



Original Article

Usage Pattern of Opioid Injections for Inpatient at a Regional Hospital in Thailand

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Abstract Opioids have been considered as agents of choice for severe pain management. Current literatures reported different usage patterns of opioids in some countries, primarily due to fear of morphine addiction and its respiratory depression. Pethidine is generally not recommended for pain management due to its toxicity. We are reporting the usage pattern of opioid injections in a regional hospital in Thailand over a 2-month period. A total of 1,498 opioid injections were prescribed for 1,345 patients. Sixty-two percents of the patients were female, and had a mean age of 42 ± 19.07 years old. The most common prescribed indications were for obstetric and gynecologic procedure and pethidine was the most frequently prescribed injectable opioid for pain. Proper safeguard is needed to ensure safe use of pethidine in Thailand. ©All right reserved.

Keywords: fentanyl, injection opioids, meperidine, morphine, narcotics, pethidine, prescribing pattern, tramadol

INTRODUCTION

Opioids have been considered as agents of choice for severe pain management. Pethidine, tramadol, fentanyl, and morphine are the agents that available for injection in Thailand. Current literatures reported different usage patterns of these agents in some countries, primarily due to fear of morphine addiction and its respiratory depression. Pethidine is generally not recommended for pain management due to its toxicity. The underutilization of opioids for pain management is also concerned. The major reasons of the underutilization are fear of polypharmacy, opioidphobia, and concerns about tolerance, physical dependence, addiction and adverse effect.¹ However, opioid analgesics are still the mainstay of moderate to severe acute pain, according to the WHO pain management guideline.² This guideline suggests different usage pattern of weak and strong opioids. The potent opioids, *i.e.* fentanyl, morphine and pethidine, should only be considered for the treatment of moderate to severe pain in hospitalized patients. However,

pethidine should not be used for chronic pain because of its anticholinergic effect and toxic metabolite. Normeperidine is considered neurotoxic and can cause agitation, tremor, myoclonus, and generalized seizure, especially if pethidine is used in high doses or in renal failure patients. Pethidine has poor oral bioavailability, and is metabolized extensively by the liver. Therefore, it is only available in the injectable form.^{3,4} Pethidine is 8-10 times less potent than morphine and has a short duration of action. It is also involved in multiple drug interactions.⁵ The recent guidelines recommend to replace pethidine with more efficacious and less toxic opioid analgesics.⁵⁻⁷ Although the trends in global consumption of opioids tend to favor morphine use rather than pethidine. In Thailand, however, the consumption of pethidine is rising and has been greater than morphine.⁸⁻¹⁰

There has been some attempts to describe determinants of meperidine (pethidine) prescribing compared to that of morphine in hospitalized patients.¹¹ Panda *et al.* studied opioid prescribing patterns in 670 patients.

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Fifty-two percents of the patients were female, and had a mean age of 51 years (interquartile range 35-65 years). Thirty-six percents of the prescriptions were for meperidine. A multivariable analysis was performed and showed that meperidine prescribing was associated with the following variables: physician specialty, patient race, and physician gender.

The aim of this study was to preliminarily describe usage pattern of opioid injections at a regional hospital in Thailand.

METHODS

Study Design

The retrospective pharmacy data from computerized database of Buddhachinnaraj Hospital, a regional hospital of northern Thailand, collected during June 1st to July 30th, 2007. Injectable opioids prescribing data including morphine, pethidine, fentanyl and tramadol, which were ordered for hospitalized patients during the specified time were reviewed to determine indications, patient characteristics, including age, gender, type of insurance, the quantity of opioid injections prescribed.

Statistical Analysis

The SPSS program was used to descriptively analyze medication orders, indications, patient characteristics, and other relevant characteristics.

RESULTS AND DISCUSSION

Demographic Characteristics

Throughout the 2-month period of this study, a total of 1,498 opioid injections were prescribed for 1,345 patients. Sixty-two percent of the patients were female, and the age mean of 42 ± 19.07 years. Sixty-two percents of the opioid analgesics prescribed were pethidine and 64% of the patients had universal coverage insurance (Table 1).

Usage Pattern of Opioids Categorized by Gender, Type of Insurance and Age

Usage patterns of the 4 injectable opioids, tramadol, fentanyl, morphine and pethidine,

categorized by gender, type of insurance and age are shown in Figures 1, 2 and 3, respectively. Pethidine was the most commonly prescribed drug in both gender, in all types of insurance, and in all age groups followed by tramadol, morphine and fentanyl, respectively.

Table 1. Patient characteristics and medication orders

Patient characteristics (n = 1,345)	No. of patients (%)
Gender	
Female	828 (62)
Male	517 (38)
Population (age)	
Adult (18-59)	942 (70)
Geriatric patient (≥ 60)	277 (21)
Pediatric patient ($> 0-18$)	126 (9)
Insurance	
Universal coverage	865 (64)
Civil employee	223 (17)
Private insurance	157 (12)
Social security	100 (7)
Medication orders (n = 1,498)	Frequency (%)
Pethidine	916 (62)
Tramadol	365 (24)
Morphine	152 (10)
Fentanyl	65 (4)

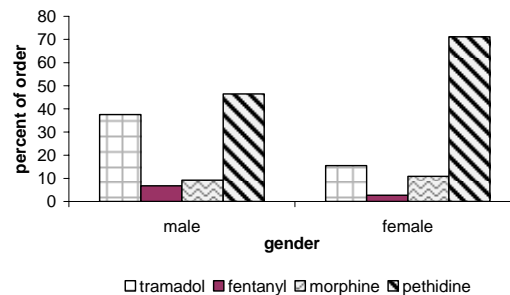


Figure 1. Usage pattern of opioids categorized by gender.

Usage Pattern of Opioids in Selected at Risk Conditions

Eighty-four opioid prescriptions were ordered in sixty-three patients whose serum creatinine data were available for calculating creatinine clearance using MDRD formula (Table 2). We categorized creatinine clearance into two groups, which were creatinine clearance ≤ 50

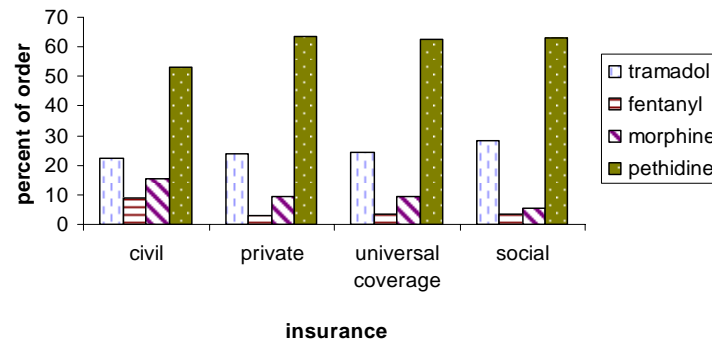


Figure 2. Usage pattern of opioids categorized by type of insurance.

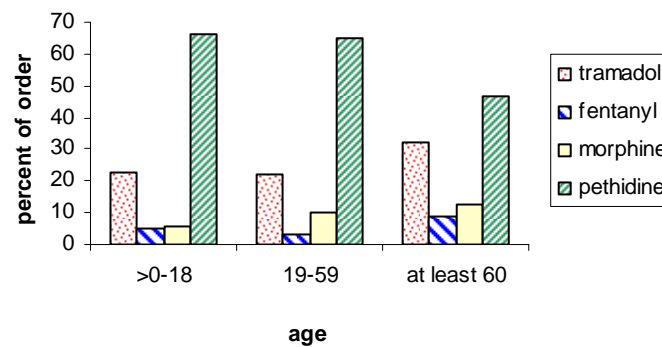


Figure 3. Usage pattern of opioids categorized by patient age.

Table 2. Usage pattern of opioid categorized by creatinine clearance (n = 63)

Drug	No. of orders		Total
	≤ 50 ml/min	> 50 ml/min	
Fentanyl	21 (65.6%)	26 (50.0%)	47
Morphine	7 (21.9%)	15 (28.8%)	22
Pethidine	2 (6.3%)	5 (9.6%)	7
Tramadol	2 (6.3%)	6 (11.5%)	8
Total	32 (100%)	52 (100%)	84

mg/min and creatinine clearance > 50 ml/min. Approximately 6% of pethidine orders were prescribed for patients who had creatinine clearance ≤ 50 mg/min, in which extra caution should be employed to avoid toxicity from normeperidine.^{6,7} Usage pattern of opioids in

Table 3. Usage pattern of opioids in patients with creatinine clearance ≤ 50 mg/min in classified by age

Drug	No. of orders (total = 32)	
	19-59 Years	≥ 60 Years
Fentanyl	8 (61.5%)	13 (68.4%)
Morphine	2 (15.4%)	5 (26.3%)
Pethidine	1 (7.7%)	1 (5.3%)
Tramadol	2 (15.4%)	0 (0%)
Total	13 (100%)	19 (100%)

patients with creatinine clearance ≤ 50 mg/min in two age groups, 19-59 years and ≥ 60 years, is indicated in Table 3. Although pethidine was commonly prescribed for labor

Table 4. Usage pattern of opioids classified by indication frequency

Indication categories	No. of orders			
	Fentanyl	Morphine	Pethidine	Tramadol
Malignancy/neoplasms	6	37	127	61
Diseases of the musculoskeletal system and connective tissues	5	9	42	58
Injuries of external causes	2	17	178	199
Delivery	0	35	281	3
Transport accidents	0	4	53	62
Other external causes of accidental injuries	1	1	28	43

Table 5. Usage pattern of opioids classified by patient concomitant conditions that might be at risk for opioid toxicity

Concomitant conditions	No. of orders			
	Fentanyl	Morphine	Pethidine	Tramadol
Respiratory failure (n = 20)	11	3	3	3
Renal failure (n = 65)	12	17	19	17
Adult respiratory distress syndrome (n = 6)	4	1	1	0
Pulmonary edema (n = 10)	4	2	2	2

delivery, it was also frequently prescribed for pain from injuries and malignancy (Table 4). These injectable opioids were sometimes prescribed in patients who had concomitant conditions that might be at risk for opioid toxicity (Table 5). When emphasize on the renal failure condition, there were 19 renal failure patients who received pethidine, which was contraindicated and/or not recommended for use due to possibility of normeperidine accumulation and cause of neurotoxicity.

CONCLUSION

Our preliminary results revealed that pethidine had been the most frequently prescribed injectable opioid for pain in hospitalized patients. This could reflect an underusage of less toxic opioid, including morphine. Furthermore, pethidine had also been prescribed in some patients with at risk condition for normeperidine toxicity, such as renal insufficiency. Further and prospective studies are needed to confirm this results. However, extra caution should be employed by physicians to ensure safe use of the injectable opioids.

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