Clinical pain management by a multidisciplinary palliative care team

Experience from a tertiary cancer center in China

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Abstract

To investigate the effect of multidisciplinary interventions on pain management in cancer inpatients.

Four hundred eighty patients with cancer pain, who performed the multidisciplinary intervention were recruited. Before and after intervention, the Brief Pain Inventory (BPI) and the MD Anderson Symptom Inventory (MDASI) score as the primary endpoints and QOL scores as the secondary endpoints were all evaluated. To investigate the factors that led to different responses to multidisciplinary interventions, patients were classified as non-responders or responders.

Finally, 92 patients (63 male and 29 female) scheduled for cancer pain management by inter-professional team were studied. After individualized multidisciplinary therapy, both pain and symptom severity was improved, as demonstrated by lowered BPI worst and average pain scores, as well as symptom severity score measured by MDASI (P = .017, P = .003, and P = .011, respectively). The proportion of patients with mild pain increased regarding the BPI worst and average pain at baseline and after treatment (P < .05). The QOL analyses showed multidisciplinary interventions could significantly improve the function and symptom scores (P < .001). More patients in responder group received chemotherapy (58, 70.7%, P = .003), while fewer received mini-invasive therapy (6, 7.32%, P = .011).

Multidisciplinary interventions had certain beneficial effect on cancer pain management, especially in patients with moderate or severe pain.

Abbreviations: BPI = Brief Pain Inventory, CPR = complete pain response, EORTC = QOL-C30European Organization for Research and Treatment of Cancer Quality of Life Core 30, MDASI = MD Anderson Symptom Inventory, PHQ-9 = Patient Health Questionnaire, PPR = partial pain response, PpR = progressive pain response, SAS = Self-Rating Anxiety Scale, SPR = stable pain response.

Keywords: cancer pain, inter-professional team, multidisciplinary intervention, pain intensity, pain management, pain response

1. Introduction

Cancer, as a major public health problem, is the leading cause of morbidity and mortality worldwide. Currently, approximately 25 million people have been reported to live with cancer and 11 million new cases are diagnosed each year. With the increasing aging of population, it is estimated that the global cancer rate will increase by 50% to 15 million by 2020. Advances in cancer therapy may arrest disease progression and prolong the life expectancy of the patients. However, the state of science and research development has lagged in targeting the physical, psychosocial, and existential elements of living with comprehensive cancer care.
Pain is the most prevalent and debilitating symptom in cancer patients. More than 50% of patients have been suffering from cancer-related pain. However, 1 study has reported the prevalence rate of cancer pain was varied with tumor type, stage, and treatment intention. Cancer pain might be a major determinant of poor quality of life (QOL) of the patients. On the basis of opioids, pharmacologic management has been proved potentially effective for cancer pain. However, according to World Health Organization (WHO) estimates, approximately one third of patients who received active cancer treatment experienced pain, as well as over half of people with more advanced disease. The uncontrolled pain significantly limits the QOL and increases the risk of depressive or anxiety disorders.

Pain is well-established as a multidimensional symptom that consists of physical, psychosocial, emotional, and spiritual elements. The primary disease-modifying therapy along with the pharmacologic treatment has always been considered for clinical cancer pain management. Meanwhile, other treatment modalities have also been advocated for pain control. Psychological and behavioral treatments have been reported to be effective in management of various types of cancer pain. The combination of therapeutic modalities, such as surgery, radiation therapy, chemotherapy, physical, interventional, complementary therapies, hormones, bisphosphonates, with pharmacological and non-pharmacological pain management can optimize pain relief.

A comprehensive, individually tailored multimodal therapy by a multidisciplinary palliative care team has been suggested to be critical for cancer pain management. However, clinical response to palliative care varied with different institutions and settings of palliative care. Therefore, the present prospectively study was to investigate the effect of multidisciplinary interventions from inter-professional team (surgeon, radiotherapist, interventional radiologist, interventional sonographer, pain physicians, psychologists, nutritionist, and nurse specialists) on pain management in cancer inpatients. The Brief Pain Inventory (BPI) and the MD Anderson Symptom Inventory (MDASI) were used for measurement of pain/symptoms and interference.

2. Methods

2.1. Study design and patients
This is a prospective study, primarily aimed to evaluate the effect of multidisciplinary interventions from inter-professional team on pain management in cancer inpatients. This study was approved by the Ethics Committee of our hospital. Patients (≥18 years old) scheduled for of cancer pain management by multidisciplinary intervention and multidisciplinary team were recruited from 16 wards of Cancer Center. In this study, the written informed consents were obtained from 1182 patients with malignant tumor, finally, 438 patients with cancer pain were recruited. Patients with mental retardation or unconsciousness that could not provide informed consent or complete questionnaires were excluded. The demographic information and clinical data of all patients, including age, gender, tumor type and stage, current treatments, and others were recorded.

2.2. Interventions
All new inpatients were initially evaluated by palliative care physicians and nurses for entry into the study. The multidisciplinary care team was then allowed to assess the clinical symptoms and severity, psychological, and nutritional status, and physical function of the patients with cancer pain. The care team was led by physicians. The members of the team included surgeon, radiotherapist, interventional radiologist, interventional sonographer, pain physicians, psychologists, nutritionist, and nurse specialists. The composition of the multidisciplinary team was based on the experience of our previous work. The team members have worked together for almost 2 years and effectively collaborated. All patients with cancer pain were consulted by multidisciplinary care team. The antitumor and/or symptomatic treatments were prescribed according to the clinical conditions of the patients.

The physician, surgeon, radiotherapist, interventional radiologist, and interventional sonographer were responsible for clinical cancer management. The pain physician mainly focused on pain assessment, analgesic prescription, evaluation of responses, and drug adjustment. Nutrition assessment was performed by nutritionist according to the nutritional risk screening tool 2002 (NRS-2002). Patients with an NRS Score ≥3 were considered at risk of malnutrition and were provided with nutrition support. Depression and anxiety of the patients were screened by the Patient Health Questionnaire (PHQ-9) depression scale and Self-Rating Anxiety Scale (SAS).

Individuals with moderate to severe depression and/or anxiety were considered at risk of malnutrition and were provided with nutrition support. The possible treatment plans were proposed and discussed by the specialists, and the definitive treatment plans were then decided and performed by multidisciplinary team.

2.3. Measurements
The comparison of BPI and MDASI scores before and after intervention were the primary endpoints. The patients were asked to report pain intensity and interference using the BPI, an 11-point scale ranging from 0 (no pain) to 10 (the worst pain you can imagine). Pain response was calculated on the basis of the changes of pain intensity score. In this study, complete pain response (CPR) was defined as a reduction in worst-pain score of 2 or more points above baseline, stable pain response (SPR) was defined as a reduction in worst-pain score of at least 2 points above baseline, stable pain response (SPR) described all the remaining cases with the change in BPI scores between -2 and 2. The overall pain response was calculated based on the number of patients with CPR, PPR, and SPR. The severity of pain was categorized as mild (1–3 points), moderate (4–6 points), and severe (7–10 points). To investigate the factors that led to different responses to multidisciplinary treatment, patients were divided into non-responders or responders based on their pain response. MDASI, a validated 19-item questionnaire, was also used to rate the symptoms and functional interference on an 11-point scale (0: no pain or no interference, 10: as bad as you can imagine or complete interference).

The comparison of QOL scores before and after intervention were the secondary endpoint. European Organization for Research and Treatment of Cancer Quality of Life Core 30 (EORTC QOL-C30) was used to assess the QOL scores of the patients before and after multidisciplinary interventions. It is a 30-item core questionnaire including 5 function scales, 9 symptom scales and 6 single items that reflect the multidimensional construct of the QOL.
2.4. Statistical analysis

All analyses were performed using SPSS software, version 17.0 (SPSS Inc, Chicago, IL). Normal distribution of data was examined by the Kolmogorov-Smirnov normality test. Values are presented as mean ± SD, medians (interquartile range), or numbers (percentage). Clinical features between non-responders and responders were compared by Student t test or Mann–Whitney U test for quantitative variables and χ² test or Fisher exact test for categorical variables. Univariate and multivariate logistic regression analyses were used to identify predictive factors associated with pain management in cancer patients. All probability values were two-sided, and P < .05 is considered significant.

3. Results

3.1. Baseline characteristics of the cancer patients with pain

Among the 438 patients with cancer pain, due to the inadequate training and discharge management for research assistants and patients, many patients did not complete the questionnaires well when they discharged, finally only 92 patients (63 male and 29 female) scheduled for cancer pain management by our inter-professional team were recruited into this study. The mean age of patients was 54.4 ± 10.3 years, the mean pain intensity at baseline was 4.18 ± 2.36 scores. Liver cancer was the most common tumor type, occurring in 29 patients (31.5%), followed by lung cancer in 26 (28.3%). Among them, 73.9% patients had advanced cancers (Stage III and IV) and 21.5% patients (20/92) had received analgesic before. Eighty two (89.1%) patients were regarded as responders, including 9 CPR, 25 PPR, and 48 SPR. The remaining 10 patients (PpR) were regarded as non-responders. Patients in responder group had advanced tumor stage (P = .018), however there was no significant difference in terms of other baseline characteristics between the 2 groups (Table 1).

3.2. Multidisciplinary therapy

The individualized multidisciplinary therapy was administered by inter-professional team. 86 patients (93.5%) received antitumor therapy, in which chemotherapy was the most frequent therapy modality (65.2%, Table 2). Eight five patients (92.4%) were prescribed with supportive symptomatic treatment. Changes in analgesic use were observed in 62 (67.4%) patients. The therapy regimens were comparable between 2 groups, except mini-invasive therapy and chemotherapy. More patients in responder group received chemotherapy (58, 70.7%, P = .003), while fewer received mini-invasive therapy (6, 7.32%, P = .011).

3.3. Outcome of cancer pain management

After the individualized multidisciplinary therapy, both pain and symptom severity was improved, as demonstrated by lowered BPI worst and average pain scores, as well as symptom severity score

Table 1

| Baseline characteristics of the cancer patients with pain. | Patients (n = 92) | Non-responder (n = 10) | Responder (n = 82) | P value |
|------------------------------------------------------------|-------------------|-----------------------|-------------------|--------|
| Age (years)                                                | 54.4 ± 10.3       | 53.4 ± 9.47           | 54.5 ± 10.4       | .759   |
| Gender                                                     |                   |                       |                   | .496   |
| Male                                                       | 63 (68.5)         | 8 (12.7)              | 55 (87.3)         |        |
| Female                                                     | 29 (31.5)         | 2 (6.9)               | 27 (93.1)         |        |
| Marital status, n (%)                                      |                   |                       |                   | 1.000  |
| Married                                                    | 90 (97.8)         | 10 (100)              | 80 (97.6)         |        |
| Widow                                                      | 2 (2.2)           | 0 (0)                 | 2 (2.4)           |        |
| Education, n (%)                                           |                   |                       |                   | .532   |
| High school                                                | 43 (46.7)         | 6 (14.0)              | 37 (86.0)         |        |
| College                                                    | 36 (39.1)         | 2 (5.6)               | 34 (94.4)         |        |
| Others                                                     | 13 (14.2)         | 2 (15.4)              | 11 (84.6)         |        |
| Tumor type, n (%)                                          |                   |                       |                   | .447   |
| Liver cancer                                               | 29 (31.5)         | 5 (17.2)              | 24 (82.8)         |        |
| Lung cancer                                                | 28 (30.4)         | 3 (10.7)              | 25 (89.3)         |        |
| Gastric cancer                                             | 8 (8.7)           | 1 (12.5)              | 7 (87.5)          |        |
| Colorectal cancer                                          | 7 (7.0)           | 1 (14.3)              | 6 (85.7)          |        |
| Pancreatic cancer                                          | 6 (6.5)           | 0                     | 6 (100)           |        |
| Others                                                     | 14 (15.2)         | 0                     | 14 (100)          |        |
| Metastasis, n (%)                                          | 49 (53.3)         | 6 (60.0)              | 43 (52.4)         | .745   |
| Tumor stage, n (%)                                         |                   |                       |                   | .018   |
| I                                                          | 5 (5.4)           | 2 (20.0)              | 3 (3.66)          |        |
| II                                                         | 19 (20.7)         | 5 (60.0)              | 14 (79.4)         |        |
| III                                                        | 36 (39.1)         | 1 (10.0)              | 35 (92.8)         |        |
| IV                                                         | 32 (34.8)         | 2 (20.0)              | 30 (75.0)         |        |
| Baseline pain intensity, n (%)                             | 4.18 ± 2.36       | 1.60 ± 1.43           | 4.50 ± 2.26       | <.001  |
| Baseline pain scale, n (%)                                 |                   |                       |                   | .058   |
| Mild                                                       | 42 (45.7)         | 8 (80.0)              | 34 (41.5)         |        |
| Moderate                                                   | 33 (35.9)         | 2 (20.0)              | 31 (37.8)         |        |
| Severe                                                     | 17 (18.5)         | 0 (0.0)               | 17 (20.7)         |        |
| Prior analgesic use                                        | 20 (21.5)         | 1 (10.0)              | 19 (23.2)         | .678   |

Categorical variables were presented with numbers and frequencies, and continuous variables were presented as means and ranges.
by contrast, the data decreased in non-responder group (Fig. 1). In some extent (Table 3). The proportion of patients with mild pain/symptom severity and their interference in responder group were increased to after multidisciplinary treatment (Fig. 1A-B). The proportion of patients with mild pain increased for both the worst and average pain after multidisciplinary treatment (Fig. 1C-D, P = .028 and P = .017, respectively).

The baseline pain/symptom and interference scores of patients in responder group were higher than those of non-responder group (Table 3), although there was no significant difference in terms of BPI least pain and symptom severity. The pain/symptom severity and their interference in responder group was markedly reduced by multidisciplinary treatment, by contrast, the data in non-responder group were increased to some extent (Table 3). The proportion of patients with mild pain increased in responder group after multidisciplinary treatment, by contrast, the data decreased in non-responder group (Fig. 1).

These results suggested that cancer patients with higher pain score were more positively affected by multidisciplinary intervention and were better managed than those with lower pain scores.

3.4. Quality of life of the patients

QOL analyses showed the function and symptom scores in the individual scales were significantly improved by the interventions of our multidisciplinary team (P < .001), although there was no obvious improvement in the global QOL scores of the cancer patients during study (Table 4).

3.5. Predictive factors for cancer pain management

In univariate logistic regression analysis, BPI worst, average and current pain scores, pain interference, and mini-invasive therapy were hardly affected by multidisciplinary treatment and were better managed than these with lower pain scores.

Table 2
Multidisciplinary therapy used in our cancer patients with pain.

|                          | Total (n = 92) | Non-responder (n = 10) | Responder (n = 82) | P value |
|--------------------------|---------------|------------------------|-------------------|---------|
| Antitumor therapy, n (%) | 86 (93.5)     | 9 (90.0)               | 77 (93.9)         | > .05   |
| Surgery, n (%)           | 20 (21.7)     | 3 (30.0)               | 17 (20.7)         | .685    |
| Radiotherapy, n (%)      | 5 (6.4)       | 0 (0.0)                | 5 (6.1)           | .644    |
| Evacuation of serous effusion, n (%) | 7 (8.6) | 0 (0.0) | 7 (8.5) | .600 |
| Mini-invasive therapy, n (%) | 10 (12.9) | 4 (40.0) | 6 (7.32) | .011   |
| Chemo therapy, n (%)     | 60 (65.2)     | 2 (20.0)               | 58 (70.7)         | .003    |
| Targeted therapy, n (%)  | 10 (10.9)     | 0 (0.0)                | 10 (12.2)         | .638    |
| Traditional chinese medicine, n (%) | 11 (12.0) | 1 (10.0) | 10 (12.2) | > .05 |
| Symptomatic treatments, n (%) | 85 (92.4) | 9 (90.0) | 76 (92.7) | .556 |
| Enteral nutrition, n (%) | 2 (2.2)       | 0 (0.0)                | 2 (2.4)           | > .05   |
| Parenteral nutrition      | 38 (41.3)     | 7 (70.0)               | 31 (37.8)         | .086    |
| Electrolyte disturbance correction, n (%) | 41 (46.4) | 5 (50.0) | 36 (43.9) | .747 |
| Protein supplement, n (%) | 19 (20.7)     | 4 (40.0)               | 15 (28.8)         | .260    |
| Anti-inflammatory drug, n (%) | 37 (40.2)   | 5 (50.0)               | 32 (39.0)         | .734    |
| Liver and kidney protection, n (%) | 85 (92.4) | 10 (100.0) | 75 (91.5) | .600 |
| Psychological support, n (%) | 45 (48.9) | 4 (40.0) | 41 (50.0) | .740 |
| Changes in analgesics use, n (%) | 62 (67.4) | 6 (60.0) | 56 (68.3) | .720 |

Table 3
Effect of multidisciplinary treatment on pain/symptom and interference scores in cancer patients with pain.

|                          | Before multidisciplinary therapy | After multidisciplinary therapy |
|--------------------------|---------------------------------|-------------------------------|
|                          | Total (Non-responder group)     | Responder group               | Total (Non-responder group) | Responder group |
| BPI pain score           |                                 |                               |                             |                 |
| Worst pain in last 24 h  | 4.18 ± 2.36                     | 1.60 ± 1.43                   | 4.46 ± 2.27**               | 3.53 ± 2.44     |
| Least pain in last 24 h  | 1.58 ± 1.54                     | 1.00 ± 1.05                   | 1.64 ± 1.56                 | 1.64 ± 1.46     |
| Average pain in last 24 h| 3.09 ± 1.89                     | 1.40 ± 0.97                   | 3.28 ± 1.90**               | 2.46 ± 1.71**   |
| Current pain             | 2.43 ± 1.96                     | 0.90 ± 1.29                   | 2.62 ± 1.94**               | 2.12 ± 1.81     |
| Pain interference score  | 2.88 ± 2.66                     | 1.14 ± 0.95                   | 3.09 ± 2.72**               | 2.48 ± 2.33     |
| General activity         | 3.23 ± 2.81                     | 1.78 ± 1.39                   | 3.38 ± 2.90                 | 2.79 ± 2.51     |
| Mood                     | 3.22 ± 3.04                     | 1.67 ± 1.12                   | 3.39 ± 3.15                 | 2.56 ± 2.64     |
| Walking ability          | 2.63 ± 2.84                     | 1.00 ± 0.87                   | 2.88 ± 2.98                 | 2.91 ± 2.90     |
| Normal work              | 3.24 ± 3.38                     | 1.00 ± 1.07                   | 3.49 ± 3.52                 | 2.11 ± 2.36     |
| Relations with others    | 2.60 ± 2.94                     | 1.00 ± 1.00                   | 2.72 ± 3.02                 | 2.69 ± 2.78     |
| Sleep                    | 2.86 ± 2.91                     | 1.67 ± 2.45                   | 3.00 ± 3.01                 | 2.76 ± 2.85     |
| Enjoyment of life        | 2.79 ± 2.98                     | 0.89 ± 0.93                   | 3.00 ± 3.10                 | 2.48 ± 2.33     |
| MDASI score              | 2.95 ± 1.98                     | 1.86 ± 2.02                   | 3.08 ± 1.95                 | 2.49 ± 1.68**   |
| Symptom interference     | 2.76 ± 2.34                     | 1.55 ± 1.25                   | 2.91 ± 2.40*                | 2.50 ± 1.77     |

*p < .05, **p < .01, ***p < .001 vs that data before multidisciplinary treatment; *p < .05, **p < .01, ***p < .001 vs the data of Non-response group.
were positively associated with pain response, while tumor stage and chemotherapy were negatively associated with pain response of the patients (Table 5). In the multivariate analysis, only the BPI worst pain score was significantly associated with pain response after adjustment for other factors (OR 7.301, 95% CI 1.695–31.451, \( P = .008 \)). Patients with higher baseline worst pain score showed better response to pain management \( (P < .001, \text{Fig. 2}) \).

4. Discussion

For cancer patients, the management of pain is still problematic worldwide, almost half of them were still undertreated. Particularly, the palliative/supportive care from an interdisciplinary working group has been suggested and demonstrated to be effective in cancer pain management. Table 4

| Quality of life of the patients with cancer pain following multidisciplinary treatment. |
|---------------------------------------------|
| Multidisciplinary Interventions | Before | After | \( P \)  |
|----------------------------------|--------|-------|--------|
| Global health status           | 50.0 (41.67–75.5) | 58.3 (41.67–66.7) | .749  |
| Function scale                  |        |       |        |
| Physical function               | 72.2 \( \pm \) 20.94 | 80.60 \( \pm \) 15.62 | < .001 |
| Role function                   | 65.73 \( \pm \) 24.79 | 82.40 \( \pm \) 17.29 | < .001 |
| Emotional function              | 70.51 \( \pm \) 22.62 | 85.02 \( \pm \) 16.49 | < .001 |
| Cognitive function              | 77.15 \( \pm \) 21.38 | 85.02 \( \pm \) 16.49 | < .001 |
| Social function                 | 61.24 \( \pm \) 29.06 | 80.71 \( \pm \) 19.12 | < .001 |
| Symptom scales                  |        |       |        |
| Fatigue scale                   | 37.70 \( \pm \) 22.88 | 25.59 \( \pm \) 15.75 | < .001 |
| Nausea/vomiting                 | 22.47 \( \pm \) 25.39 | 15.73 \( \pm \) 19.84 | < .001 |
| Pain                             | 35.96 \( \pm \) 22.03 | 22.85 \( \pm \) 17.11 | < .001 |

4.4 Univariate logistic regression analysis of factors that associated with clinical pain management in cancer patients.

| Univariate analysis | OR (95% CI)  | \( P \)  |
|---------------------|--------------|--------|
| Age                 | 1.01 (0.947–1.007) | > .05 |
| Gender              | 0.509 (0.101–2.564) | > .05 |
| Education level     |              | > .05 |
| High school         | 1.121 (0.198–6.363)  | > .05 |
| College             | 3.091 (0.388–24.606) | > .05 |
| Metastasis          | 0.735 (0.193–2.6)   | > .05 |
| Tumor stage         |              | > .05 |
| I                   | 1.010 (0.010–0.989)  | .049 |
| II                  | 0.187 (0.032–1.083)  | > .05 |
| III                 | 2.333 (0.201–27.026) | > .05 |
| Prior analgesic used| 2.413 (0.284–20.531) | > .05 |
| Antitumor therapy   | 1.711 (0.179–16.321) | > .05 |
| Surgery             | 1.639 (0.383–7.014)  | > .05 |
| Mini-invasive therapy| 8.444 (1.859–38.369) | > .05 |
| Chemotherapy        | 0.103 (0.02–0.523)   | .006 |
| Traditional Chinese Medicine| 0.8 (0.001–7.002) | > .05 |
| Symptomatic treatment| 1.407 (0.152–13.408) | > .05 |
| Parenteral nutrition| 3.839 (0.924–15.949) | > .05 |
| Electrolyte disturbance correction | 1.278 (0.434–4.755) | > .05 |
| Protein supplement  | 2.978 (0.747–11.878) | > .05 |
| Anti-infective drug  | 1.562 (0.419–5.829)  | > .05 |
| Psychological support | 0.667 (0.175–2.539) | > .05 |
| Changes in analgesic use | 0.67 (0.174–2.583) | > .05 |
| Worst pain in last 24 h | 2.96 (1.508–5.814) | > .05 |
| Least pain in last 24 h | 1.45 (0.812–2.588) | > .05 |
| Average pain in last 24 h | 2.854 (1.413–5.764) | > .05 |
| Current pain         | 2.116 (1.154–3.882)  | > .05 |
| Pain interference    | 1.621 (1.01–2.6)    | .045 |
| Symptom severity     | 1.485 (0.958–2.304)  | > .05 |
| Symptom interference | 1.441 (0.938–2.114)  | > .05 |
The therapeutic effect of multidisciplinary interventions on cancer pain was retrospectively investigated from the inpatients of Chinese PLA General Hospital, one of the largest comprehensive medical and teaching hospital in China. The findings showed that pain/symptom severity and interference of cancer pain patients were significantly improved after individualized multidisciplinary therapy by the inter-professional team. However, most patients still had pain, which was consistent with the report of Bostrom et al, they indicated the significant improvement of pain intensity in cancer patient after palliative care but still had poor pain control. The multidisciplinary intervention by inter-professional team were more effective and better for management of cancer patients with moderate or severe pain. The logistical analysis showed that BPI worst pain score was an independent factors that associated with cancer pain management.

Palliative care across multiple areas has been advocated to improve pain, physical symptoms, and any other existential suffering in cancer patients. The introduction of palliative care services has been reported to brought about meaningful improvement with an emphasis on symptom management and QOL. A cancer patient with complex and refractory pain, who responded poorly to analgesia, experienced significant improvement in symptoms after management by an interdisciplinary palliative care team. Palliative care services in Spain have demonstrated to be effective to symptom control of advanced cancer patients, significantly improving pain severity and number of breakthrough pain crises. Yennurajalingam et al also have reported that the palliative consultation could achieve significant symptom improvement in advanced cancer patients. Furthermore, the clinical pharmacist-led guidance teams have been established in China, showing efficiency and efficacy for cancer pain management. However, a randomized controlled trial failed to demonstrate the beneficial effect of hospital-based palliative care on the improvement of physical symptoms and QOL in cancer patients, when compared with limited telephone advice. A hospital-based palliative care has been identified to have several benefits but without effective pain management. Moreover, 1 study also has indicated that cancer patients with moderate or severe pain were partially responded to palliative care interventions, however, the symptom in patients with no/mild pain was exacerbated after interventions.

The findings of this study showed that the multidisciplinary therapy from inter-professional team could better control the pain of cancer patients, especially those with moderate or severe pain. Pain intensity was worse in 6.1% of patients with moderate pain and 19% of patients with mild pain, suggesting the pain worsening during a short period. Furthermore, the baseline BPI pain score was found to positively associate with pain response, consistent with the results reported by Yennurajalingam et al, which indicated that the initial pain intensity was the only significant predictive factor for pain response. However, Fainsinger et al found a negative association between pain intensity and response, with severe cancer pain predicting poor response. These conflicting results may be partially explained by different patient population and palliative care settings. The QOL scores of the patients were found to be improved to some extent after interventions by multidisciplinary team. Take all these together, these results suggested that cancer patients with moderate or severe pain responded better to the multidisciplinary therapy. Future studies are needed to optimize strategies for cancer pain management. More attention should be focused on initial pain intensity of cancer patients when multidisciplinary intervention is considered.

This study also has some limitations. The number of patients recruited in this study was comparatively small. It might bring a selection bias and lack of generalization of this study. Besides, the care setting in this study is unique, while no comparable patients in another setting are available. In addition, the application of the results of the present study was not clear in clinicians. Therefore, a randomized controlled clinical trial using a larger sample size by extending the recruitment period would be required to fully compare the efficiency of pain management by our multidisciplinary palliative care team in the future study.

5. Conclusions
The findings showed the beneficial effect of the multidisciplinary intervention team on cancer pain management, especially in patients with moderate or severe pain.

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