Pain knowledge of patients and family caregivers as predictors of pain management outcomes in cancer patients: a multicenter study in China

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Abstract

Purpose The purposes of this study were to evaluate the current situation of pain management outcomes, patients' pain knowledge and family caregivers' pain knowledge in China. And explore the impact of pain knowledge of patients and family caregivers on pain management outcomes.

Methods A multicenter cross-sectional survey was conducted. A total of 410 patient-family caregiver dyads completed questionnaires, which included basic characters of patients and family caregivers, Brief Pain Inventory (BPI), the Pain Knowledge subscales of Patient Pain Questionnaire(PPQ) and Family Pain Questionnaire(FPQ). The difference in pain management outcomes was analyzed using the two independent-samples t test, one way ANOVA analysis and Wilcoxon rank sum test. Variables with statistical significance in bivariate analysis were included in multivariable linear regression analysis.

Results The majority of the patients were male (57.1%), with the mean (*SD*) age of 59.34 (12.59). And strong opioids has been prescribed for 72.4% of the patients. The mean (*SD*) age of 410 family caregivers was 48.25(13.27) and nearly half of participants were female (54.9%). The average patient pain score in the last 24h was 3.23(*SD* = 2.16). The total average score on pain knowledge of 410 patients and family caregivers were 3.60 ± 1.90 and 3.57 ± 1.76 . Taking strong opioids, patients' perceived moderate performance, patients' pain knowledge and family caregivers' pain knowledge were the main factors influencing the pain management outcomes.

Conclusion The findings of this study revealed that patients pain are at a moderate level and not satisfactory. Pain knowledge of patients and family caregivers are also at a moderate level. Moreover, this study reveals that pain management outcomes are obviously influenced by analgesics, performance status and pain knowledge of patients and family caregivers. Advancing pain management by standardizing and individualizing pain treatment, implementing tailored education program to patients and family caregivers are important to improve cancer pain management outcomes.

Introduction

Pain is one of the most common symptoms suffered in cancer patients. Unrelieved pain greatly affects patients activities, motivation, mood, overall quality of life, and denies patients comfort^[1].

A systematic review of literature published between 1966 and 2005 showed that the overall prevalence of pain in cancer patients with all stages was 53%, and moderate to severe pain was reported by 31% of all patients^[2]. In recent years, the whole world has made a lot of efforts in pain management. New insights in pain mechanisms and the development of new analgesics, in combination with the increased attention for cancer pain gave hopeful reasons to expect a decrease in the prevalence and severity of cancer pain^[3]. However, an update systematic review of literature published between 2005 and 2014 showed that the overall prevalence of pain in patients with all cancer stages was 51%, and moderate to severe

pain was reported by 33% of all patients^[4]. Therefore, it is suggested that the prevalence and severity of pain in cancer patients may have not decreased over the world.

However, there are great differences in cancer pain prevalence and severity among different countries^[5]. Therefore, it is more significant to explore the different cancer pain management situation and influencing factors in various countries or regions for the improvement of pain management. In China, the progress in government policy, public advocacy, medication availability, education for health providers, patients and family caregivers have changed the current pain relief situation in the last decades^[6]. However, there are few multicenter studies that can fully understand the current situation of pain management in China.

Furthermore, inadequate pain management can be attributed to barriers related to patients, family caregivers, health care professionals and the health care system^[7]. There are many factors involving patients influencing pain management, such as age, education and other demographics^[8], cancer diagnosis, stages and other disease-related factors^[9], as well as pain knowledge and belief^[10–12]. Additionally, as health-care services growingly move off hospitals, the vast majority of cancer patients care is more often provided with the help of family caregivers in the community over extended periods of time. The basic characteristics, cancer pain knowledge and beliefs of family caregivers have great impact on patients' pain^[13, 14]. But the results of various studies on the influencing factors involving patients and caregivers are inconsistent^[9, 15–17].

According to Knowledge, Attitude/Belief, and Practice(KAP) Model^[18], patients' pain knowledge has an impact on their beliefs, and then affect their pain management behavior, which will influence the outcomes of pain management^[15]. In addition, it should be noted that family caregivers deliver complex cancer pain assessment, communicating with medical staff, administering analgesics and managing side-effects. Therefore, it is hypothesized that the pain knowledge of family members will also have an impact on the pain outcomes of patients. However, few studies have explored the impact of pain knowledge of patients and their families on pain management outcomes^[19].

In view of the current situation of pain management, the influencing factors, especially the pain knowledge of patients and their families are not clear, aims of our study were to (1) evaluate the current situation of pain management outcomes, patients' pain knowledge and family caregivers' pain knowledge in China; and (2) explore the pain knowledge of patients and family caregivers on pain management outcomes.

Participants And Methods

Patient population and study design

A multicenter descriptive cross-sectional study was conducted between June and December 2019. A convenience sample of 444 dyads cancer inpatients and family caregivers was recruited from seven

hospitals in China. Of the 444 dyads, 410 dyads answered all our questions and completed all the questionnaires.

Patients were eligible to participate if they were over the age of 18; have been given a diagnosis of cancer; able to communicate in Chinese; and gave informed consent. Patients were excluded if they were too weak to complete the questionnaire. The family caregivers had to be involved in patients care, which were identified by themselves or patients, over 18 years old, and able to communicate in Chinese. The sample content should be at least 5–10 times the number of independent variables according to the requirements of multifactor analysis for the sample^[20]. The number of independent variables involved in this study was 35; as such, 175–350 patient-family caregiver dyads were needed. Considering a 90.0% effective response rate, the sample size was at least 195 dyads.

This study was approved by the Ethics Committee of Peking University Cancer Hospital. A training session was scheduled for the research nurses from seven centers to establish data collection procedures and uniformity. Eligible patients were approached by a research staff member.

Written informed consent was obtained from all patients and family caregivers.

We reported our results conforming to the Strengthening the Report of Observational Studies in Epidemiology (STROBE).

Measures

Pain management outcomes

The current pain management situation was evaluated by the Brief Pain Inventory (BPI). BPI was developed by Cleeland in 1989 for use with cancer patients for the assessment of epidemiology, clinical pain and the effectiveness of pain treatment^[21, 22]. The BPI measures both the intensity of pain (pain now, worst, least and average pain in the last 24h) and the interference of pain with daily functioning. 0–10 numeric scales for item rating was used with 0 being 'no pain' and 10 being 'pain as bad as you can imagine'. The BPI asks for ratings of the degree to which pain interferes with general activity, mood, walking, normal work, relations with others, sleep, and enjoyment of life using numeric scales, with 0 being 'no interference' and 10 being 'interferes completely'. BPI also queries the patient about pain relief in the last 24h, with 0 being 'no relief' and 100% being 'complete relief'. Xin Shelley Wang^[23] translated and adapted BPI into Chinese, the Chinese version of the Brief Pain Inventory (BPI-C). The coefficient alphas for the pain intensity subscale and pain interference subscale was 0.849 and 0.915 respectively, and the constructive validity, convergent validity and inter-rater reliability of BPI-C were also well documented.

Pain Knowledge

Patient pain knowledge

Patient pain knowledge was evaluated by the Pain Knowledge subscale of Patient Pain Questionnaire (PPQ)^[24]. Pain knowledge subscale included 9 items, fatalism, using analgesics only when pain getting

worse, addiction, tolerance, giving pain medications around the clock, non-drug therapy, interfere with breathing, too much analgesics used to patients, pain is a sign of disease progression. The Likert 11 score (0–10 points) was used. The total subscale score (0–10) was the average score added by the scores of each item. The higher the score, the worse the knowledge.

Family Caregiver Pain Knowledge

Family caregiver pain knowledge was evaluated by the Pain Knowledge subscale of Family Pain Questionnaire (FPQ)^[24]. The items, scoring method and the total score of pain knowledge subscale was identical to PPQ, and the difference between these two scales was language expression.

We translated and culturally adapted PPQ and FPQ into Chinese. All items and subscales were consistent with the original scale. Cronbach's alphas was 0.701 and 0.620 for the pain knowledge subscale of PPQ and FPQ respectively.

Basic Characters

Basic characters of patients included hospital, gender, age, education, employment, self-perceived performance status, cancer diagnosis, anti-tumor therapy, analgesics and adherence. Basic characters of family caregivers included gender, age, education, employment, relationship with patients, living with patients or not.

Statistical analysis

Data were analyzed using the SPSS version 20.0 (IBM Corp., New York, USA). Descriptive statistics and frequency distributions were generated on basic characteristics of patients and family caregivers. The scores on patients' Pain Knowledge and family caregivers' Pain Knowledge were reported with mean and standard deviation. Indicators for pain management outcomes were analyzed using the two independent-samples t test, one way ANOVA analysis and Wilcoxon rank sum test for bivariate analysis. Variables with statistical significance in bivariate analysis were included in multivariable linear regression analysis. Stepwise regression analysis was used, $\alpha_{in} = 0.05$, $\alpha_{out} = 0.10$, and $P < 0.05$ was taken as the significant difference standard. Ordinal categorical variables were regarded as continuous variables for statistical analysis, and dummy variables were used for analysis of unordered categorical variables. And final two-sided P -values < 0.05 were considered statistically significant.

Results

Characteristics of patients

410 patient-family caregiver dyads participated in our study. 122(29.8%) patients were recruited from cancer hospitals, and 288(70.2%) were from general hospitals. The mean (SD) age of the all patients was 59.34 (12.59). The majority of the patients were male (57.1%). Most of the patients perceived moderate performance status (60.7%), were educated in junior high school or below (67.1%), and unemployed

(85.1%). Nearly half (44.9%) of the patients lived in cities. The most diagnosis (32.9%) was lung cancer. Strong opioids has been prescribed for 72.4% of the patients, and 82.7% of the patients completely complied with orders (Table 1).

Characteristics Of Family Caregivers

The mean (*SD*) age of 410 family caregivers was 48.25(13.27). Nearly half of participants were female (54.9%), were educated junior high school or below (48.0%), were spouses of the patients (45.4%). Most of family caregivers were unemployed (65.9%), living together with patients (72.9%) (Table 2).

Pain Management Outcomes

Patients' mean (*SD*) worst and least pain score in the last 24h was 5.06(*SD*= 2.64) and 2.02(*SD*= 1.86). The mean "pain now" score was 2.65(*SD* = 2.15). The average pain score in the last 24h was 3.23(*SD*= 2.16), with 62.7% of the patients reporting their average pain as mild pain, 29.3% as moderate, and 8.0% as severe. The mean score (%) on the pain relief in the last 24h was 66.46 ± 27.13 . And patients experienced a moderate degree of pain interference (4.71 ± 2.84). Of the seven pain interference items, items with the highest mean scores were interference with normal work (5.50 ± 3.55), general activity ($4.84 \pm SD$), mood (4.83 ± 3.15) (Table 3).

Patients' Pain Knowledge

The total average score on pain knowledge of 410 patients was 3.60 ± 1.90 . The three items with the highest score were "prognosis" (5.59 ± 3.85), "drug tolerance" (5.31 ± 3.96), "addiction risk" (4.07 ± 3.83). The score of patient pain knowledge and its correlation with patients' average pain score were presented in Table 4.

Family Caregivers' Pain Knowledge

The total average score on pain knowledge of 410 family caregivers was 3.57 ± 1.76 . The three items with the highest score were "prognosis"(5.53 ± 3.80), "drug tolerance"(5.26 ± 4.11), "addiction risk "(4.16 ± 3.95) (Table 4).

Bivariate analysis of variables and patients' average pain score in the last 24h

The average pain severity in the last 24h was the main pain management outcome of our study. Pearson correlation analysis was used to analyze the correlation between average pain severity and patients' age. The result showed that the correlation coefficient was 0.046 ($P > 0.05$). Two independent samples t-test, ANOVA, Wilcoxon rank sum test were used to analyze the correlation between average pain severity and patients' Basic characteristics. The results showed that the average pain intensity was correlated with patients' locality, self-perceived performance status, anti-tumor therapy and analgesics ($P < 0.05$) (Table 1).

There was no significant correlation between patients' average pain intensity and caregivers' age ($r = -0.064$, $P = 0.05$). The results of two independent samples t-test, ANOVA, Wilcoxon rank sum test showed that patients' average pain intensity was correlated with the relationship between family members and patients, whether family members and patients lived together or not ($P < 0.05$).

The results of Pearson correlation analysis showed that 6 out of 9 patient pain knowledge items were correlated with patients' average pain intensity ($P < 0.05$) (Table 4). Additionally, 8 out of 9 family caregivers pain knowledge items were correlated with patients' average pain intensity ($P < 0.05$) (Table 5).

Predictors Of Patients' Average Pain Severity

Based on the results of univariate analysis, the basic characters of patients, demographics of family caregivers, pain knowledge of patients and pain knowledge of family caregivers significantly correlated with patients' average pain severity were included in multivariable linear regression analysis. The results of multivariate analysis showed that $R^2 = 24.4\%$, adjusted $R^2 = 23.3\%$, $F = 21.661$, $P < 0.001$, $D-W = 0.550$ (Table 6).

Discussion

Cancer pain is one of the most common, debilitating symptoms among cancer patients worldwide. Science lots of barriers limit developing countries toward optimal cancer pain management, cancer pain has emerged as a major and undertreated health problem in developing countries^[25]. A previous study of 30 medical centers conducted in 2010 in China showed that the mean pain severity was 4.81 ± 2.27 . 30 patients (5.09%) reported as no pain, 164 patients (27.85%) reported as mild pain, 266 patients (45.16%) and 129 patients (21.90%) reported as moderate and severe pain^[26]. In our study, the average pain score in the last 24h was $3.23 (SD = 2.16)$, with 62.7% of the patients reporting their average pain as mild pain. From here we see that the current cancer pain management is better than before. The result of pain severity in this study was close to Barbara A. Elliott, P's result in America^[27], Torill Fladvad's result in 11 European countries^[28], and better than what was reported among similar samples in Jordan^[10], Israel^[15], India^[16], Portugal^[29], but worse than the severity reported in Italy^[30]. In addition, cancer pain had a moderate degree of interference on patients, and the impact on normal work was the largest. Work is generally considered to be most affected by pain^[10].

Even though the results of our study show that the pain management has made progress in China, 29.3% and 8.0% patients reported moderate and severe pain, also, the mean pain relief was only $66.46 (SD = 27.13)$. Therefore, cancer pain management is expected to be further improved.

Patients in this study reported a moderate level of pain knowledge (3.60 ± 1.90). This result is similar to a previous study in America in which it was showed the mean pain knowledge score was $3.35^{[31]}$, and better than the result of a study in Israel (5.46 ± 1.28). The three items with the worst patient pain knowledge were "prognosis", "drug tolerance" and "addiction risk". The findings of patient pain

knowledge in this study were consistent with results of attitudes or beliefs related studies, which suggested that tolerance, addiction and cancer prognosis were patients feared most^[27, 32, 33]. Therefore, this study further confirms the influence of knowledge on belief. Moreover, family caregivers in our study also reported a moderate level of pain knowledge (3.57 ± 1.76). A study conducted in America in 2019 revealed consistent result^[34]. What is interesting is that the three items with the worst pain knowledge of caregivers were consistent with those of patients. A systematic review indicated that attitudinal barriers to cancer pain management across patients, family caregivers and the general public are similar, and the fears of tolerance, side-effects were most commonly cited^[35]. Understanding patients and family caregivers perspectives on cancer pain and its management are very important for continued successful pain management. And the education should be focused on the poorest pain knowledge.

The results showed that the use of strong opioids had the greatest impact on the outcome of pain management. The pain intensity of the patients using strong opioids was 1.172 times higher than that of other patients. This result indicates that the pain is still poorly controlled despite the use of strong opioids. Another study also showed that 106 of the 354 patients enrolled in the study took strong opioids but still reported severe pain^[36]. Why did this happen? First, strong opioids are not effective for some of patients with refractory pain, if necessary, referral to a pain specialist and/or the use of interventional strategies should be considered^[1]. In addition, opioids alone is not optimal for patients with neuropathic pain. Adjuvant analgesic should also be used. Third, according to adults pain guidelines, patients who report severe pain should use strong opioids. Then, pain reassessment should be performed at specified intervals to ensure that analgesic therapy is providing maximum benefit with minimal adverse effects^[1]. However, a survey showed that 70% of doctors did not change previously prescribed analgesics based on patients' current pain status^[37]. Therefore, the standardization of pain treatment still needs to be strengthened.

Patients' self-perceived performance status was one of the influencing factors of pain intensity in our study, and the worse the performance status, the severer the average pain. A previous study by Jin Y. Kim provided evidence that the prevalence of cancer pain was higher for patients with poor performance status^[38]. In patients with poor performance status, physicians need to be more cautious in the titration of analgesics, the increase of analgesics doses, the interaction between analgesics and other drugs, and the treatment of side effects. So it is more difficult to management cancer pain in this population. One of the five essential concepts in the WHO approach to drug therapy of cancer pain is for the individual^[39]. For better pain management outcomes, individualized pain treatment should be based on the patient's clinical condition, characteristics of pain, and patient-centered goals of care.

What consistent with our hypothesis was that patients' pain knowledge was a predictor of the pain management outcome, and two knowledge variables were significant. 6.7% of the variance was due to one patients' knowledge variable-believing that patients are often given too much pain medicine. Patients who had this specific knowledge reported more pain and were perhaps less willing to increase the analgesic agents dose to relieve cancer pain. This relationship can be explained in two ways. It may be

due to that this knowledge neutralizes the fears of side effects, tolerance, addiction and physical dependence. A previous study investigating patients' pain barriers showed that the main barriers were concerning about tolerance, addiction and side effects^[40]. Patients' pain barriers result in reluctance to objectively report pain. Alternately, another possible explanation is the lack of knowledge that increasing need for pain medicine means that the pain has got worsened. A study supported this thesis revealed that patients who knew that an increased need for analgesics reflected a real increase in their pain reported better pain experience, compared to those who did not have that knowledge^[27]. Another patient's pain knowledge that had an impact on pain management outcomes was fear of addiction. Patients were less willing to report pain and use pain medicine due to fear of addiction, resulting in worse pain experience. However the R^2 on this variable was just 2.2%, which shows that this knowledge has a small effect on the pain of patients. Understanding patients knowledge of pain and implementing educational program may begin to diminish the imparities in the management of pain. It may similarly allow for programs to be tailored to fit the specific needs of the patient in the treatment and management of their cancer pain.

In the present study, pain management outcomes reported by patients were associated only a small way with family caregivers' knowledge of cancer pain and its management. Even though the family caregivers' pain knowledge on "efficacy of cancer pain management" and "patients are often given too much pain medicine" influenced patients' pain severity, the effect was small. A systematic review published in 2019 provides strong evidence that lack of pain knowledge among cancer patients, family caregivers, professionals and the public were reported as one of the most common barriers to effective cancer pain management. This comprehensive systematic review included 36 studies about cancer pain knowledge or belief from 18 countries, but only 4 of them were conducted in family caregivers^[35]. So more updated studies are needed to generate more contemporary data regarding to family caregivers. Further investigation is needed to determine how family caregivers' pain knowledge plays a role in patient cancer pain management.

Our study also has some limitations. Firstly, convenience sampling method was used to recruit medical centers and patients. Even though the sample size was sufficient enough, the sample representativeness may be not very good.

Second, family caregivers but not primary family caregivers were investigated in our study. Primary family caregivers involves more than general family caregivers in delivering care and support services to patients with cancer pain. Therefore, more attention should be paid to the primary caregivers in the future studies.

In summary, this study concludes that patients pain management outcomes, patients pain knowledge and family caregivers pain knowledge are at a moderate level. Moreover, this study reveals that pain management outcomes are obviously influenced by analgesics, performance status and pain knowledge of patients and family caregivers. Advancing pain management by standardizing and individualizing pain treatment, implementing tailored education program to patients and family caregivers are important to improve cancer pain management outcomes.

Declarations

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-Conflict of interest statement: The authors declare that there is no conflict of interest with regard to this research, authorship, and/or publication of this article.

-Ethics approval: This study was approved by the Ethics Committee of Peking University Cancer Hospital. Informed consent: The written informed consent was obtained.

-Consent to participate: Research assistants explained the study purpose, procedures, and participants' role in the study to all prospective participants before they started. Patients and family caregivers were informed that the autonomy to participate or withdraw in this study at any time was respected.

-Consent for publication: N/A

-Availability of data and material: The datasets used or analysed during the current study are available from the corresponding author on reasonable request.

-Code availability: SPSS version 20.0 (IBM Corp., New York, USA), which was download from Peking University Health Science Library.

-Author contributions:

Yuhan Lu, Xiaoxiao Ma, and Wenhua Yu designed the study.

Xiaoxiao Ma, Xin Li and Dongqin Kang collected the clinical data.

Yuhan Lu, Xiaoxiao Ma, Hong Yang contributed to the data analysis and data interpretation.

Xiaoxiao Ma wrote the manuscript.

Yuhan Lu approved the last version of the manuscript.

All the authors read and approved the final manuscript.

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References

1. National Comprehensive Cancer Network. NCCN Guidelines Version 1.2019 Adult Cancer Pain. Available from: https://www.nccn.org/professionals/physician_gls/default.aspx#age. Accessed October 02. 2021.

2. Van den Beuken-van Everdingen MH, de Rijke JM, Kessels AG, Schouten HC , van-Kleef M, Patijn J (2007) Prevalence of pain in patients with cancer: a systematic review of the past 40 years. *Ann Oncol* 18(9):1437-14493.
3. Johan Haumann, E.A.Joosten, Van den Beuken-van Everdingen MH (2017) Pain prevalence in cancer patients: status quo or opportunities for improvement? *Current Opinion in Supportive & Palliative Care* 11:99-104.
4. van den Beuken-van Everdingen MHJ, Hochstenbach LMJ, Joosten BEAJ, Tjan-Heijnen VCG, Janssen DJA (2016) Update on Prevalence of Pain in Patients With Cancer: Systematic Review and Meta-Analysis. *J Pain Relief* 5:5(Suppl).
5. Moja S, Apolone G (2008) Prevalence of undertreatment in cancer pain. A review of published literature. *Annals of Oncology* 19 (12):1985-1991.
6. Lu YH, Gu YH, Yu WH (2018) Hospice and Palliative Care in China: Development and Challenges. *Asia-Pacific journal of oncology nursing* 5 (1):26-32.
7. Kwon, J. H (2014) Overcoming barriers in cancer pain management. *Journal of Clinical Oncology Official Journal of the American Society of Clinical Oncology* 32 (16):1727.
8. Yang AD, Bai XX, Cheng ZY, Tan J, Du J (2017) Investigation and analysis of influential factors of pain condition in hospitalized cancer pain patients in Chengdu district . *Chin J Ctrl Endem Dis* 3 (3):22-23.
9. Liu YM, Shao ZH, Li W, Wang NY (2016) Factors influencing the analgesic effect of pain in advanced cancer patients with moderate or severe chronic pain. *Chinese Clinical Oncology* 21(3):251-256.
10. Saifan A, Bashayreh I, Batiha AM, Aburuz M (2015) Patient and Family Caregiver Related Barriers to Effective Cancer Pain Control. *Pain Management Nursing Official Journal of the American Society of Pain Management Nurses* 16 (3):400-410.
11. Sigridur, Gunnarsdottir, Valgerdur, Sigurdardottir, Marianne, Kloke, Lukas, Radbruch, Rainer, Sabatowski (2017) A multicenter study of attitudinal barriers to cancer pain management. *Supportive Care in Cancer* 25(11):3595-3602.
12. Barriers to Pain Management among Lithuanian Cancer Patients (2010). *Pain Practice* 10 (2):145-157.
13. Betty R. Ferrell (2018) Family Caregiving and Cancer Pain Management. *Anesthesia & Analgesia* 129(5):1408-1413.
14. Ferrell BR, Temel JS, Temin S, Alesi ER, Balboni TA, Basch EM, Firn JI, Paice JA, Peppercorn JM, Phillips T (2017) Integration of Palliative Care Into Standard Oncology Care: American Society of Clinical Oncology Clinical Practice Guideline Update. *J Clin Oncol* 35 (1):96-114.
15. Cohen MZ, Musgrave CF, Mcguire DB, Strumpf NE, Munsell MF, Mendoza TR, Gips M (2005) The cancer pain experience of Israeli adults 65 years and older: the influence of pain interference, symptom severity, and knowledge and attitudes on pain and pain control. *Supportive Care in Cancer* 13 (9):708-714

16. Singh H, Banipal RPS, Singh B (2017) Assessment of Adequacy of Pain Management and Analgesic Use in Patients With Advanced Cancer Using the Brief Pain Inventory and Pain Management Index Calculation. *J Glob Oncol* 3 (3):235-241.
17. Vuong, Sherlyn, DeAngelis, Carlo, Tsao, May, Pulenzas, Natalie, Danjoux, Cyril (2016) Inadequate pain management in cancer patients attending an outpatient palliative radiotherapy clinic. *Supportive Care in Cancer* 24(2):887-892.
18. Lou FL, Shang SM (2018) Attitudes to pain management towards cancer patients and its influencing factors based on analysis of theoretical perspectives with "S- O- R" model, Heider balance theory and KAP Model. *Chin J Prac Nurs* 34(13):1008-1015.
19. Vallerand AH, Collins-Bohler D, Templin T, Hasenau SM (2007) Knowledge of and barriers to pain management in caregivers of cancer patients receiving homecare. *Cancer Nursing* 30 (1):31-37
20. Hu Yan, Wang Zhiwen. *Nursing Research*. Beijing: People's Medical Publishing House, 2017.
21. Cleeland CS. Measurement of pain by subjective report. In: Chapman CR, Loeser JD, eds. *Advances in pain research and therapy*, vol 12. New York: Raven, 1989:391–403.
22. Hussein RG (2003) Cancer Patients Suffering Pain Unduly. *Journal of advanced nursing* 43:118.
23. Xin SW, Mendoza TR, Gao SZ, Cleeland CS (1996) The Chinese version of the Brief Pain Inventory (BPI-C): its development and use in a study of cancer pain. *Pain* 67 (2-3):407-416.
24. Ferrell B. Patient pain questionnaire. Available from: <https://prc.coh.org/> Accessed October 02. 2020.
25. Li Z, Aninditha T, Griene B, Francis J, Renato P, Serrie A, Umareddy I, Boisseau S, Hadjiat Y (2018) Burden of cancer pain in developing countries: A narrative literature review. *Clinicoeconomics & Outcomes Research* Volume 10:675-691.
26. Ding Y, Yang P, Sun LQ, Lu YH, Zhang L (2011) Pain management among hospitalized cancer patients—a survey in 30 hospitals in Beijing. *Chin J Nurs* 46 (3):282-285.
27. Elliott BA, Elliott TE, Murray DM, Braun BL, Johnson KM (1996) Patients and family members: The role of knowledge and attitudes in cancer pain. *Journal of Pain & Symptom Management* 12 (4):209-220.
28. Torill, Fladvad, Peter, Fayers, Frank, Skorpen, Stein, Kaasa, PI, Klepstad (2012) Lack of association between genetic variability and multiple pain-related outcomes in a large cohort of patients with advanced cancer: the European Pharmacogenetic Opioid Study (EPOS). *Bmj Supportive & Palliative Care* 2 (4):351-355.
29. Sequeira MI, Sousa N, Fragoso M, Silva A, Azevedo L (2017) Single Centre Prospective Study of Systematic Pain Evaluation in Portuguese Patients with Metastatic Prostate Cancer. *Acta Medica Portuguesa* 30 (11):796-804.
30. Corli O, Martoni AA, Porcu L, Roberto A, Pinto C, Torri V, Guglieri I, Zagonel V (2016) Non-clinical factors influencing pain intensity in cancer patients: Socio-cultural–economic status, awareness of disease and the relation with the oncologist. *European Journal of Internal Medicine*:e18-e19.

31. Baker TA, O'Connor ML, Krok JL (2014) Experience and Knowledge of Pain Management in Patients Receiving Outpatient Cancer Treatment: What Do Older Adults Really Know about Their Cancer Pain? *Pain Medicine* 15 (1):52-60
32. Berrett-Abebe J, Levin-Russman E, Gioiella ME, Adams JM (2016) Parental experiences with a hospital-based bereavement program following the loss of a child to cancer. *Palliat Support Care* 15 (3):11.
33. Zeng D, Li K, Lin X, Mizuno M (2019) Attitudinal Barriers to Pain Management and Associated Factors Among Cancer Patients in Mainland China: Implications for Cancer Education. *Journal of cancer education*:35(2):284-291.
34. Washington, KT , Oliver, DP, Smith, JB, Kruse, RL, Meghani, SH, Demiris, G (2019) A Comparison of Rural and Urban Hospice Family Caregivers' Cancer Pain Knowledge and Experience. *Journal of Pain & Symptom Management* 58 (4):685-689.
35. Makhoulf SM, Pini S, Ahmed S, Bennett MI (2020) Managing Pain in People with Cancer-a Systematic Review of the Attitudes and Knowledge of Professionals, Patients, Caregivers and Public. *Journal of Cancer Education* 35 (2):214-240.
36. Inadequate pain management in cancer patients attending an outpatient palliative radiotherapy clinic (2016). *Supportive Care in Cancer* 24 (2):887-892.
37. Rau, KM, Chen, JS, Wu, HB , Lin, SF, Huang, ML, Tai, CJ , Hwang, WL , Lu, YC , Wang, CC, Hsieh, RK (2017) Cancer-related pain: a nationwide survey of patients' treatment modification and satisfaction in Taiwan. *Japanese Journal of Clinical Oncology* 47(11):1060-1065.
38. Jin YK, Jang WY, Mi HH, Kang KL, Hong SS (2012) Prevalence and Management of Pain by Different Age Groups of Korean Cancer Patients. *American Journal of Hospice & Palliative Care* 30 (4):393-398.
39. Jacor A. Management of Cancer Pain. U.S.:Agency for Health Care Policy and Research, 1994.
40. Ma, XX, Lu YH, Yang, H, Yu WH, Hou, XT, Guo, RX , Wang Y, Zhang YR (2020) Relationships between patient-related attitudinal barriers, analgesic adherence and pain relief in Chinese cancer inpatients . *Supportive Care in Cancer* 28 (7):3145-3151.

Tables

Table 1
Comparison of the characteristics of the patients

Characteristics of the patients	<i>n</i> (%)	Average pain severity in last 24h (Mean±S)	<i>t</i> / <i>F</i> / <i>Z</i>	<i>P</i>
Hospital			-1.046	0.296
Cancer hospital	122(29.8)	3.16±2.23		
General hospital	288(70.2)	3.40±1.97		
Gender			1.311	0.191
Male	234(57.1)	3.35±2.17		
Female	176(42.9)	3.07±2.13		
Education			1.057	0.590
Junior high school or below	275(67.1)	3.24±2.02		
Senior high school/Junior College				
College or above	115(28.0)	3.29±2.43		
	20(4.9)	2.80±2.33		
Employment			-1.147	0.252
Unemployed	349(85.1)	3.28±2.19		
Employed	61(14.9)	2.94±1.94		
Locality			3.196	0.042*
Countryside	161(39.3)	3.52±1.95		
Town	65(15.9)	3.35±1.95		
City	184(44.9)	2.94±2.36		
Self-perceived performance status			12.428	□0.001**
Good				
Moderate	58(14.1)	2.52±2.33		
Bad	249(60.7)	3.05±1.98		
	103(25.1)	4.07±2.25		
Cancer diagnosis			1.825	0.071
Lung cancer	135(32.9)	3.56±3.25		
Gastric cancer	36(8.8)	4.28±2.92		
Colorectal cancer				
Esophageal cancer	50(12.2)	4.66±3.07		
Liver cancer				
Breast cancer	25(6.1)	4.88±3.37		
Head and neck cancer	18(4.4)	3.44±2.62		
Cervical cancer	35(8.5)	2.80±3.00		
others	7(1.7)	3.43±1.99		

		10(2.4)	4.90±2.42		
		94(22.9)	4.21±3.11		
Anti-tumor therapy				2.923	0.021*
Radiotherapy	Chemotherapy	62(15.1)	3.55±2.25		
Endocrine therapy		186(45.4)	2.87±1.85		
Targeted therapy	Others	17(4.1)	2.82±2.40		
		35(8.5)	3.54±2.16		
		110(26.8)	3.62±2.46		
Analgesics				13.396	0.001**
No		65(15.9)	2.02±1.90		
NSAIDS		10(2.4)	2.40±1.71		
Weak opioids		38(9.3)	2.45±1.61		
Strong opioids		297(72.4)	3.62±2.16		
Complied with orders				-0.830	0.412
Adherence		339(82.7)	3.23±2.174		
Nonadherence		31(7.6)	3.55±2.06		
Not clear		40(9.8)	-		

* $P<0.05$; ** $P<0.01$

Table 2
Comparison of the characteristics of the family caregivers

Characteristics of the family caregivers	<i>n</i> (%)	Average pain severity in last 24h (Mean±S)	<i>t</i> / <i>F</i> / <i>Z</i>	<i>P</i>
Gender			0.360	0.719
Male	185(45.1)	3.27±2.19		
Female	225(54.9)	3.20±2.13		
Education			3.014	0.050
Junior high school or below	197(48.0)	2.98±1.99		
Senior high school/Junior College	165(40.2)	3.53±2.36		
College or above	48(11.7)	3.23±2.16		
Employment			1.340	0.181
Unemployed	270(65.9)	3.43±2.16		
Employed	140(34.1)	3.13±2.15		
Relationship with patients			4.574	0.032*
Husband/wife	186(45.4)	3.14±1.97		
Children	178(43.4)	3.37±2.24		
Parents	15(3.7)	3.07±2.63		
Siblings	17(4.1)	3.82±2.92		
Grandchildren	2(0.5)	2.50±0.71		
Others	12(2.9)	2.08±1.73		
Living with patients			-2.470	0.014*
Yes	299(72.9)	3.07±2.06		
No	111(27.1)	3.66±2.35		

☐ **P*<0.05; ***P*<0.01

Table 3
Mean scores for each item of BPI

Items/Subscales	<i>Mean±S</i>	<i>Max</i>	<i>Min</i>
st pain in the last 24h	5.06±2.64	10.0	0.0
st pain in the last 24h	2.02±1.86	10.0	0.0
rage pain in the last 24h	3.23±2.16	10.0	0.0
i now	2.65±2.15	10.0	0.0
i relief(%)	66.46±27.13	100.0	0.0
i interference	4.71±2.84	10.0	0.0
eneral activity	4.84±3.17	10.0	0.0
ood	4.83±3.15	10.0	0.0
alking	4.47±3.31	10.0	0.0
ormal work	5.50±3.55	10.0	0.0
elations with others	3.95±3.12	10.0	0.0
leep	4.66±3.24	10.0	0.0
njoyment of life	4.71±3.37	10.0	0.0

Table 4

Relationship between patient pain knowledge and average pain in the last 24h

		Patient knowledge		Pain	Correlation between knowledge and average pain score in the 24h	
		<i>Mean±S</i>	<i>Max</i>	<i>Min</i>	<i>r</i>	<i>P</i>
ancer	pain	2.36±2.66	0.0	10.0	0.211	0.001**
ily	when pain	3.45±3.78	0.0	10.0	0.096	0.051
		4.07±3.83	0.0	10.0	0.245	0.001**
		5.31±3.96	0.0	10.0	0.187	0.001**
e		2.47±3.25	0.0	10.0	0.040	0.421
tments		3.51±3.53	0.0	10.0	0.052	0.297
eathing		3.71±3.59	0.0	10.0	0.127	0.010**
iven too much		1.93±2.74	0.0	10.0	0.293	0.001**
		5.59±3.85	0.0	10.0	0.203	0.001**
		3.60±1.90	0.0	8.22	0.291	0.001**

* $P<0.05$; ** $P\leq 0.01$

Table 5

Relationship between family caregivers pain knowledge and average pain in the last 24h

		Family Pain knowledge	caregiver	Correlation between pain knowledge and average pain score in the 24h		
		<i>Mean±S</i>	<i>Max</i>	<i>Min</i>	<i>r</i>	<i>P</i>
cer	pain	2.34±2.79	0.0	10.0	0.205	0.001**
only	when	4.05±4.08	0.0	10.0	0.101	0.041*
		4.16±3.95	0.0	10.0	0.165	0.001**
		5.26±4.11	0.0	10.0	0.150	0.002**
e		2.12±3.10	0.0	10.0	-0.045	0.363
tments		2.99±3.30	0.0	10.0	0.110	0.026*
eathing		3.74±3.52	0.0	10.0	0.157	0.001**
given	too	1.98±2.83	0.0	10.0	0.235	0.001**
		5.53±3.80	0.0	10.0	0.108	0.029*
		3.57±1.76	0.0	7.78	0.259	0.001**

* $P<0.05$; ** $P<0.01$

Table 6
Multivariable linear regression to identify indicators for pain intensity

les	<i>B</i>	<i>Beta</i>	<i>t</i>	<i>P</i>	Adjusted <i>R</i> ²
nt	0.781	-	3.089	0.002	-
opiods	1.172	0.243	5.499	0.001	8.5%
knowledge: Patients are often given too ain medicine	0.118	0.150	2.829	0.005	6.7%
s' self-perceived performance status	0.561	0.161	3.558	0.001	3.3%
knowledge: addiction risk	0.080	0.143	3.176	0.002	2.2%
caregiver knowledge: Efficacy of cancer anagement	0.105	0.136	3.053	0.002	1.8%
caregiver knowledge: Patients are often oo much pain medicine	0.090	0.117	2.228	0.026	0.8%

Supplementary Files

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