Scandinavian Journal of Pain 15 (2017) 22–29

Contents lists available at ScienceDirect

Scandinavian Journal of Pain

journal homepage: www.ScandinavianJournalPain.com

Original experimental

Pain and pain management in hospitalized patients before and after an intervention

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HIGHLIGHTS

- Guidelines in combination with staff education, improve prescription of analgesia.
- Pain responsibility nurses are successful in promoting guidelines in their own units.
- A variety of components are necessary for reducing pain levels in hospitalized patients.

ARTICLE INFO

Article history:
Received 1 July 2016
Received in revised form
11 November 2016
Accepted 13 November 2016
Available online 9 December 2016

Keywords:
Acute pain
Cancer pain
Chronic pain
Pain management
Pain organisation
Analgesia

ABSTRACT

Background and aim: Studies have shown that pain is common among hospitalized patients and that there is a lack of compliance with pain management guidelines. Improving pain management does not only involve developing new drugs or technology; even more important is an effective organisation that utilises existing expertise. The aim of this study was to investigate whether pain in hospitalized patients can be reduced by implementing evidence-based pain management guidelines, providing education for staff and an organisation that includes pain responsibility nurses.
Methods: A cross-sectional study was carried out between 2009 and 2010 at two hospitals in southwest Sweden, comprising a baseline survey followed by an intervention. The study involved 306 patients, who answered questions about pain intensity at rest and while moving, disturbed sleep due to pain and whether they had used a pain rating scale while in hospital. Medical records were scrutinised for analgesic prescriptions. An intervention then took place, involving implementation of evidence-based guidelines, staff education and the introduction of pain responsibility nurses. A follow-up survey was carried out in 2012, in which 293 patients answered the same questions and their medical records were also reviewed. The baseline results were then compared with those of the follow-up survey.
Results: When compared with the baseline survey, the follow-up survey revealed significant differences in the use of validated pain rating instruments as well as the prescription of more appropriate analgesics. Prescription of paracetamol increased significantly in the follow-up survey; 56% of the patients were prescribed paracetamol on a regular basis, compared with 42% at baseline. There was also a significant increase in the use of strong opioids, from 38% at baseline to 55% at follow-up. Prescriptions of weak opioids decreased from 16% at baseline to 4% at follow-up. No significant differences were observed in patient pain levels in the follow-up survey. At baseline, 29% of the patients reported moderate to severe

DOI of refers to article: http://dx.doi.org/10.1016/j.sjpain.2017.01.002.
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http://dx.doi.org/10.1016/j.sjpain.2016.11.006

pain at rest (NRS 4–10) and at follow-up that figure was 24% (NRS 4–10). In both surveys, 41% reported moderate to severe pain (NRS 5–10) during movement. Thirty-nine percent reported disturbed sleep at night at both baseline and follow-up.

Conclusions: This study demonstrates that evidence-based guidelines made accessible to all staff as a pocket size booklet and on the intranet, in combination with staff education, pain responsibility nurses who informed other staff on their own wards, improved the prescription of analgesics in the hospitals studied. In order to achieve a noticeable effect for patients, i.e., reduced pain levels, an intervention containing more components than those employed in the present study is required.

Implications: Nurses and physicians need greater knowledge about the importance of pain rating. A vital part of pain management at hospitals is continuous evaluation of treatment outcomes to prevent severe pain and disturbed sleep. The complexity of pain and pain management requires commitment, time and knowledge on the part of healthcare staff. Multi-professional pain teams that support ward staff in pain management are necessary in order to reduce suffering and unnecessary pain in hospitalized patients.

1. Introduction

Pain in hospitalized patients remains undermanaged. Studies have shown that pain management does not receive sufficiently high priority and that there is a lack of compliance with pain management guidelines [1–5]. A Swedish cross-sectional study by Wadensten et al. [6] revealed that 65% of 759 patients treated in hospital had experienced pain during the previous 24 h, of whom 33% rated the intensity as moderate to severe. Another study conducted at a Swedish hospital in 2014 [7] produced similar results; 65% of 710 patients had experienced pain in the previous 24 h, with a mean Visual Analogue Scale (VAS) pain intensity rating of six.

A German study from 2010 demonstrated that 30% of patients in the acute post-surgery phase reported moderate to severe pain at rest while 50% reported pain during movement [5]. After surgery, 10–50% of patients experienced chronic pain, depending on the type of surgery [8,9]. More effective pain management in the acute phase could reduce the occurrence of surgery-related chronic pain [10]. A Danish study of 134 hospitalized patients with cancer showed that 66% had pain, and 32% of these reported moderate to severe pain [11].

The World Health Organization (WHO) recommends multimodal analgesic treatment for cancer pain involving two or more analgesics, which affect different pain mechanisms and provide effective pain relief with minimum adverse effects [12]. A multimodal treatment regimen is also recommended for acute and postoperative pain [13]. Patients with chronic pain sometimes experience acute, exacerbated phases that may require hospital treatment; analgesics are then needed to relieve the pain. In the longer term a combination of non-pharmacological methods is recommended [14]. According to the International Association for the Study of Pain (IASP), neuropathic pain is often undertreated or even untreated, despite the availability of many effective drugs and treatment guidelines [15].

Adequate pain management requires pain assessment and continuous evaluation of treatment, with the participation of the patient, where her/his rating of the pain intensity is an important component [13,16,17]. Contemporary national and international guidelines recommend that pain intensity should be regularly rated in patients with acute pain and cancer pain [13,16–21]. In clinical care, nurses play an important role in rating pain and applying evidence-based pain management principles [22].

Improving pain management does not only involve developing new drugs or technology but still more important is an effective organisation that utilises existing expertise [23]. In an Italian study from 2007, a hospital-wide programme in which staff members were trained in pain management led to improved professional care and reduced the pain level of hospitalized patients [24]. No similar studies have been carried out in Swedish hospitals.

The aim of the present study was to investigate whether pain in hospitalized patients can be reduced by implementing evidence-based pain management guidelines, providing education for staff and establishing pain responsibility nurses in the organisation. A secondary aim was to examine whether analgesic prescriptions changed after the pain management intervention.

2. Methods

2.1. Design

A descriptive, cross-sectional study before and after an intervention.

2.2. Intervention

The intervention consisted of three parts:

- Evidence-based pain management guidelines were compiled and printed in pocket size booklets as well as placed on the hospital intranet, where they were easily accessible to all staff members. The guidelines were based on scientific and clinical recommendations for managing acute, cancer and chronic pain. They included theoretical information about the physiology and dimensions of pain, as well as explaining pain rating and analysis. The clinical pain management recommendations encompassed both pharmacological and complementary treatment for many of the most common pain conditions in hospital patients. The guidelines were implemented during the first half of 2011.
- Education sessions were arranged for staff members. Pharmacists and anaesthetists instructed doctors at the two hospitals, while nurses trained their nurse colleagues, assistant nurses and paramedics.
- An organisation of pain responsibility nurses was established, in which all clinics were represented. The group met on two to three occasions per semester and the nurses received training and support to develop pain management procedures in their own wards.

2.3. Sample

The study was carried out at two hospitals in southwest Sweden. The participants comprised adult patients at the two hospitals.

Hospital A had 235 somatic inpatient beds for adults. Patients in the recovery ward, intensive care ward and three medical wards were not included in the study at baseline, resulting in 142 potential participants. The medical wards treating patients with cardiovascular, renal and haematological conditions were excluded at baseline and also in follow-up, as we wanted the sample to be

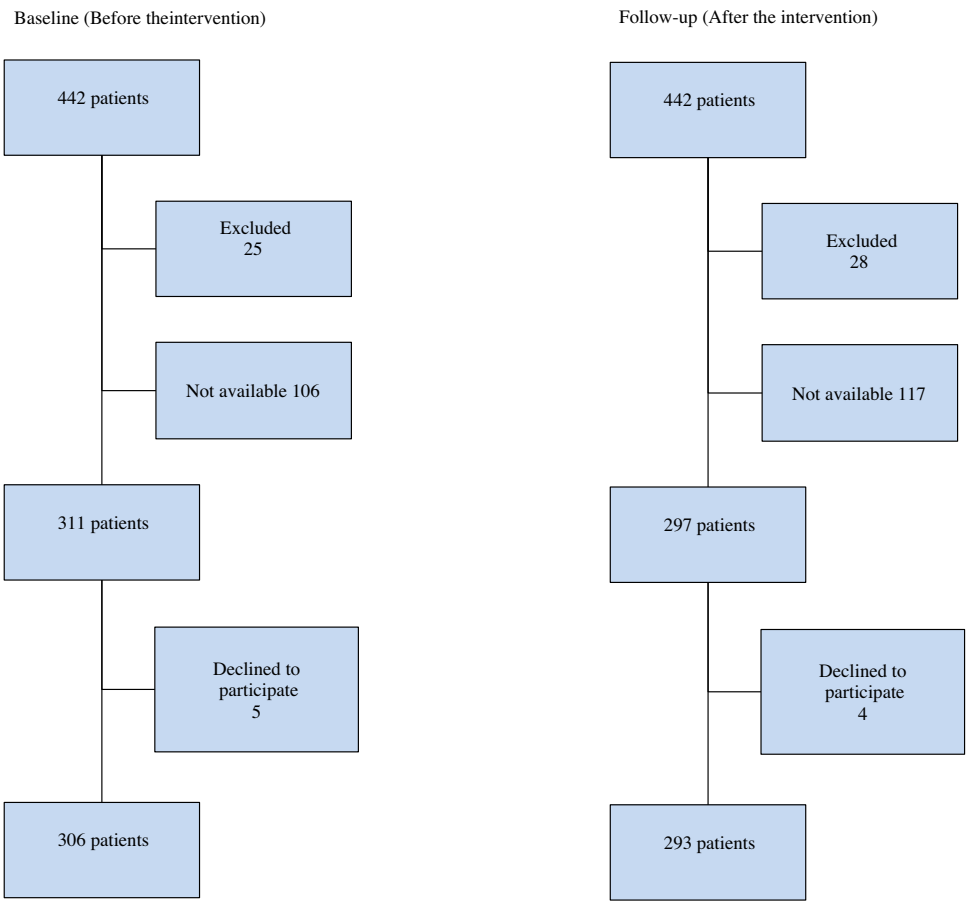

Fig. 1. Flowchart at baseline (before the intervention) and at follow-up (after the intervention).

as similar as possible on both occasions. At hospital B, which had 335 adult somatic in-patient beds, all medical wards were included at baseline and in the follow up. Patients in the high risk pregnancy ward and the intensive care ward were excluded, leaving 300 potential participants. The total number of potential participants both hospital together was therefore 442.

A baseline survey of pain and a review of medical records to identify pharmaceutical prescriptions were carried out in Hospital A in 2009 and in Hospital B in 2010. The follow-up study took place in 2012. The patient management nurse informed the researchers about patients who were unsuitable for participation in the study due to being in a late palliative phase, inability to speak or understand Swedish and cognitive impairment.

The baseline survey comprised 306 patients, with 293 taking part in the follow-up. At baseline 25 patients were excluded and 28 were excluded in the follow-up. Five patients declined participation at baseline and four in the follow-up. A total of 106 patients were not available at the time of the baseline survey because of examinations, surgery or discharge, while 117 patients were not available at the time of the follow-up survey (Fig. 1).

2.4. Instruments

Demographic and clinical data, such as age, sex, main diagnosis, any other diagnosis that could cause pain and prescribed analgesic treatment, were obtained from the review of the medical records. The patients completed a questionnaire with four specific questions about pain in the course of a structured interview. The questions were taken from the quality improvement guidelines for management of acute and cancer-related pain [13] and the Revised American Pain Society Outcome Questionnaire [18], with the questions translated into Swedish.

Each patient was asked the following four questions:

1. How do you rate your pain at rest at this moment?
2. How do you rate your pain during movement, such as when you are walking around or changing position in bed?
3. Is your sleep at night disturbed by pain?
4. Have you previously used a pain rating scale during your treatment?

The Numerical Rating Scale (NRS) 0–10 or the Verbal Descriptor Scale (VDS) based on words was employed for the self-rating of pain intensity. Mild pain on the VDS corresponds to 1–3 on the NRS, moderate pain to 4–6 and severe to unbearable pain to 7–10. Both scales have been validated for self-rating of experienced pain intensity [25,26].

2.5. Procedure

The baseline measurement and the follow up were conducted by the researcher together with a co-worker over a limited period of 8 days at the respective hospital. The patients were informed about the rating procedure and asked to rate the pain intensity on the NRS or VDS, both at rest and during movement. Each patient's condition determined the speed of the rating procedure. The first and the fifth or the sixth author collected the data together. One spoke to the patient while the other recorded the results, each verifying that the patient had understood the questions. Data were collected either in the patient's room or the day room. The researchers also collected

data from the patients' medical records about analgesics prescribed by the ward physician, as well as the main diagnosis and any other diagnosis that could cause pain. A follow-up survey was carried out in 2012, about a year after the intervention.

2.6. Data analysis

The patients were divided into four categories depending on the presence and source of the pain. Those with a painful acute disorder, trauma or who had undergone surgery were categorised as 'Acute pain'; those with cancer as 'Cancer pain' and patients with pain of a long duration, i.e., for more than 3 months, as 'Chronic pain'. A fourth category called 'No verified pain' comprised those who had no pain at rest or during movement. According to their medical history, several patients had more than one source of pain. The condition that caused them the most pain during this occasion determined the category in which they were placed.

The patient-reported pain intensity at rest and during movement was divided into three groups. At rest, the groups were NRS 0–3 (mild pain), NRS 4–6 (moderate pain) and NRS 7–10 (severe pain). For pain during movement, the groups were NRS 0–4, NRS 5–6 and NRS 7–10. According to the guidelines, a somewhat higher NRS value during movement is acceptable.

Descriptive statistics and tests to check for relevance were performed by means of the Pearson's Chi-Square test or Fisher's Exact test. Data were grouped according to the proportion of patients who experienced a pain intensity of NRS >3 at rest and NRS >4 during movement, the proportion of patients who had rated their pain intensity with a validated pain rating scale and the proportion of patients whose sleep at night was disturbed by pain. Patient-reported pain at baseline was compared with the ratings in the follow-up survey. Analgesic prescriptions in the follow-up survey were compared with those in the baseline survey.

3. Results

3.1. Characteristics of the study population

The mean age of the patients was the same in the surveys, before and after the intervention, with a predominance of women at both occasions. More patients had acute pain at follow-up (66%) than at baseline (51%), but fewer patients (15% vs. 27%) had chronic pain at follow-up (Table 1).

Table 1
Characteristics of the study population before the intervention (baseline) and after the intervention (follow-up).

		Baseline (n = 306)	Follow-up (n = 293)
Age (mean, SD)		69 ± 16	68 ± 18
Sex (male/female)		144/162	105/188
Clinics			
	Medicine	127 (42%)	101 (34%)
	Surgery	77 (25%)	73 (25%)
	Orthopaedics	53 (17%)	60 (20%)
	Gynaecology/urology	25 (8%)	39 (13%)
	Infection	15 (5%)	9 (3%)
	Rehabilitation	6 (2%)	7 (2%)
	Ear/nose/throat	3 (1%)	4 (1%)
Acute pain		157 (51%)	193 (66%)
Cancer pain		31 (10%)	28 (10%)
Chronic pain		81 (27%)	45 (15%)
No pain		37 (12%)	27 (9%)

Continuous data are presented as mean and SD and categorical data as n (%).

3.2. Pain at rest and during movement

There were no significant differences in reported pain intensity at rest (p = 0.398) or during movement (p = 0.993) between the two measurement occasions (Fig. 2).

In the case of acute pain, improvements were observed in pain intensity at rest; 33.8% reported moderate to severe pain (NRS 4–10) at baseline, while in the follow-up 24.4% reported moderate to severe pain. For the other types of pain, only small variations in pain intensity were found in the two surveys, both at rest and during movement (Table 2).

The proportion of patients who reported that they had rated their pain on the NRS/VDS increased significantly from 16% at baseline to 28% (p = 0.001) in the follow-up.

There was no significant difference (p = 0.255) in the number of patients reporting no pain at baseline (n = 37; 12%) compared to follow-up (n = 27; 9%).

In both surveys, 38.6% of the patients reported that their nightly sleep was disturbed by pain.

3.3. Drug prescription before and after the intervention

Prescription of paracetamol to be taken on a regular basis increased from 42.2% to 56.0% after the intervention (p = 0.001) and a total of 78.8% of the patients in the follow-up survey had been prescribed paracetamol to be taken either at regular intervals or when needed (p = 0.008). Prescription of nonsteroidal anti-inflammatory drugs (NSAIDs) increased from 8.2% to 19.8% (p < 0.001). Prescription of weak opioids decreased from 15.7% to 4.4% (p < 0.001), while the total prescription of strong opioids increased from 38.2% to 55.3% after the intervention (p < 0.001) (Table 3).

There was a significant increase in the prescription of strong opioids for all pain types, both for fixed-interval administration and for use when needed. The proportion of patients with multimodal analgesic treatment increased to 39% after the intervention, compared with 27% before the intervention (p = 0.002); the increase mainly concerned a fixed-interval administration of a combination of paracetamol and a strong opioid.

4. Discussion

The aim of this study was to examine the effect of an intervention comprising the implementation of evidence-based pain management guidelines, staff education and an organisation of pain responsibility nurses. The follow-up survey revealed significant improvements in terms of use of validated pain rating instruments and analgesic prescription, but when the results of the two surveys were compared, no significant differences were observed in patient pain levels.

At baseline 29% of the patients reported moderate to severe pain at rest and 41% moderate to severe pain during movement. The present results are in line with similar surveys [5–7,27–30]; the proportion of patients who rated their pain intensity as moderate to severe ranged from 25% in the study by Melotti et al. [27] to 51% in that of Sawyer et al. [29].

There were no significant reductions in the proportions of patients with moderate to severe pain in rest or during movement after the intervention. Other studies have revealed a successful reduction of postoperative pain levels after the introduction of guidelines and education for staff and patients [31]. Our study did not include any specific patient education, which might have improved the results in terms of pain levels.

Significant improvements in pain levels 1 year after the introduction of a pain management programme were found in a study

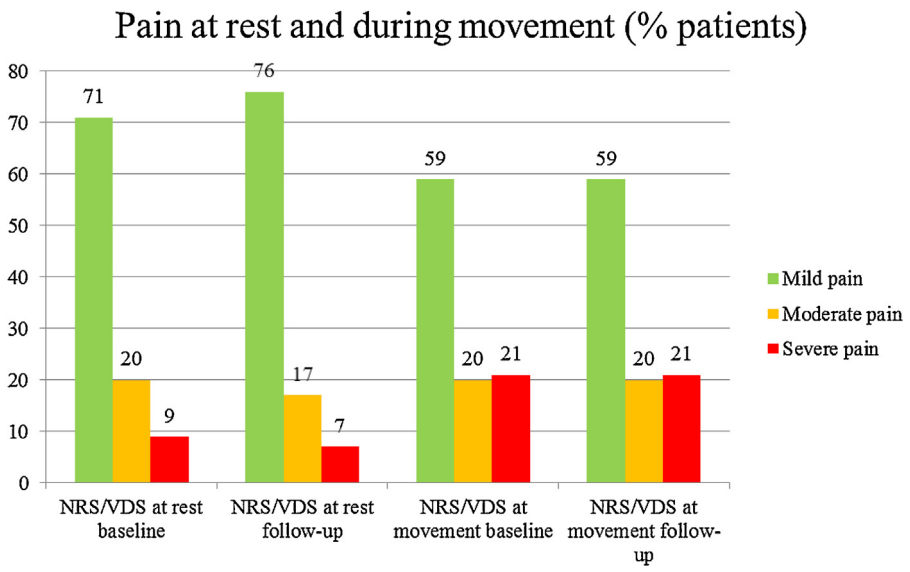

Fig. 2. Distribution of pain at rest and pain during movement, at baseline and follow-up.

Table 2
Intensity of pain at rest and during movement before (baseline) and after the intervention (follow-up).

	Acute pain			Cancer pain			Chronic pain			All types of pain		
	Baseline	Follow-up		Baseline	Follow-up		Baseline	Follow-up		Baseline[a]	Follow-up[b]	
n (%)	157 (51.3)	193 (65.9)	*p*	31 (10.1)	28 (9.6)	*p*	81 (26.5)	45 (15.4)	*p*	306 (100)	293 (100)	*p*
Pain at rest												
0–3	104 (66.2)	146 (75.6)		21 (67.7)	20 (71.4)		56 (69.1)	30 (66.7)		218 (71.2)	223 (76.1)	
4–6	34 (21.7)	32 (16.6)		7 (22.6)	6 (21.4)		21 (25.9)	12 (26.7)		62 (20.3)	50 (17.1)	
7–10	19 (12.1)	15 (7.8)	0.140	3 (9.7)	2 (7.1)	0.928	4 (4.9)	3 (6.7)	0.911	26 (8.5)	20 (6.8)	0.398
Pain during movement											*n* = 291	
0–4	82 (52.2)	103 (53.9)		21 (67.7)	17 (60.7)		42 (51.9)	25 (55.6)		182 (59.5)	172 (59.1)	
5–6	29 (18.5)	39 (20.4)		5 (16.1)	6 (21.4)		27 (33.3)	13 (28.9)		61 (19.9)	58 (19.9)	
7–10	46 (29.3)	49 (25.7)	0.729	5 (16.1)	5 (17.9)	0.835	12 (14.8)	7 (16.6)	0.876	63 (20.6)	61 (21.0)	0.993

[a] Including 37 patients that reported no pain; [b]Including 27 patients that reported no pain

Table 3
Prescription of analgesics before (baseline) and after the intervention (follow-up).

	Acute pain			Cancer pain			Chronic pain			All types of pain		
	Baseline	Follow-up		Baseline	Follow-up		Baseline	Follow-up		Baseline[a]	Follow-up[b]	
n (%)	157 (51.3)	193 (65.9)	*p*	31 (10.1)	28 (9.6)	*p*	81 (26.5)	45 (15.4)	*p*	306 (100)	293 (100)	*p*
Paracetamol												
Fixed schedule	88 (56.1)	126 (65.3)	0.078	15 (48.4)	15 (53.6)	0.691	25 (30.9)	22 (48.9)	0.045	129 (42.2)	164 (56.0)	0.001
As needed	38 (24.2)	41 (21.2)	0.510	10 (32.3)	4 (14.3)	0.105	33 (40.7)	15 (33.3)	0.412	83 (27.1)	67 (22.9)	0.229
Total number of patients	126 (80.3)	167 (86.5)	0.114	25 (80.6)	19 (67.9)	0.260	58 (71.6)	37 (82.2)	0.185	212 (69.3)	231 (78.8)	0.008
NSAIDs												
Fixed schedule	13 (8.3)	36 (18.7)	0.005	1 (3.2)	2 (7.1)	0.599	2 (2.5)	4 (8.9)	0.186	16 (5.2)	42 (14.3)	0.000
As needed	4 (2.5)	14 (7.3)	0.047	1 (3.2)	0 (0.0)	1.000	4 (4.9)	2 (4.4)	1.000	9 (2.9)	16 (5.5)	0.123
Total number of patients	17 (10.8)	50 (25.9)	0.000	2 (6.5)	2 (7.1)	1.000	6 (7.4)	6 (13.3)	0.346	25 (8.2)	58 (19.8)	0.000
Strong opioids												
Fixed schedule	46 (29.3)	71 (36.8)	0.140	13 (41.9)	18 (64.3)	0.086	13 (16.0)	12 (26.7)	0.152	72 (23.5)	101 (34.5)	0.003
As needed	67 (42.7)	115 (59.6)	0.002	18 (58.1)	20 (71.4)	0.284	23 (28.4)	16 (35.6)	0.405	108 (35.3)	152 (51.9)	0.000
Total number of patients	76 (48.4)	119 (61.7)	0.013	18 (58.1)	21 (75.0)	0.170	23 (28.4)	21 (46.7)	0.039	117 (38.2)	162 (55.3)	0.000
Weak opioids	27 (17.2)	5 (2.6)	0.000	3 (9.7)	1 (3.6)	0.614	18 (22.2)	7 (15.6)	0.369	48 (15.7)	13 (4.4)	0.000
Drug prescription neuropathic pain	3 (1.9)	4 (2.1)	1.000	0 (0.0)	1 (3.6)	0.475	1 (1.2)	5 (11.1)	0.022	4 (1.3)	10 (3.4)	0.108

[a] Including 37 patients that reported no pain; [b]Including 27 patients that reported no pain.

by Usichenko et al. [32]. Their programme comprised patient information, procedure-specific analgesic guidelines, pain rating at least every 8 h, documentation of pain rating scores, therapeutic consequences when NRS >3, introduction of Acute Pain Service (APS), a multidisciplinary working group, definition of doctors' and nurses' areas of responsibility, pain guidelines on the hospital intranet, continual staff education and regular quality control. In their study [32], patients reported 25–30% less pain in the

follow-up, both at rest and during movement. This could indicate that our intervention would have needed more components in order to reduce pain in patients, for example, a standardised pain rating system. In a study by Ene et al. [33], a relationship was found between the availability of pain relief for patients and documented pain rating scores of NRS >5 in the medical records. The patients in our study who reported severe pain would thus have required an individual pain management regimen and evaluation of the treatment. An Italian study [24] also showed lower pain levels after the introduction of daily pain rating, documentation in the medical records, implementation of pain management guidelines, education, and multidisciplinary pain control teams. The interventions in both Quattrin's [24] and Usichenko's [32] studies contained more improvement components than our study, indicating that a variety of components are necessary for reducing pain levels in hospital patients.

Our study revealed no differences before and after the intervention in terms of disturbed sleep at night. At both baseline and follow-up, 39% of the patients reported that their sleep was disturbed by pain. Dihle et al. [34] demonstrated that moderate to severe pain has a significant effect on the sleep of hospitalized patients, which is in line with the results in our study. Sawyer et al. [28] also found that pain intensity affected sleep; 30% of patients on medical wards and 38% in surgical units reported disturbed sleep at night.

The use of pain rating with validated instruments increased after the intervention. Only 16% of the patients in the baseline survey had used a validated pain rating scale, compared with 28% in the follow-up. The increase in rating of acute pain conditions was greater (34%) than in the study sample as a whole, which could indicate that pain is underestimated on medical wards [5,35]. Training and feedback to staff are important for increasing the use of pain rating scales [36,37]. In our study, no structured feedback was given to the nurses and doctors at the hospitals, regular feedback to staff would probably have increased the use of validated pain rating instruments.

The follow-up survey showed increased use of multimodal analgesic prescription, paracetamol, NSAIDs and strong opioids, with a decrease in the use of weak opioids, indicating that the new guidelines were extensively applied. Despite improved pain management regimens, the follow-up survey revealed no reduction in pain levels, which was surprising. However, our result supports the argument that more components are needed to reduce patient reported pain in hospitals, i.e. more individual pain management regimens based on the pain mechanism should have be applied. In the study by Usichenko et al. [32], where the pain levels were significantly reduced, procedure-specific multimodal pain management tailored to each individual patient constituted an important part of the intervention.

The follow-up survey showed that all patients with moderate to severe pain were prescribed paracetamol at fixed intervals, which indicated good application of the guidelines. While the use of NSAIDs increased in the follow-up survey, even more patients should have been prescribed these drugs. Of the 193 patients with acute/postoperative pain, only 36 had been prescribed NSAIDs on a fixed-interval basis. It has been questioned whether NSAIDs have a negative effect on bone healing, several of the patients in our study had undergone orthopaedic surgery. However, recent research has shown that NSAIDs as a limited treatment for 7 days does not affect bone healing [38]. In our study only two of the 28 patients with cancer pain were prescribed NSAIDs. The Swedish Medical Products Agency guidelines for cancer pain recommend a base of paracetamol and NSAIDs [39], which is also supported by guidelines from the US [21]. Greater use of NSAIDs could possibly have helped reduce the pain levels of the patients in our study.

The prescription of weak opioids (codeine combinations or tramadol) decreased significantly in the follow up survey, which is positive because weak opioids were not recommended in the new pain guidelines, in accordance with research evidence [40].

In the follow-up survey, there was a significant increase in the prescription of strong opioids, both for use at fixed intervals and when needed. Despite the increase in the prescription of strong opioids, the patients in our study only reported a slight decrease in pain at rest and unchanged pain levels during movement, which could be due to the prescriptions not being individually tailored to a sufficient extent. There are large individual differences in terms of the pharmacokinetic and pharmacodynamic characteristics of opioids [39].

Despite the fact that the guidelines implemented in our intervention provided advice about medication for neuropathic pain, there was little use of these drugs. Compared with non-neuropathic pain, neuropathic pain is generally characterised by greater severity and poorer health in all measured dimensions [15]. Chronic pain after surgery sometimes includes a neuropathic component [41]. Neuropathic pain occurs in nearly 60% of patients with cancer [42], 26% of patients with diabetes [43], approximately 10% of patients post-stroke [44] and 37% of patients with lower back pain [45]. Many of the patients in our study were treated for one of the above conditions. It is likely that some of the patients treated for diagnoses such as spinal stenosis, vertebral compression, disc displacement, diabetic neuropathy and cancer had elements of neuropathic pain. We might have found lower pain levels if more patients had been prescribed medication for neuropathic pain.

Use of non-pharmacological treatment methods such as TENS, heat, cold and tactile massage, which are recommended in guidelines as a complement to analgesics [14,16,21], could possibly have helped to reduce the pain levels in the patients in our study. However, there was no organized teamwork involving multiprofessional pain management expertise at the hospitals when we carried out the study. Others' experiences with implementation of pain-care teams [46] have shown similar barriers as our study, i.e. difficulties to adhere to guidelines and difficulties to implement guidelines into practice.

4.1. Strengths and limitations

The study was carried out in a clinical setting and the result is based on patient reported data, which is a strength, as it reflects real-life experiences. It has been demonstrated that both relatives and healthcare staff underestimate a patient's pain severity in cases where she/he has not personally reported the pain intensity [47].

The time span of 2–3 years between baseline and follow up might have contributed to factors other than the components in our intervention that could have influenced the results. An external factor that might have affected the results is that researchers in the field as well as national guidelines began to recommend multimodal analgesic treatment during the study period. Another possible external factor may be a change of analgesic methods during surgery for certain patient groups between baseline and follow up, which could have had an effect on patients' perception of postoperative pain intensity.

The patients in this study also differed at baseline and at follow-up with regard to the balance between pain types. The patients in our study who had chronic pain probably did not experience any effect of improved analgesic prescription or other non-pharmacological pain treatment during their care, as these periods were often very short.

One limitation of the study is that some medical wards were excluded; more comprehensive results and better knowledge of pain management in medical wards could have been acquired had

they been included. Research has shown that pain is underestimated and undermanaged in medical wards [5,35].

5. Conclusion

The study demonstrates that evidence-based guidelines made accessible to all staff in the form of a pocket size booklet and on the intranet, in combination with staff education, improved the prescription of analgesics in the hospitals studied. The education was effective, as it was provided for all professional categories on a regular basis. Nurses with pain management responsibility were successful in promoting the guidelines in their own units. Achieving a noticeable effect for patients in terms of reduced pain requires an intervention that contains more components than was the case in our intervention.

6. Implications

Nurses and physicians need greater understanding and knowledge about rating patients' pain, both at rest and during movement. A continuously ongoing effort is needed for all professionals to follow guidelines. An important part of pain management at hospitals is continuous evaluation of treatment outcomes to prevent severe pain and disturbed sleep. The complexity of pain and pain management requires commitment, time and knowledge on the part of healthcare staff. Multi-professional pain teams that support ward staff in pain management are necessary in order to reduce suffering and unnecessary pain in hospital patients.

Ethical issues

The study was approved by the Regional Ethical Review Board in Lund (Ref. no: 2012/383). Participants provided oral consent and signed a written informed consent form before taking part in the study.

Conflict of interest

The authors report no conflict of interest.

Acknowledgments

Special thanks to the patients who participated in the study. We also want to acknowledge the contribution of the nursing staff of the clinics involved. The study was financially supported by a research grant from Region Halland, Sweden.

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