

Pain in the emergency department: adherence to an implemented treatment protocol

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Summary

Objectives: Although pain is one of the most common presenting complaints in the Emergency Department (ED), pain management is often inadequate. Pain management protocols have been shown to be useful. The objective of this study was to assess the adherence to an already implemented pain management protocol in an urban ED.

Methods: Secondary analysis of a prospective single centre cohort study on patient preferences for analgesia in the ED. Patient charts were reviewed with a focus on selection, timing and dosage of analgesics according to a visual analogue scale (VAS) on arrival and during the ED stay.

Results: Three hundred and thirty-seven patient charts were reviewed. The adherence to the

implemented pain management protocol was 42% at the time of initial evaluation and 43% during the course of therapy in all patients. Forty-two percent of the study population were discharged with at least moderate pain. However, 43% of the patients discharged with pain did not request analgesics.

Conclusions: The benefits of pain management protocols are proven. However, adherence to these protocols needs to be monitored regularly in order to optimise pain management.

Keywords: pain management; treatment protocol; emergency department; opiophobia

Introduction

Pain is one of the most common reasons for patients to present to an emergency department (ED) [1]. As pain is a subjective experience, the judgement of the intensity of pain often differs from the standpoint of the patient and the caregivers respectively [2, 3]. Therefore, a standardised assessment of pain has been proven to be useful [4]. At present, however, pain assessment instruments are applied infrequently despite the fact that adequate analgesia was identified as being an important indicator of the quality of care in the ED [5–7]. Thus, optimising pain management remains an important challenge for interdisciplinary teams in every ED, especially considering the high prevalence of pain.

Wilson et al. were among the first to describe the problem of *oligoanalgesia* [8]. According to this study, only 44% of patients treated in the ED received analgesics, often after long waiting times. In addition, under-dosing of narcotics was the rule rather than exception. These results have recently been confirmed by a multi-centre study, showing that pain management has improved with the introduction of pain management protocols, but still remains largely inadequate [9].

There are various reasons for insufficient pain management in the ED. Evidence-based pain management protocols are not sufficiently applied, and emergency physicians often seem to suffer from *opiophobia*. After the term *opiophobia* was introduced in 1985 [10], it was commonly used in the literature to describe an irrational fear of using or prescribing opioids. Additionally, lack of protocols, regular training sessions and measurement of adherence could play a role but these factors have not been widely studied.

Patient age, gender, disease patterns and the relationship and communication between physicians, nurses, and patients seem to have an important impact on pain management [11–17]. Furthermore, ethnicity and ED overcrowding also appear to play a role, although this is controversial [18–22].

To reduce the problem of *oligoanalgesia*, continuous education of ED staff and implementation of pain management protocols seem to be beneficial [23–25].

In a previous study of patient preferences on pain management, we have shown that about 50% of 352 adult patients presenting to our ED with

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acute pain from any cause, in a questionnaire opted for pain medication. The intensity of pain was measured by a visual analogue scale (VAS) and was documented at the time of initial evaluation, during the course of treatment and immediately before discharge. Despite the implementation of our treatment protocol for pain management, 85% of our patients were discharged with a VAS significantly higher than initially desired by the patient [26].

This prompted us to perform a secondary analysis of the data in order to identify reasons for this underperformance. We hypothesised that our implemented local pain management protocol was incompletely or incorrectly applied. Additionally, we tried to identify factors responsible for this low adherence.

Methods

Study design

Secondary analysis of a prospective single centre cohort study on patient preferences for analgesia in the ED.

Setting

The study took place in the Emergency Department of the University Hospital of Basel, Switzerland. The hospital is a 700-bed primary and tertiary care university hospital and the ED treats over 41 000 patients per year. The study protocol was approved by the local ethics committee (EK: 74/05).

Selection of patients

Patients presenting to the ED of the University Hospital Basel were recruited for our prospective study examining patient preferences for pain management in the ED from May 2005 to August 2005 [26]. A culturally adapted,

German version of a questionnaire, as described in detail by Beel et al. [27], was used to determine patient preferences in the treatment of acute pain. The charts of these patients were then further used for the present study investigating the adherence to our pain management protocol. Patients were recruited from Monday to Friday during day shifts according to the working hours of the study personnel.

Exclusion criteria

Patients under the age of 18, patients unable to communicate in German, patients with limited cognitive functions (e.g., dementia, delirium, intoxication or cerebral injury), patients with an Emergency Severity Index of 1 (ESI) [28], patients with chronic pain (duration >3 months), and frequent attenders (more than two presentations to our ED in the last month) were not enrolled into the study.

Methods of measurement

The local pain management protocol at the University Hospital Basel

Our local pain management protocol was developed by an interdisciplinary team of pain management specialists and was introduced to our ED in 2001.

Primarily, all ED nurses were trained in a standardised four-hour education programme and attended a mandatory one-hour follow-up training at regular intervals. ED physicians received a 45 minute training with the local pain management protocol and had to take a standardised online test. The results of which were communicated to the head of the department.

The applied local pain management protocol for pain management has been described previously [29]. Briefly, it comprises an evaluation of pain by the ED nurse in charge using a visual analogue scale (VAS, graduation from 0 to 100 mm) [30–33] within 15 minutes of arrival followed by immediate administration of an analgesic after a short communication between nurse and physician (or, if consultation was not immediately possible, application of acetaminophen by the nurse). Reassessment of the VAS was performed within predefined time intervals (after morphine administration 15 minutes, after other intravenous analgesics

30 minutes and after oral therapy 60 minutes). According to the protocol, analgesics had to be re-administered until the VAS was below 30 mm. A VAS below 30 mm was the threshold pain score before discharge, provided the patient did not choose a different VAS goal. The type and route of analgesic medication were selected according to the implemented pain management protocols for common clinical presentations such as Non Steroidal Anti-Inflammatory Drugs (NSAIDs) for gouty arthritis, steroids for giant cell arteriitis or opiates for chest pain [29]. The combination of analgesics was chosen in a stepwise approach, according to the WHO pain ladder [34].

Review of clinical records

The clinical records were reviewed independently by two outcome assessors. One outcome assessor was an experienced emergency physician, additionally board-certified in pulmonary medicine (FCCP) and the other one was board-certified in internal medicine. In order to reduce assessor bias, none of the outcome assessors took part in patient management during the study period. Disagreements were resolved by discussion.

The questionnaire, as described above, was filled out by study participants. The questionnaire

comprises demographic baseline data, localisation of pain, VAS (at the time of initial evaluation and at discharge), preferences for pain management (i.e., path of administration, substance class). ESI score, vital signs, and medical history were taken from patients' charts. Patients' charts were reviewed with a focus on selection and dosage of analgesics; sequence and exact time-points of administrations related to the VAS on arrival and during the course of therapy. Furthermore, the use of non-drug therapies such as cold and warm packs, braces and plasters and the use of adjuvant (non-analgesic) therapies, such as anti-emetics, was assessed. Furthermore, the patients' charts were analysed for patient related factors having an impact on pain management, such as NSAIDs in chronic

renal failure or peptic ulcer, or known allergies to a certain medication. According to the history of the presenting illness and the final diagnosis, we categorised the patients into the groups "Trauma Pain", "Abdominal Pain" and "Other Pain".

Three different outcomes were predefined: 1) The complete pain management protocol was correctly applied; 2) The pain management protocol was incorrectly or only partly applied (either not in accordance with the protocol or delayed in time); 3) No analgesic therapy was administered at the request of the patient. These three outcome criteria were reviewed at different time points (at the time of initial evaluation, during treatment and at discharge). The inter-rater reliability was checked for consensus by Cohen's kappa test.

Results

Of the original 352 case records [26], 15 could not be retrieved. Therefore, 337 clinical case records were analysed. The inter-rater reliability was 0,97 regarding the three main categories as defined above. The patients consisted largely of ESI 4 trauma patients (79% ESI 4 in the trauma subgroup) with low-grade injuries (for details see table 1). ESI scores of the other, smaller subgroups were more evenly distributed (66% ESI 2-3 for abdominal pain and 41% ESI 2-3 for other pain), therefore comprising a higher number of more severely ill patients. Figure 2 shows the adherence to the pain management protocol for all patients at the time of initial evaluation as well as during their entire stay.

We also included patients who refused analgesics at the initial evaluation, but who, at a later stage, requested it. This explains the differing percentage of patients shown in figures 2 and 3 at the time of initial evaluation and during further course of therapy.

In addition, figure 3 and 4 show the adherence to our pain management protocol at the time of initial evaluation by splitting the patients into three categories: "Trauma Pain", "Abdominal Pain" and "Other Pain". "Other Pain" was by far the smallest subgroup and includes chest pain (n = 9), headache (n = 8), monoarthritis (n = 5), erysipeloid (n = 1), pneumothorax (n = 1), pain due to local metastases (n = 1), torticollis (n = 1) and somatoform pain (n = 1).

At the time of initial evaluation, the local pain management treatment protocol was correctly applied in 140 (42%) patients. In 102 (30%) patients, the protocol was incorrectly or only partially applied. Ninety-five (28%) patients refused any analgesic therapy on admission.

In 144 (43%) patients, the pain management protocol was correctly applied during treatment. In 119 (35%) patients, the protocol was incorrectly or only partially applied during treatment. Seventy-four (22%) patients objected to analgesic therapy during treatment. In total, 92 patients were treated in complete accordance with our pain management protocol (at presentation, during treatment, and at discharge). A non-drug therapy was administered to 41 patients and an adjuvant drug therapy to 12 patients. In most cases, patients initially received acetaminophen (13 patients) and mefenamic acid (13 patients). Where required, opioids (tramadol, n = 2, morphine, n = 6) were administered.

102 (30%) patients were not treated in accordance with the pain management protocol at presentation. Forty-seven patients did not receive any analgesic therapy at the time of initial evaluation, although they requested such therapy. Eight-

Table 1

Patient characteristics

	All patients N = 337	Trauma pain N = 265	Abdominal pain N = 45	Other pain N = 27
Age				
Mean age, y (SD)	44 (18)	44 (16)	45 (16)	47 (16)
Min-max, y	18-94	18-94	20-80	24-75
Sex				
Females, No. (%)	161 (48)	131 (49)	17 (38)	13 (48)
VAS-Score*				
At the time of initial evaluation				
Mean VAS, mm (SD)	50 (23)	49 (23)	51 (24)	60 (30)
Min-max, mm	3-100	3-100	5-95	12-95
At discharge				
Mean VAS, mm (SD)	36 (20)	36 (12)	31 (20)	36 (25)
Min-max, mm	0-100	0-100	0-80	0-90
ESI#				
ESI 2	4%	2%	4%	22%
ESI 3	20%	14%	62%	19%
ESI 4	70%	79%	27%	48%
ESI 5	6%	5%	7%	11%

* Visual Analogue Scale # Emergency Severity Index[28]

Table 2

Drug and non-drug therapy.

	All patients (n = 337)	Trauma pain (n = 265)	Abdominal pain (n = 45)	Other pain (n = 27)
Non-drug therapy	35%	43%	0%	11%
Acetaminophen	22%	17%	40%	37%
NSAID*				
Metamizole	4%	3%	9%	0%
Diclofenac	13%	14%	11%	7%
Mefenamic acid	10%	13%	0%	0%
Other NSAID	2%	1%	0%	22%
Opioids				
Tramadol	9%	8%	13%	11%
Morphine	2%	1%	0%	7%
Other opioids	2%	1%	9%	0%
Adjuvant therapy	14%	10%	33%	19%

* NSAID: Nonsteroidal anti-inflammatory drug

Figure 1

Inclusion procedure.

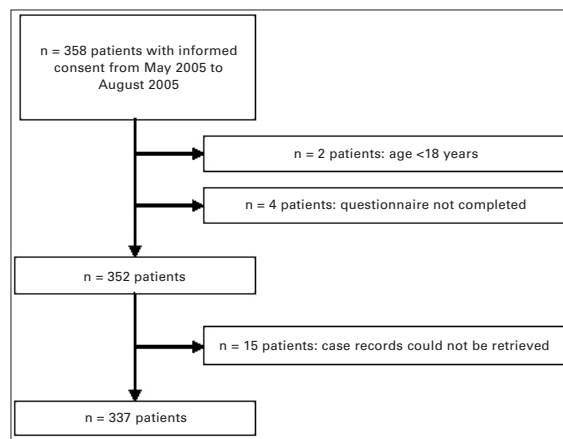


Figure 2

Adherence to pain management protocols at the time of initial evaluation and during course of therapy.

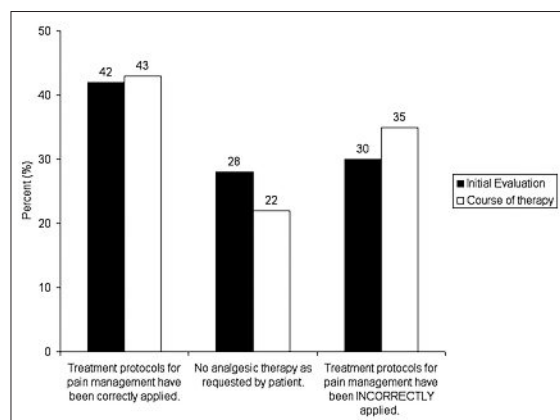


Figure 3

Adherence to pain management protocols at the time of initial evaluation (subgroups).

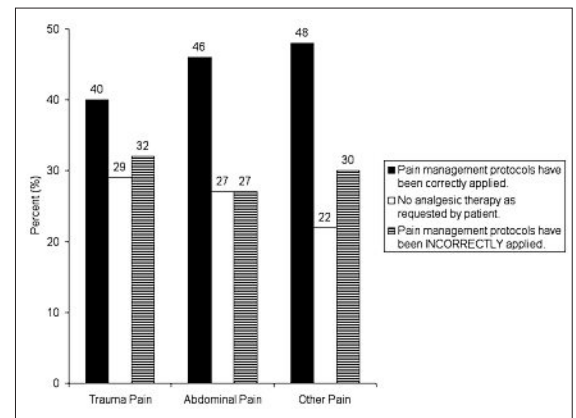
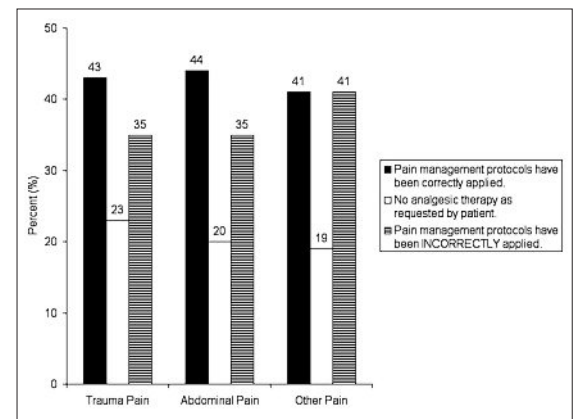


Figure 4

Adherence to pain management protocols during course of therapy (subgroups).



teen patients received analgesic therapy according to the protocol, except for the predefined time frame as described. In 29 patients, pain therapy was applied within the predefined time frame, but the selected treatment was not in accordance with the protocol. In the remaining 8 patients therapy was neither in accordance with the pain management protocol nor was it applied within the predefined time frame.

During the course of ED evaluation, 119 patients were not treated according to the protocol. Among those, 95 patients were discharged with a VAS score higher than 30 mm (mean 57 mm, SD 16 mm, min-max 35–100 mm). The remaining 24 patients were discharged with a VAS score of 30 mm or lower (mean 20 mm, SD 9mm, min-max 0–30 mm). Of these, in 13 cases a therapy was chosen, that was not mentioned in the protocol. Seven patients received neither adequate therapy nor was it provided within the predefined time frame. Four patients received an adequate therapy but it was not administered in the correct time frame.

Discussion

Inadequate pain management is a common problem in the ED and remains a challenge for health care providers. *Oligoanalgesia* has been extensively studied and described. In one study, it was shown that only 44% of patients presenting to an ED with pain received pain medication at all. Among those, more than two thirds had to wait over an hour for initiation of treatment [8].

Pain management protocols have been shown to be helpful in reducing *oligoanalgesia* in ED settings [23–25]. This prompted us to perform a secondary analysis of 337 patients presenting to our ED with pain who had been treated according to our local pain management protocol. Despite this, 85% of these patients left our ED with a significantly higher VAS than desired [26]. We therefore assessed the adherence to this protocol. To our knowledge, this is the first study investigating whether and to what extent health care providers comply with their own pain management protocols.

It could be demonstrated here that a substantial proportion of patients presenting to our ED with pain were not treated according to our local pain management protocol due to a low adherence of the ED team.

Taken together, 42% of the study population were discharged with at least moderate pain. However, 18% did not request pain medication.

A study on 842 patients presenting to the ED with pain showed comparable results. Seventy-four percent of the study population was discharged with at least moderate pain, and 29% with severe pain [9]. Therefore, our results cannot be judged as unusual, but rather as typical for a busy urban ED. However, better results have been published in other studies with or without the use of pain management protocols. In a population with similar ESI scores at the time of presentation, 61% of the patients received pain medication, in spite of the absence of pain management protocols [35]. Another study showed an increase in administration of analgesics from 40% to 63% after implementation of an education programme for pain management, similar to our pain management protocol. This education programme not only leads to improved pain management, but also to higher patient satisfaction in the ED [24].

Our results show that, whilst almost half of our patients were managed according to the protocol at presentation and during the course of their ED stay, treatment at the time of discharge seems especially problematic, as 42% of all patients suffered from at least moderate pain at this point. Surprisingly, we were unable to detect any patient-related reasons for the low adherence to our own protocols.

A possible explanation for the infrequent use of opioids in our study population may be *opiophobia*, which is a common and well-known phenomenon in pain management [36]. Educational inter-

ventions, however, can reduce *opiophobia* and thereby improve pain management in an inpatient setting [37]. Moreover, physicians' decisions to prescribe opioid analgesics are highly variable, which impacts opioid prescription [38]. However, our education programmes have for years stressed that opioids should be used more often, especially in patients with severe pain. Unfortunately, the impact of these programmes seems too small. A possible explanation for the reluctance to use opioids could be within our own protocol requiring a one hour monitoring after administration of opioids. Delaying discharge for the necessary monitoring could well explain the reluctance of the ED team to prescribe a therapy readily administered under other circumstances.

Furthermore, ED overcrowding has potential impact on pain management with significant delays in pain assessment and administration of analgesics [19, 20], but this is controversially discussed in the current literature [18]. Due to the retrospective nature of our study design, the impact of overcrowding on pain management in our study is not known. Training could be improved in ED physicians, although our mandatory training sessions and tests were believed to be sufficient. However, emergency medicine training in Switzerland is often limited to undergraduates [39], and more continuous education on management of acute pain seems necessary in face of these results.

Another possible reason for under-treatment is the patients' fear of adverse drug reactions. Indeed, nearly sixty percent of our patients were concerned about adverse reactions to analgesic therapy, independent of the type of analgesic [26]. This is supported by a previous retrospective study that found physicians' reluctance to use analgesics was primarily due to patient refusal. Common concerns about masking more serious conditions, adverse effects of medications and potential drug dependency appear to play a lesser role [40].

In addition, our typical patients were trauma patients with a mean ESI score of 4 and thus prone to early discharge. We speculate that in this patient group, caregivers underestimated the pain level experienced by patients, in spite of the pain assessment by VAS. The discrepancy between patient versus caregiver perception of acute pain in the ED has been demonstrated previously [2]. Unfortunately, the present education programmes and pain management protocols seem not to be sufficient for optimising therapy in our ED, although it seems that treatment protocols appear to help, if correctly applied [23, 24]. The reasons for low adherence to pain management protocols need to be further assessed.

Changes in nurses' patterns of practice have been shown to impact pain management.

Nurses' assessment of pain intensity and pain history improved after an educational intervention

in a walk-in clinic [41]. Furthermore, a nurse-initiated opioid analgesia protocol has been shown to reduce delays to opioid analgesia for patients with selected painful conditions, including renal and

biliary colic, without serious adverse effects [42]. Potentially, ED-nurse-initiated intravenous analgesia could be the key to optimising pain management.

Limitations

This study was done at a single centre with no blinded design. There was no control ED without pain management protocol and education program.

Additionally, the selection and inclusion of patients was not performed consecutively, due to availability of study personnel. A potential seasonal bias could be taken also into account, since the study took place during spring and summer-time. Another possible bias could be the Hawthorne effect, as care providers were subject to observation during the study. This effect is difficult to avoid. However, low adherence cannot be accounted for by the Hawthorne effect, as the oppo-

site can be expected. Thus, it could be argued that the adherence to pain management protocols may be even lower without observation.

Since we could not retrieve 15 case records, there is a potential bias influencing our results. However, 11 of these patients objected to any analgesic therapy at the initial evaluation, as documented in the questionnaire [26, 27]. Since most of these patients objected to any analgesic therapy, we postulate that there is little impact on adherence or non-adherence to the treatment protocol. The loss of these patient records therefore has no significant impact on our study results.

Conclusions

Four years after establishing not only a protocol but also after the introduction of regular education programmes both for ED nurses and ED physicians, the adherence to a well established and regularly updated pain management protocol is frustratingly low. We therefore conclude that pain management protocols need to be regularly monitored in order to optimise pain management. Monitoring may help to administer additional training as soon as the adherence rates drop below 50%, for example. Not only the implementation of pain protocols and regular pain management education programmes should be part of the mandatory quality initiatives, but also the in-depth as-

essment of adherence to these protocols, both at the time of presentation, and during treatment and at discharge of patients in the ED.

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References

- 1 Cordell WH, Keene KK, Giles BK, Jones JB, Jones JH, Brizendine EJ. The high prevalence of pain in emergency medical care. *Am J Emerg Med.* 2002;20(3):165–9.
- 2 Guru V, Dubinsky I. The patient vs. caregiver perception of acute pain in the emergency department. *J Emerg Med.* 2000;18(1):7–12.
- 3 Marquie L, Raufaste E, Lauque D, Marine C, Ecoiffier M, Sorum P. Pain rating by patients and physicians: evidence of systematic pain miscalibration. *Pain.* 2003;102(3):289–96.
- 4 Todd KH. Pain assessment instruments for use in the emergency department. *Emerg Med Clin North Am.* 2005;23(2):285–95.
- 5 Wilder-Smith OH, Mohrle JJ, Martin NC. Acute pain management after surgery or in the emergency room in Switzerland: a comparative survey of Swiss anaesthesiologists and surgeons. *Eur J Pain.* 2002;6(3):189–201.
- 6 Beattie E, Mackway-Jones K. A Delphi study to identify performance indicators for emergency medicine. *Emerg Med J.* 2004;21(1):47–50.
- 7 Eder SC, Sloan EP, Todd K. Documentation of ED patient pain by nurses and physicians. *Am J Emerg Med.* 2003;21(4):253–7.
- 8 Wilson JE, Pendleton JM. Oligoanalgesia in the emergency department. *Am J Emerg Med.* 1989;7(6):620–3.
- 9 Todd KH, Ducharme J, Choiniere M, Crandall CS, Fosnocht DE, Homel P, et al. Pain in the emergency department: results of the pain and emergency medicine initiative (PEMI) multicenter study. *J Pain.* 2007;8(6):460–6.
- 10 Morgan JP. American opiophobia: customary underutilization of opioid analgesics. *Adv Alcohol Subst Abuse.* 1985;5(1-2):163–73.
- 11 Jones JS, Johnson K, McNinch M. Age as a risk factor for inadequate emergency department analgesia. *Am J Emerg Med.* 1996;14(2):157–60.
- 12 Miner J, Biros MH, Trainor A, Hubbard D, Beltram M. Patient and physician perceptions as risk factors for oligoanalgesia: a prospective observational study of the relief of pain in the emergency department. *Acad Emerg Med.* 2006;13(2):140–6.

- 13 Heins A, Grammas M, Heins JK, Costello MW, Huang K, Mishra S. Determinants of variation in analgesic and opioid prescribing practice in an emergency department. *J Opioid Manag.* 2006;2(6):335-40.
- 14 Fosnocht DE, Swanson ER, Barton ED. Changing attitudes about pain and pain control in emergency medicine. *Emerg Med Clin North Am.* 2005;23(2):297-306.
- 15 Rupp T, Delaney KA. Inadequate analgesia in emergency medicine. *Ann Emerg Med.* 2004;43 (4):494-503.
- 16 Forero R, Mohsin M, McCarthy S, Young L, Ieraci S, Hillman K, et al. Prevalence of morphine use and time to initial analgesia in an Australian emergency department. *Emerg Med Australas.* 2008;20(2):136-43.
- 17 Raftery KA, Smith-Coggins R, Chen AH. Gender-associated differences in emergency department pain management. *Ann Emerg Med.* 1995;26(4):414-21.
- 18 Mitchell R, Kelly AM, Kerr D. Does emergency department workload adversely influence timely analgesia? *Emerg Med Australas.* 2009;21(1):52-8.
- 19 Hwang U, Richardson LD, Sonuyi TO, Morrison RS. The effect of emergency department crowding on the management of pain in older adults with hip fracture. *J Am Geriatr Soc.* 2006;54(2):270-5.
- 20 Hwang U, Richardson L, Livote E, Harris B, Spencer N, Sean Morrison R. Emergency Department Crowding and Decreased Quality of Pain Care. *Acad Emerg Med.* 2008.
- 21 Bijur P, Berard A, Esses D, Calderon Y, Gallagher EJ. Race, ethnicity, and management of pain from long-bone fractures: a prospective study of two academic urban emergency departments. *Acad Emerg Med.* 2008;15(7):589-97.
- 22 Quazi S, Eberhart M, Jacoby J, Heller M. Are racial disparities in ED analgesia improving? Evidence from a national database. *Am J Emerg Med.* 2008;26(4):462-4.
- 23 Kelly AM. A process approach to improving pain management in the emergency department: development and evaluation. *J Accid Emerg Med.* 2000;17(3):185-7.
- 24 Decosterd I, Hugli O, Tamches E, Blanc C, Mouhsine E, Givel JC, et al. Oligoanalgesia in the emergency department: short-term beneficial effects of an education program on acute pain. *Ann Emerg Med.* 2007;50(4):462-71.
- 25 Stalnikowicz R, Mahamid R, Kaspi S, Brezis M. Undertreatment of acute pain in the emergency department: a challenge. *Int J Qual Health Care.* 2005;17(2):173-6.
- 26 Martin J, Bingisser R, Spirig R. Schmerztherapie: Patientenpräferenzen in der Notaufnahme. *Intensivmedizin und Notfallmedizin.* 2007;44(6):372-80.
- 27 Beel TL, Mitchiner JC, Frederiksen SM, McCormick J. Patient preferences regarding pain medication in the ED. *Am J Emerg Med.* 2000;18(4):376-80.
- 28 Gilboy N TP, Travers DA, Rosenau AM, Eitel DR. Emergency Severity Index, Version 4: Implementation Handbook. Rockville: Agency for Healthcare Research and Quality 2005.
- 29 www.notfallstandards.ch.
- 30 Revill SI, Robinson JO, Rosen M, Hogg MI. The reliability of a linear analogue for evaluating pain. *Anaesthesia.* 1976; 31(9):1191-8.
- 31 Collins SL, Moore RA, McQuay HJ. The visual analogue pain intensity scale: what is moderate pain in millimetres? *Pain.* 1997; 72(1-2):95-7.
- 32 Gallagher EJ, Bijur PE, Latimer C, Silver W. Reliability and validity of a visual analog scale for acute abdominal pain in the ED. *Am J Emerg Med.* 2002;20(4):287-90.
- 33 Salo D, Eget D, Lavery RF, Garner L, Bernstein S, Tandon K. Can patients accurately read a visual analog pain scale? *Am J Emerg Med.* 2003;21(7):515-9.
- 34 World Health Organization. Geneva S. Cancer pain relief. 1986/1996.
- 35 Ducharme J, Tanabe P, Homel P, Miner JR, Chang AK, Lee J, et al. The influence of triage systems and triage scores on timeliness of ED analgesic administration. *Am J Emerg Med.* 2008;26(8):867-73.
- 36 Marks RM, Sachar EJ. Undertreatment of medical inpatients with narcotic analgesics. *Ann Intern Med.* 1973;78(2):173-81.
- 37 Scott E, Borate U, Heitner S, Chaitowitz M, Tester W, Eiger G. Pain management practices by internal medicine residents – a comparison before and after educational and institutional interventions. *Am J Hosp Palliat Care.* 2008;25(6):431-9.
- 38 Tamayo-Sarver JH, Dawson NV, Cydulka RK, Wigton RS, Baker DW. Variability in emergency physician decision making about prescribing opioid analgesics. *Ann Emerg Med.* 2004; 43(4):483-93.
- 39 Bingisser R. Emergency medicine training: is undergraduate training sufficient for the Swiss health-care system? *Swiss Med Wkly.* 2009;139(29-30):406.
- 40 Lewis LM, Lasater LC, Brooks CB. Are emergency physicians too stingy with analgesics? *South Med J.* 1994;87(1):7-9.
- 41 Junod Perron N, Piguët V, Bovier PA. Long-term effectiveness of a multifaceted intervention on pain management in a walk-in clinic. *QJM.* 2007;100(4):225-32.
- 42 Kelly AM, Brumby C, Barnes C. Nurse-initiated, titrated intravenous opioid analgesia reduces time to analgesia for selected painful conditions. *CJEM.* 2005;7(3):149-54.