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Patient safety in medical education: Tunisian students' attitudes

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ABSTRACT

Health care delivery continues to be unsafe despite major patient safety (PS) improvement efforts over the past decade. Medical school education plays an important role in promoting this culture during initial training. To determine undergraduate medical students' attitudes toward PS at a Tunisian medical school. We carried out a cross-sectional study among undergraduate medical students at Ibn Al Jazzar Medical School in Sousse, Tunisia, using a self-administered questionnaire inspired from the valid tool: Attitudes to Patient Safety Questionnaire (APSQ III). A total of 178 medical students responded to the questionnaire. Medical students tend to have an overall positive perceptions of PS culture with a global mean score 5.33 ± 0.5 . Among the individual domains 'Working hours as a cause of error' earned the highest score (6.38 ± 1.0) followed in order by 'Team functioning' (6.24 ± 0.8), 'Error inevitability' (5.91 ± 1.0) and 'Patient involvement in reducing error' (5.50 ± 1.0). The lowest score was for 'Professional incompetence as a cause of error' (4.01 ± 1.0). A PS domain's mean scores comparison based on socio-demographic variables: gender, age, academic year and on PS training revealed a statistically significant difference ($p < 0.05$) for five PS key dimensions: 'Error reporting confidence', 'Working hours as a cause of error', 'Professional incompetence as a cause of error', 'Team functioning' and 'PS training received'. Tunisian medical students showed positive attitude towards PS. Nevertheless, intensive in terms of frequency and duration sessions, based on various teaching methods may be needed to fulfill students' educational needs.

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1. Introduction

Health care delivery continues to be unsafe despite major patient safety (PS) improvement efforts over the past decade. The World Health Organization (WHO) estimated that 1 in 10 patients in high-income countries, with sufficient funds and modern technology, is harmed while receiving hospital care and 1 in 300 will die as a result. Moreover, 50% of such adverse events, leading to patient harm, were considered to be preventable [1].

Adverse events are becoming a major consumer of healthcare system resources, causing burdens associated with both economics and death. Unsafe care has high financial and economic costs. In developed countries, the direct cost of treating patients who have been harmed during their care approaches 13% of health spending [2].

While, the burden of unsafe care is unclear in developing countries where inappropriate infrastructure, technology and insufficient or even unskillful human resources have caused higher possible risk of harm to the patient in hospitals and in primary care compared with developed countries [3]. Lack of a well-developed system of adverse events reporting in these countries has increased the ambiguity, with

a lack of transparency, a fear of retribution, the inability of health care professionals to freely report on events and occurrences of harm and errors [4].

In Tunisia, there are no official statistics on the incidence of adverse events; however, the results of some studies increase concern regarding the rate of medical errors [5,6]. Therefore, improving patient safety has become a priority and a cornerstone to improving the delivered quality of care.

Over the past decade, many interventions have been used to address adverse events and improve patient safety, but the prevailing organizational culture in health care environment has been one of the major obstacles. Attitude of physicians to medical errors is one of the most important components of safety culture [3].

Medical school education plays an important role in promoting this culture during initial training [7]. Substantive improvements in patient safety will be difficult to achieve without major medical education reform at the medical school and internship training program levels. Medical schools must not only assure that future physicians have the requisite knowledge, skills, behaviors, and attitudes to practice competently, but also are prepared to play active roles in identifying and resolving patient safety problems [8].

The WHO has recognized this importance and has developed a curriculum guide to provide medical students with essential patient safety lessons to allow them to practice safely [9]. It includes a teacher's guide and a comprehensive, ready-to-use, topic-based program with a full set of slides.

In Ibn Al Jazzar medical school, medical studies reform was implemented since the academic year 2016–2017 to better acquire skills to satisfy the population needs. In this reform, educational managers of our faculty perceived the importance of incorporating patient safety into medical curriculum in order to orient medical students to the need for patient safety. Because we believe there are challenges associated with incorporating patient safety into medical education and training in one hand, and because little is known about medical students' attitudes toward patient safety in Tunisia, we carried out this study to determine attitudes of medical students toward patient safety at Ibn al Jazzar medical school.

2. Methods

2.1. Survey setting

This cross-sectional descriptive study was conducted in September and October 2020 at Ibn Al Jazzar University in Sousse. Sousse is located in the center of Tunisia, on the Tunisian Sahel coast and located in the Mediterranean Sea bordering the east of the country, 140 km south of the capital Tunis.

The academic program at Ibn Al Jazzar University of Medicine is a total of five years. The first and second years are the pre-clinical phase while the third, fourth and fifth years are devoted to clinical rounds with an estimated total population of 1400 medical students.

At Ibn Al Jazzar University, patient safety topics were integrated into the third- and fourth-year program since the academic year 2016–2017 to be online with accreditation standards.

Participants were undergraduate medical students from first to fifth year programs, recruited with non-probability convenience sampling. Students in third years were excluded because all patient safety objectives were not achieved with students of this level.

2.2. Study population

Students enrolled at 'Ibn El Jazzar Medical University of Sousse' for the academic year of 2021/2022 from first to fifth year of university studies.

2.3. Measures

In this study, the 26-item Attitudes to Patient Safety Questionnaire (APSQ-III) developed by Carruthers et al. in 2009 [10] was used. This questionnaire was designed to

measure medical students' attitudes in 9 safety domains. The internal consistency of the items in the nine domains ranged between 0.64 and 0.82. It has been used by several studies to assess attitudes to patient safety [11–16].

The nine dimensions of patient safety attitude and the items are:

- D1: Patient safety training received (items 1–3)
- D2: Error reporting confidence (items 4–6);
- D3: Working hours as an error cause (items 7–9);
- D4: Error inevitability (items 10–12);
- D5: Professional incompetence as an error cause (items 13–16);
- D6: Disclosure responsibility (items 17–19);
- D7: Team functioning (items 20 and 21);
- D8: Patient involvement in reducing error (items 22 and 23);
- D9: Importance of patient safety in the curriculum (items 24–26).

Even though Carruthers et al. used a Likert scale of 1–7, some studies have used the Likert scale of 1–5 [13,17]. In this study, the items were measured on a scale of 1 (strongly disagree) to 7 (strongly agree), where a response of 1 indicated disagreement while a response of 7 indicated agreement to the statement.

A higher score indicated a more affirmative or positive response to the factor concerned. Several items (**Items 11 and 13–18, 25**) were reverse scored, according to the instructions of the original creators of the instrument. Each participant's responses were summed up into nine subscores that corresponded to the nine key factors.

APSQ-Score describes the overall patient safety attitudes as a Likert-scale score with a maximum of 7. This was calculated by dividing each total APSQ-Score by the total number of items and then representing this score as one mean (\pm standard deviation) for all participants.

Furthermore, the proportion of participants giving a positive score on a single item (defined as a score of 5, 6 or 7) is represented for each item as the percentage of positive responses from all responses.

2.4. Data collection

The participating students accessed the questionnaire through the Google Forms platform via e-mail and social network (Facebook Groups).

The questionnaire was presented as a web application (Google forms), made accessible for two months (September and October 2021).

2.5. Data analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) for

Windows version 23. One-way ANOVA and t-test were used to examine any association between participants' characteristics and overall APSQ scores. A p-value of ≤ 0.05 was considered statistically significant.

2.6. Ethical considerations

Students enrolled in this research have responded to an Informed Consent which has been approved by local Ethics Committee on Human Research and this protocol has been found acceptable by them.

3. Results

3.1. General characteristics of the study respondents

A total of 178 undergraduate medical students responded to the questionnaire with a mean age of 23.0 ± 1.8 years. Among them, 69.1% were women (sex ratio = 0.44). Approximately half of the sample (42%) was in their fifth year and almost the quarter (23%) were in their first year (Table 1).

3.2. Attitudes of undergraduate medical students towards patient safety using the attitudes to patient safety questionnaire

Table 2 reveals undergraduate medical students' attitudes toward patient safety according to the APSQ-III items. Thus, 17 items were perceived with an affirmative attitude (score range was from 5 to 7 and from 1 to 3 for reverse scored items), three items with a negative attitude while 6 items showed a neutral attitude (mean score = 4). The highest positive response rate corresponded to 'team functioning' and 'working hours as error cause'. Moreover, the majority of respondents approved that a heavy workload could be an error cause and about 93% mentioned that 'By not taking regular breaks during shifts, doctors are at an increased risk of making errors' (mean score = 6.53 ± 1.0).

Table 1. Characteristics of under graduate medical students (N= 178)

Characteristics	n (%)
Gender	
Male	55(31.8)
Female	123(69.1)
Academic year	
First	40(22.9)
Second	28(13.7)
Fourth	37(20.8)
Fifth	73(41.7)
Age in years	
≤ 20	38(21.4)
21-22	38(21.4)
23-24	85(47.7)
≥ 25	17(9.5)
Mean age in years \pmSD	23.0 ± 1.8

Regarding respondents' perceptions of PS dimensions, the overall mean score of PS culture was 5.33 ± 0.5 . Among the individual domains 'Working hours as a cause of error' earned the highest score (6.38 ± 1.0), followed in order by 'Team functioning' (6.24 ± 0.8), 'Error inevitability' (5.91 ± 1.0) and 'Patient involvement in reducing error' (5.50 ± 1.0). On the other hand, the lowest score was for 'Professional incompetence as a cause of error' revealing a neutral attitude with a mean score of (4.01 ± 1.0) (Table 3).

4. Association between participants' characteristics and APSQ scores

A PS domain's mean scores comparison based on socio-demographic variables (such as gender, age, academic year) and on PS training revealed a statistically significant difference ($p < 0.05$) for five key dimensions (D1, D2, D3, D5 and D7). Thus, male medical students scored significantly lower for 'Professional incompetence as a cause of error' than females (3.7 ± 0.9 vs. 4.1 ± 1.0 , $p = 0.01$). Nevertheless, they were significantly more likely to report, comfortably, their errors made (5.0 ± 1.2 vs. 4.5 ± 1.3 , $p = 0.03$). Additionally, significant differences were observed with 'PS training received' and 'Working hours as error cause' and students age. So that we observed more significantly higher means with medical students aged more than 25 years old (5.4 ± 0.8 , $p = 0.02$ and 6.7 ± 0.5 , $p = 10^{-3}$ respectively). Similarly, academic year revealed a significant difference for three key domains 'PS training received', 'Working hours as a cause of error' and 'Team functioning' ($p = 10^{-3}$, 10^{-3} and 10^{-2} respectively). In fact, students registered in fourth and fifth year programs were more likely, than younger undergraduate students, to perceive importance of training in PS and long working hours as a cause of error. They have shown, as well a better appreciation of teamwork skills.

A statistically significant difference was also found in term of receiving training in PS. Thus, students who received this type of training perceived significantly better its importance (5.1 ± 1.0 vs. 4.5 ± 1.3 , $p = 0.04$), agreed that heavy workload was a source of errors (6.5 ± 0.9 vs. 6.0 ± 0.9 , $p = 10^{-3}$) and considered better professional incompetence as an error cause (4.1 ± 1.0 vs. 3.8 ± 0.9 , $p = 0.04$) (Table 4).

5. Discussion

Patient safety remains the most critical component of health care quality all over the world. To date, in Tunisia PS improvement is based on voluntary unstructured actions and faces several obstacles, especially cultural ones. Thus in order to consider

long-term objectives, developing a culture of safety among Tunisian practitioners is a core element of many efforts to improve patient safety and care quality [18]. In this context, focusing on attitudes, preferences and knowledge of medical students is necessary for a successful plan for patient safety in the future and making cultural changes sustainable [3].

A previous study carried out in our institution by Bougmiza et al in 2011 [19,20] among undergraduate medical students of the fifth year revealed

a low level of PS perceptions and concluded to the need to introduce PS concepts in the academic curriculum. The principal limit of this study was the use of an instrument not specifically designed for students. So, our study seems to be the first to deal with PS perceptions among Tunisian undergraduate medical students with a rigorous methodology based on validated and reliable tool specifically designed for students 'APSQ-III' used by numerous previous scientists in many countries [11–14,16,21,22].

Table 2. Undergraduate medical students' attitudes towards patient safety using the attitudes to patient safety questionnaire (N = 178).

Domains	Key Safety Factor Items	No. of agreements (%)	Mean score±SD
1. Patient safety training received	1. My training is preparing me to understand the causes of medical errors	119 (66.9)	4.97 ± 1.4
	2. I have a good understanding of patient safety issues as a result of my undergraduate medical training	124 (69.7)	5.10 ± 1.2
2. Error reporting confidence	3. My training is preparing me to prevent medical errors	102 (57.3)	4.67 ± 1.6
	4. I would feel comfortable reporting any errors I had made, no matter how serious the outcome had been for the patient	98 (55.1)	4.67 ± 1.6
	5. I would feel comfortable reporting any errors other people had made, no matter how serious the outcome had been for the patient	91 (51.1)	4.48 ± 1.5
3. Working hours as error cause	6. 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.	115 (64.6)	4.96 ± 1.5
	7. Shorter shifts for doctors will reduce medical errors	156 (87.6)	6.15 ± 1.3
	8. By not taking regular breaks during shifts, doctors are at an increased risk of making errors	165 (92.7)	6.53 ± 1.0
4. Error inevitability	9. The number of hours doctors work increases the likelihood of making medical errors	164 (92.1)	6.48 ± 1.0
	10. Even the most experienced and competent doctors make errors	163 (91.6)	6.44 ± 1.0
	11. A true professional does not make mistakes or errors *	144 (80.9)	5.59 ± 1.6
5. Professional incompetence as error cause	12. Human error is inevitable	132 (74.2)	5.73 ± 1.8
	13. Most medical errors result from careless nurses*	91 (51.1)	4.50 ± 1.6
	14. If people paid more attention at work, medical errors would be avoided*	13 (7.3)	2.00 ± 1.4
	15. Most medical errors result from careless doctors*	102 (57.3)	4.44 ± 1.7
6. Disclosure responsibility	16. Medical errors are a sign of incompetence*	131 (73.6)	5.13 ± 1.4
	17. It is not necessary to report errors which do not result in adverse outcomes for the patient*	137 (77.0)	5.42 ± 1.6
	18. Doctors have a responsibility to disclose errors to patients only if they result in patient harm*	83 (46.6)	4.34 ± 1.6
	19. All medical errors should be reported	139 (78.1)	5.58 ± 1.3
7. Team functioning	20. Better multi-disciplinary teamwork will reduce medical errors	165 (92.7)	6.28 ± 1.0
	21. Teaching teamwork skills will reduce medical errors	165 (92.7)	6.22 ± 0.9
8. Patient involvement in reducing error	22. Patients have an important role in preventing medical errors	121 (68.0)	5.21 ± 1.3
	23. Encouraging patients to be more involved in their care can help to reduce the risk of medical errors occurring	150 (84.3)	5.80 ± 1.1
9. Importance of patient safety in the curriculum	24. Teaching students about patient safety should be an important priority in medical student training	152 (85.4)	5.96 ± 1.1
	25. Patient safety issues cannot be taught and can only be learned by clinical experience when qualified*	67 (37.6)	3.71 ± 1.7
	26. Learning about patient safety issues before I qualify will enable me to become a more effective doctor	159 (89.3)	5.82 ± 1.0

* = Reversed scored item

Table 3. Mean scores of the nine domains of the attitudes to patient safety questionnaire (APSQIII).

Domains	Mean score ± SD
1. PS training received	4.91 ± 1.2
2. Error reporting confidence	4.70 ± 1.3
3. Working hours as a cause of error	6.38 ± 1.0
4. Error inevitability	5.91 ± 1.0
5. Professional incompetence as a cause of error	4.01 ± 1.0
6. Disclosure responsibility	5.11 ± 1.0
7. Team functioning	6.24 ± 0.8
8. Patient involvement in reducing error	5.50 ± 1.0
9. Importance of PS in the curriculum	5.16 ± 0.9
Overall Score	5.33 ± 0.5

Table 4. Association between participants' characteristics and APSQ scores.

Gender	Gender Mean (\pm SD)		Age in years Mean (\pm SD)			Academic year Mean (\pm SD)			PS training Mean (\pm SD)							
	Male	Female	p-value	≤ 20	[21-22]	[23-24]	≥ 25	p-value	First	2nd	4th	5th	p-value	No	Yes	p-value
D1	4.9(1.3)	4.9(1.1)	0.6	4.7(1.3)	4.5(1.2)	5.0(1.0)	5.4(0.8)	0.02*	4.7(1.3)	4.2(1.4)	5.3(0.8)	5.0(1.0)	10-3*	4.5(1.3)	5.1(1.0)	0.04*
D2	5.0(1.2)	4.5(1.3)	0.03*	5.0(1.3)	4.5(1.1)	4.6(1.4)	4.5(1.3)	0.3	4.8(1.2)	4.6(1.3)	4.8(1.4)	4.5(1.3)	0.5	4.7(1.3)	4.6(1.3)	0.7
D3	6.4(0.9)	6.3(0.9)	0.9	5.9(0.9)	6.2(0.8)	6.5(0.9)	6.7(0.5)	10-3*	5.8(1.0)	6.4(0.6)	6.6(0.6)	6.5(1.0)	10-3*	6.0(0.9)	6.5(0.9)	10-3*
D4	5.8(1.0)	5.9(0.9)	0.1	5.8(1.1)	5.9(0.8)	5.8(1.0)	6.0(0.8)	0.9	5.7(1.0)	6.0(0.8)	6.1(0.7)	5.8(1.1)	0.6	5.8(1.0)	5.9(1.0)	0.7
D5	3.7(0.9)	4.1(1.0)	0.01*	3.9(1.0)	3.5(0.9)	4.2(1.0)	4.0(0.9)	10-3*	3.6(1.0)	4.0(0.8)	3.9(0.9)	4.2(1.0)	0.05	3.8(0.9)	4.1(1.0)	0.04*
D6	5.2(1.0)	5.0(1.1)	0.2	5.0(1.1)	5.0(1.1)	5.1(1.0)	5.4(0.9)	0.6	5.0(1.2)	5.2(1.1)	5.3(1.0)	5.0(1.0)	0.4	5.0(1.1)	5.1(1.0)	0.8
D7	6.2(0.7)	6.2(1.0)	0.6	5.9(0.9)	6.4(0.7)	6.2(0.8)	6.3(1.0)	0.1	5.9(0.9)	6.4(0.6)	6.4(0.8)	6.2(0.9)	10-2*	6.1(0.8)	6.3(0.8)	0.1
D8	5.4(1.1)	5.5(1.0)	0.9	5.4(1.0)	5.6(0.9)	5.5(1.0)	5.2(1.5)	0.9	5.4(1.0)	5.7(0.8)	5.3(1.1)	5.4(1.1)	0.7	5.5(0.9)	5.4(1.1)	0.6
D9	5.3(0.8)	5.0(0.9)	0.06	5.1(0.7)	5.1(0.9)	5.1(0.9)	5.3(0.9)	0.8	4.9(0.8)	5.4(0.8)	5.1(0.9)	5.1(0.9)	0.3	5.1(0.8)	5.1(0.9)	0.8

*p < 0.05

Our survey not only reveals that undergraduate medical students tend to have an overall positive perceptions of PS culture, but also highlights the most valued PS dimensions as well as the most significant differences observed between respondents' attitudes based on their gender, age, academic year and on PS training received.

Similar to previous studies' results, the respondents' attitudes toward PS culture was generally positive, with a mean score of 5.33 ± 0.5 [11–17]. Among individual PS' dimensions: '**heavy workload**' earned the highest score, which aligns with prior study conducted by Leung et al. [21] that revealed higher positive scores for '**Working hours as an error cause**' and '**Error inevitability**', which was in concordance with another Saudi Arabian survey indicating a significant association between heavy workload and medical errors increased risk [11]. Thus, health care managers must establish adapted strategies aimed at reducing health care workers' workload by resorting to shorter shifts and regular breaks which might prevent the risk of burnout among professionals [23]. Furthermore, in the current study, we observed more significantly higher means for heavy workload with senior medical students and with those aged more than 25 years ($p = 10^{-3}$ for both). A probable reason for this finding is that senior medical students are more involved in clinical activities during their internships and are aware, by observing their senior supervisors, of the impact of a heavy workload on therapeutic conducts as well as on professionals' mental health. Our outcomes would be explained by the fact that the weekly average hours worked in our country is about 60 hours with no consideration of night shifts and without compensatory rest in most cases. So that, Tunisia is regarded as having the second highest work hours for junior physicians among 154 countries [24].

The factor of team functioning had the second highest score. Thus, over 90% of students believed that teaching teamwork skills and working with a multidisciplinary team lead to better results in term of PS. This percentage was significantly higher among senior medical students ($p = 0.01$). Indeed, many previous studies strongly agreed with this idea and reported the significant and crucial role of recognizing team work skills [11,14,21].

Regarding the causes of medical errors, the most of participants (75%) stated that medical errors are inevitable, and interestingly, over 90% reclaimed that even the most experienced doctors make errors. This is in concordance with previous studies suggesting that most of the damage caused to patients was unavoidable [3,13,21]. Hence the appropriate management of a medical incident is now believed to consist of open disclosure, a systematic analysis of root causes and the implementation of systemic measures to address underlying causative factors at different levels. This

contrasts with previous approaches that focused mainly on human and individual errors [21].

Medical students disagreed that medical errors are a sign of incompetence (73.6%). At the same time, they agreed that « If people paid more attention at work, medical errors would be avoided ». This paradox highlights the understanding of error to be that of an individual failing of a single healthcare professional, as students think that errors could be prevented if healthcare professionals took more care. This finding may indicate a knowledge gap in the understanding of error causation and shows that students lacked awareness about systematic errors and reflects the persistence of a punitive culture of blaming medical errors on individuals in Tunisian context.

Even if 'Professional incompetence as a cause of error' had revealed the lowest score, undergraduate students who had received PS training significantly considered professional incompetence as an error cause ($p = 0.04$). This finding underline the need for formal delivery of patient safety contents within the undergraduate curriculum.

Regarding the disclosure of medical errors, about the half, 55.1%, mentioned that they were comfortably confident in reporting errors and almost two thirds 64.6% felt generous in reporting their own errors to their supervisors regardless how serious the harm causing to the patient. Thus, the confidence level of reporting errors was found to be good [25–28]. Indeed, this was in concordance with the findings of prior studies [11,13,14,21,29]. Furthermore, according to the current study male medical students have been found to have significantly a greater willingness to disclose medical errors than female ($p = 0.03$). This can be attributable to the fact that psychologically female students for fear of sanctions will not report the incidence of an error in their daily practice. Unfortunately, this may lead to limit the opportunity of learning from their mistakes. Hence, these findings underscore the importance of establishing a blame free culture which seemed to be the main strategy to improve error reporting rates promoting therefore PS climate [30].

In the field of PS training, undergraduate students who have already received such training significantly mentioned the importance of including PS programs in the curriculum and agreed that heavy workload was a source of errors ($p = 0.04$, 10^{-3} respectively) which aligns with earlier research reported in the literature [16,21]. Thus, students who have been trained in PS principles appear to be more aware of the contribution that the implementation of PS culture has on the proper conduct of medical activities and on the care of patients, thereby making the health care system more effective and efficient.

The Tunisian emerging literature was largely interested in appreciating PS culture among health care workers [18,30–34] and revealed that this culture

remains underdeveloped and should be improved. Our study seems to be the first to assess PS culture among undergraduate medical students. In addition, using a rigorous methodology based on valid tool 'ASQ-III' is a powerful feature of this study. Nevertheless, some limitations of the current study must be acknowledged. First, although the tool used is reliable in many countries, it is needed to validate an appropriate tool adapted to the Tunisian context. Second, our target population consisted only of one faculty of medicine, which limits the representativeness of our results; further studies on this topic among medical students from the four Tunisian faculties of medicine are essentials in the future in order to generate a national baseline helping the authorities to act appropriately. Finally, data were self-reported and might be subject to social desirability bias.

6. Conclusion

Ibn al Jazzar Faculty of Medicine leaders are the pioneers in Tunisia to introduce PS concepts in undergraduate medical curriculum. The APSQ-III tool revealed a positive attitude among Tunisian undergraduate medical students towards PS. Nevertheless, to overcome weaknesses in the development of PS culture, more intensive in terms of frequency and duration sessions, might be needed to better address students' knowledge and attitudes in this field and to fulfill their educational needs.

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