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Outpatient pain service in trauma and orthopaedic surgery

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ABSTRACT

INTRODUCTION. Chronic pain is a common complication after surgery and trauma. The incidence of chronic pain may potentially be reduced by effective management of severe acute pain, in hospital and during the subacute post-operative phase at home.

METHODS. This was a cohort study from an outpatient follow-up service for patients with pain at discharge after orthopaedic surgery and trauma in a level 1 university hospital setting. The patients' charts were reviewed. Demographics, diagnosis and treatment were registered. The objective of this study was to describe the first five years of experience with this service.

RESULTS. A total of 261 patients were included. The median age was 39 (interquartile range (IQR): 26-76) years, and 53% were men. The median pain duration was ten (IQR: 5-22) months. Neuropathic pain was diagnosed in 83% of patients. Complex regional pain syndrome was diagnosed in 10% and suspected in 8%. Before the consultation, 48% were using paracetamol and/or non-steroid anti-inflammatory drugs (NSAIDs), 25% opioids, and 36% used gabapentioids or antidepressants. After their consultation, only 13% used paracetamol and/or NSAIDs and 8% opioids, whereas 86% were treated with gabapentinoids or antidepressants. A plan for opioid weaning was provided for all patients if opioids were continued (8%).

CONCLUSIONS. Establishing an outpatient pain service for persistent pain after surgery and trauma may encourage the use of analgesia regimens that are in accordance with international guidelines and ensure that opioids are not continued inappropriately.

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Some patients experience severe pain for a longer period than expected after surgery and trauma. About 10% are at risk of transitioning into chronic pain (persistent pain for at least three months), which may affect their quality of life for several years [1]. After multiple trauma, the incidence of chronic pain has been reported to be as high as 85% [2, 3]. Chronic pain after surgery and trauma typically begins with poorly controlled severe acute pain. It is believed that the development of chronic pain may be prevented or mitigated by early recognition and use of effective pharmacological and non-pharmacological pain management interventions [4, 5].

In most cases, satisfactory analgesia can be provided during the hospital stay. However, in modern fast-track practice, the length of hospital stay has been significantly shortened [6]. Therefore, it is important that effective and safe pain management is continued after discharge from hospital, when patients are at home, recovering

from surgery.

An outpatient follow-up service for patients with pain at discharge after orthopaedic surgery and/or trauma was established in 2017, in a University Hospital with a level 1 trauma centre. The objective of this study was to describe the experience from the first five years with this service.

METHODS

This was a retrospective cohort study. Data was collected by reviewing electronic medical records. The study followed the STROBE guidelines [7] for reporting observational studies.

The cohort included all patients referred to the outpatient acute pain service by orthopaedic surgeons after surgery and/or trauma. Patients were referred after visiting the orthopaedic outpatient clinic when the surgeons suspected persistent and/or neuropathic post-operative pain. Patients were identified from booking lists from 1 January 2017 to 31 December 2021. All patients were evaluated and treated by the same consultant anaesthesiologist. Patients were seen in the clinic less than four weeks after their referral and had only one visit.

Data

During the visit, the following data were prospectively registered: demographics (age, sex), pain localisation (hand, shoulder/elbow, foot/ankle, hip/knee, other), suspected triggering mechanism (trauma, surgery, unknown, other), duration of pain from trauma/surgery (months), tentative diagnosis/type of pain (neuropathic, nociceptive), pre- and post-consultation treatment (listed in **Table 1**), and provision of an opioid tapering plan, if opioids were continued. Neuropathic pain was pragmatically diagnosed when clinical examination demonstrated abnormal sensation in the painful area (allodynia, anaesthesia, dysaesthesia or hyperalgesia). Treatment followed existing national guidelines [8, 9].

TABLE 1 Pre- and post-consultation treatments in acute outpatient pain service after orthopaedic surgery or trauma.

Treatment modality	Pre-consultation, %[a]	Post-consultation, %[a]
No treatment	28	5
Paracetamol	44	4
NSAIDs	26	2
Opioids		
Short-acting	15	0
Long-acting	15	8
Gabapentin	22	46
Pregabalin	8	21
Antidepressants	12	30
TENS	10	42
Multidisciplinary pain team	0	5
Spinal cord stimulation	0	2
Lidocain patch	0	9

NSAIDs = non-steroid anti-inflammatory drugs; TENS = transcutaneous electrical nerve stimulation.
a) Of all patients.

The diagnosis of complex regional pain syndrome (CRPS) was made according to the Budapest Criteria [10] and registered as neuropathic pain in the database. No distinction was made between CRPS types I and II. Subgroup analysis was performed post hoc for patients with CRPS and cases with suspected CRPS.

Follow-up

The patient's general practitioner was responsible for follow-up, and a plan for adjustment of the medical treatment was proposed by the outpatient pain service consultant. Opioid tapering suggestions followed recommendations from the Danish Health Authority [9]. Low-dose opioids were discontinued immediately if the risk of severe withdrawal symptoms was considered low. Transcutaneous electrical nerve stimulation (TENS) treatment was followed by the local physiotherapist. Patients referred to the neurosurgeon for implantation of spinal cord stimulation also underwent a process with several steps outside the pain clinic.

Statistical methods

No study size calculations were performed for this descriptive study. Data are reported as actual numbers of patients (%) or median (interquartile range (IQR)). Comparisons between subgroups are reported using Student's t-test or the Wilcoxon's rank-sum test, depending on normality tests.

Data were registered in the REDCap electronic data management tool hosted at the North Denmark Region, Denmark [11], and analysed using Stata (StataCorp. 2019. Stata Statistical Software: Release 16. College Station, TX: StataCorp LLC).

Data sharing statement

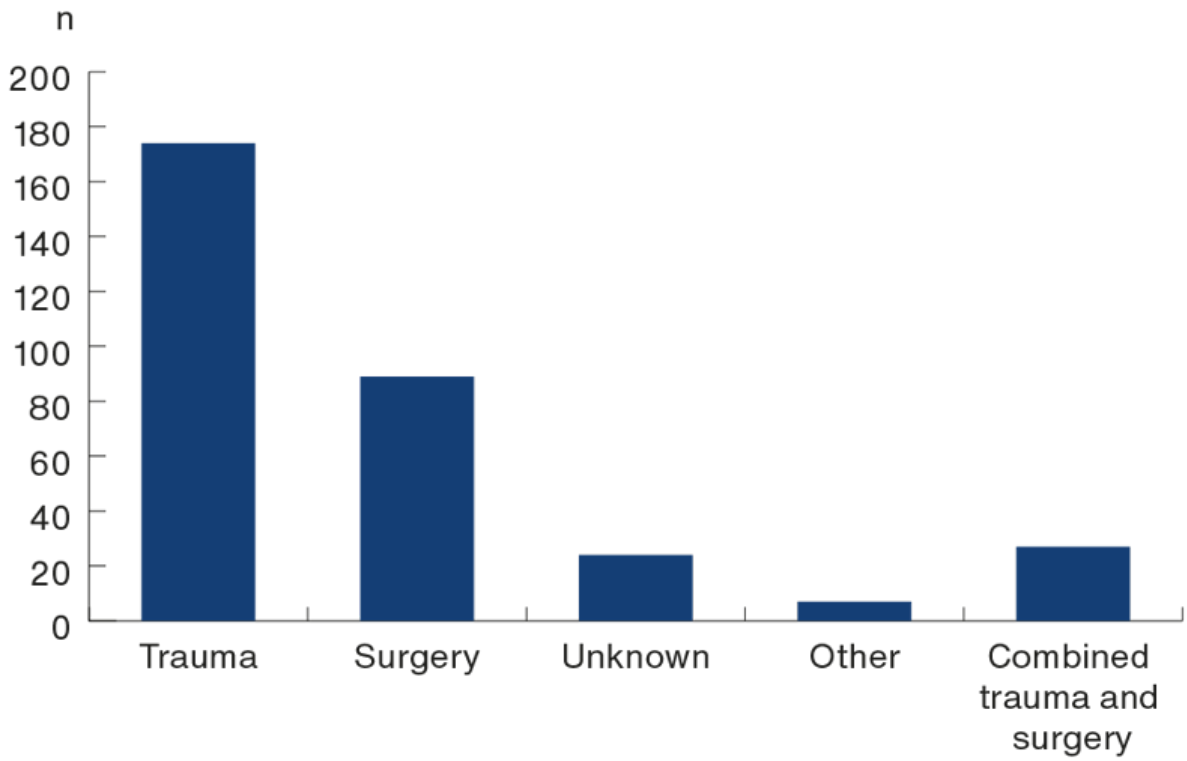
Data from the present cohort study are available on request from the corresponding author. The original data contain information that may potentially compromise the privacy of research participants and are not publicly available. Data will be available for one year as from publication.

Trial registration: The study was approved by the Data Protection Agency and the Danish Ministry of Health, represented by the North Denmark Region (study ID 2021-058441). In Denmark, registry studies do not require ethical approval.

RESULTS

During the five-year period, 261 patients were referred to the outpatient acute pain service. The median age was 39 (IQR: 26-76) years, and 138 (53%) were men. The pain-inducing mechanisms are presented in **Figure 1**. Pain location was dominated by distal upper or lower extremity: foot/ankle (n = 100 (38%)) or hand (n = 100 (38%)); and less frequently the hip/knee region (n = 49 (19%)) or shoulder/elbow (n = 21 (8%)).

FIGURE 1 Distribution of various pain aetiologies for patients in the outpatient pain clinic 2017-2022. Due to overlap, the sum of patients in each group does not equal the cohort size.



A total of 216 patients (83%) reported one or more sensory abnormalities, indicating neuropathic pain. CRPS was diagnosed in 27 patients (10%) and suspected in an additional 22 patients (8%).

Duration of pain

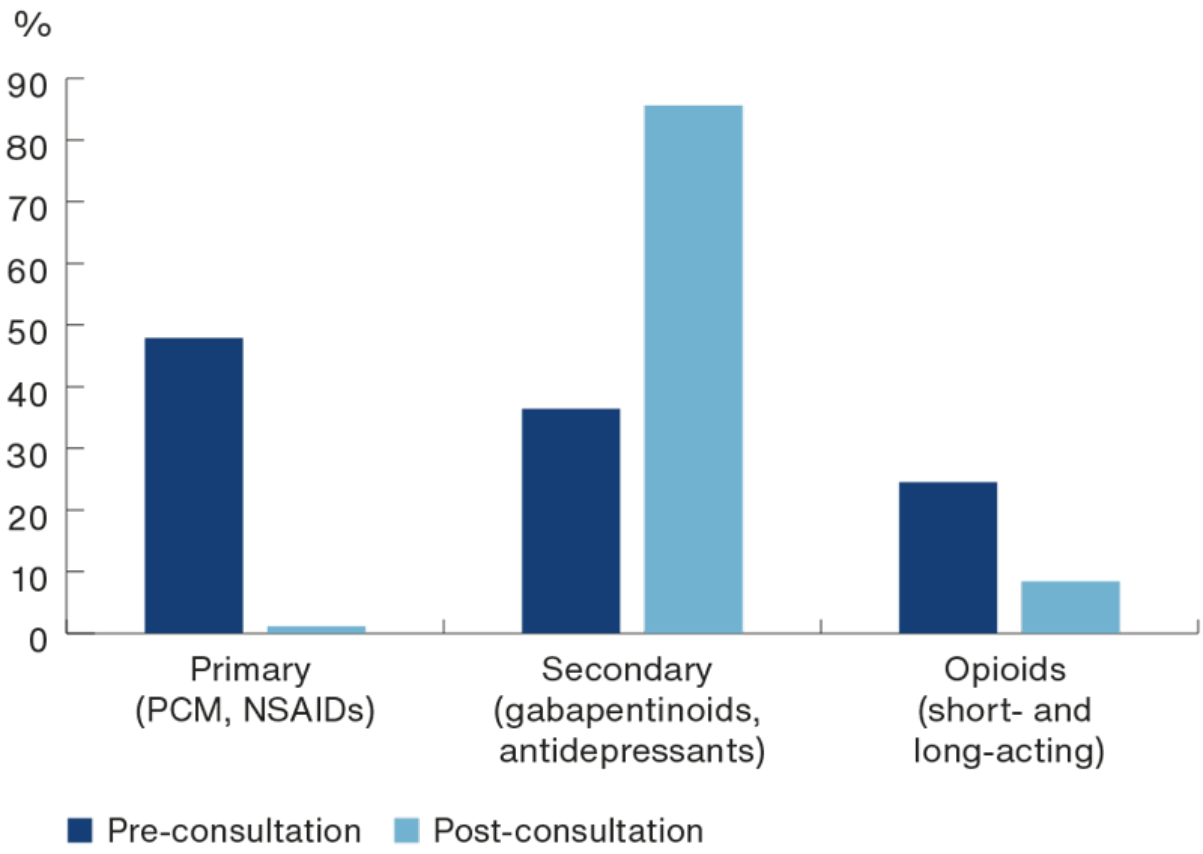
The median duration of pain before the visit was ten (IQR: 5-22) months.

Patients with suspected or diagnosed CRPS were referred earlier than other patients (6 (IQR: 3-12) months versus 12 (IQR: 5-24) months, p = 0.001) and 15 (31%) of these were < 18 years of age.

Pre- and post-consultation treatment

Pharmacological and non-pharmacological treatment before and after the consultation are presented in Table 1 and **Figure 2.** Overall, more patients were treated with first-line analgesics (paracetamol, non-steroidal anti-inflammatory drugs (NSAIDs), and opioids) before the consultation, whereas post-consultation treatment included gabapentinoids, antidepressants, lidocaine patch or non-pharmacological interventions (such as TENS and spinal cord stimulation).

FIGURE 2 Pharmacological pain treatment before and after acute pain service consultation.[a]



NSAIDs = non-steroid anti-inflammatory drugs; PCM = paracetamol.
a) Percentages of all patients in the cohort.

A plan for opioid tapering was provided to all patients who continued opioid treatment after the consultation.

Data from follow-up outside the outpatient pain service were not accessible in the present cohort.

DISCUSSION

A cohort of 261 patients, referred to the outpatient acute pain service after orthopaedic surgery and/or trauma, has been described. Neuropathic pain was found in 216 (83%) of cases. The majority of these patients were treated with paracetamol, NSAIDs and opioids before the consultation and changed to gabapentinoids or antidepressants after their consultation. All patients who continued opioid treatment received a plan for gradual tapering.

Patients with prolonged pain after discharge following surgery and trauma will often seek their general practitioner or the surgical department with complaints of persistent pain. Unfortunately, education in pain physiology and pain management is currently not a significant part of basic healthcare education, which limits

knowledge among non-specialists. This may lead to inadequate pain treatment in this group of patients. Referral to multidisciplinary pain centres is rarely an option since these centres only receive patients with complex chronic pain conditions and cannot accommodate the extensive number of patients who experience pain after surgery and trauma. This lack of treatment options was the primary reason for establishing an outpatient pain clinic as described.

Opioids

An important function of the outpatient clinic was to ensure the safe use of opioids. Treatment with opioids has a significant role in acute pain conditions but is generally not recommended in chronic non-malignant pain [12]. They are also associated with a rising epidemic of opioid misuse and overdose-related deaths [13, 14]. In the present cohort, 25% were being treated with opioids at the time of referral despite their pain being categorised as chronic non-malignant pain. These patients all received plans for opioid tapering and continued follow-up with their general practitioner.

Neuropathic pain

Patients were selected based on suspected persistent and/or neuropathic pain. Consequently, the majority of patients (83%) used descriptors indicating neuropathic pain. For the diagnosis of neuropathic pain, a pragmatic clinical approach was adopted based on pain characteristics and sensory deficits in the pain area. According to the International Association for the Study of Pain (IASP), the definition of neuropathic pain requires specific investigations to ascertain that the pain originates from the nervous system [15]. In our clinical model, only signs of sensory disorder were used to diagnose neuropathic pain. This may have led to an overestimation of the prevalence of neuropathic pain in our cohort. However, our findings are in line with those of a Finnish study of 200 patients with persistent post-operative pain, demonstrating that 72% of patients after orthopaedic surgery (limb and spine) presented with symptoms indicating neuropathic pain [16].

The reason for the high prevalence of distal neuropathic pain in our study, often traumatically induced, may possibly be a high risk of direct nerve injury in these anatomical regions. Another possible explanation is that surgeons from these subspecialties of orthopaedica were more likely to refer patients to the pain clinic, possibly due to an increased awareness of the risk of developing CRPS.

Neuropathic pain often represents severe pain conditions that have a significant impact on quality of life, including inability to work, which entails great economic costs for society [17]. Before the consultation, most patients with neuropathic pain either received no analgesics or were treated with acute pain medication (paracetamol, NSAIDs and opioids). These drugs have either no or only an insufficient effect on neuropathic pain. Only 36% received medical treatment as recommended for treating neuropathic pain [18]. After the consultation, the medical treatment was consistently changed, including discontinuing acute pain medication and introducing neuropathic pain medication (gabapentinoids, antidepressants). Follow-up was performed by the patient's general practitioner and often included several consultations during titration of neuropathic pain medication and opioid tapering. Unfortunately, specific data regarding follow-up outside the pain clinic was not accessible in the present study.

The fact that neuropathic pain appears so dominant in persistent pain after surgery and trauma emphasises the importance of reassessing the pain condition and treatment after discharge from hospital, rather than simply continuing the analgesics used for acute pain.

Chronic postsurgical pain affects an estimated 10-50% of adults, depending on the type of surgical procedure [19]. Keeping that in mind, our cohort of 261 patients seems a very low number of referred patients, considering that the location is a university hospital with a level 1 trauma centre. The reason for this may be a lack of

recognition and knowledge of persistent post-operative pain. This would also explain the long duration of pain (median ten months) before referral to the outpatient clinic. Patients with suspected CRPS were referred earlier, possibly reflecting that CRPS has a more significant impact on quality of life and is increasingly recognised.

Economic limitations and staff shortages in the healthcare system may also contribute to this delay by limiting resources allocated for such an outpatient establishment, at least in our centre. Earlier referral may increase the treatment effect and this option should therefore be accessible and visible for referring colleagues, ideally in all surgical specialties. Clinical and political focus on this area is warranted.

Limitations and perspectives

This was a retrospective, single-centre observational cohort study. Data may not be representative of other hospital settings. Ideally, an outpatient acute pain service should be available in all hospitals. Referral of patients according to specific criteria should be possible for all healthcare workers encountering possible chronic postsurgical or posttraumatic pain [20]. Referred patients should be offered an outpatient plan for follow-up by a personal caregiver, who may be either physician, nurse, physiotherapist or other healthcare resource with a relevant education and experience in pain management. These options were not available in the present cohort study since the clinic was established and driven by one dedicated consultant anaesthesiologist.

We cannot know to which extent the outpatient clinic led to an overall improvement in the treatment of these patients as most follow-up was performed by general practitioners and data outside the clinic were inaccessible in this cohort. Registration of preexisting pain and opioid use, prior to the trauma or surgery would likely have improved the understanding of this cohort.

We believe that the outpatient clinic plays a valuable role in the treatment of this group of patients and that it contributes to ensuring that opioids are not inappropriately continued for long-term use. In future studies, diagnosis and treatment should adhere to the IASP definitions [15] or similar, when evaluating the effect of an outpatient pain service. Furthermore, predefined referral criteria may help clinicians in the selection of patients and improve the quality and interpretation of data.

CONCLUSIONS

Establishing an outpatient pain service for persistent pain after orthopaedic surgery and/or trauma may contribute to better adherence to guidelines for treatment of non-malignant pain. Increased awareness of alternatives to opioids may lead to reduced risk of opioid-related adverse effects, most importantly, opioid dependency, abuse, and mortality. Prioritising the development of expertise in an outpatient pain service may potentially facilitate general knowledge and interest in the field of acute and persistent pain management.

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