Opioid analgesic prescribing and use – an audit of analgesic prescribing by general practitioners and The Multidisciplinary Pain Centre at Royal Brisbane Hospital

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Aims This study evaluated the use of and need for opioids in patients attending the Multidisciplinary Pain Centre at the Royal Brisbane Hospital (RBH).

Methods All consecutive in-patient admissions in 1998 were reviewed. A 10-point scoring system based on the World Health Organization (WHO) analgesic ladder was devised to facilitate comparison of analgesic prescribing on admission and at the time of discharge. A conversion table was used to standardize opioid analgesic doses to an oral morphine equivalent.

Results Of the 370 patients reviewed, 233 (81%) were by their general practitioners. Records of 288 (78%) were available for full review and 270 (94%) of these had noncancer pain. On admission, 239 (83%) were taking an opioid analgesic, with 135 (47%) taking strong opioids (e.g. morphine, oxycodone, methadone). There was a significant decrease in the mean total daily oral morphine equivalent prescribed on discharge 36.9 mg (95% CI: 33.4, 40.4) compared with that on admission 88.7 mg (95% CI: 77.6, 99.8) ($P < 0.001$). There was a significant decrease ($P < 0.05$) in the proportion of patients taking a primary opioid on discharge 153 (58%) compared with admission 239 (83%), although the proportion of patients taking a strong opioid on discharge 150 (52%) compared with admission 135 (47%) was not significantly different ($P > 0.05$). The proportion of patients taking a laxative showed a significant increase on discharge 110 (73%) compared with admission 38 (28%) ($P < 0.05$).

Conclusions Our analgesic prescribing scoring system and opioid conversion table have the potential to be developed further as tools for assessing opioid analgesic prescribing. The significant decrease in total daily oral morphine equivalents signifies the value of prescribing in accordance with the WHO analgesic ladder, and the necessity of general practitioner education. The management of chronic pain is complex, and it requires interventions additional to pharmacological therapy. Evaluation by a multidisciplinary team, coupled with experience in and an understanding of analgesic prescribing and rehabilitation provides an effective basis for improving the management of patients with chronic pain.

Keywords: analgesic use, chronic pain, multidisciplinary pain centre, opioid analgesics, prescribing practices

Introduction

Pain is defined as 'an unpleasant sensory and emotional experience associated with actual or potential tissue

damage, or described in terms of such damage' [1]. The word 'pain' is used to describe the signalling system involved in nociception together with cognitive, emotional and behavioural actions that occur as a result of this stimulation. It cannot be defined independently of the person experiencing it, thus making it a complicated state to manage [2]. The Australian Government has recognized that pain is one of its three most costly areas of health care [3]. Inappropriate management and under treatment of

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pain are associated with increased disability, suffering, personal and financial costs [3]. Each year, members of the Multidisciplinary Pain Centre, Royal Brisbane Hospital (RBH), see approximately 2500 patients either as in-patients in allocated beds or as consultations in other units or as outpatients. When this study was initiated, anecdotal data suggested that approximately half of these patients had been prescribed opioids before their first contact with the Pain Centre. A number of international studies have highlighted the problems associated with pain management in a general practice environment [4, 6–9]. These include assessment of pain, management of side-effects, the use of adjuvant medications, the general understanding of the pharmacology of opioids and education of patients regarding these medications and their effective use [7–9]. It has been shown that educational interventions can be a successful means of altering prescribing habits as well as increasing awareness of best practice techniques [7–9] and that both prescriber and patient related factors affect the prescribing of opioid analgesics [7, 8].

In the past 15 years, the International Association for the Study of Pain and affiliated National Chapters, have made concerted efforts to educate their members about the most appropriate methods for the management of various acute and chronic pain states in a range of target patient populations [3]. As a result Multidisciplinary Pain Centres have been established in many countries, but there is still considerable concern that the results have not yet filtered down to all general practitioners [10, 11]. Within Australia, National Health and Medical Research Council guidelines and independent 'Therapeutic Guidelines' have been developed for analgesic drugs [12, 13]. These both recommend prescribing according to the WHO analgesic ladder, ensuring adequate use of analgesics at each step before progressing further up the ladder [14].

This study was designed to evaluate the use of and need for opioids in patients attending the Royal Brisbane Hospital (RBH) Multidisciplinary Pain Centre. The study also aimed to provide a quality improvement audit of the prescribing practices of referring doctors and the staff of the Centre.

Methods

A retrospective review of all consecutive in-patient admissions to the Multidisciplinary Pain Centre (Royal Brisbane Hospital) was undertaken for the whole of 1998. Of the 370 in-patients admitted during the study period, records were available for 288 to be reviewed (78% of total). Each admission was followed until discharge. Patients were categorized into two groups:

First admission: no previous admission or patients admitted previously to the Multidisciplinary Pain Centre but >1 year before current admission.

Subsequent admission: patients admitted to the Multidisciplinary Pain Centre within 1 year of the current admission.

An ACCESS[®] database was designed to record relevant information including prescribed analgesics, adjuvant medication and concurrent medical conditions, both on admission and discharge. As no scoring system for prescribing was available in the literature, a 10-point scoring system was devised to facilitate comparison between analgesic prescribing on admission and at discharge, based on the principles summarized by the WHO analgesic ladder (Table 1) [14].

The scoring system encapsulates the basic principles of the WHO ladder, namely regular medications, by mouth, by the clock and by the ladder. The scoring system also quantifies the recommendation to use laxatives with strong opioids (e.g. morphine, oxycodone, methadone), and not

Table 1 10-point scoring system for analgesic prescribing.

Step of WHO ladder	Primary analgesic	Dosing	Non opioid medication	Adjuvant medication	Score
1	Non opioid	Regular	–	No	1
		Pm	–	No	3
	Non opioid	Regular	–	Yes	0
		Pm	–	Yes	2
2	Weak opioid	Regular	No	No	3
		Pm	No	No	7
	Weak opioid	Regular	Yes	No	1
		Pm	Yes	No	5
	Weak opioid	Regular	No	Yes	2
		Pm	No	Yes	6
	Weak opioid	Regular	Yes	Yes	0
		Pm	Yes	Yes	4
3	Strong opioid	Regular	No	No	3
		Pm	No	No	7
	Strong opioid	Regular	Yes	No	1
		Pm	Yes	No	5
	Strong opioid	Regular	No	Yes	2
		Pm	No	Yes	6
	Strong opioid	Regular	Yes	Yes	0
		Pm	Yes	Yes	4

*Note: One point to be added for (Maximum score 10):

Use of two different opioids together.

Inappropriate use of medication (e.g. patients self injecting Pethidine).

Prescribing of a strong opioid analgesic without a laxative.

A HIGH score = less than optimal prescribing.

A LOW score = more optimal prescribing.

Steps of WHO analgesic ladder [14].

Step 1. Simple analgesics, e.g. paracetamol (1 g four times a day), +/- adjuvants.

Step 2. Weak opioids, e.g. codeine, dextropropoxyphene, +/- paracetamol, +/- adjuvants.

Step 3. Strong opioids, e.g. morphine, +/- paracetamol, +/- adjuvants.

Table 2 Total daily oral morphine equivalent conversion table.

Drug	Dose $\times$ conversion factor
Pethidine (oral)	$\times 0.125$
Pethidine (i.v.)	$\times 0.4$
Methadone	$\times 1.5$
Oxycodone	$\times 1.5$
Buprenorphine	$\times 50$
Codeine	$\times 0.16$
Dextropropoxyphene	$\times 0.1$
Morphine (i.v.)	$\times 3$
Morphine (oral)	$\times 1$

to prescribe two different opioids simultaneously. The type of primary analgesic the patient was taking defined the step of the ladder; for example, a patient taking regular MS Contin[®] (Sustained Release Morphine) would be classed as step 3 on the ladder. A high score indicates less than optimal prescribing whereas a low score indicates more optimal prescribing (scale 0–10). These scores are presented as an aggregate since each step of the scoring system integrates a number of factors relating to prescribing (Table 1).

A conversion table was also used to standardize all opioid analgesic doses to a total daily oral morphine equivalent, allowing comparison between total daily opioid consumption on admission and at discharge (Table 2). A number of different opioid conversion tables are available in the literature [15–17]. For this reason, it was decided for the purpose of this study, that the conversion factors already used by the staff of the multidisciplinary pain centre (which incorporate factors from a number of published tables) be used as the basis for calculation of the total daily oral morphine equivalent.

Statistical analysis

The difference between admission and discharge prescribing scores and total daily oral morphine equivalent consumed were evaluated using the paired Student's *t*-test. The statistical significance of the proportions of patients prescribed opioids, laxatives, adjuvant medications and paracetamol on admission compared with discharge were evaluated using chi-squared analysis. The statistical significance criterion was $P < 0.05$. Prescribing scores and Total Daily Oral Morphine Equivalents are presented as mean (95% CI). Statistical analysis was performed using the SPSS statistics program.

Results

A total of 370 in-patients were admitted during the study period. Of these, 288 patient charts were reviewed

(78% of total admissions). Eighty-two charts could not be accessed during the study period due to their allocation to other areas of the hospital. Concerted attempts were made to recover these charts without success. Two hundred and thirty-six (82%) of the reviewed patients were first admissions. Of the patients reviewed, 233 (81%) were referred to the Multidisciplinary Pain Centre by their general practitioners. The majority of patients were suffering from chronic back pain, 130 (45%), or other noncancer pain, 63 (22%). Only 18 (6%) of the patients reviewed had cancer pain.

Opioid consumption, laxative use, adjuvant drugs and paracetamol administration at admission and discharge are shown in Figure 1a–e. Chi squared analysis showed a significant ($P < 0.05$) decrease in the proportion of patients taking a primary opioid on discharge 153 (58%) compared with admission 239 (83%) (Figure 1a). The proportion of patients taking a strong opioid on admission 135 (47%) compared with discharge 150 (52%) was not significantly different ($P > 0.05$) (Figure 1b). The proportion of patients taking a laxative with their strong opioid showed a significant increase ($P < 0.05$) on discharge 110 (73%) compared to admission 38 (28%) (Figure 1c). The number of patients taking adjuvant medications (158 (55%) *vs* 107 (37%)) and regular paracetamol (228 (79%) *vs* 78 (27%)) (Figure 1d and e) also showed similar significant decreases. When these data were further divided into first and subsequent admissions, these differences on discharge compared with admission remained significant ($P < 0.05$) (Figure 1a, c–e).

There was a significant decrease in the mean total daily oral morphine equivalent prescribed on discharge, 36.9 mg (95% CI: 33.4, 40.4), compared with that on admission, 88.7 mg (95% CI: 77.6, 99.8) ($P < 0.001$). The mean total daily oral morphine equivalents prescribed on discharge, were lower relative to admission, for patients in the first and subsequent admission groups (Figure 2).

There was also a significant decrease in prescribing score on admission 2.95 (95% CI: 0.79, 0.91) compared with that on discharge 0.85 (95% CI: 2.81, 3.09) to hospital ($P < 0.001$). For first admissions scores were 2.99 (95% CI: 2.84, 3.14) on admission compared with 0.7 (95% CI: 0.64, 0.76) on discharge, and for subsequent admissions scores were 2.54 (95% CI: 2.24, 2.84) on admission and 1.08 (95% CI: 0.92, 1.24) on discharge ($P < 0.001$).

Discussion

The RBH Multidisciplinary Pain Team comprises a psychiatrist, pain medicine and psychiatry registrars, nursing staff, a physiotherapist and an occupational therapist, psychologists, a pharmacist and community liaison and research nurses. Patients are assessed by all members of the team to obtain a full background to

Figure 1 a–e: Prescribing details for reviewed patients upon admission (□) and discharge (■). a) *Primary opioids*: all patients (as percentage of the total patient group) taking an opioid as their primary analgesic medication including – codeine, dextropropoxyphene, morphine, methadone, buprenorphine, pethidine, oxycodone. b) *Primary strong opioid*: all patients (as percentage of the total patient group) taking a strong opioid as their primary analgesic medication including – morphine, methadone, buprenorphine, pethidine, oxycodone. c) *Strong opioid plus laxative*: all patients (as percentage of patients on a primary strong opioid) taking a strong opioid as their primary analgesic medication plus a laxative as per the WHO guidelines. d) *Adjuvant medication*: all patients (as percentage of the total patient group) taking an adjuvant drug including: tricyclic antidepressants, anticonvulsants, antiarrhythmics. e) *Paracetamol*: all patients (as percentage of the total patient group) taking paracetamol, does not include those taking combination analgesics such as Panadeine Forte® or Di-gesic®. Patient types: *First admission*: no previous admission or patients admitted previously to the Multidisciplinary Pain Centre but >1 year before current admission. *Subsequent admission*: patients admitted to the Multidisciplinary Pain Centre within 1 year of the current admission. *Statistically significant χ^2 for difference between admission and discharge $P < 0.05$. NS not statistically significant.

Figure 2 Comparison of total daily oral morphine equivalent on admission (□) vs discharge (■).

the patient's condition. Patients undergo a 2 week educational program on drugs, activities of daily living, posture, back care, relaxation, exercise, diet and the reality of living with chronic pain. Although pharmacological therapy provides only part of the treatment it serves a pivotal role and selection of an in-patient group enabled comparison of analgesic prescribing between referring practitioners (admission) and Pain Centre staff (discharge).

A number of patient records (22%) could not be reviewed during the study period, but 78% of all records for a calendar year should provide a representative sample of prescribing practices. To enable comparison of prescribing on admission and at discharge, a 10-point scoring system for analgesic prescribing was developed (Table 1). The concept was based on the principles encapsulated by the WHO analgesic ladder, and encompasses the principles of regular analgesic medication by mouth, by the clock and by the ladder, as opposed to the 'when necessary' method of analgesic prescribing. Optimal prescribing was considered to be that which complied with the WHO principles, including the use of laxatives for patients taking strong opioids. Evaluating prescribing practices against a recognized standard (WHO analgesic ladder) allowed comparisons to be made between the referring practitioners and the staff of the Pain Centre. Further investigation of the tool will be required to establish its validity for use in patient populations. It has the potential to act as a self-assessment tool for prescribers and a Quality Assurance method for Pain Centres.

The majority of patients admitted to the RBH Pain Centre were first admissions. The comparison of Total Daily Oral Morphine Equivalent in this group compared with the subsequent admission group showed that the amount of opioid prescribed was reduced to a lesser extent in the latter group. There are a number of possible explanations for this. This small group of patients 52 (18% of patients reviewed) were defined as those having

been admitted to the Pain Centre within 1 year of the current admission. Their previous stay in the Centre may have already optimized their medications, although some variations may have occurred in the community setting. These patients may also have had more complicated problems or they may have suffered from more resistant pain. Although a statistically significant decrease in the Total Daily Oral Morphine Equivalent was not found, there was a significant improvement in the use of adjuvant medications, laxatives and prescription of regular paracetamol. Overall prescribing improved in both groups.

These results support the benefits of an objective review of chronic pain management, which can be facilitated by a multidisciplinary approach. Thorough review of an individual patient's history, knowledge of the cause of the pain, and assessment of on functional status, aids in the appropriate choice of analgesic treatment. The application of WHO principles of analgesic prescribing are reflected in the increase in use of paracetamol, adjuvant medications and laxatives by patients on discharge compared with admission.

Before this study was undertaken it was thought that approximately 50% of patients were taking opioid analgesics before admission to the RBH Pain Centre. In fact the proportion was 239 (83%) of whom 136 (57%) were using a strong opioid as their primary analgesic. On discharge this had changed to 167 (58%) as an opioid analgesic, with the proportion number using strong opioids increasing to 150 (90%). This suggests that opioids are overused in the community but that when they are required they should have appropriate efficacy.

A number of patients (30) admitted to the Centre were self-injecting opioid analgesics, without clear guidelines and sometimes associated with skin and muscle damage at the injection sites. Also a number of patients were taking more than three different opioids in various formulations (oral, rectal, parenteral). The patient taking the largest Total Daily Oral Morphine Equivalent on admission did not have pain of cancer origin. The staff of the centre see a number of cancer pain patients as consultations to other units within the hospital.

Our findings, in common with published studies (7–9) suggest a need for general practitioner education in all aspects of opioid use for the relief of chronic pain. A recent Danish article reported a randomized trial comparing the multidisciplinary process with standard general practice management [18, 19]. The results suggested that this complicated group of patients could benefit from a multidisciplinary approach to treatment [18, 19]. Our methodology will allow prospective studies of educational material designed to change the prescribing patterns of general practitioners.

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