


Knowledge and Attitude of Saudi Emergency Medical Services Students Regarding Pain Management: A Cross-Sectional Study

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Abstract

The most common reason people seek emergency medical services is pain, either from a severe injury or a life-threatening illness emergency medical services (EMS). Few studies on analgesic administration and pain management assessments are available for EMS students to read (as potential EMS professionals). Therefore, the goal of this study is to find out the knowledge and attitude of EMS students about pain management. Saudi EMS students were asked to complete a survey on their knowledge and attitudes about pain management. As a result, the KASRP scale was used. A t-test was performed to assess the statistical descriptive and independent sampling findings. Data collection started in October 2020 and lasted for one month. EMS students completed 79 questionnaires (response rate of 53%). According to the findings, EMS students demonstrate inadequate fundamental knowledge and attitudes in pain management. The mean correct count for the entire scale was 47% (SD=.09). The findings showed that no major variations were observed in the scores of students associated with demographic features. There are potential opportunities in the program to improve the content and student competencies in pain management.

Keywords

knowledge, attitudes, pain management, emergency medical services, emergency medical services students

What do we already know about this topic?

Emergency medical services education invests much in empowering its graduates by introducing various sophisticated maneuvers and procedures to enlarge the system effectiveness that results in saving more lives and reducing the suffering of patients who are in medical emergency. Knowledge and competency in medication is an important aspect in this empowerment. Pain management can be by techniques (e.g., immobilization) or by medication administration. The research in pain management in the area of EMS is limited overall.

How does your research contribute to the field?

The fact that no other study has been found that investigated the knowledge and attitudes of EMS students in pain management in Saudi Arabia suggests a presence of a research gap in this area of information in EMS field in the country. This study comes to fill this gap of knowledge in the topic.

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What are your research's implications toward theory, practice, or policy?

Filling this gap is more likely to contribute in enhancing EMS education, graduates competencies, patients care practice, policies making, and nonetheless, enhancing EMS students' knowledge and attitudes in pain management.

Introduction

Experiencing pain due to a serious injury or critical sickness is the main cause for seeking EMS. Helping emergency patients relieve pain is considered as a human right.¹ Pain management is defined as minimizing patient anxiety and complications associated with the severity of pain.² Pain is a complicated phenomenon associated with the perception and expression of pain by an individual patient and influenced by complex psychological, social, and environmental factors.³ During training, EMS providers (paramedics) are instructed on various maneuvers in splinting and immobilizing patients which are considered as the best ways to manage pain.

In their regular duties, EMS paramedics often observe significant interpersonal variations in the expression of pain by the patients. They tend to rely on patient's behavior to validate the patient's description of pain severity.⁴ Consequently, disparities in the quality of care based on patients' behavior are related to pain. There was a substantial underestimation of the level of pain (intensity) and accordingly under-administration of the prescribed analgesic medications to the patients in EMS.⁵ Reports stated that up to 43% of EMS patients conveyed insufficient effort to manage pain.^{6,7}

The trend of de-emphasizing opioid exposure in health sector and in EMS might discourage pain management. EMS paramedics are required to comprehend pain assessment and safety of analgesics for an effective pain management. EMS paramedic competencies in pharmacological and non-pharmacological treatments for patients' pain management are essential. Patients suffer from the impact of insufficient pain management skills and knowledge of professionals due to insufficient appropriate education or negative attitudes toward patients' pain experience.^{8,9} Comprehensive subjective and objective assessments of patient complaints are important to determine the extent of their pain.¹⁰ Some prevalent pain assessment methods used in EMS are numeric rating scale (NRS), visual analog scale (VAS), and verbal rating scale (VRS).¹¹

EMS students (as potential EMS professionals) among EMS crew are players in administering medications and managing patients' pain.^{10,11} However, sufficient knowledge

related to pain management based on international standards are required skills for EMS students. The extent of pain management educational content in the EMS curriculum needs to be continuously evaluated.⁶ Ironically, the majority of EMS students are accustomed to the recognition of pain as a symptom of injury or illness by lecture-based and practical teaching.¹² However, the literature revealed a certain deficiency in knowledge besides adverse attitude toward the extent of pain realization by EMS students.^{5,6,12}

The fact that no other study has investigated the knowledge and attitudes of EMS students in pain management in Saudi Arabia demonstrates the presence of a research gap in this area of information.^{5,13} Filling this gap is more likely to contribute to enhancing EMS education, graduates competencies, patients care and nonetheless, assess the Saudi EMS students' knowledge and attitudes in pain management.^{5,13} Therefore, this research focuses on assessing the knowledge and attitudes of EMS students in pain management and determining the differences between students categories as classified by their sociodemographic characteristics.

Methods

Research Setting

The accredited EMS program in Saudi Arabia is missioned to graduate highly qualified competent EMS graduates. The program follows international standards of EMS education and is thrilling in terms of determining how EMS students understand various pain management principles.

The Design

It is a descriptive quantitative cross-sectional design. EMS students who met the following inclusion criteria were included in the study: A senior EMS student who is voluntarily engaging in a Bachelor of Science in Emergency Medical Services (BS-EMS) program and is fluent in English. To guarantee sufficient pain management knowledge and participation in various training courses across the curriculum, EMS students in their first two years were excluded from the study's research group. The one-tailed independent sample t-test was used with an alpha error probability of .05, a power of .80, an effect size of .5, and a predicted sample size of 70 to 100 using the statistical software G-Power version (3.1.3).¹⁴ Even then, larger sample size is needed to draw a solid conclusion from this study.

Instrument

The survey included two instrumental stages. Phase 1 analyzed participants' demographic information, including age, degree of study, and pain management information such as reading textbooks, attending courses or workshops, and clinical endurance experience. Phase 2 is a modified version

of the author Ferrell and McCaffery's (2008) Knowledge and Attitudes Survey Regarding Pain questionnaire (KASRP).¹⁵ This questionnaire has been widely revised and used among health education research. It comprises 39 closed-ended questions as follows: 22 true or false questions; 16 multiple choice questions; and 2 questions in the form of case studies each contain two questions that require the participants to assess, intervene, and then reassess according to the case scenarios.^{16,17} The validity and reliability of the KASRP has been established, as by content and construct validity and score of .80 for test-retest reliability and internal consistency i.e., Cronbach's alpha = .70.¹⁵ The questionnaire was administered in English according to the instructions of the entire EMS program. Moreover, a pilot test of the questionnaire was conducted among 15 students prior the actual study to assure the unambiguousness, appropriateness of languages, questions understanding, and usual time taken to complete the answers.

Ethics Considerations

An ethical review and approval from the institutional ethical committee (reference no. E-20-5482) was granted to perform the study. Prior to conducting the study, the investigator informed participants of the confidentiality and anonymity of all information provided. Participation was voluntary. Participants were informed that they had the right to refuse or withdraw any time. Therefore, prior to moving forward into the questionnaire, an informed consent agreement of participation and publication of the results was confirmed from each participant. Moreover, research data can be revealed by the corresponding author upon rational request.

Data Collection

Data were collected using online questionnaires. An invitation to participate has been sent to all students through an advertisement via WhatsApp Messenger for the College teaching Emergency Medical Services (PSCEMS) students. For overall safety, the transmission of hard copies between individuals was avoided. A reminder to answer and submit the responses has been sent on several occasions. Data were collected over a period of one month, from October to November 2020.

Statistical Analysis

Using a SPSS version 26.0 program, all data collected were recorded, stored, and statistically analyzed, with an identified level of significance of .05. The descriptive statistical results were performed to pronounce the demographic details and measures of knowledge and attitudes in pain management among EMS students. An independent sample t-test was performed to measure the significant diversities in the levels of knowledge and attitude in pain management scores among

the groups according to sociodemographic and other selected variables. The author applied binary logistic regression analysis to investigate the independent predictor variables. KASRP design strongly represents knowledge and attitudes. In addition, the tool is considered to be most beneficial in evaluating the data items in percentage (%) of full scores and individual item analyses. For correct/incorrect answers, the answers to the survey items were dichotomized. One mark was given for each correct question (1), and a score of zero (0) was given for each wrong question and those without a response. These marks have been transformed to imply the percentage of the correct responses for simplifying the interpretation. The investigator follows the authors of the KASRP tool requirement that 80% is the smallest satisfactory score for the test.¹⁵

Results

Participants' Characteristics

The students completed 79 survey questionnaires out of the 150 ones, indicating a weak response rate of 53%. The results revealed that undergraduate students (third and fourth years) account for more than 82% of total participants with an average age of 20.96 ± 1.03 years for all participants. Most of the students (67.1%) stated that they had not read pain management books and more than half of them (59.5%) had not completed any pain management training course. Fifty-eight (73.4%) students stated that they never or rarely used pain use pain' scales (Table 1).

Knowledge and Attitude in Pain Management

The key findings were that, in general, EMS students did not demonstrate adequate knowledge and attitudes, so that their

Table 1. Participant characteristics of the sample (N = 79).

Variables	n	(%)
Age mean = 20.96 years (SD = 1.03)		
≤21	56	70.9
>22	23	29.1
Academic year		
Undergraduate	65	82.3
Internship year	14	17.7
Reading textbooks about pain management		
Yes	26	32.9
No	53	67.1
Attendance a training course on pain management		
Yes	32	40.5
No	47	59.5
Frequency of using of pain scales		
Never OR rarely	58	73.4
Sometimes OR always	21	26.6

scores were below the required level (i.e., KASRP scores of 80% or greater).¹⁵ The mean score of the students' KASRP correct responses was $47 \pm .09$. Table 2 shows the relationship between proportion of demographic characteristics according to knowledge and attitude level. According to the Chi-square test, there is no significant relationship between knowledge and attitude score and reading a textbook about pain management, academic level, attending a training course about pain management, frequency of using pain scales, or student age groups.

Table 3 demonstrates that the following propositions received the most correct responses:

- "Intravenous is the recommended route administration of opioid analgesics for patients with brief, severe pain of sudden onset such as trauma or postoperative pain" (over 77%).
- "Narcotic/opioid addictions' definition" (over 74%).
- "Patients' spiritual beliefs may lead them to think pain and suffering are necessary" (over 74%).

Among the top 10 properly answered questions, the number of right responses for other propositions ranged from 69.6%–59.5%.

Table 4 demonstrates that the following propositions received the lowest correct responses:

- "Morphine administration for reported persistent postoperative pain in the absence of vital sign indicators and side-effects for patient with relaxed manner" (less than 7%).
- "morphine administration for reported pain in the absence of vital sign and behavioral changes for patient who grimaces" (less than 12%).
- "The recommended route of administration of opioid analgesics for patients with persistent cancer-related pain is oral" (less than 18%).

Among the top 10 improperly answered questions, the number of right responses for other propositions ranged from 21.5%–34.2%.

Table 2. Proportion of demographic characteristics according to knowledge and attitude Level (n = 79).

Variable	Poor	Fair	Sig
Frequency of using pain scales			.846
Never or rarely	40(39.6%)	18(18.4%)	
Sometimes or always	14(14.4%)	7(6.6%)	
Attending a training course about pain management			.295
Yes	24(21.9%)	8(10.1%)	
No	30(32.1%)	17(14.9%)	
Reading textbook about pain management			.154
Yes	15(17.8%)	11(8.2%)	
No	39(36.2%)	14(16.8%)	
Academic level			.785
Undergraduate	44(44.4%)	21(20.6%)	
Internship	10(9.6%)	4(4.4%)	
Age			.292
≤21	36(38.3%)	20(17.7%)	
>22	18(15.7%)	5(7.3%)	

Table 3. Top 10 correctly answered questions.

Questions' description	n	%
Intravenous is the recommended route administration of opioid analgesics for patients with brief, severe pain of sudden onset such as trauma or postoperative pain	61	77.2
Narcotic/opioid addictions' definition	59	74.7
Patients' spiritual beliefs may lead them to think pain and suffering are necessary	59	74.7
Subsequent doses should be adjusted in accordance with the individual patient's response	55	69.6
Respiratory depression rarely occurs in patients who have been receiving stable doses of opioids over a period of months	52	65.8
Sedation assessment is recommended during opioid pain management because excessive sedation precedes opioid-induced respiratory depression	51	64.6
The term 'equianalgesia' means approximately equal analgesia and is used when referring to the doses of various analgesics that provide approximately the same amount of pain relief	50	63.3
Morphine is considered the drug of choice for the treatment of prolonged moderate to severe pain for cancer patients	50	63.3
Elderly patients can tolerate opioids for pain relief	49	62
Vicodin PO is approximately equal to 5–10 mg of morphine PO	47	59.5

Table 4. Top 10 incorrectly answered questions.

	n	%
B. Morphine administration for reported persistent postoperative pain in the absence of vital sign indicators and side-effects for patient with relaxed manner	5	6.3
Morphine administration for reported pain in the absence of vital sign and behavioral changes for patient who grimaces	9	11.4
The recommended route of administration of opioid analgesics for patients with persistent cancer-related pain is oral	14	17.7
Likelihood of cancer patient experiencing respiratory depression following increase in IV morphine is <1%	17	21.5
Pain assessment in the absence of vital sign and behavioral changes for patient with relaxed manner	19	24.1
Following abrupt discontinuation of an opioid, physical dependence is manifested by the following: (sweating, yawning, diarrhea, and agitation) with patients when the opioid is abruptly discontinued	21	26.6
If the source of the patient’s pain is unknown, opioids should not be used during the pain evaluation period, as this could mask the ability to correctly diagnose the cause of pain	23	29.1
The best approach for cultural considerations in caring for patients in pain is patients should be individually assessed to determine cultural influences	26	32.9
A 30 mg dose of oral morphine is approximately equivalent to morphine 10 mg IV	27	34.2
C. The most likely reason a patient with pain would request increased doses of pain medication is increased pain	27	34.2

Table 5. Logistic regression analysis of variables associated with knowledge and attitude of student.

	B	S.E.	df	Sig	Odds ratio	95% C.I. Odds ratio	
						Lower	Upper
Age	-.536	.615	1	.383	.585	.175	1.953
Academic level	-.381	.689	1	.580	.683	.177	2.636
Reading textbook about pain management*	1.403	.679	1	.039	4.067	1.076	15.374
Attending a training course about pain management	-1.102	.677	1	.104	.332	.088	1.253
Frequency of using pain scales	-.073	.607	1	.904	.929	.283	3.053
Constant	-.621	.374	1	.097	.537		

Note: R² = .08 (cox & Snell), .12 (Nagelkerke), Model X² (5) = 7.17, P = .20. * P < .05.

In order to predict students’ knowledge and attitudes, binary logistic regression was used to determine five factors (reading a textbook on pain management, academic level, attendance at a training course on pain management, the frequency with which pain measures were used, and students’ age groups). It is clear from the Omnibus Test of Model Coefficient Table that the model or equation is not significant when five variables are considered simultaneously. There is a modest correlation between prediction and reading a pain management textbook, as shown by Nagelkerke’s R² = .12 (91.4%). According to the Wild criteria, only reading textbooks on pain management contributed significantly (P = .039) to prediction (Table 5).

On any question for EMS students, Tables 3 and 4 indicate the percentages of correct responses. Sixteen items out of a set of 39 (less than 50%) obtained the correct answer. The majority of students (74.7%) recognized the concept of narcotic/opioid addiction in the assessment of pain indicators. Far less than half of the participants (34.2%) indicated that increased pain was the most likely the reason why certain patients subsequently receive increased doses of pain killers. Less than half of the EMS students (48.1%) mistakenly thought that vital signs are often actual signs of pain level,

besides 46.8% inaccurately assumed that there is no significant pain in a patient who recovered from pain. Concerning the use of indicators of drugs, 63.3% of the students were aware that morphine was deemed the preeminent medication to relieve prolonged mild to severe pain in cancer patients, 35.4% were aware that 1 to 2 hours is the highest effect of orally administered morphine, and merely 17.7% of EMS students were aware that it is recommended orally for cancer patients with chronic pain.

Two patients of the same age underwent a comparative surgical procedure and a similar pain level in two comparative case scenarios to determine the students’ competence in decision-making about patient evaluations and successful treatment choices in two situations. The main difference, though, is the patients’ behavior and facial expressions. In the first case scenario, the patient has a peaceful and pleasing expression, but in the second case scenario, the patient has furrowed brows. Participants were asked questions to determine their level of pain based on the evaluation and behavioral data. Subsequently, other questions were given to figure out the desirable intervention based on the provided information about patient condition. In both case scenarios, a low percentage of

students (8/10) accurately assessed the patient's pain level (24.1% for the first case scenario and 26.6% for case scenario 2). Furthermore, only 6.3% picked the correct intervention, which was 3 mg of morphine IV for both case scenarios.

Discussion

In this study, the knowledge and attitudes of Saudi EMS students concerning pain management were found to be relatively lacking. This lack of knowledge and attitude is evidenced by a 41.8% mean count of correct answers on the KASRP. This result is in line with others from the same field of research.¹⁸⁻²¹ These findings may be an indicator about the amount of information and content dedicated to pain management in EMS curriculum. Pain management is essentially taught to EMS students in basic maneuver such as splinting and immobilization and included in greater depth as a unit or chapter in particular courses such as Pharmacology, Pathophysiology, and Critical Care of medical and trauma patients. This may require students and instructors to move smoothly from one level of knowledge to another advanced level due to the disparities in knowledge accomplishment. Nevertheless, this may lead to gaps in student knowledge, as students have to integrate knowledge across different courses. Watt-Watson et al (2009) noted that major Canadian universities are required to allocate content for pain management in EMS curriculum in health sciences programs prior to licensing. They assumed that the average total hours allocated among nine health assistant positions in undergraduate programs was 31 ± 4.2 hours (range: 0-48).²² Our results support the findings of previous research.^{16,18} Therefore, it is highly recommended that EMS program officials consider offering more opportunities for pain management education in EMS curriculum throughout the study.

The research instrument included two case scenarios concerned with the intensity of pain, in which the accurate value of pain level for both cases was eight. Twenty-four percent (24.1%) of EMS students correctly answered the question about pain level equal to eight, although in each case scenario the patient appeared calm and smiled, whereas (26.6%) assessed correctly that the patient had a level of pain equal to eight while the patient appeared grimaced and distressed. These results may suggest that EMS students' responses indicate that patients' physical appearance is an influential factor in their assessment of pain with no in-depth assessment of pain being performed. This agrees with reviewed literature.^{4,10} In both case scenarios, fourteen percent of students stated that they would administer the right dosage of morphine medication after applying a thorough pain assessment for the patient. A conceivable explanation for this finding is that choosing the correct dose and timing of opioid administration requires adequate training that helps them make the right medical decision. These findings are in agreement with the studies reviewed.¹⁶ Moreover, the results revealed a discrepancy between EMS students' choice of an

appropriate therapeutic intervention and the efficacy of pain assessment. Even when patients' pain level was correctly assessed, the EMS students' responses varied between giving a suboptimal dose or/and not giving pain medication at all. Similar results have been observed in previous research.²³

In spite of the relatively low baseline scores in EMS students' results, signs of a notable significant strength are yet to be observed in various disciplines of their knowledge in pain management. For example, patients' sedation assessment is realized and considered by more than 50% through opioid pain management. Moreover, EMS students showed inadequate fundamental knowledge on the physiology and pathophysiology of pain-sensing nerve fibers and pharmacological perception of opioids may have had an influence on their attitudes related to pain management. Therefore, EMS students necessitate further enrichment of the pharmacological knowledge of pain management as recommended in the review literature.²⁻⁷

The findings revealed that there is no marked association between the level of knowledge of EMS students and reading pain management textbooks. This is an indication that the student may not pay sufficient effort to update their knowledge in the period of time near the test. Therefore, the recommendation to compel a review and update of the EMS curriculum and the subjects' placements that include topics concerning pain management, in-depth theoretical and practical teaching makes sense with respect to these findings.

Moreover, the teaching concept of pain management should be linked to evidence-based practice to deliver high-efficiency care. Rationally, evidence-based practice learning becomes an important aspect in EMS education. Thus, that evidence-based practice greatly affects the knowledge and attitudes of EMS paramedics related to pain management. Meanwhile, EMS students might face difficulty in carrying out educational evidence-based practice related to the topic of pain management.^{7,23}

Theoretically, our results could be linked to the insufficiency of educational facilities, educational resources, continuity logistical educational services, and lack of access to updating references related to pain management. However, this is not the case as the EMS program successfully achieved recent academic accreditations from 2 different accrediting bodies.

Gender was significantly related to students' capability to manage pain, as female students have showed superior acquaintance. In addition, variance of knowledge and attitudes in gender comparison was an indicator amongst EMS students.²⁴ Since our participants were all male, these results are difficult to compare with the findings reported previously, specifically regarding the behavioral dimensions of pain management. In contrast, gender was perceived as a significant differentiating factor among nursing students' knowledge in pain management. In other EMS environments, female EMS paramedics were perceived to be in general more empathetic than their male colleagues.¹⁸ This indicates that female might pay more attention to pain management, which requires further research.²³

Based on our findings, this investigation raises significant concerns in an important area of the EMS curriculum which necessitates prompt attention. First, there is insufficient emphasis directed at pain management education (content, competencies and learning outcomes) that is offered currently via several courses offerings of the current EMS curriculum. Second, attention should be directed to the extent and sufficiency of total contact hours given to pain education (assessment and management). This program's third goal is to help students become well-versed, skilled, and competent graduates who also have the characteristics and desire to stop patients' suffering; thus, empathic and compassion abilities that are lacking should be cultivated in students. The outcomes of the current investigation may indicate a paucity in the availability of EMS expert instructors specializing in pain management in EMS programs. This deficiency may hinder the delivery of the latest scientific knowledge related to pain management.

Conclusion

Although the EMS program is academically and institutionally approved and accredited, there are probable signs of inadequacy in pain management knowledge and attitudes among EMS students. For the effectiveness of the program in pain management, it should be incorporated consistently along the curriculum. In clinical practice training, EMS programs should accord more attention to pain management along with theoretical knowledge courses. Faculty staff members should take the initiative to focus more on training EMS students to function as patient advocates and not allow negative behaviors to negatively impact patients' pain management. Furthermore, experienced practitioners and preceptors must be competent enough in pain management education through EMS programs.

Limitation of the Study

This study explored the knowledge and attitudes of male EMS students in pain management. The cross-sectional descriptive design used did not define cause and effect among the variables. Moreover, this investigation targeted a single EMS program. Although, the program comprises large number of students, additional empirical studies using objective evaluations of male and female EMS students from different education institutions will result in highly generalizable study findings.

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