Age and opioid analgesia in an acute hospital population

SIR—Achieving effective pain control in elderly patients is complicated by difficult pain assessment, co-existing diseases, concurrent medications, increased risk of adverse events and age-associated changes in pharmacokinetics and pharmacodynamics [1]. Pain in older people is often unrecognised and untreated as they may understate pain [2]. Cognitive impairment, depression, altered pain perception [3, 4] and altered response to analgesia may limit pain management in old age [5]. Concerns about opioid-related adverse events may influence opioid prescribing patterns and restrict escalation of opioid doses for analgesia [2, 6]. Similar factors may limit the administration of opioids by nursing staff to older patients [7].

Use of lower opioid doses in older patients has been documented [8–10] and may be partially attributed to pharmacological changes in old age. Ageing is associated with reduction of first-pass metabolism, impaired hepatic drug clearance, reduced renal elimination of drugs and their metabolites [11], and with a decrease in µ-opioid receptor density and higher receptor affinities [12]. Factors contributing to the quality of opioid analgesia in older acute hospital inpatients are not well described. The aim of this cross-sectional study was to assess the association of age with the utilisation, efficacy and safety of opioid analgesia in a teaching hospital in Sydney, Australia.

Methods

Subjects

Participants were patients admitted to acute geriatric medicine, orthopaedic and oncology wards and were prescribed opioids at the Royal North Shore Hospital (RNSH), a Sydney teaching hospital, between June and September 2006. Patients were excluded if they had severe cognitive or hearing impairment, did not speak English, were younger than 18 or refused to participate. The study was approved by the Human Research Ethics Committee (HREC) of Northern Sydney Central Coast Area Health, Australia. Written informed consent was obtained from all patients and/or their legal representatives.

Data collection

A cross-sectional survey was performed on day 2 or day 3 of the patient’s admission. A standardised questionnaire was designed to collect data from interviews with patients, their medication charts and medical notes. Data included demographics, medical history, admission diagnoses, total number of medications; and for each opioid drug, generic name, dose, frequency and prescription pattern (regular or as needed; prn).

Pain intensity was assessed using patients’ self-report rated visual analogue scale (VAS): 0 mm (no pain) to 100 mm (worst pain) [13]. The numerical rating scale (NRS) was used in patients unable to complete VAS: 0 (no pain) to 10 (worst pain) [14]. The degree of pain relief was graded with terms such as ‘no pain relief’, ‘moderate pain relief’ and ‘complete pain relief’ [13]. ‘No pain relief’ and ‘moderate pain relief’ were classified as incomplete pain relief.

Dosages of different opioids were calculated as parenteral morphine equivalents according to equianalgesic dose tables obtained from the Australian Medicines Handbook [15]. The accuracy of parenteral morphine equivalent estimates may vary with inter-individual differences [16, 17]. For each patient, a prescribed daily dose (PDD) was the sum of the total regular and maximum prn opioid doses prescribed in 24 h. Received daily dose (RDD) was calculated by adding the doses of regular and prn opioids received in 24 h.
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Table 1. Characteristics of the patient sample (n = 190)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients (by ward)</td>
<td>139</td>
</tr>
<tr>
<td>Orthopaedic</td>
<td>29</td>
</tr>
<tr>
<td>Acute geriatric medicine</td>
<td>22</td>
</tr>
<tr>
<td>Oncology</td>
<td>61.1 ± 20.8</td>
</tr>
<tr>
<td>Gender (% female)</td>
<td>90.5</td>
</tr>
<tr>
<td>Ethnicity (% Caucasian)</td>
<td>91.1</td>
</tr>
<tr>
<td>Residence (% living at home)</td>
<td>94.7</td>
</tr>
<tr>
<td>Number of comorbidities (mean ± SD)</td>
<td>2.3 ± 2.0</td>
</tr>
<tr>
<td>Number of medications (mean ± SD)</td>
<td>10.4 ± 4.1</td>
</tr>
<tr>
<td>Pain relief (% complete relief)</td>
<td>35.3</td>
</tr>
<tr>
<td>VAS (0–100 mm scale) (mean ± SD)</td>
<td>73.5 ± 25.5 mm</td>
</tr>
<tr>
<td>NRS (0–10 scale) (mean ± SD)</td>
<td>7.7 ± 2.3</td>
</tr>
<tr>
<td>Opioid prescriptions patterns (% of total number of regular and prn prescriptions)</td>
<td>51.4</td>
</tr>
<tr>
<td>Oxycodone</td>
<td>28.6</td>
</tr>
<tr>
<td>Morphine</td>
<td>11.9</td>
</tr>
<tr>
<td>Tramadol</td>
<td>4.6</td>
</tr>
<tr>
<td>PDD (mean ± SD)</td>
<td>67.9 ± 71.2 mg</td>
</tr>
<tr>
<td>RDD (mean ± SD)</td>
<td>35.2 ± 42.1 mg</td>
</tr>
<tr>
<td>Paracetamol</td>
<td>100.0</td>
</tr>
<tr>
<td>NSAIDs</td>
<td>32.6</td>
</tr>
</tbody>
</table>

SD, standard deviation; PDD, prescribed daily dose in morphine equivalents (mg); RDD, received daily dose in morphine equivalents (mg); NSAIDs, non-steroidal anti-inflammatory drugs; VAS, visual analogue scale; NRS, numerical rating scale; Prn, as needed.

Statistical analysis
Analyses were performed using SPSS (Version 14, Chicago, Illinois). Descriptive statistics were generated. Chi square (χ²) test was used to compare groups for categorical analyses. Logistic regression analyses were performed to analyse the association between opioid usage, pain intensity and pain relief. All tests were two-tailed. Statistical significance was set at P < 0.05.

Results
As many as 463 patients were screened of whom 208 were prescribed opioid analgesics. Of these, 18 patients refused to participate. The mean age of participants was 61 years (range 19–98); 61% were females, and 91% were Caucasian (Table 1). Regular opioid therapy alone was prescribed in 10 patients. 78 patients were treated with prn opioids only and 102 were prescribed both regular and prn opioids. A total of 138 regular opioid prescriptions (67.4% oxycodone, 22.5% tramadol) and 313 prn opioid prescriptions (44.4% oxycodone, 39.3% morphine) were audited. The PDD of 9 regular and 12 prn opioid prescriptions could not be calculated because of missing or unclear dose and/or frequency of administration. These were excluded from the analyses of PDD.

On univariate analysis, with increasing pain intensity, the mean total PDD (n.s.) and RDD (t189 = 3.07; P = 0.002) increased (Figure 1A). For every unit increase in pain score, mean RDD increased by 0.13 morphine equivalents (mg) (95% CI: 0.15, 0.21). Mean PDD and RDD were highest in patients aged 40–59 years and lowest in patients aged 90–99 years. Overall, as age increased, mean PDD (t189 = −4.33; P < 0.001) and RDD decreased (t189 = −3.19; P = 0.002) (Figure 1B). For every year increase in age, mean PDD decreased by 0.09 morphine equivalents (mg) (95% CI: −0.13, −0.05) and RDD decreased by 0.11 morphine equivalents (mg) (95% CI: −0.18, −0.04). The proportion of PDD received was consistent across the age groups. The youngest and oldest patients were more likely to report incomplete pain relief than the middle-aged patients (n.s.) (Figure 1C). On subgroup analysis of patients older than 50 years (n = 136), increasing age was associated with incomplete pain relief (t135 = −2.29; P = 0.02; B = −0.007; 95% CI: −0.014, −0.001).

At least one opioid adverse event was detected in 103 participants (54.2%). The most frequently reported side effects included nausea (40.0%), dizziness (21.2%), vomiting (21.2%), sweating (15.3%) and constipation (14.7%). Young and middle-aged patients were more likely to report side effects than older patients (χ² = 11.16; P < 0.01) (Figure 1D). Pain intensities were similar in all age groups (Figure 1E) (n.s.). On logistic regression analyses, complete pain relief was significantly associated with lower pain intensity, absence of side effects, prescription of both regular and prn opioids and higher RDDs of opioids (see Appendix 1 in the supplementary data on Age and Ageing Online).

Discussion
In this study, the majority (64.7%) of patients reported incomplete pain control, with the youngest and oldest patients more likely to experience incomplete pain relief (n.s., Figure 1C). Complete pain relief was associated with higher RDDs of opioids. Older patients received significantly lower doses of opioids than younger and middle-aged patients (Figure 1B). When experiencing similar pain levels, older patients require significantly lower amounts of opioids than younger patients to achieve good analgesia [9, 10]. A decrease in opioid doses in older patients is often recommended because of reduced renal clearance and hepatic metabolism of some opioids [18, 19], large inter-patient variability [9, 20] and pharmacodynamic factors. Escalation of opioid doses for current pain intensity in elderly patients may also be curtailed because of the possibility of adverse events [21].

In our study, younger patients reported significantly more opioid-related side effects than older patients (χ² = 11.16; P < 0.01). Younger and middle-aged patients are more likely to report side effects than older patients. Older patients may accept the presence of side effects, attributing them to multiple co-morbidities that may mimic opioid side effects [2, 8]. On logistic regression analysis, regardless of age, patients without side effects had better pain control. Effective pain relief is more likely to be achieved if the benefits of opioid analgesia outweigh treatment-related adverse effects [22].
This was a cross-sectional study with a high recruitment rate (91% of eligible patients entered the study), indicating a representative sample. Validated tools were used for pain intensity and pain-relief assessments. A single investigator performed all assessments. Pain assessment and pain-relief evaluation were based on patient self-reports, perhaps representing a potential source of bias. PDD may be underestimated, as it was not obtained for 7% of regular and 4% of prn opioid prescriptions. When panadeine (paracetamol plus codeine) was prescribed, the codeine dose was not included in PDD and RDD calculations. There are several limitations to the generalisability of the findings in our study. The sample contained predominantly orthopaedic patients and the findings may not apply to inpatients of other services. Patients with severe dementia were excluded from the study, and our results may not apply to this group of patients. Local factors influencing prescribing of opioids, such as hospital policies and education about opioid prescribing may vary between hospitals. The study was small, and patients aged 90 years and over represented approximately 5% of the study sample. The assessment of use of opioid analgesia and pain control was limited to the 2nd and 3rd day of hospital admission. Further larger studies are required to assess the factors contributing to the adequacy of pain management in young, middle-aged and older hospital inpatients.
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Conclusion

Only 35% of the hospital inpatients who were prescribed opioid analgesia experienced adequate pain control. Poor pain relief was significantly associated with the presence of side effects, higher pain intensity, prescription of regular opioids without as-needed doses and lower received opioid doses. Young and middle-aged patients were significantly more likely to report side effects than older patients. Pain intensity did not vary across age groups. Older patients were prescribed and administered lower doses of opioids than middle-aged patients.

Key points

- Only 35% of inpatients who were prescribed opioid analgesia experienced complete pain relief.
- Prn opioid analgesia alone was prescribed in 41% of inpatients.
- Older patients were prescribed and received lower doses of opioids than younger and middle-aged patients.
- Young and middle-aged patients reported more opioid-related side effects than older patients.

Conflicts of interest

None.

Supplementary data

Supplementary data for this article are available at Age and Aging Online.

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References


Should elderly patients be screened for their ‘falls risk’? Validity of the STRATIFY falls screening tool and predictors of falls in a large acute hospital

SIR—Falls are not uncommon in hospitals settings at rates between 1.3 and 12.2% of all admissions [1–3]