Samara et al. Applied Cancer Research (2018) 38:15
https://doi.org/10.1186/s41241-018-0066-8

Applied Cancer Research

RESEARCH ARTICLE Open Access

Physicians' knowledge, perceived barriers, and practices regarding cancer pain management: a cross-sectional study from Palestine

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Abstract

Background: Pain continues to be a prevalent yet undertreated problem among cancer patients. Achieving adequate control of cancer pain is influenced by physicians' knowledge and practices, which have been found to be inadequate by many studies. In this study, we aimed to examine knowledge and practices, as well as perceived barriers relating to the management of cancer pain among Palestinian physicians.

Methods: This cross-sectional study took place at eight hospitals in the northern West Bank in Palestine. A questionnaire was developed and distributed to physicians who were responsible for the care of cancer patients. The questionnaire assessed knowledge, perceived barriers, assessment practices, pain documentation, and delaying processes relating to cancer pain management (CPM).

Results: In total, we analysed 109 questionnaires. The mean age of the participants was 32.3 ± 7.0 years and 73.4% had less than 10 years of professional experience. After analysing the data, we found physicians' knowledge to be inadequate, with a mean knowledge score of 6.2 ± 1.9 out of 14. The barriers that were perceived by the highest percentages of physicians to affect CPM were inadequate pain assessment (89%), insufficient experience (79.8%), and insufficient knowledge (76.1%), all of which are staff-related. However, 65% reported assessing pain on every round and 70% asked about all items related to the nature of pain. Finally, obtaining opioids from the pharmacy was the most recognized delaying step in CPM.

Conclusions: Despite reporting good practices, physicians showed substantial knowledge deficits regarding CPM. Besides, many barriers appear to impede effective CPM. Therefore, appropriate educational programmes and policy changes are recommended in order to improve professional performance as well as patient care.

Keywords: Cancer pain, Physician, Knowledge, Practice, Perceived barriers, Palestine

Background

Pain is a serious problem among cancer patients, with a prevalence ranging from 33 to 64%, depending on disease advancement and the patient's state relating to treatment [1]. However, the rate of under-treatment of cancer pain is still higher than could be achieved, occurring in almost a half of all cancer patients [2]. This has been conventionally attributed to a variety of obstacles including health professional, patient, and health-care system concerns [2–4]. Health-care providers in general, and physicians in particular, have been frequently evaluated in terms of their knowledge, attitude and practice in regards to cancer pain management (CPM) [5–11].

In Palestine, the health-care system does not yet provide palliative care services for cancer patients [12, 13]. Moreover, the CPM situation among medical professionals has not been previously assessed, despite the poor quality of life that has been found among Palestinian cancer patients [14, 15].

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In this study, our aims were to examine knowledge and practices regarding pain control in cancer patients, and to identify the barriers to adequate and satisfying relief of cancer pain. We approached these aims by surveying a group of physicians dealing with cancer patients in their practice. The results of this survey provide the basis for the efforts and recommendations to improve patient care and policies in Palestine. Also, this survey offers a reference point for additional studies to assess and compare the situation of CPM after the appropriate actions and policies are carried out.

Methods

Study design and setting

This study was designed and carried out as a cross-sectional survey. The study took place, between May and September 2017, at eight hospitals (7 governmental and 1 private) in six cities, all in the northern part of the West Bank in Palestine. Physicians who cared and were responsible for cancer patients in their practice were eligible for participation in the survey.

Sample size and sampling technique

The estimated number of physicians licensed by the Palestinian Medical Association who worked at the surveyed hospitals and were responsible for cancer patients in their practice was around 150 [16]. This number was reached after considering the total number of physicians working in the surveyed hospitals and then assessing how many of those were working in departments where cancer patients were treated and cared for. The numbers of physicians working in those departments varied from one hospital to another as did the size of population served by each hospital and the total bed count in each one, which was also considered in estimating our target population size. Accordingly, a minimal sample of 109 participants was calculated using the Raosoft sample size calculator [17], after setting the indicator percentage at 0.50, the margin of error at 5%, and the confidence interval at 95%. Subsequently, in order not to fall short of this number, a convenience sample of 120 participants was invited to participate in the study. We then selected our sample using the proportional quota sampling method to be representative of the surveyed hospitals, as best as we could, with the number of physicians working in that particular hospital compared to the other hospitals in the study, so that hospitals where a higher number of physicians are working were represented with a proportionately higher number of physicians in our sample, and vice versa. Here are the names of the surveyed hospitals and the corresponding number of physicians invited from each hospital: Jenin Hospital, 10 physicians; Tubas Turkish Hospital, 5 physicians; Tulkarm Hospital, 10 physicians; Rafidia Hospital, 25 physicians; Al-Watani Hospital, 20 physicians; Qalqiliya Hospital, 10 physicians; Salfit Hospital, 10 physicians; and An-Najah National University Hospital (the only private hospital included in the study), 30 physicians.

Inclusion and exclusion criteria

For the purpose of our study, participating physicians were required to meet certain inclusion criteria: to work in a department that provided care for cancer patients and to play an active role in the management of those patients. Interns were excluded from this study as they did not hold any responsibility for patients and were not allowed to write orders or prescriptions. After collecting the data, those who did not complete all items and whose questionnaires were missing a significant part of the data were also excluded.

Questionnaire

The questionnaire used in this study was developed after reviewing the existing literature [5–7, 9, 18–30] on CPM. Items of interest were extracted and adapted for the purposes of the current survey. The final results were organized into five parts.

The first part enquired about demographic data and characteristics of the participants. The remaining parts focused on four different aspects of CPM: knowledge, perceived barriers, assessment and documentation practices, and delaying processes.

Knowledge was evaluated through 14 questions that addressed the basic principles of CPM including [5]: causes of pain and their specific treatment, opioids routes of administration, the pharmacological properties of nonsteroidal anti-inflammatory drugs (NSAIDs), principles of pain assessment, the role of radiotherapy in pain management, prevalence of refractory cancer pain, the role of nerve block in pain management, the ideal time for pain assessment after opioids administration, the safety profile of opioid analgesics, tolerance development to opioid analgesics, the incidence of side effects of opioids, the pharmacological properties of opioid analgesics, opioid dose calculation, and the addictive potential of opioid analgesics. All knowledge questions required 'true', 'false', or 'I don't know' responses. A knowledge score was then generated by assigning one point for each correct answer and summing the points to calculate the total score. The knowledge score ranged from 0 to 14, with a higher score meaning more correct answers and better knowledge. Permission to use questionnaire was asked and obtained from Professor Kim Yeol via personal email.

In the section on perceived barriers, three groups of items were listed: medical staff, patients, and health-care system-related barriers. Participants were simply asked to identify the items that interfered with the CPM process through their experience. Questions regarding

practice enquired about the occasions of pain assessment in cancer patients, aspects of pain assessed, and whether physicians documented pain after every assessment practice in the patient file. The last section investigated the recognition of the most delaying process during CPM, as perceived by physicians. Three processes were suggested for the participants to choose from: administrating the opioid to the patient, getting to the pharmacy to obtain the opioid, and contacting the physician for an opioid prescription.

Before proceeding to the main study, the questionnaire was pilot-tested on 10 physicians, results were analysed, and appropriate modifications were made accordingly. Eligible participants were approached and briefed on the study. They subsequently provided verbal consent to participate in the survey, and then were handed the questionnaire. We requested that they fill the questionnaire in on the spot. Most participants completed all questions in less than 15 min.

Data analysis

Statistical analyses were conducted by IBM SPSS Statistics, version 21 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp). Frequencies and percentages or means and (SD) or median and interquartile range were used to describe responses to items in all five sections of the questionnaire. The Kolmogorov–Smirnov test was used for the assessment of the normality of data. Both Mann–Whitney U test and Kruskal-Wallis post-hoc test were used, as appropriate, to compare knowledge score differences between different categories of participants based on their characteristics. The level of statistical significance was assumed at $p < 0.05$.

Results

Demographic data

Out of 120 physicians who were offered the questionnaire, 109 completed all questions and were included in the final results. Eleven questionnaires were subsequently excluded because physicians (six from government hospitals and five from the private hospitals) did not indicate some of their socio-demographics. Table 1 provides in detail the demographics and characteristics of the participants. The mean age of the participants was 32.3 (in years) with a standard deviation of 7.0, and the majority were males (89%). Less than one-third had received their medical education in Palestine. Most of the participating physicians worked for the government. All levels of professional statuses – from general practitioner to specialist – were represented in a roughly balanced ratio. Many clinical specialties were included, but the majority (76%) fell into the three major areas: general practice, internal medicine and surgery. Based on their years of experience, only a minority (26.6%) had 10 or more years in their account.

Table 1 Demographic data and characteristics of participants ($n = 109$)

Characteristics	Number (%), $N = 109$
Age (years)	
Less than 40	85 (78.0)
40 or more	24 (22.0)
Gender	
Male	97 (89.0)
Female	12 (11.0)
Country of education	
Palestine	34 (31.2)
Abroad	75 (68.8)
Type of work	
Governmental	80 (73.4)
Private sector	25 (22.9)
Both	4 (3.7)
Professional level	
General practitioner	30 (27.5)
Resident	47 (43.1)
Specialist	32 (29.4)
Clinical specialty	
General practitioner	30 (27.5)
Internal medicine	29 (26.6)
Surgeon	24 (22.0)
Paediatrician	10 (9.2)
Other[a]	16 (14.7)
Years of experience	
Less than 10 years	80 (73.4)
10 years or more	29 (26.6)

[a]Other includes medical oncology, family medicine, gynaecology, nephrology, emergency medicine and intensive care medicine

Knowledge of cancer pain management

On average, participants scored 6.2 points out of a maximum 14 points for questions on knowledge about the management of cancer pain, with a SD of 1.9. Table 2 presents the items addressing different aspects of CPM knowledge and the percentage of correct responses for each of these items among participants. The percentage of correct answers varied for questions on different aspects of cancer pain control. The lowest percentages of correct answers were to questions about the addictive potential of opioid analgesics (10.1%), opioid dose calculation (11.9%), and pharmacological properties of opioid analgesics (13.8%). On the other hand, the highest percentage of correct responses was to a question addressing the causes of cancer pain and their specific

Table 2 Percentage of correct responses to items on knowledge of cancer pain management (CPM) among physicians ($n = 109$)

Item[a]	Number (%), $N = 109$
"You should differentiable certain cause of pain which needs specific treatment (i.e. cord compression)" (T)	105 (96.3)
"The IV route for opioid administration has the fastest onset of action" (T)	86 (78.9)
"Prescribing a few different types of NSAIDs will increase the analgesic efficacy and decreased adverse effect" (F)	74 (67.9)
"You should not trust patient's subjective reports of pain" (F)	67 (61.5)
"For painful bone metastasis, radiotherapy can alleviate the pain or help to reduce the amount of analgesics" (T)	59 (54.1)
"Refractory cancer pain rarely occurs with an incidence that does not exceed 5%" (F)	51 (46.8)
"Celiac plexus block is effective for treating cancer pain at upper abdomen" (T)	47 (43.1)
"The effect of immediate release oral opioid can be assessed at 1 h after administration" (T)	45 (41.3)
"Pethidine can be prescribed for chronic cancer pain safely" (F)	35 (32.1)
"Tolerance for opioid-induced sedation develops within a few days" (T)	35 (32.1)
"Opioid-induced respiratory suppression is common" (F)	33 (30.3)
"Opioid analgesics do not have a ceiling effect" (T)	15 (13.8)
"Opioid rescue dose equals 25% of the basal daily requirement of opioid" (F)	13 (11.9)
"Opioid analgesics have a high risk of addiction" (F)	11 (10.1)

[a]Questions were adapted from Jho et al. [5]

treatment (96.3%), followed by responses to questions on opioids routes of administration (78.9%), and the pharmacological properties of NSAIDs (67.9%).

Table 3 shows the relationship between the knowledge score and the characteristics of the participants. Working in the private sector was associated with a higher knowledge score ($p < 0.001$). No other association with a knowledge score was statistically significant.

Perceived barriers for cancer pain management

Figure 1 presents the percentages of physicians who perceived certain barriers to interfere with CPM. In general, barriers related to medical staff were cited more frequently than those related to patients or the health-care system. Inadequate pain assessment was the most frequently perceived barrier (89%), followed by insufficient experience (79.8%) and knowledge (76.1%) of pain control. Only two perceived barriers were encountered by less than half of the participants: the importance of CPM, as considered by the health-care system, and financial constraints.

Practices and documentation

Pain assessment and documentation practices are described in Table 4. The majority (65%) of participants assessed pain on every encounter with the patient, whereas only 11% rarely did so. Regarding the nature of pain, 70% of physicians asked about all five items in their practice, and only 11% checked less than three items. Pain severity and location were the most checked items by 95% and 90% of participants, respectively. As for documentation practices, 79% of physicians reported that they documented pain every time after assessing the patient.

Recognition of delaying processes

Regarding the difference in recognizing the most delaying process in CPM among physicians, 44 of the 109 participating physicians (40%) regarded obtaining the opioid analgesics from the pharmacy as the most delaying step in management. Another 32 participants (29%) considered the delay to be mostly due to the step of getting to the physician for a prescription. Only a minority (11 participants, 10%) considered the most delaying step to be the administration of the analgesic to the patient, whereas the remaining 22 participants (20%) were unable to identify the most delaying process.

Discussion

In the current study, we aimed to evaluate physicians' knowledge and practice, as well as to identify possible barriers relating to CPM in Palestine. We found serious knowledge deficits regarding CPM among physicians. Also, high percentages of physicians perceived many barriers to negatively impact the process of CPM in their experiences, most recognizably inadequate pain assessment, insufficient experience, and poor knowledge relating to CPM, all of which are related to the medical staff. However, physicians reported good practices relating to CPM as well as good adherence to pain documentation. Obtaining the opioid analgesics was the most cited delaying process in the management of pain in cancer patients. We subsequently surveyed a convenience sample of 120 hospital physicians, obtaining an excellent response rate (90.8%), wherein 109 participants completed all parts of the survey. This highly preferable response rate can be attributed to many factors, including the relatively short duration required to complete the questionnaire, the nature of the request to complete the

Table 3 Relationship between characteristics of participants and knowledge score ($n = 109$)

Characteristics	Median [a] [Q1-Q3]	*P* value[b]
Age (years)		
Less than 40	6.0 [5.0–7.0]	0.582[c]
40 or more	6.5 [5.0–7.8]	
Gender		
Male	6.0 [5.0–7.0]	0.172[c]
Female	7.0 [5.0–8.0]	
Country of education		
Palestine	7.0 [5.0–8.3]	0.111[c]
Abroad	6.0 [5.0–7.0]	
Type of work		
Governmental	6.0 [5.0–7.0]	**< 0.001**[d]
Private sector	8.0 [6.5–9.0]	
Both	5.5 [4.3–6.0]	
Professional level		
General practitioner	6.0 [5.0–7.0]	0.694[d]
Resident	6.0 [5.0–7.0]	
Specialist	7.0 [5.0–8.0]	
Clinical specialty		
General practitioner	6.0 [5.0–7.0]	0.137[d]
Internal medicine	7.0 [5.5–8.5]	
Surgeon	6.0 [5.0–7.0]	
Paediatrician	5.0 [4.8–6.3]	
Other*	6.0 [4.0–7.0]	
Experience		
Less than 10 years	6.0 [5.0–7.0]	0.461[c]
10 years or more	7.0 [5.0–8.0]	

*Other includes medical oncology, family medicine, gynaecology, nephrology, emergency medicine and intensive care medicine
[a]Knowledge Score was a range of 0–14; high score reflects more knowledge about cancer pain management)
[b]The *p*-value is bold where it is less than the significance level cut-off of 0.05
[c]Statistical significance of differences calculated using the Mann–Whitney U test
[d]Statistical significance of differences calculated using the Kruskal–Wallis test

survey on the spot, and the choice of timing to approach the subjects taking into account their workloads.

The knowledge deficits, as found in our results, were spanning all levels of professional status and experience, and all clinical specialties, with a mean knowledge score (6.2) not reaching half the maximum (14) points allocated to knowledge assessment. These knowledge deficits were less prominent among physicians working in the private sector compared to those working in government hospitals ($p < 0.001$). This difference can be explained, at least partially, by the positions of the hospitals included in this survey within the Palestinian health-care system: the only private hospital surveyed is considered as a tertiary referral hospital, whereas the rest – all are governmental hospitals – mostly provide secondary health-care services [16]. The results of our study are similar to results from other countries, including China [7] and Thailand [25], where knowledge deficits regarding CPM were also identified. A similar situation of poor knowledge relating to chronic pain management and the use of analgesics among medical residents was also reported by a recent study conducted in Iran [31]. However, these results indicate a deeper knowledge gap compared to more recent studies conducted in Korea [5] and Jordan [32]. Addressing such knowledge problem among physicians can benefit from the experiences of other countries where similar problems were recognized and improved upon. An example of such experiences has been reported in Spain by a study conducted on a group of oncologists there [33].

In order to improve physicians' knowledge relating to CPM, we suggest implementing strategies that can bring more attention to the topic of CPM. Examples of suggested educational interventions include developing and integrating materials and programs that focus on the basics and implementations of CPM within the curriculum of medical students as well as the training of resident physicians. Also, different aspects of CPM could be introduced and addressed on a regular basis during the already existing activities such as journal clubs, medical lectures, and group discussions between physicians of different professional levels and specialties [34–41].

Most of the physicians in our sample perceived barriers related to medical staff to negatively impact on CPM. The other two groups of barriers (patient and system-related) were perceived less frequently, but were still cited by significant percentages of physicians. These results are noticeably higher than results found in Korea [5], but comparable to results from Jordan [32], in terms of the frequency of barrier perception. Nevertheless, barriers to CPM were recognized and reported in many countries. For example, one study, which surveyed 10 Asian countries in 2015, has found high rates of barriers perception relating to CPM among physicians [42]. Also, barriers to CPM were surveyed among cancer patients and were found to be frequently perceived as described by a study involving patients from 6 countries that is a part of the European Pharmacogenetic Opioid Study [43].

In general, participants reported good practice towards CPM. Almost two-thirds of physicians reported assessing pain on every round, and even more stated routinely checking all five items related to the nature of pain. Surprisingly, the results of this self-evaluated pain assessment practice by individual physicians are in clear discordance with the results of the section on perceived barriers, wherein inadequate pain assessment was singled out as the most important obstacle to adequate pain control. Similar discordance between barriers perception

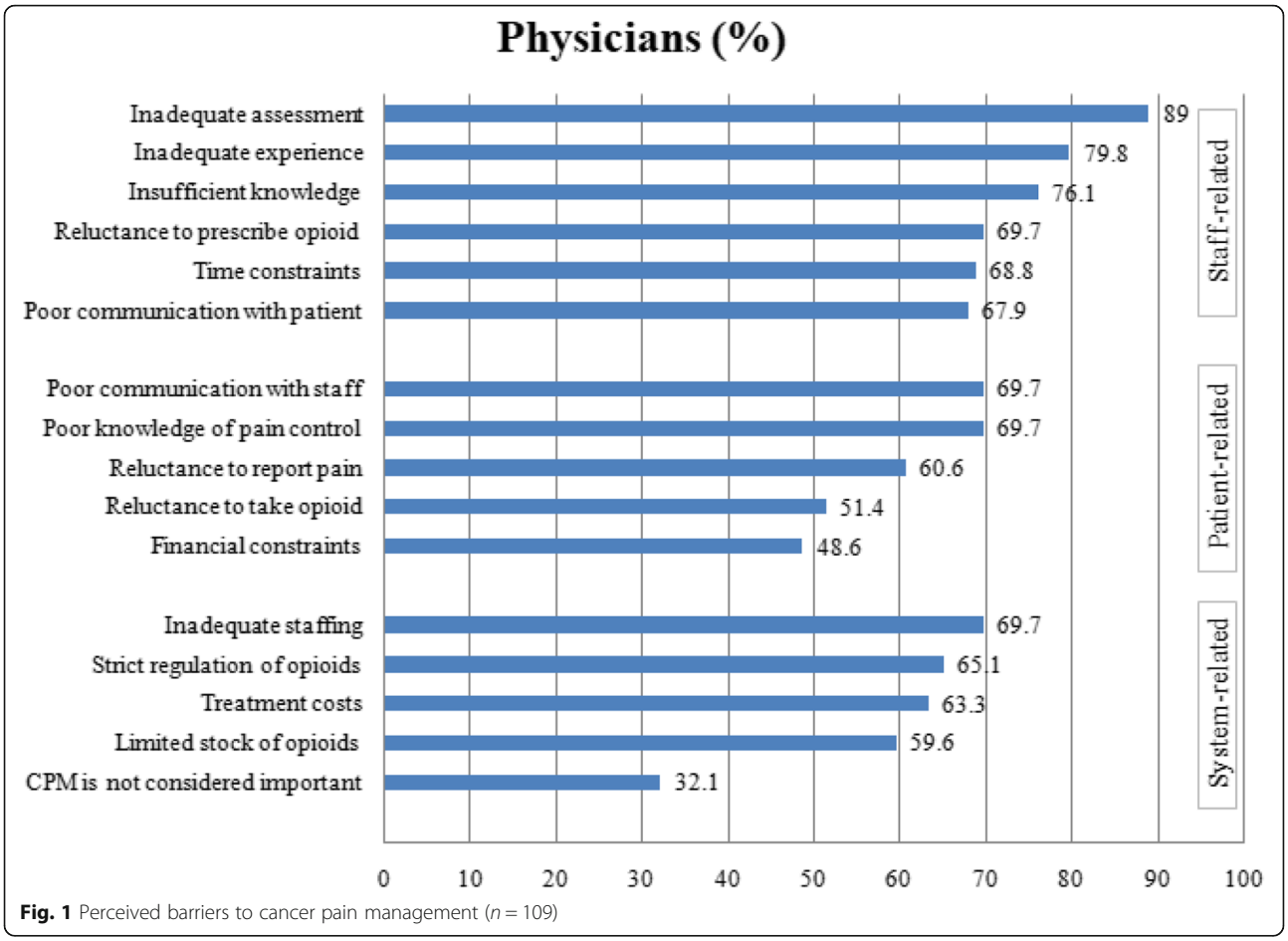

Fig. 1 Perceived barriers to cancer pain management ($n = 109$)

and self-evaluation of practices among physicians has been reported previously in the literature, namely by a study conducted in Israel [6]. The reason behind this observation is more likely to be an overestimation of the self-evaluated pain assessment practice by individual physicians rather than for it to be an overestimation of the role of pain assessment as a barrier to the process of CPM, simply due to the subjective nature of both questions in the sections on barriers and practices, for one is more likely to think highly of his or her own ability than to assume the presence of a problem that is not actually there.

Table 4 Pain assessment and documentation practices

Practice	Number (%), $N = 109$
Occasion of pain assessment	
On every round	71 (65.1)
On some occasions	26 (23.9)
On rare occasions	12 (11.0)
Items checked during pain assessment	
Site	98 (89.9)
Character	95 (87.2)
Associations	89 (81.7)
Severity	103 (94.5)
Time course	81 (74.3)
Documentation of pain assessment	86 (78.9)

Regarding documentation practices, the majority of participants showed excellent adherence. The results of our study were considerably higher than the results of a study conducted in Korea in terms of rate of adherence to pain documentation among physicians [5]. This reflects a good attitude towards CPM among Palestinian physicians. Such preferable findings can be attributed to the strict regulations and instructions concerning pain documentation within the Palestinian health-care system. The findings of perceived barriers also support this proposition in which participants considered 'CPM is not considered as important by the system' to be the least important barrier, perceived by only 32% of participating physicians.

Responses to the question enquiring about the most delaying step in CPM raise two main concerns. First, deciding the best way to address the delaying processes – obtaining opioids from the hospital pharmacy and getting to physicians

for prescriptions are the most recognized sources of delay according to our results. Keeping opioids in wards rather than hospital pharmacies, and emphasizing clear and effective communication means between all members of the health-care team, respectively, are possible interventions to minimize the delay caused by these processes. The second concern is to investigate other sources of delay besides the proposed processes in our question, considering the significant percentage (20%) of participants who were unable to identify the process in question.

Strengths and limitations

To our knowledge, this was the first study to evaluate physicians' knowledge and practice, as well as barriers relating to the management of cancer pain in Palestine. Moreover, considering the multi-centric setting of the study, results can be better generalized to represent the population in question. The current study has some limitations, however, such as its cross-sectional design, convenience sampling and relatively small sample size. Additionally, assessment practices, documentation and barriers to cancer pain control were evaluated indirectly by asking physicians what they did and perceived through their experience. Therefore, our results may not reflect the actual practices and barriers had we examined them first-hand. Also, barriers and delaying processes were listed for participants to choose from, which may have limited the results to already recognized obstacles.

Conclusions and recommendations

In conclusion, although they generally reported good practice, physicians displayed substantial knowledge deficits regarding CPM. Furthermore, high percentages of physicians perceived barriers to undermine the proper control of cancer pain, especially those barriers related to medical staff. Based on the results of this study, we recommend developing strategies – mainly on educational and policy-making levels – to improve the current performance relating to CPM. Such strategies should also be re-evaluated in time by further studies in order to test their effectiveness.

Abbreviations

CPM: Cancer pain management; IRB: Institutional Review Board; NSAIDs: Nonsteroidal anti-inflammatory drugs; SD: Standard deviation

Acknowledgments

Not applicable

Funding

None

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Authors' contributions

AS, and HT collected data, performed the analyses, searched the literature, and drafted the manuscript. SZ conceptualised and designed the study; coordinated, supervised, and analysed the data; critically reviewed the manuscript and the interpretation of the results; and assisted in the final write-up of the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

Ethical approval was granted for the study by the Institutional Review Board at An-Najah National University. Written consents were obtained from the Palestinian Ministry of Health and Office of Medical Director at An-Najah National University Hospital to collect data from seven governmental hospitals and An-Najah National University Hospital (the only private hospital surveyed in this study), respectively. We obtained verbal consent from each participant before the start of the interview.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

Publisher's Note

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Received: 31 January 2018 Accepted: 21 October 2018
Published online: 29 October 2018

References

1. van den Beuken-van Everdingen MH, de Rijke JM, Kessels AG, Schouten HC, van Kleef M, Patijn J. Prevalence of pain in patients with cancer: a systematic review of the past 40 years. Ann Oncol. 2007;18(9):1437–49. https://doi.org/10.1093/annonc/mdm056.
2. Deandrea S, Montanari M, Moja L, Apolone G. Prevalence of undertreatment in cancer pain. A review of published literature. Ann Oncol. 2008;19(12):1985–91. https://doi.org/10.1093/annonc/mdn419.
3. Pargeon KL, Hailey BJ. Barriers to effective cancer pain management: a review of the literature. J Pain Symptom Manag. 1999;18(5):358–68.
4. Paice JA, Ferrell B. The management of cancer pain. CA Cancer J Clin. 2011;61(3):157–82. https://doi.org/10.3322/caac.20112.
5. Jho HJ, Kim Y, Kong KA, Kim DH, Choi JY, Nam EJ, Choi JY, et al. Knowledge, practices, and perceived barriers regarding cancer pain management among physicians and nurses in Korea: a nationwide multicenter survey. PLoS One. 2014;9(8):e105900. https://doi.org/10.1371/journal.pone.0105900.
6. Sapir R, Catane R, Strauss-Liviatan N, Cherny NI. Cancer pain: knowledge and attitudes of physicians in Israel. J Pain Symptom Manag. 1999;17(4):266–76.
7. Yanjun S, Changli W, Ling W, Woo JC, Sabrina K, Chang L, Lei Z. A survey on physician knowledge and attitudes towards clinical use of morphine for cancer pain treatment in China. Support Care Cancer. 2010;18(11):1455–60. https://doi.org/10.1007/s00520-009-0768-2.
8. Breuer B, Fleishman SB, Cruciani RA, Portenoy RK. Medical oncologists' attitudes and practice in cancer pain management: a national survey. J Clin Oncol. 2011;29(36):4769–75. https://doi.org/10.1200/jco.2011.35.0561.
9. Nuseir K, Kassab M, Almomani B. Healthcare Providers' knowledge and current practice of pain assessment and management: how much Progress have we made? Pain Res Manag. 2016;2016:8432973. https://doi.org/10.1155/2016/8432973.
10. Alnajar MK, Darawad MW, Alshahwan SS, Samarkandi OA. Knowledge and attitudes toward Cancer pain management among nurses at oncology units. J Cancer Educ. 2017. https://doi.org/10.1007/s13187-017-1285-5.
11. Xue Y, Schulman-Green D, Czaplinski C, Harris D, McCorkle R. Pain attitudes and knowledge among RNs, pharmacists, and physicians on an inpatient oncology service. Clin J Oncol Nurs. 2007;11(5):687–95.

12. Zeinah GF, Al-Kindi SG, Hassan AA. Middle East experience in palliative care. Am J Hosp Palliat Care. 2013;30(1):94–9. https://doi.org/10.1177/1049909112439619.
13. Shawawra M, Khleif AD. Palliative care situation in Palestinian authority. J Pediatr Hematol Oncol. 2011;33(Suppl 1):S64–7. https://doi.org/10.1097/MPH.0b013e31821223a3.
14. Thweib N. Quality of life of Palestinian cancer patients. J Pediatr Hematol Oncol. 2011;33(Suppl 1):S68–9. https://doi.org/10.1097/MPH.0b013e3182122438.
15. Abu Farha NH, Khatib MT, Salameh H, Zyoud SH. Cancer-related post-treatment pain and its impact on health-related quality of life in breast cancer patients: a cross sectional study in Palestine. Asia Pac Fam Med. 2017;16:7. https://doi.org/10.1186/s12930-017-0037-3.
16. Ministry of Health, and Palestinian Health Information Center. 2017. Health Annual Report, Palestine 2016. https://www.site.moh.ps/Content/Books/ZxRcynmiUofNqt66u4CrHRgmJR6Uv7z77srjjIEAho6xnz5V3rgLTu_RhO7xf2j2VusNiIvWkjwp84yXHLdGleB97gKrHHI5iZ9oPJ25owGEN.pdf. Accessed 14 Jan 2018.
17. Raosoft. Sample Size Calculator. http://www.raosoft.com/samplesize.html. Accessed April 20 2014.
18. Gunnarsdottir S, Donovan HS, Serlin RC, Voge C, Ward S. Patient-related barriers to pain management: the barriers questionnaire II (BQ-II). Pain. 2002;99(3):385–96.
19. Jeon YS, Kim HK, Cleeland CS, Wang XS. Clinicians' practice and attitudes toward cancer pain management in Korea. Support Care Cancer. 2007;15(5):463–9. https://doi.org/10.1007/s00520-006-0183-x.
20. Ger LP, Ho ST, Wang JJ. Physicians' knowledge and attitudes toward the use of analgesics for cancer pain management: a survey of two medical centers in Taiwan. J Pain Symptom Manag. 2000;20(5):335–44.
21. Sun VC, Borneman T, Ferrell B, Piper B, Koczywas M, Choi K. Overcoming barriers to cancer pain management: an institutional change model. J Pain Symptom Manag. 2007;34(4):359–69. https://doi.org/10.1016/j.jpainsymman.2006.12.011.
22. Zhang Q, Yu C, Feng S, Yao W, Shi H, Zhao Y, Wang Y. Physicians' practice, attitudes toward, and knowledge of Cancer pain Management in China. Pain Med. 2015;16(11):2195–203. https://doi.org/10.1111/pme.12819.
23. Gallagher R, Hawley P, Yeomans W. A survey of cancer pain management knowledge and attitudes of British Columbian physicians. Pain Res Manag. 2004;9(4):188–94.
24. Jacobsen R, Sjogren P, Moldrup C, Christrup L. Physician-related barriers to cancer pain management with opioid analgesics: a systematic review. J Opioid Manag. 2007;3(4):207–14.
25. Srisawang P, Harun-Or-Rashid M, Hirosawa T, Sakamoto J. Knowledge, attitudes and barriers of physicians, policy makers/regulators regarding use of opioids for cancer pain management in Thailand. Nagoya J Med Sci. 2013;75((3–4)):201–12.
26. Von Roenn JH, Cleeland CS, Gonin R, Hatfield AK, Pandya KJ. Physician attitudes and practice in cancer pain management. A survey from the eastern cooperative oncology group. Ann Intern Med. 1993;119(2):121–6.
27. Weinstein SM, Laux LF, Thornby JI, Lorimor RJ, Hill CS Jr, Thorpe DM, Merrill JM. Physicians' attitudes toward pain and the use of opioid analgesics: results of a survey from the Texas Cancer pain initiative. South Med J. 2000;93(5):479–87.
28. International Association for the Study of Pain. 2008. Cancer Pain https://www.iasp-pain.org/GlobalYear/CancerPain. Accessed January 12 2018.
29. Manwere A, Chipfuwa T, Mukwamba MM, Chironda G. Knowledge and attitudes of registered nurses towards pain management of adult medical patients: a case of Bindura hospital. Health Sci J. 2015;9(4):3.
30. Visentin M, Trentin L, de Marco R, Zanolin E. Knowledge and attitudes of Italian medical staff towards the approach and treatment of patients in pain. J Pain Symptom Manag. 2001;22(5):925–30.
31. Kheshti R, Namazi S, Mehrabi M, Firouzabadi D. Health care Workers' knowledge, attitude, and practice about chronic pain management, shiraz, Iran. Anesth Pain Med. 2016;6(4):e37270. https://doi.org/10.5812/aapm.37270.
32. Darawad M, Alnajar MK, Abdalrahim MS, El-Aqoul AM. Cancer pain Management at Oncology Units: comparing knowledge, attitudes and perceived barriers between physicians and nurses. J Cancer Educ. 2017. https://doi.org/10.1007/s13187-017-1314-4.
33. Garcia-Mata, J., C. Alamo, J. de Castro, J. Contreras, R. Galvez, C. Jara, A. Llombart et al. 2018. A survey of perceptions, attitudes, knowledge and practices of medical oncologists about cancer pain management in Spain. Clin Transl Oncol. 2018;20(8):1061-71. doi:10.1007/s12094-017-1826–8.
34. Plymale MA, Sloan PA, Johnson M, LaFountain P, Snapp J, Sloan DA. Cancer pain education: the use of a structured clinical instruction module to enhance learning among medical students. J Pain Symptom Manag. 2000;20(1):4–11.
35. Plymale MA, Sloan PA, Johnson M, Lafountain P, Snapp J, Vanderveer B, Sloan DA. Cancer pain education: a structured clinical instruction module for hospice nurses. Cancer Nurs. 2001;24(6):424–9.
36. Sloan PA, LaFountain P, Plymale M, Johnson M, Montgomery C, Snapp J, Sloan D. Implementing cancer pain education for medical students. Cancer Pract. 2001;9(5):225–9.
37. Sloan PA, Plymale M, LaFountain P, Johnson M, Snapp J, Sloan DA. Equipping medical students to manage cancer pain: a comparison of three educational methods. J Pain Symptom Manag. 2004;27(4):333–42. https://doi.org/10.1016/j.jpainsymman.2003.08.006.
38. Paneduro D, Pink LR, Smith AJ, Chakraborty A, Kirshen AJ, Backstein D, Woods NN, Gordon AS. Development, implementation and evaluation of a pain management and palliative care educational seminar for medical students. Pain Res Manag. 2014;19(5):230–4.
39. Tellier PP, Belanger E, Rodriguez C, Ware MA, Posel N. Improving undergraduate medical education about pain assessment and management: a qualitative descriptive study of stakeholders' perceptions. Pain Res Manag. 2013;18(5):259–65.
40. Adam R, Bond C, Murchie P. Educational interventions for cancer pain. A systematic review of systematic reviews with nested narrative review of randomized controlled trials. Patient Educ Couns. 2015;98(3):269–82. https://doi.org/10.1016/j.pec.2014.11.003.
41. Prevost V, Delorme C, Grach MC, Chvetzoff G, Hureau M. Therapeutic education in improving Cancer pain management: a synthesis of available studies. Am J Hosp Palliat Care. 2016;33(6):599–612. https://doi.org/10.1177/1049909115586394.
42. Kim YC, Ahn JS, Calimag MM, Chao TC, Ho KY, Tho LM, Xia ZJ, et al. Current practices in cancer pain management in Asia: a survey of patients and physicians across 10 countries. Cancer Med. 2015;4(8):1196–204. https://doi.org/10.1002/cam4.471.
43. Gunnarsdottir S, Sigurdardottir V, Kloke M, Radbruch L, Sabatowski R, Kaasa S, Klepstad P. A multicenter study of attitudinal barriers to cancer pain management. Support Care Cancer. 2017;25(11):3595–602. https://doi.org/10.1007/s00520-017-3791-8.