional data is 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	2-3
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	5-7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
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	N/A
Bias	9	Describe any efforts to address potential sources of bias	N/A
Study size	10	Explain how the study size was arrived at	4-6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6-7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6-7
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
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	7
		(b) Give reasons for non-participation at each stage	7
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8
		(b) Indicate number of participants with missing data for each variable of interest	7
Outcome data	15*	Report numbers of outcome events or summary measures	5-7
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	N/A

		(*b*) Report category boundaries when continuous variables were categorized	6
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	8-12;18
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	17-18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	N/A
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	N/A

*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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Attitudes of Doctors and Nurses to Patient Safety and Errors in Medical Practice in the Gaza-Strip: A cross-sectional study

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Abstract:

Objectives: This study examined the attitudes of nurses and doctors to key patient safety concepts, evaluated differences and similarities between professional groups and assessed positive and negative attitudes to identify target areas for future training.

Setting: Four major governmental hospitals in the Gaza-Strip.

Participants: A convenience sample of 424 nurses and 150 physicians working for at least six months in the study hospitals.

Primary and secondary outcome measures: The primary outcome measures were mean scores with standard deviations as measured for individual items and nine main patient safety domains assessed by the Attitudes to Patient Safety Questionnaire (APSQ-III). Secondary outcome measures were the proportions of doctors and nurses, that gave a positive response to each item, represented as percentage of each group.

Results: Nurses and doctors held moderately positive attitudes towards patient safety with five out of nine domain scores > 3.5. Doctors showed slightly more positive attitudes than nurses, despite a significantly smaller proportion of doctors having received patient safety training with 37.5% compared to 56.1% of nurses. Both professions showed a high level of similarity in patient safety attitudes with their most positive scores in the same domains ('team functioning' and 'working hours as a cause for error'), as well as their two most negative scores, ('importance of patient safety in the curriculum' and 'professional incompetence as a cause of error'),

demonstrating significant deficits in understanding medical errors. A specific challenge will be the negative attitudes of both professions towards patient safety training for wider dissemination of this content in the postgraduate curriculum.

Conclusion: Patient safety attitudes were moderately positive with similarities between professional groups. Target of future patient safety training should be enhancing the understanding of error in medicine. Any training has to be motivating and relevant for clinicians, demonstrating its importance in ongoing professional learning.

Strengths and weaknesses of this study

- Recruitment of a large and diverse sample from different governmental hospitals and areas in the Gaza-Strip, including 56.3% of the target population, as well as assessment of patient safety attitudes irrespective of workplace allow, a view of shared or disparate attitudes present among local professionals.
- Use of a convenience sample might limit generalizability of the findings.
- The low proportion of missing values may be due to face-to-face distribution and collection of questionnaires by members of the research team as well as express urge of professionals to share their views.
- The APSQ-III used in this study was originally designed for medical students and does not enable direct comparison with other studies in this area, which used other questionnaires that assess patient safety attitudes in an institutional context.

Background

In hospitals, one out of 150 patients have been reported to die as a consequence of an adverse event.[1] Positive patient safety attitudes are associated with better patient outcomes as well as conversely, negative attitudes with poorer patient outcomes.[2 3] Furthermore, patient safety training and education can improve patient safety attitudes and thus also patient outcomes, creating a safer healthcare environment for patients.[1 4 5] Moreover, patient safety attitudes have been shown to be associated with staff wellbeing, bullying in the workplace, quality of delivered care and job satisfaction.[6-9] Thus, patient safety has a wide reaching influence on professionals' and patients' experiences in healthcare systems. Healthcare professionals with positive attitudes towards patient safety are more likely to display patient safety related behaviours.[10 11]

A survey using the Global Trigger Tool found that one in seven patients admitted to Palestinian hospitals suffered from harm and 59.3% of these had been preventable,[12] thus compounding the difficult situation with staff and equipment shortages and contributing to poor patient outcomes. Furthermore, adverse events were shown to be significantly associated with poor safety culture in two hospitals in the West Bank, Palestine.[13] Therefore, improving patient safety attitudes and awareness among staff, may contribute significantly to improve patient outcomes in Palestine at little additional costs.[1 4 5 13] Simple changes in staff behaviour, such as in infection control practices, have been shown to be achievable and can positively affect patient care.[14] But increased awareness of their significance and a culture of such practice has still to be created.[15-17] Some improvements have already been achieved to increase patient

safety standards in Palestinian hospitals by efforts introducing the Patient Friendly Initiative to West Bank hospitals.[18]

Although patient safety education has been integrated in many postgraduate curricula across the world, it only has a small presence in postgraduate education in Gaza.[19-22] Therefore, it is not surprising that patient safety attitudes among local healthcare professionals appear to be lagging behind that of regional and international colleagues.[22-27] This study assessed patient safety attitudes among doctors and nurses working at governmental hospitals in the Gaza-Strip and examined differences and similarities, as well as positive and negative attitudes in order to identify areas for future training.

Methods

A descriptive, cross-sectional study, using a self-administered questionnaire was conducted in four major governmental hospitals that represent the governorates of the Gaza-Strip. A convenience sample of 600 doctors and nurses was recruited by personal invitation to participate in this study. The total numbers of employed doctors and nurses in all four study hospitals are 375 doctors and 645 nurses, resulting in a total study population of 1020. Professionals were eligible to participate if they had worked at one of the four governmental hospitals for at least six months prior to participating in this study. The data were collected by members of the research team who were not working in the governmental health system. Eligible participants were approached at their workplace, the purpose of the survey was explained to them and those, who agreed to participate, were handed the questionnaire by a research team member. Each participant completed the questionnaire alone and anonymously. The survey instrument used was the Attitudes to Patient Safety Questionnaire III (APSQ-III).[28] This had been translated into

Arabic by three different healthcare professionals fluent in both English and Arabic and with experience in health research and survey design. This translation was back-translated from Arabic to English by two other bilingual healthcare professionals, ensuring consistency. Face validity was assessed by faculty members of local faculties of nursing and medicine, all of them experienced nurses and doctors, who reviewed the questionnaire and suggested slight modifications to better address local healthcare personnel, resulting in a 30-item questionnaire. Finally, this Arabic version of the questionnaire was completed by 20 experienced doctors and nurses from the study hospitals, who were not included in the study. The reliability of the instrument was assessed with Cronbach's α, which was 0.71 showing acceptable reliability.

The APSQ-III examines patient safety attitudes over nine domains; patient safety training received, error reporting confidence, working hours as an error cause, error inevitability, professional incompetence as an error cause, disclosure responsibility, team functioning, patient involvement to reduce error and importance of patient safety training. It had originally been developed for use in medical students with the intent to be used in a wider context.[28] Its advantage in the context of this study over other survey instruments was that it examines healthcare professionals' attitudes and does not focus on organizational culture, allowing the comparison of different professional groups working across Gaza in different hospitals.

Responses to each item were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A higher score indicated a more affirmative or positive attitude; a score of 3 reflected a neutral attitude and scores below 3 showed negative attitudes. Several items had a reverse score, according to the instructions of the original creators of the instrument.[28] Each

participant's response was summed up into nine sub-scores that corresponded to the nine key domains.

Approval for the study was obtained from the Human Resources Department of the Palestinian Ministry of Health, the body responsible for approval of studies including humans. The purpose of the study was explained to all participants, data were kept anonymously without participants' names and informed consent had been taken from participants prior to filling out the questionnaire.

Data Analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) for Windows version 22.0. The results are given in means ± standard deviation as well as percentage of positive responses to each item among each professional group. Significance was tested by the independent sample t-test for participants' characteristics and item scores. Although the use of parametric tests with Likert scales remains controversial, as this is an ordinal scale, it has been shown to be a more robust than non-parametric tests, especially in large samples, as in this study.[29 30] Assumptions for t-tests were tested and not violated. A p-value of ≤ 0.05 was considered statistically significant.

Patient and Public Involvement

Patients or community members have not been involved in the design or conduct of this study.

Results

In total 645 nurses and 375 doctors were working in the study hospitals, of which 600 were given a copy of the Attitudes to Patient Safety Questionnaire III (APSQ-III) to complete. From these, 583 professionals completed and returned the questionnaire to a research team member. The information if the participant was a doctor or a nurse was missing in nine questionnaires. Therefore, these were excluded from the study, leaving 424 nurses (65.7% of all nurses) and 150 (40.0% of all doctors) doctors included in the study (figure 1).

The number of total missing values was low with 296 unanswered questions out of 17 220 (1.6%) in the 574 x 30-item questionnaire. These were randomly distributed among all items, ranging from 2 of 574 unanswered questions (0.3%) to 33 (5.6%). Missing values were replaced by the mean for each item., for calculation of the mean score.

Characteristics of Participants

Table 1: Characteristics of Participants; significance was tested by independent sample t-test.

	Doctors (n=150)		**Nurses (n=424)**		**p-value**
Age in years	36.6 ± 9.8		33.1 ± 9.2		<0.001
Work experience in years	9.5 ± 8.2		9.4 ± 7.8		0.954
Previous patient safety training in hours Median Range	7.4 ± 15.8 0.0 0 - 100		7.7 ± 21.8 0.0 0 - 200		0.828
Previous patient safety training received Number Percentage Missing	**YES** 56 37.3%	**NO** 92 61.3% **2**	**YES** 177 41.9%	**NO** 247 56.2% **8**	<0.001

Participants' mean age was 33.1 ± 9.2 years for nurses and 36.6 ± 9.8 for doctors (table 1). No significant differences were found between the two professional groups in their work experience or the hours of patient safety training they had received previous to filling out the questionnaire (table 1). However, the proportion of participants who had benefited from patient safety education was higher among the nurses with 56.2% (n=247/425) reporting not to have received any patient safety education, compared to 61.3% (n=92/150) of doctors (table 1).

Similarities in patient safety attitudes of doctors and nurses

Doctors and nurses gave similar responses in 14 individual items of the APSQ-III (table 2) as well as four of nine patient safety domains tested by the APSQ-III (table 3). Interestingly, both professional groups shared their most negative and most positive attitudes in individual item as well as patient safety domain scores (tables 2).

Differences in patient safety attitudes of doctors and nurses

Significant differences were found in 16 individual items of the APSQ-III between doctors and nurses (table 2) as well as five of nine patient safety domains tested in the APSQ-III. Doctors displayed more positive attitudes in the domains of patient safety training received, working hours as a cause of error and professional incompetence as a cause of error, while nurses held more positive attitudes in error reporting confidence and error inevitability (table 2). Reflecting the difference of error reporting confidence, 31.1% of doctors gave a positive response to the item 'I don't think I make errors', compared to 52.4% of nurses, as well as 28.7% of doctors only gave a positive response to 'Doctors / nurses have a responsibility to disclose errors to patients only if they result in patient harm' compared to 34.7% of nurses (table 2).

Positive and negative patient safety attitudes

Very positive attitudes were found in participants of both professional groups (mean > 4) on the items 'Even the most experienced and competent doctors make errors', 'Even the most experienced and competent nurses make errors' and 'Better multi-disciplinary teamwork will reduce medical errors' with >80% of participants giving a positive response. This was also demonstrated in the most positive attitudes of both professional groups in the patient safety domains 'Working hours as a cause of error' as well as 'Professional incompetence as a cause of errors' (table 2).

Additionally, doctors had very positive attitudes on the items 'Teaching teamwork skills will reduce medical error', 'Encouraging patients to be more involved in their care can help to reduce the risk of medical errors occurring', 'Shorter shifts will reduce medical errors' 'By not taking regular breaks during shifts doctors / nurses are at an increased risk of making errors' and 'I like my job'. While the participating nurses had no other item with a positive response rate of >80% of participants. (tables 2).

The most negative attitudes were displayed by both professional groups on the item 'Learning about patient safety issues is not as important as learning other more skill based aspects of being a doctor / a nurse', also reflected by the lowest patient safety attitudes held in both professions on the patient safety domain of 'Importance of patient safety in the curriculum'. However, the lowest score by far was achieved for the item 'If people paid more attention at work, medical errors would be avoided with less than 8% of participants in both professions holding a positive attitude (table 2).

Table 2: Results for individual items in each domain as means ± standard deviation, percentage of positive responses to each item and p-value for differences between professions (tested by independent sample t-tests). The darkly shaded rows show results for patient safety domain scores as means ± standard deviations. Items marked with (R) were reversely coded.

1. Patient Safety Training Received					
	Doctors (n=150)		**Nurses (n=424)**		
	Means ± Standard deviation	**% of positive response**	**Means ± Standard deviation**	**% of positive response**	**p-value**
My training has prepared me to understand the causes of medical errors	3.3 ± 1.0	**47.2%**	3.4 ± 1.2	**54.7%**	0.082
2. Error Reporting Confidence					
I would feel comfortable reporting any errors I had made no matter how serious the outcome had been for the patient.	3.5 ± 1.0	**55.3%**	3.7 ± 1.0	**65.6%**	0.025
I would feel comfortable reporting any errors other people had made, no matter how serious the outcome had been for the patient.	3.1 ± 1.1	**38.0%**	3.5 ± 1.0	**57.3%**	<0.001
I feel confident I could report an error I had made without feeling I would be blamed.	3.5 ± 1.1	**58.7%**	3.8 ± 1.0	**69.1%**	0.001
I am confident I could talk openly to my supervisor about an error I had made if it had resulted in potential or actual harm to my patient.	3.5 ± 1.1	**59.3%**	3.7 ± 1.0	**67.2%**	0.077
Medical errors are handled appropriately in my workplace	3.0 ± 1.0	**35.5%**	3.3 ± 1.1	**48.3%**	0.001
Error reporting confidence	3.3±0.7		3.3±0.7		<0.001
3. Working hours as a cause of errors					
The number of hours doctors / nurses work increases the likelihood of making medical errors.	4.2 ± 1.0	**70.6%**	3.9 ± 1.2	**66.0%**	0.003
Shorter shifts will reduce medical errors.	4.1 ± 1.0	**78.7%**	3.9 ± 1.1	**66.7%**	0.016
By not taking regular breaks during shifts doctors / nurses are at an increased risk of making errors.	4.3 ± 0.9	**85.3%**	4.0 ± 1.0	**78.3%**	0.014
I like my job	4.1 ± 0.9	**80.7%**	4.0 ± 1.0	**76.4%**	0.205
Working hours as a cause of errors	4.2± 0.7		4.2± 0.7		0.001
4. Error Inevitability					
I don't think I make errors. (R)	2.9 ± 1.1	**31.3%**	3.4 ± 1.1	**52.4%**	< 0.001
Even the most experienced and competent doctors make errors.	4.2 ± 0.9	**86.7%**	4.2 ± 0.9	**84.0%**	0.505
Even the most experienced and competent nurses make errors.	4.2 ± 0.8	**88.0%**	4.1 ± 0.9	**80.7%**	0.325
Error inevitability	3.7±0.6		3.9±0.6		0.033
5. Professional Incompetence as a Cause of Error					
A true professional does not make mistakes or errors. (R)	3.9 ± 1.1	**74.0%**	3.6 ± 1.1	**60.1%**	0.006

Medical errors are a sign of incompetence. (R)	3.7 ± 1.0	**64.7%**	3.4 ± 1.1	**48.2%**	<0.001
Most medical errors result from careless nurses. (R)	3.4 ± 0.9	**50.7%**	3.6 ± 1.3	**56.6%**	0.051
If people paid more attention at work, medical errors would be avoided. (R)	2.1 ± 0.8	**4.7%**	2.1 ± 0.9	**7.3%**	0.918
Most medical errors result from careless doctors. (R)	3.3±1.2	**46.7%**	2.7±1.1	**24.1%**	< 0.001
Professional incompetence as a cause of error	3.3±0.5		<0.001	3.1±0.6	<0.001
6. Disclosure Responsibility					
Doctors / nurses have a responsibility to disclose errors to patients only if they result in patient harm	2.8 ± 1.1	**28.7%**	3.0 ± 1.1	**34.7%**	0.139
All medical errors should be reported	3.9 ± 0.9	**68.7%**	3.9 ± 1.0	**72.6%**	0.931
It is not necessary to report errors which do not result in adverse outcomes for the patient. (R)	3.4 ± 1.1	**47.6%**	3.2 ± 1.2	**43.6%**	0.060
It is the responsibility of all health care professionals to formally report all medical errors which occur	3.7 ± 1.0	**64.5%**	3.7 ± 1.0	**65.1%**	0.822
Disclosure responsibility	3.5±0.6		3.5±0.6		0.711
7. Team Functioning					
Better multi-disciplinary teamwork will reduce medical errors.	4.3 ± 0.9	**86.7%**	4.1 ± 0.8	**82.2%**	0.017
Personal input about patient care is well received at my workplace	3.4 ± 1.0	**50.7%**	3.6 ± 1.0	**60.4%**	0.013
Teaching teamwork skills will reduce medical errors.	4.1 ± 0.8	**84.7%**	4.1 ± 0.8	**79.2%**	0.800
Team functioning	3.9±0.6			3.9±0.6	0.914
8. Patient Involvement in reducing Error					
Patients have an important role in preventing medical errors.	3.4 ± 1.0	**53.3%**	3.6 ± 1.0	**59.2%**	0.082
Encouraging patients to be more involved in their care can help to reduce the risk of medical errors occurring.	4.0 ± 0.8	**84.0%**	3.9 ± 0.9	**74.3%**	0.047
Patient Involvement in reducing Error	3.5±0.7		3.7±0.7		0.958
9. Importance of Patient Safety in the Curriculum					
Patient safety issues cannot be taught and can only be learned by clinical experience when qualified (R)	3.6 ± 1.1	**57.3%**	3.2 ± 1.2	**42.0%**	<0.001
Learning about patient safety issues before I qualify will help me to become a more effective doctor / nurse.	3.9 ± 1.0	**74.0%**	3.8 ± 0.9	**71.7%**	0.858
Learning about patient safety issues is not as important as learning other more skill based aspects of being a doctor / a nurse (R)	2.3 ± 1.1	**16.7%**	2.7 ± 1.2	**25.7%**	0.001
Importance of Patient Safety in the Curriculum	3.2±0.6		3.2±0.6		0.973

Discussion

In general, doctors showed more positive attitudes towards patient safety than the group of nurses who participated in this study, although significantly more nurses had received patient safety training than doctors, but conversely doctors displayed a significantly more positive attitude towards the patient safety training they had received (tables 1 and 2). Both professional groups showed their most negative as well as their most positive attitudes in the same domains and even on most items, resulting in high levels of agreement between both professions, which is in contrast to some international studies on patient safety attitudes including doctors and nurses,[31-33] but similar to a recent study from Palestine.[18]

Team Functioning

Good functioning of the team has been recognized as one of the most important factors in securing patient safety and establishing a safe patient culture.[21] M Leonard et al. investigated 2455 sentinel events reported to the Commission on Accreditation of Healthcare Organizations and found that 70% of these were due to a breakdown in the team functioning.[34] Teamwork also gathered the most positive attitudes in different studies in other contexts, as among nurses in Iran,[35] operating department teams in Sweden,[32] medical students in Taiwan[26] and Pakistan[33] or medical interns in Korea.[36] Physicians and nurses in Gaza showed more positive attitudes towards team work than nurses in Lithuania[31] or medical students in Hong Kong and Singapore.[19] One reason for these positive attitudes in the this study might be a recent emergence of undergraduate and postgraduate team training in the local context, such as in trauma care, resuscitation teams or unit teams.[14]

Teams act in different forms in healthcare, including short-term teams, such as resuscitation teams, more stable teams, such as those working together on one shift or long-term teams in one unit. Several definitions of teams have been discussed, but they all have common factors, including shared identity, clear roles/goals, shared responsibility, interdependence of team members, integration of work and team tasks.[37-40] The importance of these factors varies with types of teams and their purpose. Teamwork requires varying levels of collaboration, coordination, cooperation, networking or a mixture of these types of teamwork.[38 41] Healthcare workers will be part of different teams in their career. Although participants of this study were recruited from different specialties and departments, they displayed agreement on the importance of efficient teamwork to ensure patient safety, demonstrating commonly shared and agreed values towards this important factor. This offers potential to be translated into a culture of shared values when they work together in one unit.[32 42] However, the actual teamwork climate in Palestinian hospitals is lagging behind this attitude demonstrated by doctors and nurses. Within the Arab context, a systematic review by Elmonstrsi et al., which included a Palestinian study, examined patient safety culture within hospital units and found actual team work culture was rated better within units, (71% in the Palestinian study), than across hospitals (44% in Palestine) and this was worse than in most studies from other Arab countries.[25] Therefore, to improve efficiency of teams, training has to address existing teams as well as individuals, who will use their skills in different team contexts. [14 37-39 41 43]

Working Schedule

The working hours received the second highest patient safety ratings in both professions with doctors' attitudes significantly more positive than nurses. Heavy workload, poor staffing levels and unsatisfactory facilities have been identified as challenges to the provision of safe care in

Gaza Hospitals in other studies.[5 23 44 45] In times of crises such pressures are often further exacerbated. Therefore, it is safe to assume that both doctors and nurses have experienced excessive working hours and workload before and are able to judge the effect this might have on patient safety based on their own experiences. Although this factor is important to ensure patient safety,[6 7] it is often neglected in low resource settings, as experienced by participants of this study.[20]

Understanding and Dealing with Medical Error

A main threat to patients are medical errors that have been reported to be the third leading cause of death in the USA[46] and affect one in seven patients admitted to Palestinian hospitals.[12] Therefore, one of the most important concepts in patient safety is the causation of and learning from errors. This includes the understanding that errors are often not individual failings, but system failures, which can be of vital importance for an organization to learn and develop systems that keep patients safer in the future.[46 47] It is vital that individual professionals, teams as well as managers and organizations use such opportunities for improvement of safe patient management.

One component of this is the realization that errors are inevitable,[47] but it is the responsibility of a well-designed system to prevent them causing actual harm to patients. In this study, the professional groups displayed positive attitudes in the domain 'error inevitability' with nurses having higher scores than doctors and showing a degree of understanding of human factors and their contribution to possible errors. Conversely, however, in the domain 'professional incompetence as a cause of error' nurses showed the most negative and doctors the second most negative attitudes, demonstrating deficient understanding in this area. One reason for this can be

the relatively small proportion of participants who had received patient safety training. Another factor might be the experience of participants of how management and the Palestinian Ministry of Health deal with mistakes in practice, showing also poor understanding of this concept. In one study in Palestine, 34.5% of participants reported difficulties in discussing and learning from error, confirming a cultural problem in this area affecting a large proportion of healthcare professionals.[5] Similarly, in a report investigating maternal mortality in the Gaza-Strip, clinicians reported that they felt unsupported by management in case of adverse events.[48] However, similar discrepancies between the acknowledgment that errors are inevitable, but that professionals should not make mistakes were also found internationally,[28 31 33 35 49 50] possibly reflecting the ideal for professionals not to make mistakes. The understanding of this discrepancy, between error inevitability and the ideal of professionals avoiding them, needs to be focused on in further training with developing more effective systems to deal with errors openly and learn from them.[51 52]

Both professions also showed more negative attitudes to disclosure responsibility and error reporting confidence, where doctors held significantly more negative attitudes than nurses. These results reflect poor understanding of error as a tool of learning and underline the poor confidence of both professional groups in this study in reporting errors and their responsibility in disclosure of mistakes. Similar findings were shown in other studies in the Palestinian and wider Arab context, as well as other countries.[5 23 48 53] In order to achieve ongoing organizational learning and continuous improvement in care, a disclosure system and disclosure training for professionals are essential to facilitate learning from mistakes. Both are absent locally and the impact of this deficiency on patient safety attitudes are demonstrated by this study.[52]

Patient Safety Education

It has been acknowledged widely that patient safety is an important component of the undergraduate as well as postgraduate curricula.[54-56] However, neither nurses nor doctors, participating in this study, found training in patient safety particularly important for healthcare professionals. This could be due to the 'hidden curriculum' that has been discussed by several researchers,[57 58] describing the fact that students and professionals witness behaviours in clinical practice, possibly on a daily basis, which are contradicting their learning. Healthcare professionals might feel demotivated and therefore find that patient safety training has no value.

This is a big challenge to overcome, as only the motivated students might have full benefit from any delivered teaching.[59] Therefore, delivering patient safety training should be regarded as a priority and use novel ways of its teaching in order to keep a close link to clinical practice as well as capture the learners' imagination and interest. Many different ways have been investigated and described, including simulation training, e-learning, problem based learning, self-reflection and critical thinking and even an iPad game.[60-64] Developing such curricula content requires leadership, resources and commitment, which can be difficult to mobilize, especially in the context of low and middle income countries like Palestine who have many other challenges to cope with.[20] A study examining the impact of patient safety interventions undertaken in Palestinian hospitals by several bodies, including the WHO and the Patient Friendly Hospitals Initiative showed a 9.1% improvement in patient safety attitudes of healthcare staff in the area with the largest improvement; incidence reporting frequency. Despite the fact that, a large volume of monies was spent on this improvement over a 3-year period from 2011 – 2014, it only achieved a moderate impact.[18] This finding underlines the significance of

identifying those interventions with the greatest effect, in order to ensure not only impact, but also cost effectiveness. Nonetheless, such investment might in the future pay off in terms of improved patient outcomes and a more satisfied workforce.

Strengths and Limitations

The main strengths of this study are the sample size and the fact that participants were able to be recruited from different hospitals, giving a representative account of the situation across the Gaza-Strip. Furthermore, the low number of missing values adds to the strengths of this study.

Limitations of the study include the fact that the questionnaire had originally been validated among medical students. However, as it offered a way to assess patient safety attitudes independent of organizational culture, it was found to be a suitable tool for this study. Several other studies in this area look at institutional cultures and use different questionnaires, making direct comparisons of values impossible. Another limitation to this study is the use of a convenience sample which may limit the generalizability of the findings. However, the sample size was good with 56.3% of potential participants, which increases representativeness of this study. Furthermore, face-to-face distribution might have made participants feel obliged to complete the questionnaire. However, the research team members did not know the participants and they were informed that participation was entirely voluntary.

Conclusion

Wide concordance was found in the patient safety attitudes of nurses and doctors with positive attitudes in the same domains (‘importance of teamwork and working hours’) as well as the most negative attitudes in the same domains (‘importance of patient safety training’ and ‘professional

incompetence as a cause for error'). Healthcare policy makers and educators have to focus on the development of patient safety training, which is both motivating and relevant for clinicians and demonstrates the importance of this content in ongoing professional learning. Furthermore, inevitability of medical errors, their impact and learning from them are an essential part of undergraduate as well as postgraduate training and have to be more consistently included in curriculum delivery.

Authors' Contributions

BB designed the study, performed the statistical analysis, contributed to and supervised data collection, contributed to interpretation of results, drafted and revised the manuscript. NAEN and MAEN contributed to the design of the study and the statistical analysis as well as interpretation of results and contributed to revision of the manuscript. YA and MA contributed substantially to the data collection, supervised the process of data collection and data entry, participated in interpretation of results and statistical analysis and revision of the manuscript. EA, SEH and IAN conducted the data collection and supported interpretation of results and revision of the manuscript.

Competing interests

None of the authors have any competing interests to declare.

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Ethical approval and Consent

Approval was received from the ethics committee of the Human Resources Department of the Palestinian Ministry of Health. Formal written consent was obtained from all participants in this study. All data were kept completely anonymously.

Data Sharing Statement

No additional data is available.

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Legends and Captions for legends

Figure 1: Study population flow chart

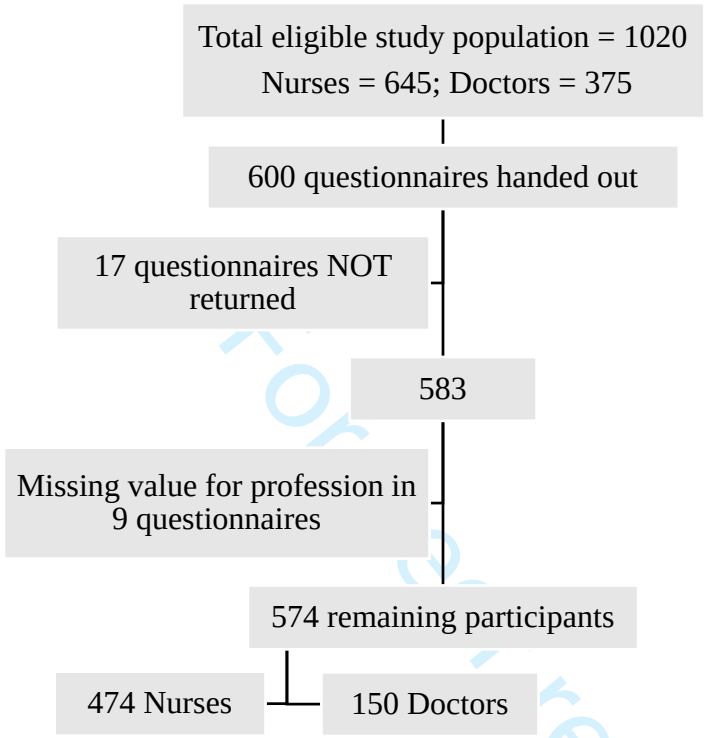

Figure 1: Study population flow chart

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	2-3
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	5-7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
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	N/A
Bias	9	Describe any efforts to address potential sources of bias	N/A
Study size	10	Explain how the study size was arrived at	4-6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6-7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6-7
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
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	7
		(b) Give reasons for non-participation at each stage	7
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8
		(b) Indicate number of participants with missing data for each variable of interest	7
Outcome data	15*	Report numbers of outcome events or summary measures	5-7
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	N/A

		(*b*) Report category boundaries when continuous variables were categorized	6
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	8-12;18
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	17-18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	N/A
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	N/A

*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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Attitudes of Doctors and Nurses to Patient Safety and Errors in Medical Practice in the Gaza-Strip: A cross-sectional study

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Attitudes of Doctors and Nurses to Patient Safety and Errors in Medical Practice in the Gaza-Strip: A cross-sectional study

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Abstract:

Objectives: This study examined the attitudes of nurses and doctors to key patient safety concepts, evaluated differences and similarities between professional groups and assessed positive and negative attitudes to identify target areas for future training.

Setting: Four major governmental hospitals in the Gaza-Strip.

Participants: A convenience sample of 424 nurses and 150 physicians working for at least six months in the study hospitals.

Primary and secondary outcome measures: The primary outcome measures were mean scores with standard deviations as measured for individual items and nine main patient safety domains assessed by the Attitudes to Patient Safety Questionnaire (APSQ-III). Secondary outcome measures were the proportions of doctors and nurses, that gave a positive response to each item, represented as percentage of each group.

Results: Nurses and doctors held moderately positive attitudes towards patient safety with five out of nine domain scores >3.5 of 5. Doctors showed slightly more positive attitudes than nurses, despite a significantly smaller proportion of doctors having received patient safety training with 37.5% compared to 56.1% of nurses. Both professions displayed their most positive patient safety attitudes in the same domains ('team functioning' and 'working hours as a cause for error'), as well as their two most negative attitudes ('importance of patient safety in the curriculum' and 'professional incompetence as a cause of error'), demonstrating significant deficits in understanding medical errors. A specific challenge will be the negative attitudes of

both professions towards patient safety training for wider dissemination of this content in the postgraduate curriculum.

Conclusion: Patient safety attitudes were moderately positive in both professional groups. Target of future patient safety training should be enhancing the understanding of error in medicine. Any training has to be motivating and relevant for clinicians, demonstrating its importance in ongoing professional learning.

Strengths and weaknesses of this study

- Recruitment of a large and diverse sample from different governmental hospitals and areas in the Gaza-Strip, including 56.3% of the target population is a strong point in this study, as well as the assessment of patient safety attitudes in different professions.
- Another strength is the low proportion of missing values, which may be due to face-to-face distribution and collection of questionnaires by members of the research team, as well as an urge of professionals to share their views.
- A limitation of the study is the use of a convenience sample, which might limit generalizability of the findings.
- Further limitations include the fact that the APSQ-III used in this study, was originally designed for medical students and that it does not enable direct comparison with other studies in this area, which used other questionnaires that assess patient safety attitudes in institutional/workplace contexts.
- However, the advantage of the APSQ-III in the context of this study, over other survey instruments, was that it examines healthcare professionals' attitudes and does not focus

on organizational culture, allowing the comparison of different professional groups working across Gaza in different hospitals.

Background

In hospitals, one out of 150 patients have been reported to die as a consequence of an adverse event.[1] Positive patient safety attitudes are associated with better patient outcomes as well as conversely, negative attitudes with poorer patient outcomes.[2 3] Furthermore, patient safety training and education can improve patient safety attitudes and thus also patient outcomes, creating a safer healthcare environment for patients.[1 4 5] Moreover, patient safety attitudes have been shown to be associated with staff wellbeing, bullying in the workplace, quality of delivered care and job satisfaction.[6-9] Thus, patient safety has a wide reaching influence on professionals' and patients' experiences in healthcare systems. Healthcare professionals with positive attitudes towards patient safety are more likely to display patient safety related behaviours.[10 11]

A survey using the Global Trigger Tool found that one in seven patients admitted to Palestinian hospitals suffered from harm and 59.3% of these had been preventable,[12] thus compounding the difficult situation with staff and equipment shortages and contributing to poor patient outcomes. Furthermore, adverse events were shown to be significantly associated with poor safety culture in two hospitals in the West Bank, Palestine.[13] Therefore, improving patient safety attitudes and awareness among staff, may contribute significantly to better patient outcomes in Palestine at little additional costs.[1 4 5 13] Simple changes in staff behaviour, such as in infection control practices, have been shown to be achievable and can positively affect patient care.[14] But increased awareness of their significance and a culture of such practice has

still to be created.[15-17] Some improvements have already been achieved to increase patient safety standards in Palestinian hospitals by efforts introducing the Patient Friendly Initiative to West Bank hospitals.[18]

Although patient safety education has been integrated in many postgraduate curricula across the world, it only has a small presence in postgraduate education in Gaza.[19-22] Therefore, it is not surprising that patient safety attitudes among local healthcare professionals appear to be lagging behind that of regional and international colleagues.[22-27] This study assessed patient safety attitudes among doctors and nurses working at governmental hospitals in the Gaza-Strip and examined differences and similarities, as well as positive and negative attitudes in order to identify areas for future training.

Methods

A descriptive, cross-sectional study, using a self-administered questionnaire was conducted in four major governmental hospitals that represent the governorates of the Gaza-Strip. A convenience sample of 600 doctors and nurses was recruited by personal invitation to participate in this study. The total numbers of employed doctors and nurses in all four study hospitals are 375 doctors and 645 nurses, resulting in a total study population of 1020. Professionals were eligible to participate if they had worked at one of the four governmental hospitals for at least six months prior to participating in this study. The data were collected by members of the research team who were not working in the governmental health system. Eligible participants were approached at their workplace, the purpose of the survey was explained to them and those, who agreed to participate, were handed the questionnaire by a research team member. Each participant completed the questionnaire alone and anonymously. The survey instrument used was

the Attitudes to Patient Safety Questionnaire III (APSQ-III).[28] This had been translated into Arabic by three different healthcare professionals fluent in both English and Arabic and with experience in health research and survey design. This translation was back-translated from Arabic to English by two other bilingual healthcare professionals, ensuring consistency. Face validity was assessed by faculty members of local faculties of nursing and medicine, all of them experienced nurses and doctors, who reviewed the questionnaire and suggested slight modifications to better address local healthcare personnel, resulting in a 30-item questionnaire. Finally, this Arabic version of the questionnaire was completed by 20 experienced doctors and nurses from the study hospitals, who were not included in the study. The reliability of the instrument was assessed with Cronbach's α, which was 0.71 showing acceptable reliability.

The APSQ-III examines patient safety attitudes over nine domains; patient safety training received, error reporting confidence, working hours as an error cause, error inevitability, professional incompetence as an error cause, disclosure responsibility, team functioning, patient involvement to reduce error and importance of patient safety training. It had originally been developed for use in medical students with the intent to be used in a wider context.[28] Its advantage in the context of this study over other survey instruments was that it examines healthcare professionals' attitudes and does not focus on organizational culture, allowing the comparison of different professional groups working across Gaza in different hospitals.

Responses to each item were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A higher score indicated a more affirmative or positive attitude; a score of 3 reflected a neutral attitude and scores below 3 showed negative attitudes. Several items had a reverse score, according to the instructions of the original creators of the instrument.[28] Each

participant's response was summed up into nine sub-scores that corresponded to the nine key domains.

Approval for the study was obtained from the Human Resources Department of the Palestinian Ministry of Health, the body responsible for approval of studies including humans. The purpose of the study was explained to all participants, data were kept anonymously without participants' names and informed consent had been taken from participants prior to filling out the questionnaire.

Data Analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) for Windows version 22.0. The results are given in means ± standard deviation as well as percentage of positive responses to each item among each professional group. Significance was tested by the independent sample t-test for participants' characteristics and item scores. Although the use of parametric tests with Likert scales remains controversial, as this is an ordinal scale, it has been shown to be more robust than non-parametric tests, especially in large samples, as in this study.[29 30] Assumptions for t-tests were tested and not violated. A p-value of ≤ 0.05 was considered statistically significant.

Patient and Public Involvement

Patients or community members have not been involved in the design or conduct of this study.

Results

In total 645 nurses and 375 doctors were working in the study hospitals, of which 600 were given a copy of the Attitudes to Patient Safety Questionnaire III (APSQ-III) to complete. From these, 583 professionals completed and returned the questionnaire to a research team member. The information if the participant was a doctor or a nurse was missing in nine questionnaires. Therefore, these were excluded from the study, leaving 424 nurses (65.7% of all nurses) and 150 (40.0% of all doctors) doctors included in the study (figure 1).

The number of total missing values was low with 296 unanswered questions out of 17 220 (1.6%) in the 574 x 30-item questionnaire. These were randomly distributed among all items, ranging from 2 of 574 unanswered questions (0.3%) to 33 (5.6%). Missing values were replaced by the mean for each item., for calculation of the mean score.

Characteristics of Participants

Table 1: Characteristics of Participants; significance was tested by independent sample t-test.

	Doctors (n=150)		**Nurses (n=424)**		**p-value**
Age in years	36.6 ± 9.8		33.1 ± 9.2		<0.001
Work experience in years	9.5 ± 8.2		9.4 ± 7.8		0.954
Previous patient safety training in hours Median Range	7.4 ± 15.8 0.0 0 - 100		7.7 ± 21.8 0.0 0 - 200		0.828
Previous patient safety training received Number Percentage Missing	**YES** 56 37.3%	**NO** 92 61.3% **2**	**YES** 177 41.9%	**NO** 247 56.2% **8**	<0.001

Participants' mean age was 33.1 ± 9.2 years for nurses and 36.6 ± 9.8 for doctors (table 1). No significant differences were found between the two professional groups in their work experience or the hours of patient safety training they had received previous to filling out the questionnaire (table 1). However, the proportion of participants who had benefited from patient safety education was higher among the nurses with 56.2% (n=247/425) reporting not to have received any patient safety education, compared to 61.3% (n=92/150) of doctors (table 1).

Similarities in patient safety attitudes of doctors and nurses

Doctors and nurses gave similar responses in 14 individual items of the APSQ-III (table 2) as well as four of nine patient safety domains tested by the APSQ-III (table 2). Interestingly, both professional groups shared their most negative and most positive attitudes in individual item as well as patient safety domain scores (table 2).

Differences in patient safety attitudes of doctors and nurses

Significant differences were found in 16 individual items of the APSQ-III between doctors and nurses (table 2) as well as five of nine patient safety domains tested in the APSQ-III. Doctors displayed more positive attitudes in the domains of patient safety training received, working hours as a cause of error and professional incompetence as a cause of error, while nurses held more positive attitudes in error reporting confidence and error inevitability (table 2). Reflecting the difference of error reporting confidence, 31.1% of doctors gave a positive response to the reversely coded item 'I don't think I make errors', which meant in this context that 31.1% of doctors acknowledged to make mistakes, compared to 52.4% of nurses. Furthermore, 28.7% of doctors found disclosure of errors mandatory in all cases (by giving a positive response to the

reversely coded item 'Doctors / nurses have a responsibility to disclose errors to patients only if they result in patient harm') compared to 34.7% of nurses (table 2).

Positive and negative patient safety attitudes

Very positive attitudes were found in participants of both professional groups (mean > 4) on the items 'Even the most experienced and competent doctors make errors', 'Even the most experienced and competent nurses make errors' and 'Better multi-disciplinary teamwork will reduce medical errors' with >80% of participants giving a positive response. This was also demonstrated in the most positive attitudes of both professional groups in the patient safety domains 'Working hours as a cause of error' as well as 'Professional incompetence as a cause of errors' (table 2).

Additionally, doctors had very positive attitudes on the items 'Teaching teamwork skills will reduce medical error', 'Encouraging patients to be more involved in their care can help to reduce the risk of medical errors occurring', 'Shorter shifts will reduce medical errors', 'By not taking regular breaks during shifts doctors / nurses are at an increased risk of making errors' and 'I like my job'. While the participating nurses had no other item with a positive response rate of >80% of participants. (tables 2).

Negative patient safety attitudes were displayed by both professional groups on the item 'Learning about patient safety issues is not as important as learning other more skill based aspects of being a doctor / a nurse', also reflected by the lowest patient safety attitudes held in both professions on the patient safety domain of 'Importance of patient safety in the curriculum'. However, the lowest score by far was achieved for the item 'If people paid more attention at

work, medical errors would be avoided with less than 8% of participants in both professions holding a positive attitude (table 2).

Table 2: Results for individual items in each domain as means ± standard deviation, percentage of positive responses to each item and p-value for differences between professions. The darkly shaded rows show results for patient safety domain scores as means ± standard deviations.

1. Patient safety training received					
	Doctors (n=150)		**Nurses (n=424)**		
	Means ± Standard deviation	**% of positive response**	**Means ± Standard deviation**	**% of positive response**	**p-value**
My training has prepared me to understand the causes of medical errors	3.3 ± 1.0	**47.2%**	3.4 ± 1.2	**54.7%**	0.082
2. Error reporting confidence	3.3±0.7		3.6±0.7		<0.001*
I would feel comfortable reporting any errors I had made no matter how serious the outcome had been for the patient.	3.5 ± 1.0	**55.3%**	3.7 ± 1.0	**65.6%**	0.025
I would feel comfortable reporting any errors other people had made, no matter how serious the outcome had been for the patient.	3.1 ± 1.1	**38.0%**	3.5 ± 1.0	**57.3%**	<0.001*
I feel confident I could report an error I had made without feeling I would be blamed.	3.5 ± 1.1	**58.7%**	3.8 ± 1.0	**69.1%**	0.001*
I am confident I could talk openly to my supervisor about an error I had made if it had resulted in potential or actual harm to my patient.	3.5 ± 1.1	**59.3%**	3.7 ± 1.0	**67.2%**	0.077
Medical errors are handled appropriately in my workplace	3.0 ± 1.0	**35.5%**	3.3 ± 1.1	**48.3%**	0.001*
3. Working hours as a cause of errors	4.2±0.7		3.9±0.8		<0.001*
The number of hours doctors / nurses work increases the likelihood of making medical errors.	4.2 ± 1.0	**70.6%**	3.9 ± 1.2	**66.0%**	0.003*
Shorter shifts will reduce medical errors.	4.1 ± 1.0	**78.7%**	3.9 ± 1.1	**66.7%**	0.016*
By not taking regular breaks during shifts doctors / nurses are at an increased risk of making errors.	4.3 ± 0.9	**85.3%**	4.0 ± 1.0	**78.3%**	0.014*
I like my job	4.1 ± 0.9	**80.7%**	4.0 ± 1.0	**76.4%**	0.205
4. Error inevitability	3.7± 0.6		3.9± 0.6		0.033*
I don't think I make errors. (R)	2.9 ± 1.1	**31.3%**	3.4 ± 1.1	**52.4%**	< 0.001*
Even the most experienced and competent doctors make errors.	4.2 ± 0.9	**86.7%**	4.2 ± 0.9	**84.0%**	0.505
Even the most experienced and competent nurses make errors.	4.2 ± 0.8	**88.0%**	4.1 ± 0.9	**80.7%**	0.325
5. Professional incompetence as a cause of error	3.3±0.5		3.1±0.6		<0.001*

A true professional does not make mistakes or errors. (R)	3.9 ± 1.1	**74.0%**	3.6 ± 1.1	**60.1%**	0.006*
Medical errors are a sign of incompetence. (R)	3.7 ± 1.0	**64.7%**	3.4 ± 1.1	**48.2%**	<0.001*
Most medical errors result from careless nurses. (R)	3.4 ± 0.9	**50.7%**	3.6 ± 1.3	**56.6%**	0.051
If people paid more attention at work, medical errors would be avoided. (R)	2.1 ± 0.8	**4.7%**	2.1 ± 0.9	**7.3%**	0.918
Most medical errors result from careless doctors. (R)	3.3±1.2	**46.7%**	2.7±1.1	**24.1%**	< 0.001*
6. Disclosure responsibility	3.5±0.6		3.5±0.6		<0.711
Doctors / nurses have a responsibility to disclose errors to patients only if they result in patient harm	2.8 ± 1.1	**28.7%**	3.0 ± 1.1	**34.7%**	0.139
All medical errors should be reported	3.9 ± 0.9	**68.7%**	3.9 ± 1.0	**72.6%**	0.931
It is not necessary to report errors which do not result in adverse outcomes for the patient. (R)	3.4 ± 1.1	**47.6%**	3.2 ± 1.2	**43.6%**	0.060
It is the responsibility of all health care professionals to formally report all medical errors which occur	3.7 ± 1.0	**64.5%**	3.7 ± 1.0	**65.1%**	0.822
7. Team Functioning	3.9±0.6		3.9±0.6		0.914
Better multi-disciplinary teamwork will reduce medical errors.	4.3 ± 0.9	**86.7%**	4.1 ± 0.8	**82.2%**	0.017*
Personal input about patient care is well received at my workplace	3.4 ± 1.0	**50.7%**	3.6 ± 1.0	**60.4%**	0.013*
Teaching teamwork skills will reduce medical errors.	4.1 ± 0.8	**84.7%**	4.1 ± 0.8	**79.2%**	0.800
8. Patient involvement in reducing error	3.5±0.8		3.5±0.6		0.958
Patients have an important role in preventing medical errors.	3.4 ± 1.0	**53.3%**	3.6 ± 1.0	**59.2%**	0.082
Encouraging patients to be more involved in their care can help to reduce the risk of medical errors occurring.	4.0 ± 0.8	**84.0%**	3.9 ± 0.9	**74.3%**	0.047*
9. Importance of patient safety in the curriculum	3.2±0.6		3.2±0.4		0.973
Patient safety issues cannot be taught and can only be learned by clinical experience when qualified (R)	3.6 ± 1.1	**57.3%**	3.2 ± 1.2	**42.0%**	<0.001*
Learning about patient safety issues before I qualify will help me to become a more effective doctor / nurse.	3.9 ± 1.0	**74.0%**	3.8 ± 0.9	**71.7%**	0.858
Learning about patient safety issues is not as important as learning other more skill based aspects of being a doctor / a nurse (R)	2.3 ± 1.1	**16.7%**	2.7 ± 1.2	**25.7%**	0.001*

***= statistically significant, (R) reversely coded items**

Discussion

In general, doctors showed more positive attitudes towards patient safety than nurses who participated in this study, although significantly more nurses had received patient safety training than doctors, but conversely doctors displayed a significantly more positive attitude towards the patient safety training they had received (tables 1 and 2). Both professional groups showed their most negative as well as their most positive attitudes in the same domains and on the same items, which is in contrast to some international studies on patient safety attitudes including doctors and nurses,[31-33] but similar to a recent study from Palestine.[18] However, significant differences between both professional groups were found on the majority of items (16 of 30 item) and domains (five out of nine domains), with nurses having significantly more positive attitudes in the domains of 'Error reporting confidence' and 'Error inevitability' and doctors in 'Working hours as a cause of error' and 'Professional incompetence as a cause of error'.

Team Functioning

Good functioning of the team has been recognized as one of the most important factors in securing patient safety and establishing a safe patient culture.[21] M Leonard et al. investigated 2455 sentinel events reported to the Commission on Accreditation of Healthcare Organizations and found that 70% of these were due to a breakdown in the team functioning.[34] Teamwork also gathered the most positive attitudes in different studies in other contexts, as among nurses in Iran,[35] operating department teams in Sweden,[32] medical students in Taiwan[26] and Pakistan[33] or medical interns in Korea.[36] Physicians and nurses in Gaza showed more positive attitudes towards team work than nurses in Lithuania[31] or medical students in Hong

Kong and Singapore.[19] One reason for the positive attitudes in this study might be a recent emergence of undergraduate and postgraduate team training in the local context, such as in trauma care, resuscitation teams or unit teams.[14]

Teams act in different forms in healthcare, including short-term teams, such as resuscitation teams, more stable teams, such as those working together on one shift or long-term teams in one unit. Several definitions of teams have been discussed, but they all have common factors, including shared identity, clear roles/goals, shared responsibility, interdependence of team members, integration of work and team tasks.[37-40] The importance of these factors varies with types of teams and their purpose. Teamwork requires varying levels of collaboration, coordination, cooperation, networking or a mixture of these types of teamwork.[38 41] Healthcare workers will be part of different teams in their career. Although participants of this study were recruited from different specialties and departments, they displayed agreement on the importance of efficient teamwork to ensure patient safety, demonstrating commonly shared and agreed values towards this important factor. This offers potential to be translated into a culture of shared values when they work together in one unit.[32 42] However, the actual teamwork climate in Palestinian hospitals is lagging behind this attitude demonstrated by doctors and nurses. Within the Arab context, a systematic review by Elmontsri et al., which included a Palestinian study, examined patient safety culture within hospital units and found actual team work culture was rated better within units, (71% in the Palestinian study), than across hospitals (44% in Palestine) and this was worse than in most studies from other Arab countries.[25] Therefore, to improve efficiency of teams, training has to address existing teams as well as individuals, who will use their skills in different team contexts. [14 37-39 41 43]

Working Schedule

The working hours received the second highest patient safety ratings in both professions with doctors' attitudes significantly more positive than nurses. Heavy workload, poor staffing levels and unsatisfactory facilities have been identified as challenges to the provision of safe care in Gaza Hospitals in other studies.[5 23 44 45] In times of crises such pressures are often further exacerbated. Therefore, it is safe to assume that both doctors and nurses have experienced excessive working hours and workload before and are able to judge the effect this might have on patient safety based on their own experiences. Although this factor is important to ensure patient safety,[6 7] it is often neglected in low resource settings, as experienced by participants of this study.[20]

Understanding and Dealing with Medical Error

A main threat to patients are medical errors that have been reported to be the third leading cause of death in the USA[46] and affect one in seven patients admitted to Palestinian hospitals.[12] Therefore, one of the most important concepts in patient safety is the causation of and learning from errors. This includes the understanding that errors are often not individual failings, but system failures, which can be of vital importance for an organization to learn and develop systems that keep patients safer in the future.[46 47] It is vital that individual professionals, teams as well as managers and organizations use such opportunities for improvement of safe patient management.

One component of this is the realization that errors are inevitable,[47] but it is the responsibility of a well-designed system to prevent them causing actual harm to patients. In this study, the professional groups displayed positive attitudes in the domain 'Error inevitability' with nurses having higher scores than doctors and showing a degree of understanding of human factors and

their contribution to possible errors. Conversely, however, in the domain 'Professional incompetence as a cause of error' nurses showed the most negative and doctors the second most negative attitudes, demonstrating deficient understanding in this area. One reason for this can be the relatively small proportion of participants who had received patient safety training. Another factor might be the experience of participants of how management and the Palestinian Ministry of Health deal with mistakes in practice, showing also poor understanding of this concept. In one study in Palestine, 34.5% of participants reported difficulties in discussing and learning from error, confirming a cultural problem in this area affecting a large proportion of healthcare professionals.[5] Similarly, in a report investigating maternal mortality in the Gaza-Strip, clinicians reported that they felt unsupported by management in case of adverse events.[48] However, similar discrepancies between the acknowledgment that errors are inevitable, but that professionals should not make mistakes were also found internationally,[28 31 33 35 49 50] possibly reflecting the ideal for professionals not to make mistakes. The understanding of this discrepancy, between error inevitability and the ideal of professionals avoiding them, needs to be focused on in further training as well as by developing more effective systems to deal with errors openly and learn from them.[51 52]

Doctors held significantly more negative attitudes in 'Error reporting confidence' than nurses, possibly reflecting disparate cultures in this domain within both professions. However, 'Disclosure responsibility' showed no significant differences, reflecting general poor understanding of incident reporting and analysis as a tool of learning. Similar findings were shown in other studies in the Palestinian and wider Arab context, as well as other countries.[5 23 48 53] In order to achieve ongoing organizational learning and continuous improvement in care, a disclosure system and disclosure training for professionals are essential to facilitate learning

from mistakes. Both are absent locally and the impact of this deficiency on patient safety attitudes are demonstrated by this study.[52]

Patient Safety Education

It has been acknowledged widely that patient safety is an important component of the undergraduate as well as postgraduate curricula.[54-56] However, neither nurses nor doctors, participating in this study, found training in patient safety particularly important for healthcare professionals. This could be due to the 'hidden curriculum' that has been discussed by several researchers,[57 58] describing the fact that students and professionals witness behaviours in clinical practice, possibly on a daily basis, which are contradicting their learning. Healthcare professionals might feel demotivated and therefore find that patient safety training has no value.

This is a big challenge to overcome, as only the motivated students might have full benefit from any delivered teaching.[59] Therefore, delivering patient safety training should be regarded as a priority and use novel ways of its teaching in order to keep a close link to clinical practice as well as capture the learners' imagination and interest. Numerous different ways have been investigated and described, including simulation training, e-learning, problem based learning, self-reflection, critical thinking and even an iPad game.[60-64] Developing such curriculum content requires leadership, resources and commitment, which can be difficult to mobilize, especially in the context of low and middle income countries like Palestine who have many other challenges to cope with.[20] A study examining the impact of patient safety interventions undertaken in Palestinian hospitals by several bodies, including the WHO and the Patient Friendly Hospitals Initiative showed a 9.1% improvement in patient safety attitudes of healthcare staff in the area with the largest improvement, which was incidence reporting frequency. Despite

the fact that, a large volume of monies was spent on this improvement over a 3-year period from 2011 – 2014, it only achieved a moderate impact.[18] This finding underlines the significance of identifying those interventions with the greatest effect, in order to ensure not only impact, but also cost effectiveness. Nonetheless, such investment might in the future pay off in terms of improved patient outcomes and a more satisfied workforce.

Strengths and Limitations

The main strengths of this study are the sample size and the fact that participants were able to be recruited from different hospitals, giving a representative account of the situation across the Gaza-Strip. Furthermore, the low number of missing values adds to the strengths of this study.

Limitations of the study include the fact that the questionnaire had originally been validated among medical students. However, as it offered a way to assess patient safety attitudes independent of organizational culture, it was found to be a suitable tool for this study. Several other studies in this area look at institutional cultures and use different questionnaires, making direct comparisons of values impossible. Another limitation to this study is the use of a convenience sample which may limit the generalizability of the findings. However, the sample size was good with 56.3% of potential participants, which increases representativeness of this study. Furthermore, face-to-face distribution might have made participants feel obliged to complete the questionnaire. However, the research team members did not know the participants, who were informed that participation was entirely voluntary.

Conclusion

Nurses and doctors displayed their most positive patient safety attitudes in the same domains (‘importance of teamwork’ and ‘working hours as a cause for error’’) as well as their most negative attitudes (‘importance of patient safety training’ and ‘professional incompetence as a cause for error’). However, differences were also found with nurses being more confident in error reporting and doctors having slightly better understanding of possible causes of error, such as working hours. Healthcare policy makers and educators have to focus on the delivery of patient safety training, which is both motivating and relevant for clinicians and demonstrates the importance of this content in ongoing professional learning. Furthermore, inevitability of medical errors, their impact and learning from them are an essential part of undergraduate as well as postgraduate training and have to be more consistently included in curriculum delivery.

Authors’ Contributions

BB designed the study, performed the statistical analysis, contributed to and supervised data collection, contributed to interpretation of results, drafted and revised the manuscript. NAEN and MAEN contributed to the design of the study and the statistical analysis as well as interpretation of results and contributed to revision of the manuscript. YA and MA contributed substantially to the data collection, supervised the process of data collection and data entry, participated in interpretation of results and statistical analysis and revision of the manuscript. EA, SEH and IAN conducted the data collection and supported interpretation of results and revision of the manuscript.

Competing interests

None of the authors have any competing interests to declare.

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Ethical approval and Consent

Approval was received from the ethics committee of the Human Resources Department of the Palestinian Ministry of Health. Formal written consent was obtained from all participants in this study. All data were kept completely anonymously.

Data Sharing Statement

No additional data is available.

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Legends and Captions for legends

Figure 1: Study population flow chart

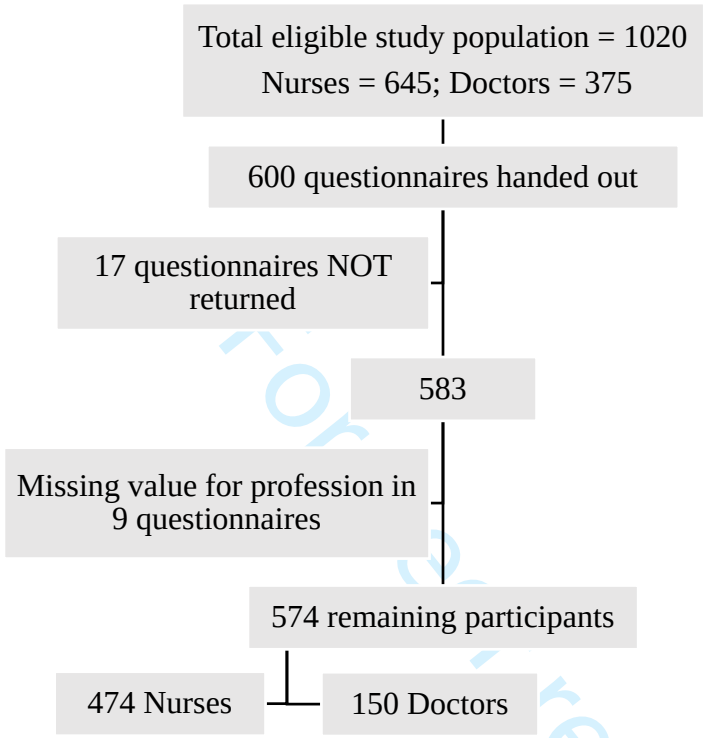

Figure 1: Study population flow chart

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	2-3
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	5-7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
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	N/A
Bias	9	Describe any efforts to address potential sources of bias	N/A
Study size	10	Explain how the study size was arrived at	4-6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6-7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6-7
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
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	7
		(b) Give reasons for non-participation at each stage	7
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8
		(b) Indicate number of participants with missing data for each variable of interest	7
Outcome data	15*	Report numbers of outcome events or summary measures	5-7
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	N/A

		(*b*) Report category boundaries when continuous variables were categorized	6
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	8-12;18
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	17-18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	N/A
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	N/A

*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.