Characteristics of pain in hospitalized medical patients, surgical patients, and outpatients attending a pain management centre

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Editor’s key points

- This small, single-centre study found that acute and chronic pain, anxiety, and depression were similar in hospitalized medical and surgical patients.
- However, the assessment of pain in medical patients was often unreliable and they were less likely to receive appropriate analgesics.
- Pain in medical inpatients may be under-recognized and under-treated.
- More, larger studies are needed.

Background. The characteristics and psychological impact of pain suffered by medical inpatients has been relatively under-investigated. The aim of this study was to compare the pain experience of medical, surgical inpatients, and patients attending a pain management centre. Some aspects of the quality of pain scoring and prescribing were also audited.

Methods. Medical inpatients with significant pain (moderate or severe pain on a verbal rating scale) were assessed using a battery of psychometric questionnaires. Comparator samples of surgical inpatients and patients attending the pain management centre were recruited.

Results. The prevalence of significant pain did not differ between the medical group (n=37) and the surgical group (n=38) (16.7% and 19.9%). Chronic pain was common in the medical group (54%) and the surgical group (50%). There were no differences in psychometric variables between the medical and surgical groups. Clinically significant scores for anxiety and depression (HADS ≥11) were common in all groups (30–38%). There was less concordance between patient-reported pain scores and nurse-recorded pain scores in the medical group than the surgical group and analgesic prescribing differed between the two groups.

Conclusions. The characteristics of pain in the medical and surgical groups were similar, with high levels of anxiety and depression. The pain management group differed from the inpatient groups, with higher levels of psychopathology and poorer coping. These findings provide some insight into the complex nature of pain in hospital inpatients, and may inform where limited resources should be utilized to provide greatest patient benefit.

Keywords: Acute pain services; medical psychology; pain; pain measurement

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Pain is common and often under-treated in hospital inpatients.1 Surgical inpatients are the focus of pain management teams in the majority of institutions.2 However, it is becoming accepted that pain is equally common and problematic in medical inpatients.3 4

Previous studies have revealed poor pain relief in medical inpatients, particularly for pain not of musculoskeletal origin.5 The prevalence of unbearable pain is similar among surgical and medical inpatients, but this is often not addressed in the latter group.6 Although there is evidence for the efficacy of specific analgesic techniques in some painful medical conditions, there is little information to guide the development of pain management services for medical inpatients.7 8

Thus, our objective was to characterize and compare pain suffered by medical and surgical inpatients and patients attending a pain management centre using validated psychometric questionnaires.9 Questionnaires are commonly used to assess outpatients with chronic pain, but are rarely used in acute pain studies or applied to inpatient groups.10

We were interested to discover how the characteristics of pain in medical inpatients compared with those in patients after surgery. We also studied a group of patients attending the pain management programme (PMP) as these patients by definition have chronic pain and high levels of psychological dysfunction.

We also audited some aspects of the quality of pain scoring and prescribing for hospital inpatients. Knowledge of the characteristics of inpatient pain and the quality of assessment and prescribing are prerequisites to developing effective pain management services.
Methods

Ethics approval
The study was conducted at Derriford Hospital in accordance with the Research Governance Framework for Health and Social Care, Second edition (2005), in compliance with the principles of GCP. It was sponsored by Plymouth Hospitals NHS Trust (PHNT) and approved by the National Research Ethics Service Committee South West and the PHNT Research and Development Department. Written informed consent was obtained from all subjects after a cooling-off period.

Patient population
Three groups of adult patients (aged ≥18) were invited to take part in the study: all patients on medical wards on a single day in May 2011; a sample of postoperative surgical inpatients (recruited between May 11, 2011, and August 11, 2011); and a sample of patients undergoing PMP assessment at the Plymouth Pain Management Centre (recruited sequentially from May 18, 2011, to July 20, 2011). The intention was to collect data from all medical wards on 1 day in May 2011. However, 3 days were required as two medical wards were closed due to an outbreak of diarrhoea and vomiting. The majority of the psychometric questionnaire data sets were collected on a single day (32/37).

Inclusion and exclusion criteria
The key inclusion criterion was patient-reported moderate or severe pain on a verbal rating scale of none, mild, moderate, or severe, at any time during the preceding 24 h. Exclusion criteria were mild or absent pain during the prior 24 h, patient refusal, inability to communicate or read and understand the study documentation, or inability to give informed consent. Patients in high dependency and intensive care areas including the emergency department were not approached.

Conduct of the study
The data collection team included consultant pain specialists, trainee anaesthetists, research nurses, and medical students. Before the start of the study, all team members were trained in the data collection process and technical terms such as chronic pain and neuropathic pain were defined. All medical and surgical inpatients able to communicate verbally were assessed for moderate or severe pain. After verbal assessment, patient characteristic data including sex and age were collected from all patients. The subject’s worst pain experience in the last 24 h was recorded (on a verbal rating scale of none, mild, moderate, or severe). For those patients identified as having moderate or severe pain at any time in the last 24 h (termed significant pain from now on), advice was given to the clinical team to manage their pain by an appropriately qualified member of the research team. Patient information sheets were given at this stage. After a cooling-off period of at least 1 h, patients were approached to consent to completing psychometric questionnaires. The questionnaires were administered with minimal interference from the researcher, but occasionally assistance was required due to impaired visual acuity or to clarify written instructions.

Pain severity and impact, and patient coping strategies were assessed using the brief pain inventory (BPI), pain catastrophizing scale (PCS), and the pain self-efficacy scale (PSEQ). Patient mood was investigated using the hospital anxiety and depression scale (HADS) and optimism by the revised life orientation test (LOT-R). Appropriate permissions were sought to use the questionnaires.

The medical diagnosis or operation and the duration of pain were also noted. Chronic pain was defined as pain of >3 months’ duration. The type, location, and number of pains were categorized as in a previous published audit by Johnson.

In addition to the pain questionnaires, some aspects of patient care were also audited. Analgesic use before hospital admission was recorded and inpatient analgesic prescribing was transcribed from the drug chart. Concordance between patient-reported and nurse-reported pain scoring was assessed, by comparing the patient-reported worst pain score over the last 24 h with pain scores as recorded on the ward observation chart.

Data handling
Findings were entered onto numbered case-report forms (CRF) and transferred to an Excel spreadsheet. No patient-identifiable data were entered onto the spreadsheet, which was stored on a password-protected computer. Paper CRFs were stored in a locked filing cabinet in a locked office and contained no patient-identifiable data. Consent forms were stored separately. Collection and storage of data was in accordance with the Data Protection Act 1998. Archiving of the study data and essential study records will be in accordance with the Sponsor’s Standard Operating Procedure.

Statistical methods
Patient characteristic data were compared using appropriate parametric tests \( \chi^2 \text{, analysis of variance (ANOVA)} \), or t-test. Analyses were carried out within the medical and surgical groups to detect differences in psychometric variables between patients with and without chronic pain, between patients with a single pain vs multiple pains, and between male and female patients. An independent-samples Mann–Whitney U-test was applied to detect these differences. Statistical significance was assumed at \( P<0.05 \). The data were analysed using SPSS Statistics version 19.0 software (SPSS Inc., Chicago, IL, USA).

Cross-sectional sample was obtained from all medical inpatients in Derriford Hospital, Plymouth, UK, over 3 days in May 2011. The sample size for collection of detailed psychometric data was limited to all medical inpatients meeting the inclusion criteria and who gave consent. The surgical and pain management samples were collected over several time points. As differing techniques were used to select
participants in the three groups, and no attempt was made to match the groups on age and sex, statistical comparisons between the groups could not be made.

Results

Recruitment

On 15 medical wards, 388 medical inpatients were questioned. Of these, 75 were eligible. The medical patient group consisted of 37 inpatients consenting to take part (49.3% recruitment). On 10 surgical wards, 335 surgical inpatients were questioned. A total of 56 patients were eligible for recruitment. The surgical group consisted of 38 inpatients (67.9% recruitment). The pain management group consisted of 38 patients recruited either by postal contact (15 of 43 questionnaires returned) or sequentially from PMP assessment clinics between May 18, 2011, and July 20, 2011 (23 of 29 consented; the overall recruitment was 53%). The groups were not matched on patient characteristic variables.

Patient characteristics

The study groups differed significantly in sex ratio, with a lower proportion of male patients in the medical group ($\chi^2$ test). Sex ratio for the medical group was 9 male to 28 female, for the surgical group 15 male to 23 female, and for the pain management group 17 male to 21 female. The mean patient age also differed between the groups [medical group 70.9 (range 23–94) yr, surgical group 57.2 (range 17–87) yr, and pain management group 46.6 (25–67) yr, $P<0.05$ for all groups, one-way ANOVA].

Prevalence of moderate and severe pain on medical and surgical wards

The prevalence of significant pain in the medical and surgical groups was 19.9% and 16.7%, respectively. Although numbers of patients in pain varied between wards, there was no significant difference in pain frequency by ward for the medical or surgical inpatient groups (Fisher’s exact test).

Duration of pain

Chronic pain of $>3$ months duration occurred in 54.1% of the medical group and 50% of the surgical group.

Location and type of pain

Pain location varied by group. Patients in the surgical group had a lower incidence of multiple pains than the other two groups (16% compared with 49% and 53%, respectively) (Fig. 1). Pain type also varied by the group. There was a high proportion of musculoskeletal pain in all groups (30–40%). Iatrogenic pain accounted for 20% of all pains in the surgical group and back pain 42% of all pains in the pain management group. Neuropathic pain was more common in the surgical and pain management groups (16%) than in the medical group (8%) (Fig. 2). Mixed pain types occurred in 51% of all medical patients, 42% of pain management patients, and 29% of surgical patients.

Diagnosis

Diagnoses were recorded as free text. One surgical patient and two medical patients did not have a diagnosis recorded.

Fig 1 Location of pain by the group. (Medical group=Group M, $n=37$; surgical group=Group S, $n=38$; pain management group=Group P, $n=38$.)
Common surgical diagnoses included joint replacement (6/37) and abdominal surgery or abdominal pain (7/37). In the medical group, respiratory diagnoses were the most common (11/35) and diagnoses involving malignancy the next highest frequency (7/35). The most frequent diagnoses in the pain management group related to back pain or failed spinal surgery (16/38 and 6/38) or chronic pain after surgery or trauma (7/38).

Comparison of psychometric variables

There were a number of differences between the median values for the psychometric test results for the three groups, but little absolute difference between the medical and surgical groups (Table 1). Formal statistical analysis of these data was not appropriate due to the lack of matching between the three groups. One patient in the surgical group did not complete the psychometric questionnaires with the result that comparison of psychometric variables was based on 37 surgical patients only.

The surgical group had a lower median anxiety score than the pain management group (8/21 vs 11/21). For depression, both the medical and surgical groups scored lower than the pain management group (8/21 vs 11/21). Scores of 8 or above on the HADS have been shown to identify a borderline case of clinical anxiety or depression with a sensitivity and specificity of 0.8, and scores of 11 or above are suggestive of a probable case.\(^1\) The median values for anxiety and depression were outside the normal range for both medical and surgical inpatients (9/21 and 8/21, respectively). Using a cut-off value of 11 for probable clinically significant anxiety or depression, 14 of 37 (38%) medical patients were suffering significant anxiety, and 13 of 37 (35%) surgical patients. For depression, 11 of 37 medical and 11 of 37 surgical patients showed significant abnormality (30%). Abnormal results were even more common in the pain management group [22/38 patients (58%) for anxiety and 21/38 patients (55%) for depression].

Pain severity assessed by BPI and catastrophizing assessed by PCS did not differ between the groups. Pain interference was lower in the medical group than the pain management group (46 vs 53.5, maximum score 70). Optimism, as assessed
by the LOT-R, was higher in medical and surgical inpatients compared with pain management patients (15 vs 11 and 15.5 vs 11, maximum score 24). Self-efficacy, as assessed by PSEQ, was higher in the medical group than the pain management group (27 vs 20.5, maximum score 60).

## Analgesic use and prescribing practices

There were marked differences between the medical and surgical groups in pre-admission medication use and hospital prescribing (Tables 2 and 3). All patients in the surgical group had at least two appropriate analgesics prescribed. Of the medical group, 35% had no regular analgesia prescribed and 38% were prescribed paracetamol only. Surgical patients received 94% of their analgesics as prescribed, compared with 75% of medical patients.

### Inpatient pain scoring

There was poor concordance between investigator-recorded pain scores and those reported on the observation chart. The concordance of pain scoring varied between medical and surgical inpatients (36% concordant in the surgical group and 20% in the medical group). Medical patients with significant pain were commonly reported as being pain free (47.2%) or having no pain score recorded at all (14.7%).

#### Table 2 Pre-admission medication use by the group (absolute numbers)

<table>
<thead>
<tr>
<th></th>
<th>Medical group (n = 37)</th>
<th>Surgical group (n = 38)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No analgesia</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Simple analgesia</td>
<td>18</td>
<td>29</td>
</tr>
<tr>
<td>Weak opioids</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Strong opioids</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Adjuvant drugs</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

#### Table 3 Inpatient analgesic prescribing (absolute numbers). Advanced analgesic techniques such as patient-controlled analgesic delivery devices and epidural and local anaesthetic infusions were not recorded. NSAID, non-steroidal anti-inflammatory drug; IR, immediate release; MR, modified release

<table>
<thead>
<tr>
<th>Analgesic</th>
<th>Medical group (n = 37)</th>
<th>Surgical group (n = 38)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As required</td>
<td>Regular prescription</td>
</tr>
<tr>
<td>Paracetamol</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>NSAID</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Weak opioid</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Strong opioid IR</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>Adjuvant drug</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Combination drug</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Strong opioid MR or patch</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Strong opioid parenteral</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

## Secondary analyses

Psychometric variables were compared for both medical and surgical patient groups between patients with acute and chronic pain and those with single and multiple pains and between male and female patients. No significant differences were found for any of these comparisons (independent-samples Mann–Whitney U-test).

## Discussion

The prevalence of moderate or severe pain was found to be 19.9% among medical inpatients and 16.7% among surgical patients. This is in agreement with previous studies and challenges the impression that pain is not a problem on medical wards.5 6

The psychometric data suggest that there was a high prevalence of psychopathology in all three patient groups. Some 30–35% of medical and surgical inpatients in pain have clinically relevant levels of anxiety or depression. Pain management patients had a higher median depression score than both inpatient groups. The surgical group had a lower median anxiety score than the pain management group.

These results are consistent with previous studies and compare with a prevalence of 10–20% for depression in general hospital inpatients.5 12 It is clear that anxiety and depression are far more common in inpatients in pain than in the general population, where the cumulative incidence for subclinical anxiety and depression is around 3–5% over 23 months.13

Chronic pain was common in both medical and surgical inpatient groups (54.1% and 50%, respectively). In the outpatient setting, there is a well-established correlation between chronic pain and mood disorder, but this association was not found for hospital inpatients.14

Pain severity (assessed as the sum of the four pain measures of the BPI—maximum score 40) was similar between the groups (median pain severity for the medical group was 24/40, for the surgical group 25/40, and the pain management group 27/40).
The pain management group showed poorer coping with pain when compared with the inpatient groups. Pain interference was lower in the medical group than the pain management group (median pain interference 46/70 and 53.5/70, respectively). Catastrophizing scores did not differ between groups. The median catastrophizing scores for both inpatient groups would not be considered clinically significant (median score 24/52 and 25/52, respectively); however, the pain management group median score reflects significant catastrophizing (31/52). Self-efficacy scores were lower in the pain management group than the medical group, with the pain management group median score suggesting clinically significant impairment in coping. Patient disposition was assessed using the LOT-R, which demonstrated normal levels of optimism in inpatients and lower optimism in the pain management group. These findings demonstrate generally poorer coping strategies and lower levels of optimism in patients awaiting a PMP than in hospital inpatients. This might be expected as patients are selected to attend the PMP specifically to improve poor coping strategies.

Compared with the surgical group, a higher proportion of medical and pain management group patients had multiple pain problems (16%, 49%, and 53%, respectively).

In terms of pain assessment and prescribing, medical patients are more likely to have incorrect or absent pain scoring and weaker analgesic prescribing. This may be in part due to the lack of educational input from a specialist pain service on the medical wards. Additionally, it may be that medical co-morbidities preclude the prescribing of effective analgesia. Prescribing practices may also differ between pain specialists and general physicians.

The psychometric questionnaires used in this study were chosen after the recommendations of the IMMPACT consensus group for outcome assessment in pain management trials. We selected questionnaires measuring the core domains of pain, physical functioning, and emotional functioning. They were as brief as possible with validity in a wide range of subject groups.

The current study has a number of potential weaknesses. First, patients who were unable to communicate were excluded from the study. This includes patients with cognitive dysfunction, who are more likely to receive poor pain management. The patient characteristic differences between the groups may have an impact on the prevalence of chronic pain: medical inpatients were older and more likely to be female. Sample groups were not matched on patient characteristic variables and this precluded direct statistical comparison between the groups. As data were collected from a snapshot of all medical inpatients, the sample size is small. Future studies may include data collection over a longer time period with a larger sample size.

The research team consisted of individuals with varied experience in pain medicine and although all had formal training in administering the questionnaires, this may have resulted in inconsistent quality of subjective assessments. Additionally, bias may have been introduced as differing selection techniques were used for the three study groups, and data were collected over different time periods. Finally, consent was required to collect detailed psychometric data used in the analysis. There may have been selection bias using this approach, reducing the generalizability of the findings.

The application of questionnaires validated in a chronic pain population to patients with acute pain will reduce the relevance of some questionnaire items. However, the questionnaires chosen have demonstrated high internal reliability, inter-rater, and test–retest reliability. The results did not show floor and ceiling effects, suggesting the questionnaires used had an appropriate range of responses.

This study will be repeated after the introduction of an acute care team, designed to provide ward support, education, and pain management to all patient groups. The role of anxiety, depression, and poor coping in delaying rehabilitation and hospital discharge and their impact on long-term pain-related disability would also benefit from further longitudinal study. Future studies will require matched patient samples and identical patient selection methods, and also a control group of inpatients without pain, which will permit more detailed statistical comparison between the groups.

**Conclusions**

We were surprised to find no differences between medical and surgical patient groups in terms of pain severity and frequency or any psychometric variables. This suggests that pain management resources should be divided more equitably between both inpatient groups. There is room for better assessment and prescribing in medical inpatients and more emphasis on complex chronic pain management in both groups. The lack of differences between medical and surgical patient groups and patients with acute and chronic pain may be due to the overriding effect of the context of pain, in this case, the individual’s status as an inpatient, on the perception of and psychological response to pain.

**Declaration of interest**

None declared.

**Funding**

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