

# Effectiveness of collaboration between oncology pharmacists and anaesthesiologists for inpatient cancer pain management: A pilot study in Taiwan

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## Abstract

**Objective:** To evaluate the effectiveness of the collaboration between oncology pharmacists and anaesthesiologists for improving pain control management in cancer patients.

**Methods:** This retrospective case–control pilot study enrolled inpatients with active cancer and a pain score of >3 at least once per day for 3 consecutive days. The study group was selected from June 2018 to January 2019. Patients with the same inclusion criteria were selected between November 2017 and May 2018 to serve as the comparison group. The primary outcome was the percentage of patients that experienced pain relief within 7 days from initial pain attack.

**Results:** A total of 71 and 77 patients were enrolled in the study and comparison groups. More patients in the study group experienced pain relief within 7 days from the index date (78.9% [56 of 71 patients] versus 72.7% [56 of 77 patients], respectively). The service increased the rate of intervention from attending physicians within 4 days from index date and quality of opioid management.

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**Conclusion:** The collaboration between oncology pharmacists and anaesthesiologists for cancer pain management may be associated with an increase in the rate of pain relief in cancer patients with poor pain control.

### **Keywords**

pain management, pharmacist, anaesthesiologist, cancer pain

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### **Introduction**

Pain management is a crucial aspect of the treatment for cancer patients. In the oncological population, pain is one of the most debilitating symptoms, affecting approximately 66% of cancer patients.<sup>1</sup> Pain can affect quality of life and have a negative impact on physical, psychological and social activities. For example, studies have demonstrated that pain without appropriate control can contribute to higher rates of depression.<sup>2,3</sup> Enhanced pain control can reduce length of hospital stay, reduce inpatient costs and increase patient satisfaction.<sup>4</sup> Research has indicated that receiving palliative care is associated with enhanced quality of life and survival benefits among patients with advanced lung cancer.<sup>5,6</sup>

Current data from the World Health Organization and hospice care centres suggest that oral morphine alone can alleviate pain in 85% of patients with cancer pain, whereas altering the route of opioid administration, adding co-analgesics, antineoplastic therapies and neurosurgical modalities were recommended in cancer pain management.<sup>7</sup> One survey of cancer patients in Asia demonstrated that nearly half of patients claimed they did not receive a quantified pain assessment.<sup>8</sup> Other studies indicated that opioids may cause adverse effects such as nausea, constipation, sedation and pruritus.<sup>9,10</sup> Therefore, decisions

to administer opioids should consider the balance between efficacy and adverse effects.

Receiving appropriate pain control is a crucial patient right, so establishing pain medication stewardship can improve the quality of patient care and increase medication safety.<sup>11</sup> A previous report described clinicians' attitudes toward pain typically focused on pathophysiology first rather than the quality of life linking to cultural, societal and other factors.<sup>12</sup> Management of cancer pain should be proactive and driven by an understanding of pain mechanisms; and it should include the optimal use of multimodality interventions provided by a consultation with pain or palliative medicine physicians.<sup>13</sup> Studies have shown that pharmacists can have a positive impact on clinical care by leading or collaborating with interdisciplinary teams to identify drug-related problems.<sup>14,15</sup>

To provide a better service for cancer patients with pain issues in a 700-bed medical centre located in northern Taiwan, the oncology pharmacists collaborated with anaesthesiologists and began conducting ward rounds proactively from June 2018. Two pharmacists were responsible for the service. One was a board-certified oncology pharmacist and the other was certified for pain management from the American Society of Health-System Pharmacists. Cancer patients with moderate-to-severe

pain for at least 3 consecutive days were enrolled in the service. The pharmacists review patient data every day and had ward rounds with anaesthesiologists twice a week. They assessed their pain condition including location, intensity, timing, aggravating factors and current pain management. After the assessment, they held discussions with the attending physicians and provided interventions including medication adjustments and non-pharmacological therapy such as nerve block and consultation for other specialists. The purpose of the pilot study was to evaluate the effectiveness of this collaboration between the oncology pharmacists and anaesthesiologists.

## Patients and methods

### *Study design and patient population*

This retrospective case-control study evaluated the efficacy of the collaborative pain control service at the Department of Pharmacy, Wan Fang Hospital, Taipei Medical University, Taipei between 1 June 2018 and 31 January 2019. Eligible patients included inpatients >20 years that had a diagnosis of cancer as defined by the codes 140.xx–239.xx of the International Classification of Diseases, Ninth Revision (ICD-9) and C0–D48 of ICD-10.<sup>16,17</sup> The team proactively interviewed patients that had a single pain score >3 at least once per day for 3 consecutive days. The nurses used a numerical pain scale (from 0 to 10) to assess every inpatient at least once every 8 h. The team visited the patients every Tuesday and Friday. They assessed the cause, location, intensity and frequency of current pain; evaluated pain management; discussed these factors with the attending physicians; and provided suggestions. The initial pain management and interventions were documented by the team members and the pain score after the first visit was

documented by ward nurses. The team members also evaluated the use of prophylactic laxatives in opioid-naïve patients receiving strong opioids and assessed any pain control adjustments made to pain management protocols in the 3 days preceding the team's visit. A comparison period was defined between 1 October 2017 and 31 May 2018. The same criteria were used to select patients in the comparison period as in the study period. The data collected included sex, age, cancer stage, cancer type, pain score, laxative use, and suggestions from the teams.

This study was approved by the Institutional Review Board (IRB) of Taipei Medical University (no. N201909065). The IRB agreed to waive need for informed consent and all patient details were de-identified. The reporting of this study conforms to STROBE guidelines.<sup>18</sup>

### *Outcomes*

The primary outcome was the percentage of patients that experienced pain relief within 7 days from the index date. The first day of pain attack was defined as the index date. Pain relief was defined as no consecutive pain score of >3 on any days between days 4 and 7 since the index date. Other outcomes included the rate of pain relief within 5 days from the index date, rate of intervention by the attending physician within 4 days from the index date, rate of prophylactic laxative use in opioid-naïve patients receiving strong opioids and types of suggestions made by the oncology pharmacists and anaesthesiologists. Intervention by the attending physician was defined as newly prescribed analgesics or analgesic dose adjustment 1–3 days before the team visited the patients. The rate of intervention was the number of patients with interventions from the attending physician divided by total number of patients. Opioid-naïve

patients were defined as at least absence of opioid medication within 3 months preceding their opioid prescriptions. Prophylactic laxatives were defined as medications containing magnesium oxide, sennoside, lactulose or bisacodyl. The American Pain Society recommends that the prevention of opioid-induced constipation should be a performance measure.<sup>19</sup> Types of suggestions made by oncology pharmacists and anaesthesiologists were classified as dose adjustments, medication changes, medication additions, frequency adjustments and non-pharmacological interventions.

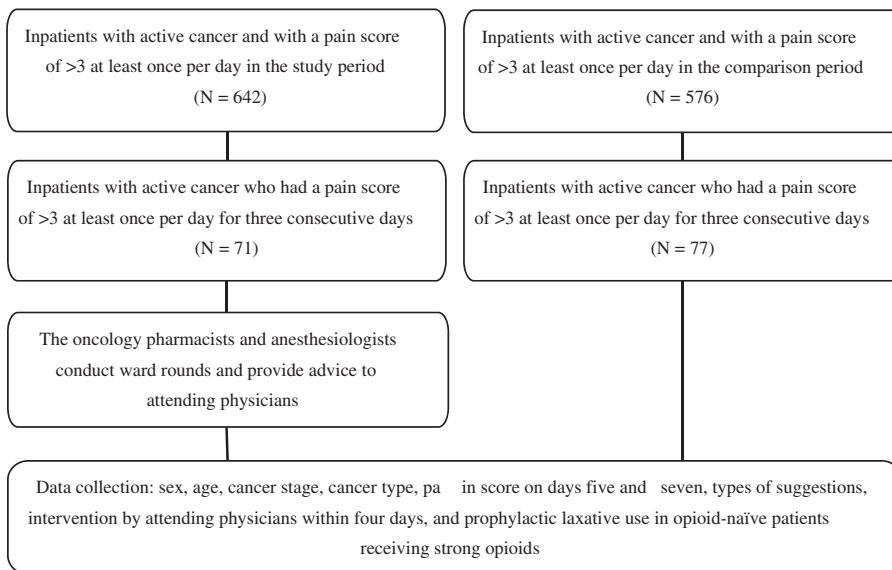
### Statistical analyses

All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 19.0 (IBM Corp., Armonk, NY, USA). Demographic data, clinical variables and study endpoints were compared between the study period and the comparison period. Data are presented as

mean  $\pm$  SD or  $n$  of patients.  $\chi^2$ -test or Fischer's exact tests were used for assessing categorical variables. Student's  $t$ -test or Wilcoxon tests were used for assessing continuous variables. A  $P$ -value  $<0.05$  was considered statistically significant.

### Results

This retrospective pilot study enrolled 642 and 576 inpatients with active cancer that had pain scores  $>3$  in the study period and comparison period, respectively. Among these patients, 148 patients met the inclusion criteria and were enrolled in the study (Figure 1). The baseline characteristics of age, sex, cancer stage and cancer type were similar between the two groups (Table 1). Among the study group, 29.6% (21 of 71 patients) of patients were noted to have stage IV cancer with malignant ascites. During the comparison period, the percentage of patients that experienced pain relief within 7 days was 72.7% (56 of 77 patients).



**Figure 1.** Flow diagram showing the enrolment of the study and comparison groups in a pilot study to evaluate the effectiveness of a collaboration between oncology pharmacists and anaesthesiologists for cancer pain management.

**Table 1.** Baseline characteristics of inpatients with pain scores of >3 for at least 3 consecutive days that were enrolled in a pilot study to evaluate the effectiveness of a collaboration between oncology pharmacists and anaesthesiologists for cancer pain management.

	Study group <i>n</i> = 71	Comparison group <i>n</i> = 77
Sex, male	32 (45.1)	40 (51.9)
Age, years	59.2 ± 11.1	58.3 ± 15.1
Cancer stage		
Stage IV	48 (67.6)	52 (67.5)
Stage III	13 (18.3)	10 (13.0)
Stage II	8 (11.3)	6 (7.8)
Stage I	2 (2.8)	9 (11.7)
Cancer type		
Gastric cancer	16 (22.5)	14 (18.2)
Colorectal cancer	11 (15.5)	14 (18.2)
Gynaecological cancer	10 (14.1)	5 (6.5)
Lung cancer	7 (9.9)	8 (10.4)
Bladder cancer	5 (7.0)	1 (1.3)
Head and neck cancer	5 (7.0)	14 (18.2)
Breast cancer	4 (5.6)	5 (6.5)
Pancreatic cancer	3 (4.2)	4 (5.2)
Hepatocellular cancer	2 (2.8)	3 (3.9)
Prostate cancer	1 (1.4)	1 (1.3)
Others	7 (9.9)	8 (10.4)

Data presented as mean ± SD or *n* of patients (%). No significant between-group differences ( $P \geq 0.05$ );  $\chi^2$ -test or Fischer's exact tests were used to compare categorical variables; and Student's *t*-test or Wilcoxon tests were used to compare continuous variables.

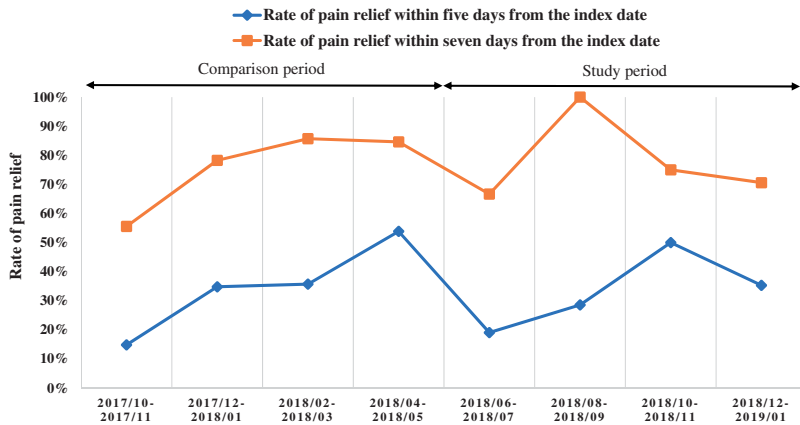
This percentage increased to 78.9% during the intervention period (56 of 71 patients) (Table 2). The mean monthly rate of pain relief within 7 days from the index increased from 66.7% (14 of 21 patients) in the first 2 months after the beginning of the collaborative service to 84.0% (42 of 50 patients) in the following 6 months. The rate of pain relief within 5 days from the index date was similar in the intervention period and the comparison period (31.0% [22 of 71 patients] versus 31.2% [24 of 77 patients]) (Table 2). An examination of the mean pain relief rate in 2-month increments over the comparison and study periods revealed an increasing trend in the rate of pain relief within 5 or 7 days from the index date (Figure 2).

The rate of intervention by attending physicians within 4 days from the index date also increased steadily. The rate of intervention was 57.1% (12 of 21 patients) in June to July 2018, 61.9% (13 of 21 patients) in August to September 2018, 75.0% (nine of 12 patients) in October to November 2018 and 94.1% (16 of 17 patients) in December 2018 to January 2019 (Figure 3). During the intervention period, the rate of prophylactic laxative use in opioid-naïve patients receiving strong opioids increased from 66.7% (eight of 12 patients) in June 2018 to 81.3% (13 of 16 patients) in January 2019

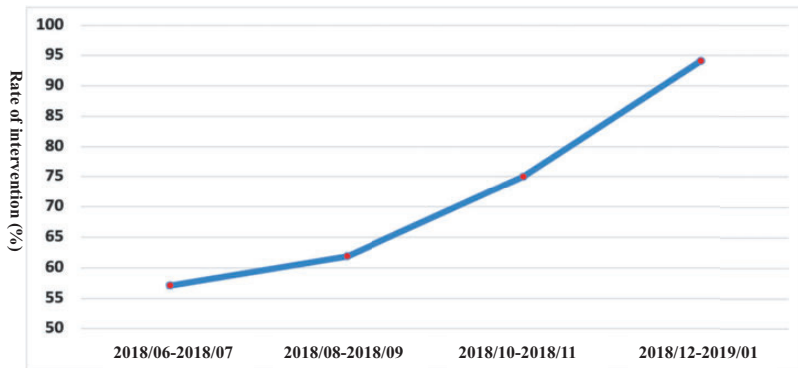
**Table 2.** Rate of pain relief within 5 or 7 days from the index date in inpatients with pain scores of >3 for at least 3 consecutive days that were enrolled in a pilot study to evaluate the effectiveness of a collaboration between oncology pharmacists and anaesthesiologists for cancer pain management.

	Study group <i>n</i> = 71	Comparison group <i>n</i> = 77
Pain relief within 7 days from the index date	56 (78.9)	56 (72.7)
Pain relief within 5 days from the index date	22 (31.0)	24 (31.2)

Data presented as *n* of patients (%). No significant between-group differences ( $P \geq 0.05$ );  $\chi^2$ -test or Fischer's exact tests were used to compare categorical variables.



**Figure 2.** Mean rate of pain relief within 5 and 7 days from the index date for each 2-month increment during the comparison period and the study period in inpatients enrolled in a pilot study to evaluate the effectiveness of a collaboration between oncology pharmacists and anaesthesiologists for cancer pain management.



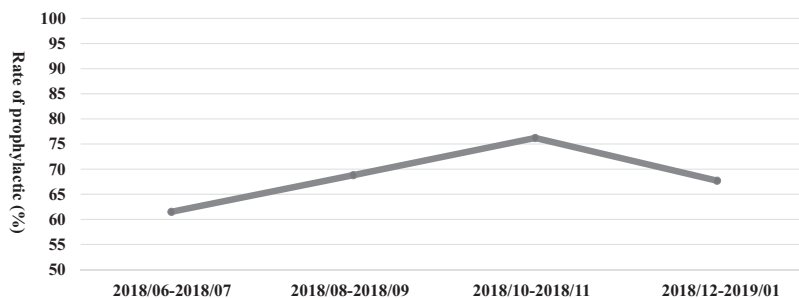
**Figure 3.** Rate of intervention by attending physicians within 4 days from the index date in inpatients enrolled in a pilot study to evaluate the effectiveness of a collaboration between oncology pharmacists and anaesthesiologists for cancer pain management.

(Figure 4). A total of 32 suggestions were provided during the intervention period and the acceptance rate was 100% (29 of 29 patients). The majority of the suggestions provided were dose adjustments (12 of 32; 37.5%), followed by medication changes (10 of 32; 31.3%), medication additions (seven of 32; 21.9%), frequency adjustments (two of 32; 6.3%) and non-pharmacological interventions (one of 32; 3.1%) (Figure 5). Among patients with

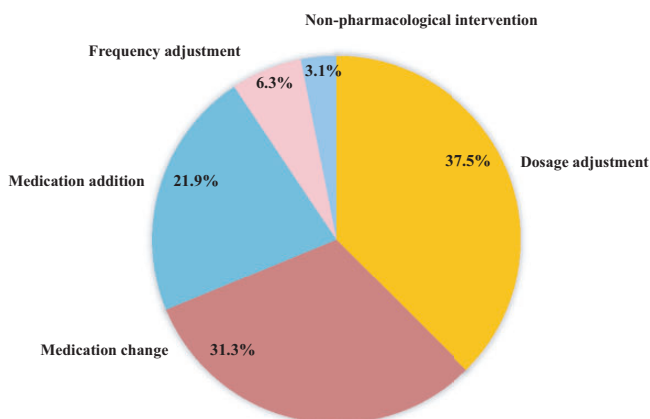
interventions, the mean daily pain score on day 7 was 2.6.

## Discussion

This retrospective pilot study demonstrated the efficacy of the collaboration between oncology pharmacists and anaesthesiologists for cancer pain management. The results indicated that this collaborative service can increase the rate of pain relief in



**Figure 4.** Rate of prophylactic laxative use in opioid-naïve patients receiving strong opioids in inpatients enrolled in a pilot study to evaluate the effectiveness of a collaboration between oncology pharmacists and anaesthesiologists for cancer pain management.



**Figure 5.** Types of suggestions made by oncology pharmacists and anaesthesiologists to inpatients enrolled in a pilot study to evaluate the effectiveness of a collaboration between oncology pharmacists and anaesthesiologists for cancer pain management.

cancer patients within 7 days from the index date. The service also increased the quality of opioid management, including prophylactic laxative administration and an optimal opioid prescription pattern. Throughout the study period, more attending physicians made pain control adjustments for their patients within 4 days from the index date.

The collaboration between pharmacists and anaesthesiologists can play a unique role through the implementation of a multidisciplinary team for cancer pain management. Studies discussing such collaboration

in cancer pain management or palliative care are limited. One study examined a palliative care team made up of specialty physicians, nurse practitioners, a social worker and a chaplain.<sup>20</sup> The results showed increased goals-of-care communication for stage IV cancer patients.<sup>20</sup> Another study suggested that quality of life was improved for patients under the care of a palliative care team, which included palliative care nurses, a medical oncologist, a neurologist and a team of anaesthesiologists.<sup>21</sup> The results of this current pilot study suggest that the



collaboration between pharmacists and anaesthesiologists in the proactive monitoring and evaluation of pain management may play a beneficial role in the pain management of cancer patients.

The effectiveness of this collaboration may be attributed to the contributions of the different specialties. Anaesthesiologists can provide expertise in postoperative pain and optimize the prescription of opioids. They also can provide several non-pharmacological interventions. Neurolytic celiac plexus block, intrathecal drug delivery, vertebral augmentation and other interventional treatments recommended by anaesthesiologists may help cancer patients achieve better pain control depending on their specific scenario.<sup>22</sup> One retrospective study demonstrated that multimodal intrathecal analgesia was an effective and safe intervention for cancer refractory pain in patients that were unable to control their pain with other analgesics.<sup>23</sup> Pharmacists can provide expertise to help reduce side-effects, reduce drug-related problems and improve patient knowledge; they can also optimize medication use by adjusting dosage, frequency and drug choice.<sup>15,24</sup> Oncology pharmacists can also help reduce drug-related problems, reduce costs, reduce physician visit time, improve quality/clinical care and elevate satisfaction among various types of cancer patients.<sup>25,26</sup> Therefore, the collaboration between oncology pharmacists and anaesthesiologists can have positive impacts on pain management through pharmacological and non-pharmacological interventions.

The results of this current pilot study indicated no significant difference between the two groups in pain relief rate within 5 or 7 days. Nearly 70% of patients in the current study had terminal stage cancer and the cause of pain was attributed to tumours or cancer-related complications that may not be fully relieved by analgesia. For example, the proper management of pain

caused by malignant ascites involves cancer treatment or paracentesis.<sup>27</sup> Patients with terminal-stage cancer may not have a sufficiently high performance status to continue cancer treatment. Draining ascites aggressively may cause unstable haemodynamic status and is not feasible in every patient. Nearly 30% of patients in the current study were noted to have advanced cancer with malignant ascites. The benefits of analgesia were limited for these patients. However, the results of the current study suggest that collaboration between oncology pharmacists and anaesthesiologists may be able to improve rates of pain relief within 7 days and contribute to increased education and awareness of clinicians and attending physicians regarding pain issues.

This current study had several limitations. First, this was a pilot study and performed at a single tertiary care site. The results should be considered preliminary. The study design limited the generalizability of the results to other care settings. Secondly, pain score was one of the inclusion criteria and one of the assessed outcomes. However, some patients may not complain about pain, whereas others may request analgesia immediately. Thus, the pain scores for these patients may not accurately reflect their pain levels and may be documented incorrectly. Because the study recruited patients based on their pain scores, some patients may not have been interviewed promptly, limiting the sample size. Thirdly, the data of rescue doses of opioids, total daily opioid doses and pain management index were not collected due to the limitation of manpower. Lastly, due to the staff-to-patient ratio in the hospital, specialists were unable to conduct ward rounds every weekday, limiting their ability to manage cases promptly. Further studies addressing larger patient groups, across hospitals and with increased data collection



including the opioid consumption and patient satisfaction are necessary.

In conclusion, this retrospective pilot study demonstrated that the collaboration between oncology pharmacists and anaesthesiologists for cancer pain management may be associated with an increasing trend in the rate of pain relief within 7 days for cancer patients with poor pain control. Further prospective studies with larger sample sizes and longer study periods are necessary to confirm these results.

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### Declaration of conflicting interest

The authors declare that there are no conflicts of interest.

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