

# Do final-year medical students have sufficient knowledge of pain management?

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## ABSTRACT

**Background:** The prevalence of pain is high and there have also been serious complications related to undermanaged pain. Deficiency in pain education is among the causes of the problem. Studies in the last two decades have consistently reported that knowledge and attitude regarding pain management was generally poor among the medical students. The aim of this study is to assess the knowledge and attitudes among the Universiti Malaysia Sarawak (UNIMAS) final year medical students regarding pain management.

**Methods:** This is a cross-sectional study and “Knowledge and Attitudes Survey Regarding Pain (KASRP)” questionnaire developed by Ferrell and McCaffery (revised in 2014) was used. Data was collected in July 2019 in which students had to complete the hard copy questionnaire before a teaching session began. Participation of students was voluntary, anonymous and written informed consent was also obtained. Data were analysed using SPSS, version 16.

**Results:** Out of 118 enrolled students, 110 participated in this study giving a response rate of 93%. The results showed a low number of correct response to the questions on analgesics, assessment, and treatment. The mean percentage score of correct answers was 52.23±8.67% (range: 29.27% to 70.73%). The results reflected that students were poor in both knowledge and attitude regarding pain management.

**Conclusion:** Final year medical students, frontliners-to-be in hospital care, should have good knowledge and attitudes in pain management. Findings, however, revealed that UNIMAS final year medical students still need to get improved in this aspect of patient care. A larger study involving students from all the medical schools in Malaysia is needed before reviewing the undergraduate curriculum for pain.

## KEYWORDS:

*knowledge; attitudes; medical students; pain*

## INTRODUCTION

Pain is one of the most common presenting symptoms which health care professionals have to deal with. A study done at a teaching hospital in the United States of America (USA) showed that pain was the main complaint for 52.2% of visits

to the emergency department.<sup>1</sup> Chronic pain is also common. About 20% of adults in Europe, North America and Australia were reported having chronic pain.<sup>2</sup> The figure is much higher among elderly patients in Asia ranging from 42% to 90.8%.<sup>3</sup> A study carried out in Malaysian primary care clinics also revealed that about 32% of patients reported pain.<sup>4</sup>

Despite the high prevalence of pain and negative consequences, pain management is often inadequate in clinical practice.<sup>5-7</sup> In fact, unrelieved pain is a worldwide problem. Chronic pain, in particular, can negatively affect physical as well as emotional well-being resulting in poor quality of life, loss of productivity and a significant burden on the healthcare system.<sup>2</sup>

The above problem is attributed to lack of resources, restriction on using opioid analgesics by law, fear of addiction or tolerance to drugs or drug side effects.<sup>8</sup> A study done in Malaysia found that even among physicians, there was a concern about respiratory depression due to opioids.<sup>9</sup> Other causes of suboptimal pain management include cultural, societal and religious attitudes, low priority given by health authorities, lack of established guidelines in pain management and limited pain education for health care professionals.<sup>10,11</sup>

As a strategic plan to improve the education about pain, in 1988, the International Association for the Study of Pain (IASP) has produced a number of curricula for medical, dental, nursing and paramedical schools. In 2005, the IASP conducted a survey on pain education among health care professionals in developing countries. Over 90% of the participants claimed that they had not obtained adequate pain education when they began their clinical practice after graduation. The survey also found that only an average of 12 hours was spent on undergraduate pain education.<sup>12</sup> A study in 2009-2010 on assessment of pain education programs in medical schools in the USA and Canadian also concluded that pain education for North America medical students was limited.<sup>13</sup> A similar study involving 15 European countries was carried out during 2012 and 2013. It also found that average teaching time for pain education was only 12 hours. It was just 0.2 percent of 5,550 hours, minimum total teaching hours set by a European directive for an undergraduate medical degree.<sup>14</sup> All these findings show the low emphasis given for pain education in undergraduate medical schools.

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Furthermore, studies on knowledge and attitudes of medical and nursing students regarding pain management had been around the world in last two decades and the results remained poor in both groups.<sup>15</sup>

It has been almost 15 years since IASP has stepped in to improve pain education in developing countries. In Malaysia, the Ministry of Health launched the "Pain as the 5th Vital Sign" initiative in 2008 and introduced the Pain Free Hospital initiative in 2011. It has also published the pain management guidelines for doctors and paramedics. However, no reports regarding the level of pain management knowledge among the Malaysian medical students are available.

This led us to carry out the current study to assess the level of knowledge and attitudes among the medical students in Universiti Malaysia Sarawak (UNIMAS) regarding pain management.

## MATERIALS AND METHODS

The study was a descriptive survey on knowledge and attitudes of UNIMAS final year medical students regarding pain management. All the 118 students enrolled in the final year medical programme were included.

### Research Instrument

A validated 39-item questionnaire known as 'Knowledge and Attitudes Survey Regarding Pain' developed by Betty Ferrell and Margo McCaffery (revised 2014) was used.<sup>16</sup> It consists of 22 True-False questions, 15 Multiple Choice questions and two Case Scenarios. Contents of the questions are based on the guidelines established by the American Pain Society, the World Health Organization and the National Comprehensive Cancer Network. Some of these questions test the knowledge of clinical pharmacology only and some test both knowledge and attitude in pain management. We used all the original questions without any modification.

### Ethical Clearance

This study was approved by the Medical Ethic Committee of UNIMAS (Reference: UNIMAS/NC-21.02/03-02 Jld.3 (92)).

### Data Collection

In the UNIMAS medical school, final year medical students are divided into three groups and they are rotating among the speciality postings. Therefore, data was collected in the first week of July 2019 when all the students had received pain teaching sessions during their Surgery posting during which posting students are given one lecture session on the topic of "Pain Management". Student participation in this study was completely voluntary and anonymous, and written informed consents were also obtained. The questionnaires were administered just before or after their classes and returned to the researcher once completed. Demographic data were also collected about the gender and whether students had attended an elective course on pain management.

### Statistical Method

Statistical package for Social Science (SPSS, version 16) was used for data entry and analysis. Continuous variables were presented as mean and standard deviation while categorical data were presented as frequency and percentages. Student performance results were analysed as the complete scores instead of analysing knowledge and attitude scores separately because many questions test both domains. Total scores and percentage of total scores of individual students were first calculated using Excel. Students with a percentage total score <80% were considered as not having adequate knowledge in pain management. Item analysis was also carried out for each question item to find out the number and percentage of respondents who answered correctly, using frequency statistics in SPSS. The Independent t test was used to detect any statistically significant difference in mean percentage scores between the two groups (i.e., male, and female students, those who attended an elective pain management course and who did not). In this test, the 95% confidence interval (95%CI) was also calculated and a p-value < 0.05 (two-sided) was considered statistically significant.

## RESULTS

Out of 118 enrolled students, 110 (93%) completed the questionnaire. Only three students (2.7%) reported that they attended an elective course of pain management without specifying the date of the course (Table I). Overall, the students obtained a mean percentage score  $52.23 \pm 8.67\%$ , which ranges from 29.27% to 70.73%. Out of the total 110 respondents, four obtained 70.73% while 42 obtained <50%. There was no statistically significant difference in the mean percentage score between male and female students, and those who attended an elective pain management course and those who did not (Table I).

The percentage of students who gave the correct answer for each question are shown in the Table II. The performance of students in case scenarios (Item 38 and 39) will be mentioned in the discussion.

## DISCUSSION

We consider less than 80% as low for both total percentage scores and item analysis which was carried out to find out the percentage of students giving the correct answer for individual question item. Item analysis shows that students' knowledge and attitudes were poor in use of opioid analgesics, pain treatment and pain assessment.

### Questions on opioids with lower number of correct answers

As can be seen in the Table II, low percentages of correct response for Item 6, 28 and 37 reflect that a significant number of respondents are overconcerned with opioid-induced respiratory depression.

The results for Item 36 (Table III) shows that only 29 students (26.4%) were able to give the correct answer and the majority of respondents are confused between physical and psychological dependence on opioids. The Item 23 had even a lower correct response rate, 18.2%. The question theme was

Table I: Demographic information of participants (n=110) and Percentage Score of Knowledge and Attitude in Pain Management

Demographic Factors	Frequency (%)	Percentage Score of Knowledge and Attitude in Pain Management		
		Mean (SD)	t(df)	p-value
Gender				
Male	31 (28.2%)	52.64 (9.08)	0.299 (108)	0.766
Female	79 (71.8%)	52.08 (8.57)		
Attended an elective course for pain management				
No	107 (97.3%)	52.47 (8.54)	1.702 (108)	0.092
Yes	3 (2.7%)	43.90 (11.18)		

Table II: Item Analysis showing percentage of students who answered the questions correctly

Item	Questions	Percentage of students with correct answer
	<b>Questions with high percentage of students who answered correctly</b>	
14	Subsequent doses of opioid analgesics should be adjusted as per the individual patient's response.	95.5
20	Definition of Narcotic/opioid addiction	92.7
22	Sedation assessment is recommended during opioid pain management to watch out respiratory depression.	92.7
31	The most accurate judge of the intensity of patient's pain is:	87.3
34	The time to peak effect for morphine given IV is:	86.4
12	Children less than 11 years old cannot reliably report pain.	85.5
11	The patient should be encouraged to endure as much pain as possible before using an opioid.	80.9
	<b>Questions on opioid analgesics with low percentage of students who answered correctly</b>	
6	Respiratory depression is rare in patients receiving stable doses of opioids for months.	46.4
37	Which statement is true regarding opioid-induced respiratory depression?	24.5
28	The chance of developing clinically significant respiratory depression in a patient receiving daily opioid analgesics for past 2 months, intravenous morphine 200mg/hour yesterday and 250mg/hour today is: a. less than 1%, b. 1-10%, c. 11-20%, d. 21-40%, e. > 41%	13.6
35	The time to peak effect for oral morphine is: a. 5 min, b. 30 min, c. 1 – 2 hours, d. 3 hours	41.8
9	Opioids should not be used in patients with a history of substance abuse.	34.5
17	Using opioids during pain evaluation can interfere with finding the cause of pain.	29.1
36	Following abrupt discontinuation of an opioid, physical dependence is manifested by:	26.4
8	The usual duration of analgesia of 1-2mg morphine IV is 4-5 hours.	24.5
23	The recommended route of administration of opioid analgesics for persistent cancer-related pain is:	18.2
	<b>Questions on pain treatment with low percentage of students who answered correctly</b>	
7	Combining analgesics with different mode of action produce better pain control and less side effects.	55.5
18	Gabapentin produces optimal pain relief after a single dose.	45.5
27	Analgesics for post-operative pain should initially be given: a. around the clock on a fixed schedule, b. only when the patient asks for the medication, c. only when the nurse determines that the patient has moderate or greater discomfort	44.5
30	Which of the following is useful for treatment of cancer pain? a. Ibuprofen, b. Hydromorphone, c. Gabapentin, d. All of the above	36.4
5	Aspirin and other non-steroidal anti-inflammatory agents are NOT effective analgesics for painful bone metastases.	30.9
	<b>Questions on pain assessment with low percentage of students who answered correctly</b>	
13	Patients' spiritual beliefs lead them to think pain and suffering are necessary.	68.2
32	Which of the following is the best approach for cultural considerations in caring for patients in pain?	63.6
15	Giving sterile water injection (placebo) is useful to check if the patient's pain is real.	37.3
1	Vital signs are always reliable indicators of the intensity of a patient's pain.	33.6
3	Patients who can be distracted from pain usually do not have severe pain.	28.2
4	Patients may sleep in spite of severe pain.	28.2

Note: 1) Questions are adapted from 'Knowledge and Attitudes Survey Regarding Pain' questionnaire<sup>16</sup>.

2) Some questions are summarized and only themes are shown in some questions.

Table III: Item Analysis of four multiple choice questions for percentages of students selecting different options

Item	Questions	Percentage of students for options selected
37	Which statement is true regarding opioid-induced respiratory depression? a. More common several nights after surgery due to accumulation of opioid. b. Obstructive sleep apnea is an important risk factor. c. Occurs more frequently in those already on higher doses of opioids before surgery. d. Can be easily assessed using intermittent pulse oximetry.	10.9 24.5 40.0 22.7
36	Following abrupt discontinuation of an opioid, physical dependence is manifested by: a. sweating, yawning, diarrhea and agitation b. Impaired control over drug use, compulsive use, and craving c. The need for higher doses to achieve the same effect d. a and b	26.4 18.2 16.4 39.1
23	The recommended route of administration of opioid analgesics for persistent cancer-related pain is: a. intravenous b. intramuscular c. subcutaneous d. oral e. rectal	69.1 7.3 0.9 18.2 1.8
32	Which of the following is the best approach for cultural considerations in caring for patients in pain? a. There are no longer cultural influences in the U.S. due to the diversity of the population. b. Cultural influences can be determined by an individual's ethnicity (e.g., Asians are stoic, Italians are expressive, etc). c. Patients should be individually assessed to determine cultural influences. d. Cultural influences can be determined by an individual's socioeconomic status (e.g., blue collar workers report more pain than white collar workers).	7.3 20.0 63.6 7.3

"the recommended route of administration of opioid analgesics for persistent cancer-related pain is:" and 76 students (69.1%) wrongly selected the intravenous route. These students seem to have overlooked the fact that treating chronic pain with intravenous injection is not practical. This mistake also reflects the students' poor knowledge in the usage of oral opioids such as oral morphine.

#### Questions on pain assessment with lower number of correct answers

The results for Item 1, 3, and 4 (Table II) indicate that around two thirds of respondents need to improve the knowledge regarding the relationship between pain severity and vital signs, and the individual difference in ability to cope with severe pain.

Students performed relatively better in the Item 32. However, we are concerned with the incorrect response rates for that question. Twenty-two students (20%) thought that cultural influences can be determined by an individual ethnicity (Table III). These students seem to have lost their knowledge in basic science about different individual pain thresholds and behaviours in response to pain. Otherwise, this kind of wrong attitude with ethnic bias in pain assessment should be changed.

#### Student Performance in Case Scenarios

Each case scenario consists of two questions and tests the ability of the students to rate the patient's pain and give the appropriate treatment. In both scenarios, the patient was an adult male on his first day after an abdominal operation and had morphine 2mg IV two hours ago.

In the first scenario, the patient was smiling and making

jokes with someone visiting him at the time of assessment. His vital signs were also stable, but he rated his pain as 8 out of 10. Only 30 students (27.3%) correctly rated the patient's pain as 8. Eighty other students (72.7%) underestimated his pain between 0 and 5. This may be due to them being confused with combined Visual Analogue and Numerical Rating scale, in which smiling face means no pain. In fact, the patient was just trying not to show his suffering. The result highlights that students lacked the knowledge of different behavioural response to pain among the individuals. For the subsequent question of this scenario, only two students got the right answer which was to give further morphine 3mg IV. The rest opted for no further morphine or repeating morphine IV 1mg or 2mg. Apparently, underestimation of pain led the students to wrong answers.

In the second case scenario, the patient was lying in bed and grimacing at the time of review. His vital signs were normal, and he rated his pain as 8 out of 10. Students performed better in this case and 72 students (66.7%) correctly rated the pain as 8. However, only 32 students (29.1%) selected the right treatment option which was to give further morphine 3mg IV. Among the rest, 32 opted for 1 mg and 37 for 2mg. A possible reason for choosing 1mg is that students just followed the Malaysian Ministry of Health's Morphine Protocol.<sup>17</sup>

#### How much do our students know about pain management?

In 2002, McCaffery and Robinson conducted an online survey on knowledge on pain management among nurses and set the passing score as 80%. In that study, 15-item questionnaire was used. Majority of the participants were experienced registered nurses.<sup>18</sup> In our study, the mean



percentage score of UNIMAS final year medical students was 52.23 which is quite low compared with 80%. It may be argued that the difference in study instruments, qualifications of the participants and hand-on experience should be considered in setting the passing score. There are also a few questions which test the factual knowledge such as equianalgesic doses of different opioids. We would not suggest undergraduate students to memorise these doses. However, we feel that at least 80% of questions are designed to test the basic and useful knowledge about pain management, which is necessary for those who are about to begin their clinical practice as medical doctors. Therefore, we consider the passing score 80% is reasonable for final year medical students and we are convinced that our students are poor in knowledge and attitudes regarding pain management.

No other information is available in the literature to compare with medical students from other universities in Malaysian. In previous studies done with elsewhere among nursing students, which also used the KASRP questionnaire, mean percentage scores ranged between 34.1% and 68%.<sup>15</sup>

In two Malaysian studies done using KASRP questionnaire, one in 2013 and the other in 2017, participants were registered nurses. The former was conducted among the nurses working at a tertiary public hospital in Kuala Lumpur and their mean percentage score was 58.57.19 The latter was carried out among the surgical nurses in Miri Hospital and their mean percentage score was 51.7. The questions with low correct response rate found in that study are quite similar to ours except for the Item 11 (Table II). It is a True-False question and states that "*Patients should be encouraged to endure as much pain as possible before using an opioid*" The 62.5% of participating nurses (N=40) agreed with the statement, hence giving the wrong answer. The authors stated that it was due to opioid phobia attitude.<sup>20</sup> In our study, 80.9% of participants (N=110) disagreed with the Item 11 statement and got the right answer (Table II). From our point of view, our medical students still need to learn about judicious use of opioid analgesics during their future practice to prevent opioid crisis related to overprescribing.

#### *What might have affected students' attitude score?*

- 1) Analysing the data as the percentage of complete scores for both knowledge and attitude  
We analysed the data as the percentage of complete scores for both knowledge and attitude because many questions tested both. On the other hand, we feel that 18 items (Item No.5, 7, 8, 14, 16, 18 to 26, 30, 34, 35, 36), about 44% of the questionnaire, test the knowledge only. Then, less than 60% (Range: 13.6-55.5) of students could answer 10 of these items correctly. That might have affected the overall attitude scores of the students.
- 2) Poor knowledge itself might also lead to a wrong attitude. This is particularly relevant to poor scores in question items which test both knowledge and attitude.
- 3) Preconceived ideas: Item analysis of question 32 shows that some students had preconceived ideas such as patients of particular ethnicity being more expressive. Besides, these students seem to have overlooked the importance of difference in pain severity and individual pain thresholds. That could have led them to the wrong

answer. Another example of preconception is observed with item 15 analysis in which nearly two thirds of respondents stated that injecting sterile water as a placebo was useful to test if the patient was really in pain.

- 4) Overconcern with opioid side effects.
- 5) Lack of empathy: Lack of empathy might also be a reason for poor attitude scores. For example, nearly 20% of the participants wrongly answered the Item 11 meaning that they would advise the patient to take the pain as much as he or she can before an opioid is prescribed. This reflects overconcern with opioid side effects as well as lack of empathy.

#### *Why poor knowledge?*

Poor knowledge of students could be due to the following reasons.

- 1) Lack of teaching hours: Medical students in UNIMAS had total 6 hours for pain education during their 5-year Medical Doctor programme. They had four hours in first two years, another two hours in the final year and were given lecture sessions on physiology, pharmacology, psychology, and management of pain. In 2005, IASP (International Association for the Study of Pain) survey on pain education of health care professionals in developing countries found that the average number of teaching hours allocated for undergraduate pain education was 12.<sup>12</sup> Therefore, UNIMAS students had just a half of that time span for pain teaching. Besides, more than 90% of respondents in that survey stated that they had not attained adequate pain education when they began their clinical practice.<sup>12</sup> Therefore, lack of teaching hours for pain education may be a cause of poor knowledge among students.
- 2) Pain was not taught and assessed as a separate module. Instead, both teaching and assessment were incorporated into preclinical modules such as Nervous System and Behaviours, Musculoskeletal System, and clinical posting for Surgery during the final year. Then students may not have been given enough coverage for learning pain topics when they spent more time on other priority topics.
- 3) Lack of clinical exposure to patients with pain and their management

#### *What could be done for improvement?*

During the past three decades, medical schools across the USA, Canada, the UK, Europe, Australia and New Zealand have implemented a number of changes in undergraduate medical curricula in an effort to improve the performance of medical students in pain management. The changes include: 1) making pain modules compulsory, 2) defining learning objectives of pain medicine, 3) offering the students elective for pain medicine courses, 4) increasing the teaching hours spent for pain medicine, 5) including teaching topics on pain assessment, non-pharmacological management, multi-disciplinary pain management, paediatric pain, geriatric pain, medico-legal and ethical aspects of pain medicine in addition to existing topics on neurophysiology, neuroanatomy and pharmacology of pain, 6) providing clinical placements while continuing usual teaching methods such as lecture, seminar and case-based instruction, 7) including questions on pain topics in written exams to increase student motivation to learn, 8) developing interprofessional pain curricula for undergraduate students.<sup>21</sup>

The extent of changes made was widely variable among the schools. For example, although pain modules were made compulsory in 84% of medical schools in France, it was not the case in 96% of the USA and UK medical schools. Pain medicine electives were offered for minimum 1 week and maximum 6 weeks. Overall, these electives were offered to only a limited number of students.<sup>21</sup> There was also a considerable difference in the median of teaching hours for pain medicine ranging from 4 to 39 hours. In Australia and New Zealand, it was 20 hours as of 2018. In the UK, Europe and the USA, it was 13 hours (2011), 12 hours (2012-2013) and 9 hours (2009) respectively.<sup>13,21</sup> The percentages of medical schools which offered students clinical placement were 84% in Australia and New Zealand, 48% in the UK and 26% in Europe. Among the measures listed above, the interprofessional learning is less addressed in these medical schools with the exception of some medical schools in Canada and the USA.<sup>21</sup>

On the other hand, the information on evaluation of pain curricula in Asia, Africa and South America medical schools is not available in the literature.<sup>21</sup>

#### LIMITATIONS OF THE STUDY

This study has a few limitations. Firstly, this is a small-scale study (n=110) involving final year medical students of UNIMAS only. The findings may not be applicable to medical students at other universities. Secondly, data was analysed as the percentage of complete scores for both knowledge and attitude as many questions can assess both. There are, however, many question items which test only knowledge on pharmacology. Thus, poor knowledge among students could have affected their attitude scores.

#### CONCLUSION

In view of the high prevalence of pain and complications of undermanaged pain, final year medical students should acquire reasonably good knowledge and attitudes in pain management before they begin clinical practice as hospital frontliners. The study findings, however, revealed that the final year medical students in UNIMAS were poor in knowledge and attitude regarding pain management. Increasing the number of pain teaching hours particularly during the final year and conducting an assessment session could help improve their knowledge and attitude in this important aspect of patient care. On the other hand, findings of this study cannot be generalized due to its small sample size. A larger study involving medical students from all the medical schools Malaysia is needed before implementing changes in the undergraduate curriculum on pain.

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