

How Does an Undergraduate Pain Course Influence Future Physicians' Awareness of Chronic Pain Concepts? A Comparative Study

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Abstract

Objective. Pain is one of the most undertreated medical complaints, with barriers to effective pain management lying in poor education of health professionals and misconceptions regarding patients in pain. The aim of this study was to assess whether an elective undergraduate course on chronic pain offered in Greek medical schools influences knowledge and attitudes of medical undergraduates about chronic pain and helps them clarify pain-related concepts.

Methods. An electronic questionnaire with 6 demographic and 21 pain-related items was uploaded on

SurveyMonkey. The questionnaire was open to medical students in every Greek medical school for 1 month. Students were asked to respond to questions regarding various aspects of pain taught in the aforementioned course. In specific, they were asked to respond to questions regarding the definition, types, and adequacy of treatment of chronic cancer and non-cancer pain. They were queried about their knowledge of pain clinics, health practitioners who run them, and types of treatment available there. There were also questions about opioid use in cancer and non-cancer chronic pain patients and regarding the likelihood of opioid addiction.

Results. According to their responses, medical students had good knowledge about the definition and consequences of pain, and those who attended the pain course had greater knowledge regarding the adequacy of treatment of chronic pain and were more familiar with the recent classification of types of pain. Students who did not have exposure to the undergraduate pain course had little information regarding pain clinics and had poor knowledge regarding the use of opioids in cancer and in nonmalignant chronic pain. All students expressed concerns regarding addiction to opioids.

Conclusions. Although students enter medical school with little knowledge about pain issues, pain awareness can be positively influenced by education. A curriculum about pain should not only teach the basic science of pain but also present treatment strategies available and address the socio-emotional dimensions of pain. Additionally, if misconceptions about opioid use and addiction are properly elucidated early in medical education, the future health practitioners will be one step forward in achieving the goal of alleviating suffering patients' pain.

Key Words. Pain Education; Medical Students; Chronic Pain; Undergraduate Teaching; Pain; Patient-Centered Care

Introduction

Pain is one of the prevalent complaints in medical institutions, yet it is also one of the most undertreated, with widespread underprovision of services as far as both acute and chronic pain are concerned [1–5]. Despite the remarkable progress in the scientific understanding of pain basic science and mechanisms during the recent years, it appears that patients continue to suffer from pain, with untoward consequences for their quality of life as well as a heavy economic burden for health care provision [6].

The reason for the suboptimal treatment of pain in most medical institutions lies in deficits in education of health professionals in this field as well as in occasionally prejudiced attitudes and beliefs of physicians toward pain. Regarding the former, it appears that despite the overwhelming frequency of pain problems, at most medical schools, there are no formal curricula of pain education [7–9]. Recently, a multidisciplinary group of experts, including among others representatives from the European Federation of the International Association for the Study of Pain (IASP), launched a pan-European initiative aiming at highlighting the importance of undergraduate pain education, as inadequate or nonexistent pain management training is still the norm in European medical schools [10]. The problem is equally evident in North America; although medical school pain curricula have been proposed for over 30 years, they are rarely implemented, with very little time devoted to pain education in the majority of American medical schools [8,11,12]. In specific, in a systematic review of 117 U.S. and Canadian medical schools, Mezei and Murinson reported considerable gaps between recommended pain curriculum and actual educational content in medical school education related to pain management [11]. As a result, pain education is limited and often fragmentary with multiple areas of pain essentially unaddressed by current undergraduate curricula and with very poor integration in medical school core teaching of the basic science and the clinical knowledge pertaining to the challenges of chronic pain [11]. Therefore, despite the fact that pain is one of the most common reasons for seeing a physician in primary care, medical school graduates lack the skills that are needed in clinical practice due to the inadequate undergraduate teaching of pain assessment and management [8].

As to the way individual beliefs and attitudes influence professional behavior, it appears that students enter medical school believing that working with pain patients is difficult and they have little contact with patients in pain [13,14]. They often display anxiety if they happen to encounter suffering patients and they seldom have the opportunity to directly observe medical practitioners providing appropriate treatment in either acute or chronic pain settings [9,15–17]. Medical students' concern about dealing with patients in pain is further accentuated by uncertainty and misconceptions regarding opioids, drugs which are surrounded by myths and erroneous beliefs that

serve as major barriers to their proper use [18]. Furthermore, one important area least understood by medical students is the issue of opioid addiction [19]. If concerns about opioid prescription are not properly elucidated within the medical school curriculum, the sometimes unjustified fear of addiction can accompany medical practitioners even after graduation and lead to underprescribing when working with pain patients and eventually inadequate pain management [6,20].

In Greece, suboptimal treatment of chronic and cancer pain is due to the limited availability of some opioid formulations, while regulatory restrictions caused mainly by considerations about the abuse potential of controlled substances occasionally restrict patients' access to opioids. In fact, among the Western European countries, Greece along with Turkey has more accessibility barriers in comparison with other countries [21]. For instance, outpatients must be registered to be eligible to receive opioid prescriptions and a special duplicate form to prescribe opioids is required for physicians. In addition, there is a limit on the number of days supplied on one prescription, which precludes provision of an adequate supply of medication to meet individual clinical needs [22]. This, along with the fact that pharmacists cannot correct technical errors on a prescription, makes it necessary for patients to return for frequent refills or corrections of prescriptions. The overvigilant restrictive legislation and bureaucratic burden accompanying opioids (which is not only pertinent to Greece but is an internationally recognized public problem) is aimed at reducing substance abuse and restricting the diversion of medicinal opioids into illicit channels but at the same time unduly interferes with availability for genuine medical need. This fact, combined with occasionally prejudiced attitudes of patients and families toward opioid medications (concerns about addiction, tolerance, and side effects) and fear of stigmatization as well as limited knowledge and attitudes of some physicians regarding the use of controlled substance prescriptions or alternative modalities for the management of cancer patients, poses barriers to the successful treatment of pain. Based on the aforementioned facts, a compelling need to revise medical school curriculum and to promote effective practice through education has arisen, as pain medicine teaching in Greek medical schools is deemed inadequate. In fact, in Greek medical schools, teaching about pain is not formally integrated in the compulsory curriculum. Therefore, an elective undergraduate course about the management of malignant and nonmalignant chronic pain has been introduced in order to meet the educational needs of future physicians. This course is selected by a vast majority of students in their last three clinical years (it is noted that the medical school in Greece consists of three preclinical and three clinical years). The course includes most of the IASP's recommended content on medical school pain curriculum (<https://www.iasp-pain.org/Education/CurriculumDetail.aspx?ItemNumber=729>) (Appendix Table A1). It is taught for 25 hours per semester, 20 hours of which being lectures and 5 hours being participation in pain clinic practice.

The aim of the current study was to assess the knowledge, attitudes, and beliefs of medical undergraduates about chronic pain and its management. We also sought to determine whether the aforementioned elective course on pain helps students clarify pain-related issues or change their perceptions and beliefs toward chronic pain.

Methods

After a pilot study and after getting approval from the institutional review board, an electronic questionnaire comprised of 6 demographic and 21 pain-related items was uploaded on SurveyMonkey, an online survey site that allows users to create their own surveys, using question format templates (<http://www.surveymonkey.com>). The questionnaire was open to medical students of all years of studying in every university medical school throughout Greece for 1 month. Reminders sent once a week through popular electronic social media (Facebook and Greek medical students' web forums) invited students to participate in the survey while anonymity was maintained throughout.

In the questionnaire, students were asked to respond to questions regarding the definition and types of pain, their experience with chronic pain or cancer patients, as well as whether they thought that chronic pain should be treated and why. They were also asked about their awareness of pain clinics' existence, the patients who can resort to pain clinics, their knowledge about the health practitioners who run them, and types of pain treatment available in the pain clinics. They were additionally enquired regarding the etiology of cancer pain or the cause for increased requirements for analgesics in cancer pain patients and whether they considered that chronic pain or cancer pain patients are undertreated or not. They were asked whether they thought that patients suffering from chronic unbearable pain should be referred to specialists and regarding who they considered to be the best judge of the severity of cancer pain. There were also questions regarding opioid use in cancer and non-cancer chronic pain patients and regarding the likelihood of opioid addiction. Finally, students were asked about the existence of any courses providing relevant knowledge in the medical school curriculum.

Data were stored anonymously and were analyzed with the SigmaPlot for Windows v.11.0 statistical software (Systat Software, Inc., San Jose, CA, USA). Descriptive statistics (frequency distributions) were used to summarize the data. Differences in characteristics and attitudes between students who had exposure to the pain course and those who did not were analyzed with chi-square analyses, with Yates correction and Fisher's exact test, as appropriate. Results were considered significant at the $P < 0.05$ level.

Results

A total of 321 medical students replied to the questionnaire (women 61.7%, men 38.3%), the majority of them

being between the second and the sixth year of their studies, whereas 78.5% were students of University of Athens Medical School with the rest studying medicine in peripheral universities of Greece (Table 1). Of the students who responded to the questionnaire, 281 replied to the question whether they had selected or not the elective undergraduate course on chronic pain and they were those who were included in the subsequent analysis. Of the 281 students, 43% had selected the undergraduate course of chronic pain, as opposed to 57% who had not. According to their responses, students believed that apart from the elective course of pain, knowledge regarding pain in the undergraduate curriculum was acquired sporadically through lectures within the context of physiology, pharmacology, neurology, internal medicine, anatomy, and anesthesiology, in descending order.

Medical students seemed to be familiar with the definition of pain, with no difference between students who attended the pain course and those who did not. As to the types of pain, the vast majority of students were familiar with the entity of acute and chronic pain. However, students who attended the course seemed to have greater knowledge regarding the existence of nociceptive, neuropathic, cancerous, or psychiatric pain and the differences were statistically significant. Approximately half of the students declared that they had lived through the experience of chronic or cancer pain patients. The vast majority of students thought that chronic pain should be treated and both groups agree that chronic pain should be treated because of the pathophysiologic disturbances that it causes. However, the number of students with exposure to the course who thought that chronic pain should be treated as a human right or because of the social, financial, or family problems that it creates was higher than the number of students who did not attend the course (Table 2).

A high percentage of students who attended the pain course (90.0%) were aware of the pain clinic existence as

Table 1 Number of respondents to the questionnaire and total number of students in University of Athens Medical School, according to year of studying

	Respondents from Athens UMS	Respondents from Peripheral UMS	Total Number of Students in Athens UMS
1st year	28	—	249
2nd year	41	34	256
3rd year	43	24	329
4th year	43	3	306
5th year	47	1	275
6th year	50	7	278
Total	252	69	1,693

UMS = University Medical School.

Table 2 Medical students' beliefs about definition, types, reasons for treating chronic pain, and past experience with chronic pain patients

	Students Who Attended the Pain Course	Students Who Did Not Attend the Pain Course	<i>P</i> value	Total
	N = 121	N = 160		N = 281
Think that pain is				
– A sensory experience	103 (85.1)	122 (76.2)	0.089	225 (80.0)
– An emotional experience	79 (65.2)	104 (65.0)	0.927	183 (65.1)
– An experience associated with actual or potential tissue damage	106 (87.6)	133 (83.1)	0.379	239 (85.0)
Think that pain can be*				
– Chronic	120 (99.1)	154 (96.2)	0.252	274 (97.5)
– Acute	120 (99.1)	154 (96.2)	0.252	274 (97.5)
– Neuropathic	117 (96.6)	107 (66.8)	<0.0001	224 (79.7)
– Nociceptive	87 (71.9)	76 (47.5)	0.0001	163 (58.0)
– Mixed	99 (81.8)	84 (52.5)	<0.0001	183 (65.1)
– Cancerous	82 (67.7)	62 (38.7)	<0.0001	144 (51.2)
– Psychiatric	75 (61.9)	67 (41.8)	0.0013	142 (50.5)
Are familiar with someone suffering from chronic pain	59 (48.7)	79 (49.3)	0.983	138 (49.1)
Have lived through the experience of cancer patients	73 (60.3)	86 (53.7)	0.325	159 (56.5)
Think than chronic pain should be treated	121 (100.0)	154 (96.2)	0.079	275 (97.8)
Think than chronic pain should be treated because*				
– It is a human right	119 (98.3)	118 (73.7)	<0.0001	237 (84.3)
– It causes pathophysiological disturbances	87 (71.9)	97 (60.6)	0.064	184 (65.4)
– It creates social problems	107 (88.4)	109 (68.1)	0.0001	216 (76.8)
– It creates financial problems	87 (71.9)	73 (45.6)	<0.0001	160 (56.9)
– It creates family problems	103 (85.1)	105 (65.6)	0.0004	208 (74.0)

For questions marked with *, students could tick more than one answer.

P value for the comparison between students who attended and did not attend the course.

Bold numerals denote a significant difference between students who attended the pain course and those who did not ($P < 0.05$). Values are numbers (percentage).

opposed to 33.1% of students who did not attend the course, and the difference was statistically significant. Similarly, a greater percentage of students belonging in the former group (97.5%) believed that patients suffering from chronic intractable pain should be referred to specialists, as opposed to a lower percentage of students from the latter group (89.3%). Moreover, students who attended the course seemed to have greater knowledge regarding the health specialists who run pain clinics, identifying them as anesthesiologists, psychologists, physiotherapists, psychiatrists, social workers, oncologists, acupuncturists, and surgeons in descending order. Students also stated that the majority of patients that can be helped after referral to a pain clinic are those suffering from pain lasting more than 3 months, cancer patients, and patients with incurable diseases; this knowledge was also higher among students who attended the pain course. Similarly, students with exposure to the course seemed to have greater knowledge regarding modalities of chronic pain management available (such as opioids, nonsteroidal anti-inflammatory drugs, nerve blocks, antiepileptic and antidepressant drugs, physiotherapy, acupuncture, and psychotropic drugs) in contrast to students that did not attend the course (Appendix Table A2).

About 60.3% of the students who attended the course believed that the majority of patients with chronic pain do not receive adequate treatment as opposed to 41.2% of the students with no exposure to the course with the same belief; the difference was statistically significant. Likewise, a higher percentage of students in the former group as opposed to the latter (76.8% vs 53.7%) believed that the majority of patients with any kind of pain are undertreated. The perception of the patient himself/herself as the best judge of the intensity of cancer pain was also higher among students who attended the pain course. Students also had the knowledge that cancer pain can be caused by cancer itself, but the belief that it can also be caused by treatment for cancer or by situations not directly related to cancer was higher among students who attended the course (Table 3).

Students who attended the course seemed to have greater knowledge regarding situations that cause increased requirements for analgesia in cancer patients, identifying these as analgesic tolerance, inadequate analgesia, mistakes in drug selection, disease progression, and increased psychological burden in descending order. There was not a significant difference in the percentage of

Table 3 Medical students' beliefs about adequacy of treatment of pain, the best judge of the intensity of pain, the etiology of cancer pain, opioids, and addiction

	Students Who Attended the Pain Course	Students Who Did Not Attend the Pain Course	<i>P</i> value	Total
	N = 121	N = 160		N = 281
Think that the majority of patients with chronic pain do not receive adequate treatment	73 (60.3)	66 (41.2)	0.002	139 (49.4)
Think that patients suffering from chronic incurable pain should be referred to specialists	118 (97.5)	143 (89.3)	0.016	261 (92.8)
Think that the majority of patients with any kind of pain are undertreated	93 (76.8)	86 (53.7)	0.0001	179 (63.7)
Think that the best judge of the intensity of pain is*				
– The patient himself/herself	114 (94.2)	129 (80.6)	0.002	243 (86.4)
– The patient's family	21 (17.3)	31 (19.3)	0.785	52 (18.5)
– The nurse	8 (6.6)	10 (6.2)	0.911	18 (6.4)
– The treating doctor	16 (13.2)	34 (21.2)	0.114	50 (17.7)
Think that cancer pain can be caused by*				
– Cancer itself	97 (80.1)	111 (69.3)	0.056	208 (74.0)
– Cancer treatment	115 (95.0)	129 (80.6)	0.0008	244 (86.8)
– Situations not directly related to cancer	72 (59.5)	64 (40.0)	0.0018	136 (48.3)
Think that increased requirements for analgesia in cancer patients are caused by*				
– Addiction to analgesics	81 (66.9)	99 (61.8)	0.449	180 (64.0)
– Disease progression	87 (71.9)	92 (57.5)	0.018	179 (63.7)
– Development of analgesic tolerance	109 (90.0)	119 (74.3)	0.001	228 (81.1)
– Psychological deterioration	84 (69.4)	91 (56.8)	0.042	175 (62.2)
– Mistakes in drug selection	96 (79.3)	91 (56.8)	0.0001	187 (66.5)
– Inadequate analgesia	102 (84.2)	92 (57.5)	<0.0001	194 (69.0)
Think that chronic nonmalignant pain can be treated with opioids	58 (47.9)	36 (22.5)	<0.0001	94 (33.4)
Think that opioids can be administered to cancer patients	75 (61.9)	36 (22.5)	<0.0001	111 (39.5)
Think that addiction is the main problem when opioids are administered for cancer pain	56 (46.3)	80 (50.0)	0.621	136 (48.3)

For questions marked with *, students could tick more than one answer.

P value for the comparison between students who attended and did not attend the course.

Bold numerals denote a significant difference between students who attended the pain course and those who did not (*P* < 0.05).

Values are numbers (percentage).

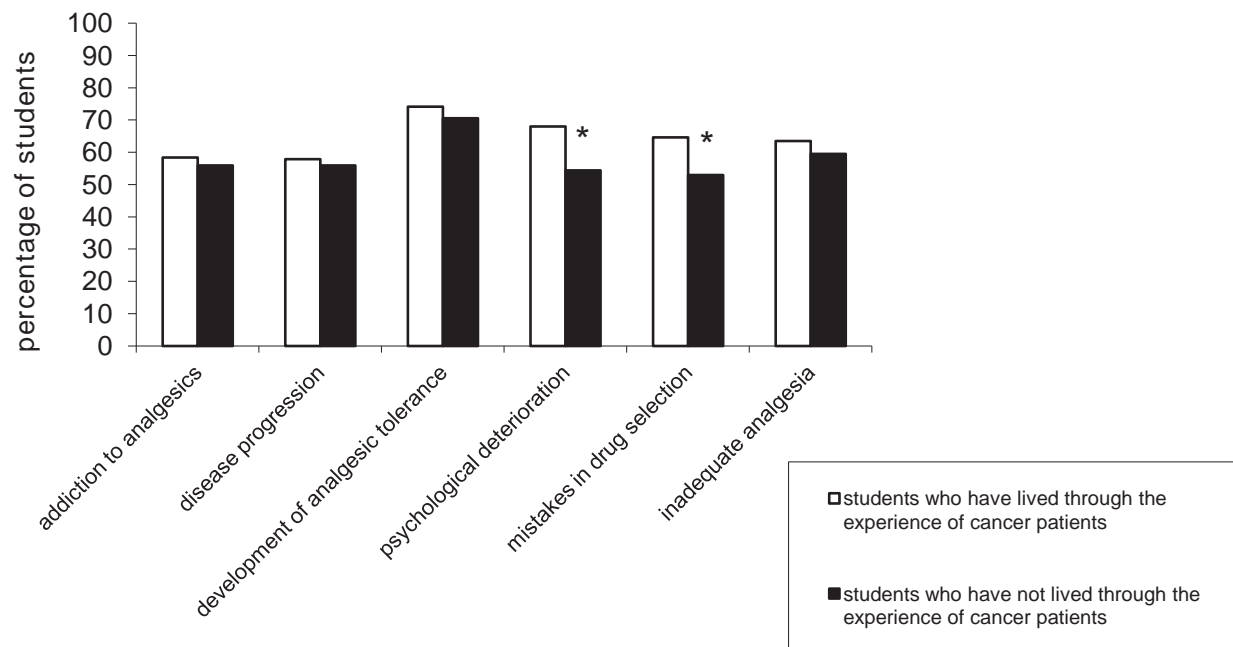
students who considered the development of addiction as cause for increased analgesic requirements between the two groups. Additionally, 48% of the students who attended the course believed that nonmalignant chronic pain can be treated with opioids as compared with 22.5% of the students with no exposure to the course. Likewise, 62% of the students in the former group believed that opioids can be administered on a regular basis to cancer pain patients as opposed to only 22.5% of students in the latter group. Furthermore, there was no significant difference in the percentage of students who considered addiction as the main problem when opioids are given for cancer pain treatment between the two groups (46.3% vs 50%, respectively) (Table 3).

Finally, when responses to the questionnaire were analyzed in relation to whether students have cancer patients

in their family environment and after eliminating the confounding factor of the attendance of the undergraduate course, students who had lived through the experience of cancer patients were more likely to believe that increased requirements for analgesia in cancer patients are caused by increased psychosocial burden and mistakes in drug selection, as opposed to students without experience of such patients (Figure 1).

Discussion

The results of our survey showed that medical students who replied to the questionnaire had good knowledge about the definition and consequences of pain and believed that chronic pain should not be left untreated. However, information on pain clinics, the health practitioners who run them, and the types of treatment available



increased requirements for analgesia in cancer patients are caused by (you can tick more than one answer), * $P < 0.05$ between the two groups

Figure 1 Medical students' beliefs regarding increased requirements for analgesia in cancer patients; * $P < 0.05$ between students who have lived through the experience of cancer patients and students who have not lived through the experience of cancer patients.

was still rather low, especially among those who did not have exposure to the undergraduate pain course. Moreover, students who attended the pain course had greater knowledge regarding the adequacy of treatment of chronic pain and were more familiar with the recent classification of types of pain. Students were rather apprehensive about the use of opioids in cancer and in nonmalignant chronic pain; the knowledge on the subject was particularly poor among students who did not attend the pain course. Finally, addiction to opioids was a major concern for students, even in the treatment of cancer pain.

Pain is a complex and multidimensional problem with a requirement for various specialties' expertise into its management [23]. Teaching about pain is not well integrated into the medical curriculum and both basic science material and the complex behavioral and psychosocial implications of pain have not been major components of medical education [8,11,20,24]. Although students in our sample seemed to have an accurate knowledge regarding the definition of pain, some sections of the questionnaire show discrepancies in the perception of particular concepts. Students who had not exposure to the pain course were less familiar with the entities of nociceptive and neuropathic pain, which is an indication of a poor knowledge of the central nervous system involvement in the development of chronic pain. The lack of elucidation of such

issues lies in defects of conventional medical education regarding the basic science of pain, a subject properly addressed by very few medical schools around the world [25].

Moreover, students who attended the course were more likely to believe that the majority of chronic pain patients are undertreated. They also scored higher in their knowledge of reasons for pain in cancer patients other than the primary disease, such as the treatment itself or situations not directly related to cancer. Students who did not attend the course had poorer knowledge regarding situations that can cause increased requirements for analgesia in cancer patients, such as inadequate analgesia or mistakes in drug selection, the development of analgesic tolerance, or disease deterioration. It appears that students with no special education about pain have misconceptions about the adequacy of treatment of pain and a low degree of certainty regarding pain issues, such as the multifactorial etiology of cancer pain or reasons for inadequate response to treatment in cancer patients.

Another interesting finding of our study was the low information that students have about pain clinics, which is a corollary of the poor teaching on pain assessment and treatment during the academic years. A higher percentage of students who attended the elective pain course believed that chronic patients should be referred to

specialists and were familiar with the concept of pain clinics in relation to those who did not attend the course. The successful management of pain requires a multidisciplinary approach and contribution, and the implications of complex chronic pain situations cannot be met by the sole expertise of any one specialty but rather require multiprofessional collaboration [23]. A strikingly higher percentage of students who attended the pain course had the knowledge that pain clinics are run by anesthesiologists as opposed to those with no exposure to the course (85.1% vs, 25.6%). In accordance, students in the former group were also more familiar with the multidiscipline personnel available to attend to pain patients in pain clinics, such as social workers, physiotherapists, and psychologists. They were also more knowledgeable about the variety of pain treatment methods offered there and were more likely to have acquainted themselves with novel and alternative approaches in the management of pain, such as acupuncture. This shows that the course on pain fulfills its purpose in elucidating issues that even health care providers are not very familiar with, such as the function and personnel running pain clinics, patients that can be referred there, and pain treatment modalities available within their context.

Although, according to our results, students who attended the pain course and those who did not agreed that chronic pain should be treated because of the pathophysiological disturbances that it causes, more students in the former group believed that treating chronic pain is a human right than students in the latter group. Moreover, a higher percentage of students with exposure to the course credited the patients themselves as the best authority of the intensity of their pain. These interesting findings show that education about pain can help the future health professionals realize the importance of a patient-centered approach in the management of pain. The ability to understand another person's pain is a characteristic of empathy, a quality improving the physician-patient rapport and interaction [26–30]. Various educational tools have been developed aiming at introducing a more humanistic and empathetic approach to patient care into medical school curricula and the results have been quite satisfactory [31,32]. In accordance, as it was shown in our study, the undergraduate course about pain helped students realize to a greater extent that pain problems are real and not imaginary, that the patient should always be asked regarding his or her own estimation of pain, and that a compassionate approach is important in order to create mutual trust and improve the encounter between health practitioners and chronic pain patients. The realization of the importance of the patients' self-reporting of pain rather than the family's or attending clinicians' estimation and of the fundamental human right to decent treatment creates the basis for a new model of patient-oriented health care where input from patients and shared decision-making will facilitate the effectiveness of their management [33,34].

Students who attended the pain course also scored higher in the perception that chronic pain should be treated because of the social, financial, and family prob-

lems that it creates. Pain is a complex phenomenon, encompassing not only pathophysiological impairment but also social hindering, disability, and limited self-efficacy, while it often leads to psychological distress and imposes a heavy economic burden on both the patient and his or her family [35,36]. Pain education seems to help students face pain patients with a more holistic approach and be devoid of negative stereotypes, creating the basis for the necessary biopsychosocial framework of care, which will incorporate strategies to reduce the patient's anxiety, impairment of life quality, and social interruption that his or her pain causes.

The consequences for the family of chronic cancer patients are also evident by a secondary interesting finding of our study: The belief that increased requirements for analgesia are caused by the increased psychological burden borne by patients and mistakes in treatment selection was higher among students who have cancer patients in their family environment than those who have not. It appears that respondents who have lived through the frustration and desperation of a loved one's deteriorating condition and poorly controlled pain get emotionally involved and are more likely to consider that the psychological factor plays a significant role in increased analgesic requirements. Empathizing with the suffering relative's disappointment and frustration, they may even tend to believe that fellow health practitioners have selected an inappropriate treatment for their loved ones.

An issue that should be more thoroughly addressed in medical education and for which there seems to be a high level of misconception is that of opioid use and addiction. According to our results, the percentage of students with no pain education who think that opioids can be used as a treatment option in chronic nonmalignant and cancer pain was worryingly low (22.5%). Even students from the other cohort displayed a slight "opiophobia" as they expressed uncertainty about the usefulness or appropriateness of opioid administration in nonmalignant and cancer pain patients, despite clarifications about opioid use through lectures offered in the context of the elective pain course. Moreover, students in both cohorts seemed to exaggerate the incidence of addiction, even in the treatment of cancer pain. The development of a negative attitude toward opioid prescription as undergraduates can lead to untoward stereotype formation in the minds of the prospective clinicians regarding opioid use, which will unfortunately maintain the high number of inadequately treated chronic pain patients due to reluctance to prescribe opioids [3,37,38]. Therefore, it is crucial that opioid and addiction issues are more thoroughly addressed early in medical education in order to preclude the formation of negative attitudes and misconceptions, which can accompany health practitioners throughout their professional life [6,19,39,40].

Our study has a few limitations, such as the small number of students who replied to the questionnaire in relation to the medical student population of Greece, in spite of several efforts to improve recruitment. However, open

questionnaires uploaded on the web, like it was the case in our study, are not sent out to a specific number of persons so that meaningful conclusions about response rate can be reached. It is by no means possible to exactly know how many students are frequent users of social media or to figure out how many of them paid attention to the questionnaire. Moreover, because the majority of respondents were students of the University of Athens Medical School, the results cannot be generalized to all medical students in Greece. An additional limitation is that studies based on questionnaires have inherent limitations due to their structured standardized format and the constraints of preset questions. Furthermore, we did not use an already standardized tool in order to evaluate the undergraduate pain course, as such questionnaires have not been validated in the Greek language. To the best of our knowledge, our attempt to assess the effect of the attendance of the course on students is the first of its kind in Greece and we are not aware of any other studies that have focused on this matter. We do realize that the use of standardized tools, due to their internal consistence and reliability, is necessary in order to measure and compare the effectiveness of different pain management educational programs and to reflect knowledge, attitudes, and beliefs transmitted through education. However, constructing a questionnaire in order to assess the impact of the pain course on students' acquirement of knowledge and on the development of a patient-centered approach to pain assessment was a novel and challenging venture for us. Therefore, in order to assess the impact of the pain course on students' acquirement of knowledge and on the development of a patient-centered approach to pain assessment, we decided to tailor the questionnaire to the content of the course. Definitely, testing, refining, and validating in the Greek language one of the already universally available assessment tools as well as adjusting it in light of the Greek medical education reality would be of interest and can be the object of a future study. A final limitation is that we cannot exclude the possibility that rather motivated by some sort of personal experience, students replied to the questionnaire. We do, however, believe that our results are of value as a preliminary finding and give a snapshot of students' attitudes regarding chronic pain issues.

Conclusion

According to our findings, students enter medical school with little knowledge about pain issues. If the field of pain is not properly addressed in the medical curriculum, they can graduate ill-equipped to manage patients in pain, as they will lack essential knowledge of basic science concepts and of the complex biopsychosocial implications of pain. Our results showed that pain issues awareness can be positively influenced by education. Given the high prevalence of pain in clinical practice, it is imperative that medical curricula should attempt to rectify pain knowledge deficits. A curriculum about pain should not only integrate all necessary neurobiological and pharmacological knowledge about pain but also allow students to directly observe specialists manage patients in pain and most

importantly help students form positive attitudes toward patients in pain, devoid of stereotypes. Moreover, inappropriate concerns about opioid use and addiction should be more thoroughly elucidated. Based on the positive results of our study, attempts are now being rigorously made to introduce a comprehensive curriculum of pain education in the context of various mandatory undergraduate courses in Greek medical schools, apart from what is taught in the elective course. We strongly believe that through this process, medical students' anxiety about encountering patients suffering from chronic pain will be alleviated and they will acquire the clinical skills required to assess and manage pain effectively. Equipped with both knowledge and confidence, they will realize that working with pain patients, although challenging, can be both worthwhile and rewarding.

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References

- 1 Mantyselka P, Kumpusalo E, Ahonen R, et al. Pain as a reason to visit the doctor: A study in Finnish primary health care. *Pain* 2001;89:175–80.
- 2 Von Korff M, Dworkin SF, Le Resche L, Kruger A. An epidemiologic comparison of pain complaints. *Pain* 1988;32:173–83.
- 3 Green CR, Wheeler JR, LaPorte F, Marchant B, Guerrero E. How well is chronic pain managed? Who does it well? *Pain Med* 2002;3:56–65.
- 4 Christo PJ, Mazloomdoost D. Cancer pain and analgesia. *Ann N Y Acad Sci* 2008;1138:278–98.
- 5 Gibbins J, McCoubrie R, Maher J, Forbes K. Incorporating palliative care into undergraduate curricula: Lessons for curriculum development. *Med Educ* 2009;43:776–83.
- 6 Glajchen M. Chronic pain: Treatment barriers and strategies for clinical practice. *J Am Board Fam Pract* 2001;14:2111–8.
- 7 Benedetti C, Dickerson ED, Nichols LL. Medical education: A barrier to pain therapy and palliative care. *J Pain Symptom Manage* 2001;21:360–2.
- 8 Watt-Watson J, McGillion M, Hunter J, et al. A survey of prelicensure pain curricula in health science faculties in Canadian universities. *Pain Res Manag* 2009;14:439–44.
- 9 Niemi-Murola L, Heasman P, Pyorala E, Kalso E, Poyhia R. Training medical students to manage a chronic pain patient: Both knowledge and communication skills are needed. *Eur J Pain* 2006;10:167–70.

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- 10 Kress HG. The importance of putting pain on the curricula in medical schools in Europe. *J Pain Palliat Care Pharmacother* 2013;27:182–4.
- 11 Mezei L, Murinson BB, John Hopkins Pain Curriculum Development Team. Pain education in North American medical schools. *J Pain* 2011;12:1199–208.
- 12 Tauben DJ, Loeser JD. Pain education at the University of Washington School of Medicine. *J Pain* 2013;14:431–7.
- 13 Sloan PA, Plymale M, Johnson M, et al. Cancer pain management skills among medical students: The development of a cancer pain Objective Structured Clinical Examination. *J Pain Symptom Manage* 2001;21:298–306.
- 14 Sloan PA, Plymale M, LaFountain P, et al. Equipping medical students to manage cancer pain: A comparison of three educational methods. *J Pain Symptom Manage* 2004;27:333–42.
- 15 Chen JT, Fagan MJ, Diaz JA, Reinert SE. Is treating chronic pain torture? Internal medicine residents' experience with patients with chronic nonmalignant pain. *Teach Learn Med* 2007;19:101–5.
- 16 Mavis BE, Ogle KS, Lovell KL, Madden LM. Medical students as standardized patients to assess interviewing skills for pain evaluation. *Med Educ* 2002;36:135–40.
- 17 Hajek P, Najberg E, Cushing A. Medical students' concerns about communication with patients. *Med Educ* 2000;34:656–8.
- 18 Forbes K. Opioids: Beliefs and myths. *J Pain Palliat Care Pharmacother* 2006;20:33–5.
- 19 Weinstein SM, Laux LF, Thornby JL, et al. Medical students' attitudes towards pain and the use of opioid analgesics: Implications for changing medical school curriculum. *South Med J* 2000;93:472–8.
- 20 Turner GH, Weiner DK. Essential components of a medical student curriculum on chronic pain management in older adults: Results of a modified Delphi process. *Pain Med* 2002;3:240–52.
- 21 Cherny NI, Baselga J, de Conno F, Radbruch L. Formulary availability and regulatory barriers to accessibility of opioids for cancer pain in Europe: A report from the ESMO/EAPC Opioid Policy initiative. *Ann Oncol* 2010;21:615–26.
- 22 Argyra E, Staikou C, Vadalouca A. Access to and use of opioid for pain management in Greece. *J Palliat Care* 2014;30:55–61.
- 23 Carr E, Brockbank K, Barrett R. Improving pain management through interprofessional education: Evaluation of a pilot project. *Learn Health Soc Care* 2003;2:6–17.
- 24 Poyhia R, Niemi-Murola L, Kalso E. The outcome of pain related undergraduate teaching in Finnish medical faculties. *Pain* 2005;115:234–7.
- 25 Yeziarski RP, Radson E, Vanderah TW. Understanding chronic pain. *Nursing* 2004;34:22–3.
- 26 Kenny DT. Constructions of chronic pain in doctor-patient relationships: Bridging the communication chasm. *Patient Educ Couns* 2004;52:297–305.
- 27 Benbassat J, Baumal R. What is empathy and how can it be promoted during clinical clerkships? *Acad Med* 2004;79:832–9.
- 28 Carr DB. Twenty-first century pain education: The rediscovery of compassion. *Pain Med* 2011;12:183–5.
- 29 Murinson BB, Gordin V, Flynn S, et al. Medical Education Sub-Committee of the American Academy of Pain Medicine. Recommendations for a new curriculum in pain medicine for medical students: Toward a career distinguished by competence and compassion. *Pain Med* 2013;14:345–50.
- 30 Marcus ER. Empathy, humanism and the professionalization process of medical education. *Acad Med* 1999;74:1211–5.
- 31 Boyle D, Dwinnell B, Platt F. Invite, listen and summarize: A patient-centered communication technique. *Acad Med* 2005;80:29–32.
- 32 Rosenthal S, Howard B, Schlüssel YR, et al. Humanism at heart: Preserving empathy in third-year medical students. *Acad Med* 2011;86:350–8.
- 33 Christianson CE, McBride RB, Vari RC, Olson L, Wilson HD. From traditional to patient-centered learning: Curriculum change as an intervention for changing institutional culture and promoting professionalism in undergraduate medical education. *Acad Med* 2007;82:1079–88.
- 34 Murinson BB, Agarwal AK, Haythornthwaite JA. Cognitive expertise, emotional development and reflective capacity: Clinical skills for improved patient care. *J Pain* 2008;9:975–83.
- 35 Niv D, Devor M. Chronic pain as a disease in its own right. *Pain Pract* 2004;4:179–81.
- 36 Fordyce WE. Pain and suffering. *Am Psychol* 1988;43:276–83.

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- 37 Cowan DT, Wilson-Barnet J, Griffiths P, Allan LG. A survey of chronic non cancer pain patients prescribed opioid analgesics. *Pain Med* 2003;4:340–51.
- 38 Fields HL. Should we be reluctant to prescribe opioids for chronic non-malignant pain? *Pain* 2007;129:233–4.
- 39 Heit HA. Addiction, physical dependence, and tolerance: Precise definitions to help clinicians evaluate and treat chronic pain patients. *J Pain Palliat Care Pharmacother* 2003;17:15–29.
- 40 Bennet DS, Carr DB. Opiophobia as a barrier to the treatment of pain. *J Pain Palliat Care Pharmacother* 2002;16:105–9.

Appendix

Table A1 Elective undergraduate curriculum content outline for Greek medical schools

1. History and definition of pain
 - a. Biological significance of pain
 - b. Relationship between acute and chronic pain
 - c. Distinction between nociceptive and neuropathic pain
 - d. Pain as a public health problem
 - e. Epidemiology: societal consequences
 - f. Pain treatment as a human right
 - g. Ethical issues in pain management and research
2. Neuroanatomy and neurophysiology of pain
 - a. Peripheral receptors, afferent fibers, transduction and transformation, peripheral sensitization
 - b. Spinal processing of nociceptive information, brainstem mechanisms of pain
 - c. Descending control and pain modulation
 - d. Central sensitization
3. Pharmacology
 - a. Simple analgesics, NSAIDS
 - b. Opioids
 - c. Adjuvants
 - d. Local anesthetics
4. Pain assessment and measurement
 - a. The measurement of pain
 - b. Pain taxonomy
 - c. Assessment of pain and pain relief
5. Management of pain
 - a. Pharmacotherapy
 - b. Nerve blocks
 - c. Interventional techniques
 - d. Other modalities (acupuncture, neural therapy, massage, physiotherapy)
 - e. Psychotherapeutic and behavioral approaches
 - f. Multidisciplinary approach
6. Pain in special conditions and populations
 - a. Postoperative pain
 - b. Pain in the emergency service
 - c. Neuropathic pain
 - d. Musculoskeletal pain
 - e. Cancer pain
 - f. Headache
 - g. Visceral pain
 - h. Dysfunctional pain syndromes
 - i. The opioid tolerant patient
 - j. End-of-life care

Based on the recommendations of IASP's Curriculum Outline on Pain for Medicine (<https://www.iasp-pain.org/Education/CurriculumDetail.aspx?ItemNumber=729>).

NSAID = nonsteroidal anti-inflammatory drug.

Table A2 Medical students' awareness about pain clinics, health practitioners who run them, patients who can resort there, and treatments available

	Students Who Attended the Pain Course N = 121	Students Who Did Not Attend the Pain Course N = 160	P value	Total N = 281
Are aware of pain clinics existence	109 (90.0)	53 (33.1)	<0.0001	162 (57.6)
Think that pain clinics are run by*				
– Anesthesiologists	103 (85.1)	41 (25.6)	<0.0001	144 (51.2)
– Oncologists	63 (52.0)	24 (15.0)	<0.0001	87 (30.9)
– Surgeons	43 (35.5)	13 (8.1)	<0.0001	56 (19.9)
– Psychologists	91 (75.2)	31 (19.3)	<0.0001	122 (43.4)
– Physiotherapists	82 (67.7)	22 (13.7)	<0.0001	104 (37.0)
– Social workers	66 (54.5)	19 (11.8)	<0.0001	85 (30.2)
– Psychiatrists	75 (61.9)	23 (14.3)	<0.0001	98 (34.8)
– Acupuncturists	53 (43.8)	8 (5.0)	<0.0001	61 (21.7)
Think that patients referred to pain clinics are*				
– Cancer patients	101 (83.4)	44 (26.8)	<0.0001	145 (51.6)
– Patients who are about to be operated on	14 (11.5)	4 (2.5)	0.004	18 (6.4)
– Pregnant women who seek relief from labor pain	16 (13.2)	4 (2.5)	0.001	20 (7.1)
– Patients with incurable diseases	89 (73.5)	32 (20.0)	<0.0001	12 (43.0)
– Psychiatric patients	34 (28.0)	10 (6.2)	<0.0001	44 (15.6)
– Patients suffering from pain lasting more than 3 months	102 (84.2)	45 (28.1)	<0.0001	147 (52.3)
Think that methods of chronic pain management available are*				
– Nonsteroidal anti-inflammatory drugs	89 (73.5)	81 (50.6)	0.0002	170 (60.4)
– Opioids	111 (91.7)	108 (67.5)	<0.0001	219 (77.9)
– Psychotropic drugs	71 (58.6)	54 (33.7)	0.0001	125 (44.4)
– Physiotherapy	85 (70.2)	76 (47.5)	0.0002	161 (57.2)
– Nerve blocks	102 (84.2)	81 (50.6)	<0.0001	183 (65.1)
– Acupuncture	75 (61.9)	66 (41.2)	0.0009	141 (50.1)
– Antiepileptic or antidepressant drugs	105 (86.7)	59 (36.8)	<0.0001	164 (58.3)

For questions marked with *, students could tick more than one answer.

P value for the comparison between students who attended and did not attend the course.

Bold numerals denote a significant difference between students who attended the pain course and those who did not (P < 0.05).

Values are numbers (percentage).