DANISH MEDICAL JOURNAL

Original Article

Dan Med J 2023;70(3):A09220540

Acute pain treatment of children in the Danish emergency departments

Maria Nyhøj Krusenstjerna-Hafstrøm[1, 2, 3], Claus Sixtus Jensen[3, 4, 5], Hans Kirkegaard[3, 4] & Stine Fjendbo Galili[3, 4]

1) Health, Aarhus University, 2) Research Centre for Emergency Medicine, Emergency Department, Aarhus University Hospital, 3) Department of Clinical Medicine, Aarhus University, 4) Department of Clinical Medicine, Aarhus University, 5) Department of Paediatrics and Adolescent Medicine, Aarhus University Hospital, Denmark

Dan Med J 2023;70(3):A09220540

ABSTRACT

INTRODUCTION. Preconditions for good pain treatment in children include education and guidelines. This study investigated whether the guidelines on acute pain treatment of children in Danish emergency departments reflected the national guideline, examined the knowledge and use of guidelines, and explored the approach adopted to treating pain in children.

METHODS. This cross-sectional study consisted of two parts. Part I compared the guidelines in each emergency department with a national guideline; Part II was a structured interview with the emergency department doctors regarding their approach to treating pain in children.

RESULTS. Several guidelines did not include pain assessment, dose schedules and non-pharmacological methods as recommended in the national guideline. The doctors knew where to find the guidelines, but a considerable share of them did not use the guidelines. Most doctors felt competent in treating children, but reported a reluctance to using opioids and reported using pain assessment irregularly.

CONCLUSION. The Danish guidelines on acute pain treatment of children in many emergency departments vary compared with the national guideline. We found that several doctors do not use the guidelines, are reluctant to use opioids and do not use pain assessment. We suggest a thorough implementation of a national guideline in emergency departments to standardise pain treatment.

FUNDING. none.

TRIAL REGISTRATION. not relevant.

Children have a high risk of pain underestimation [1] and insufficient pain treatment of children in the emergency department (ED) is well documented [2-4]. Insufficient pain treatment may have long-term negative effects on the child and their development and is an unpleasant experience [5, 6].

The ED setting may be characterised by a large patient-flow and a stressful atmosphere [7], rarely producing a child-friendly environment [8]. These factors, in combination with a lack of pain recognition and education in the use of pain assessment tools for children, are possible explanations for the insufficient pain treatment of children in EDs [9].

Well-implemented guidelines and education that focus on pain treatment for children lead to a significant increase in pain assessment, pain score documentation and use of opioids when relevant, thereby improving

pain treatment in children [10, 11]. The present study aimed to clarify whether the Danish EDs have well-implemented guidelines that reflect the national guideline on acute pain treatment of children. We hypothesised that one of the causes explaining insufficient pain treatment of children is that the guidelines differ from the national evidence-based guideline and/or are not well implemented. This was investigated by comparing the local guidelines to a national guideline (seen as the gold standard) and via a structured telephone interview with doctors in the ED.

METHODS

This cross-sectional study consisted of two parts. In Part I, local guidelines from Danish EDs were collected and compared with the national guideline. In part II, a structural questionnaire was developed and a junior and senior doctor in each ED were interviewed. This study was focused on EDs treating minor and severe traumatic injuries. We did not include the specialised paediatric departments who handle other types of paediatric emergencies.

We included the 21 Danish EDs that take in patients 24 hours/day.

Collection of guidelines

The guidelines were obtained either from public websites or by contacting the ED directly. If the departments used more than one guideline, all guidelines were examined and those containing acute pain treatment were included.

The guidelines were compared with the national guideline, “Acute pain in children” [12]. which was published in 2019. The authors of the national guideline represent the Danish Society for Anaesthesiology and Intensive Medicine, the Danish Society for Emergency Medicine and the Danish Paediatric Society. The collected guidelines were analysed by focusing on the following subjects:

Pain assessment

Pharmacological treatment, including:

- Medication
- Dosage schedules

Non-pharmacological treatment.

Structured telephone interview

The structured telephone interview was conducted following a questionnaire. The telephone interviews were conducted during weekdays in the daytime from 13 October to 2 December 2021 by MNKH.

Statistics

Descriptive statistics were used to present actual numbers and percentages. Information from the telephone interviews was registered in RedCap, and the data were analysed in STATA 13. Continuous variables were compared using the chi-squared test. Statistical significance was set at $p < 0.05$.

Ethics

This study did not involve any collection of personal data regarding human participants why approval from an ethics committee was not required under Danish law (Committee Act, Section 14, Part 2).

Trial registration: not relevant.

RESULTS

Part I – Guidelines

Twenty (95%) EDs were included in part I, and one (5%) ED never responded to any of our communications regarding their local guideline. Some of the EDs provided more than one guideline. If the EDs referred to both a local and an inter-regional guideline; both guidelines were included; 24 guidelines were included in our study.

General characteristics

Ten (42%) guidelines were developed specially for the ED setting. The remaining EDs used guidelines developed for a different department, mainly paediatric departments (**Table 1**). The age distribution of the target patient group varied among the guidelines according to the higher and lower age limits established (Table 1).

TABLE 1 Characteristics and origins of the included guidelines presented as actual number and percentages of the guidelines. The first section of the table lists the departments for which the guideline was originally developed. The second section lists the focus group described in the guidelines.

Characteristics	Guidelines, n (%) (N = 24)
Guideline origin	
Emergency department	10 (42)
Inter-regional paediatric guideline	6 (25)
Regional guideline, unspecified department	2 (8)
Other department[a] at the hospital:	
Paediatric department	3 (13)
Anaesthesiology department	2 (8)
Orthopaedic department	1 (4)
Subtotal	6 (25)
Target patient group	
Children, age unspecified	3 (13)
All patients in pain in the emergency department	1 (4)
> 12 mos.-15 yrs[b]	3 (13)
0-15 yrs[b]	2 (8)
1 mo.-18 yrs	6 (25)
4-18 yrs	1 (4)
28 days-15 yrs	2 (8)
0-12 yrs	1 (4)
< 18 yrs	1 (4)
Children > 3 mos.	1 (4)
Children > 1 yr	2 (8)
Children > 1-17 yrs	1 (4)

a) Distribution in the other department groups.
b) Up to 18 yrs.

Pain assessment

The national guideline [12] recommends using the following pain scales to assess children's pain: COMFORTNeo; face, legs, activity, cry, consolability (FLACC); the Wong-Baker and visual analogue scale (VAS); or the numeric rating scale (NRS). Two (10%) of the EDs referred to the exact same pain assessment tools as the national guideline. However, six (30%) EDs mentioned FLACC, Face scale/Wong-Baker and VAS/NRS, excluding only the scale recommended for neonates (COMFORTNeo) (**Table 2**). Three (15%) EDs did not include pain assessment for children in any of their guidelines (Table 2).

TABLE 2 The emergency departments' inclusion of pain assessment, pharmacological treatments and non-pharmacological methods in their guidelines, shown as actual numbers and as a percentage of the emergency departments.

Method	EDs' recommendations according to guidelines, n (%)[a] (N = 20)
Pain assessment	
COMFORTNeo scale, FLACC scale, Face scale/Wong-Baker scale, VAS/NRS[b]	2 (10)
FLACC scale, Face scale/Wong-Baker scale, VAS/NRS	5 (25)
NIPS, FLACC scale, Face scale/Wong-Baker scale, VAS/NRS	1 (5)
Refers to another guideline	12 (60)
No pain assessment mentioned	3 (15)
Pharmacological treatment	
Basic analgesic drugs:	
Paracetamol	20 (100)
NSAID: ibuprofen	20 (100)
Morphine	20 (100)
Morphine antidote: naloxone	9 (45)
Dose schedule:	
Included in the guideline	7 (35)
Refers to other guidelines	13 (65)
No dose schedule	3 (15)
Non-pharmacological treatment	
Non-pharmacological methods mentioned	11 (55)
Refers to other guidelines	4 (20)
Parent involvement	7 (35)
Distraction and coping strategies	5 (25)
Positioning	2 (10)
Cognitive therapy, breathing exercises	1 (5)
Sucrose and breastfeeding	2 (10)
No non-pharmacological methods mentioned	6 (30)

ED = emergency department; FLACC = face, leg, activity, cry, consolability; NIPS = neonatal infant pain scale for neonates 0-2 mos.; NRS = numeric pain rating scale; VAS = visual analogue scale.
a) If a category sums up to > 100%, each ED can appear in > 1 group.
b) As the national guideline.

Pharmacological treatment

The national guideline [12] suggests using paracetamol and ibuprofen for light pain and to add morphine if the patient has moderate to severe pain. If the patient experiences break-through pain, the guideline suggests adding an opioid as required. The appendix of the national guideline contains dose schedules for individual medications.

All 20 (100%) EDs recommended using paracetamol, ibuprofen and morphine as pain medicine. Seven (35%) of the EDs included dose schedules in the guideline and 13 (65%) of the EDs referred to a separate guideline for

dose schedules. Three (15%) EDs did not have any dose schedules included in any of their guidelines. Nine (45%) of the EDs mentioned the antidote for morphine, including the dosage scale (Table 2).

Non-pharmacological strategies

The national guideline [12] emphasises the importance of using non-pharmacological methods for treating pain. Eleven (55%) of the EDs mentioned non-pharmacological management strategies in their guidelines (see **Table 3**). Eight (30%) of the EDs did not have any guideline concerning non-pharmacological methods (see Table 3).

TABLE 3 Questions regarding education and guidelines in the emergency departments. The replies are divided into junior and senior doctors and are provided as actual numbers and as percentages.

	Senior doctors, n (%; 95% CI) (N = 19)		Junior doctors, n (%; 95% CI) (N = 17)	
Question	yes	no	yes	no
Did you receive any education from your department in treating children in pain?	10 (53; 30-74)	9 (47; 26-70)	4 (24; 8-51)	13 (76; 49-92)
Have you been introduced to a guideline in your department?	10 (53; 30-74)	9 (47; 26-70)	5 (29; 12-56)	12 (71; 44-88)
Do you know the local guideline on pain treatment for children?	13 (68; 43-86)	6 (32; 14-57)	6 (35; 16-62)	11 (65; 38-84)
Do you know where to find a guideline on pain treatment of children in the ED?	19 (100)	0	17 (100)	0
Do you know any non-pharmacological measures in the department?	17 (89; 64-98)	2 (11; 2-36)	9 (53; 29-76)	8 (47; 24-71)

CI = confidence interval; ED = emergency department.

Part II – Structured telephone interview

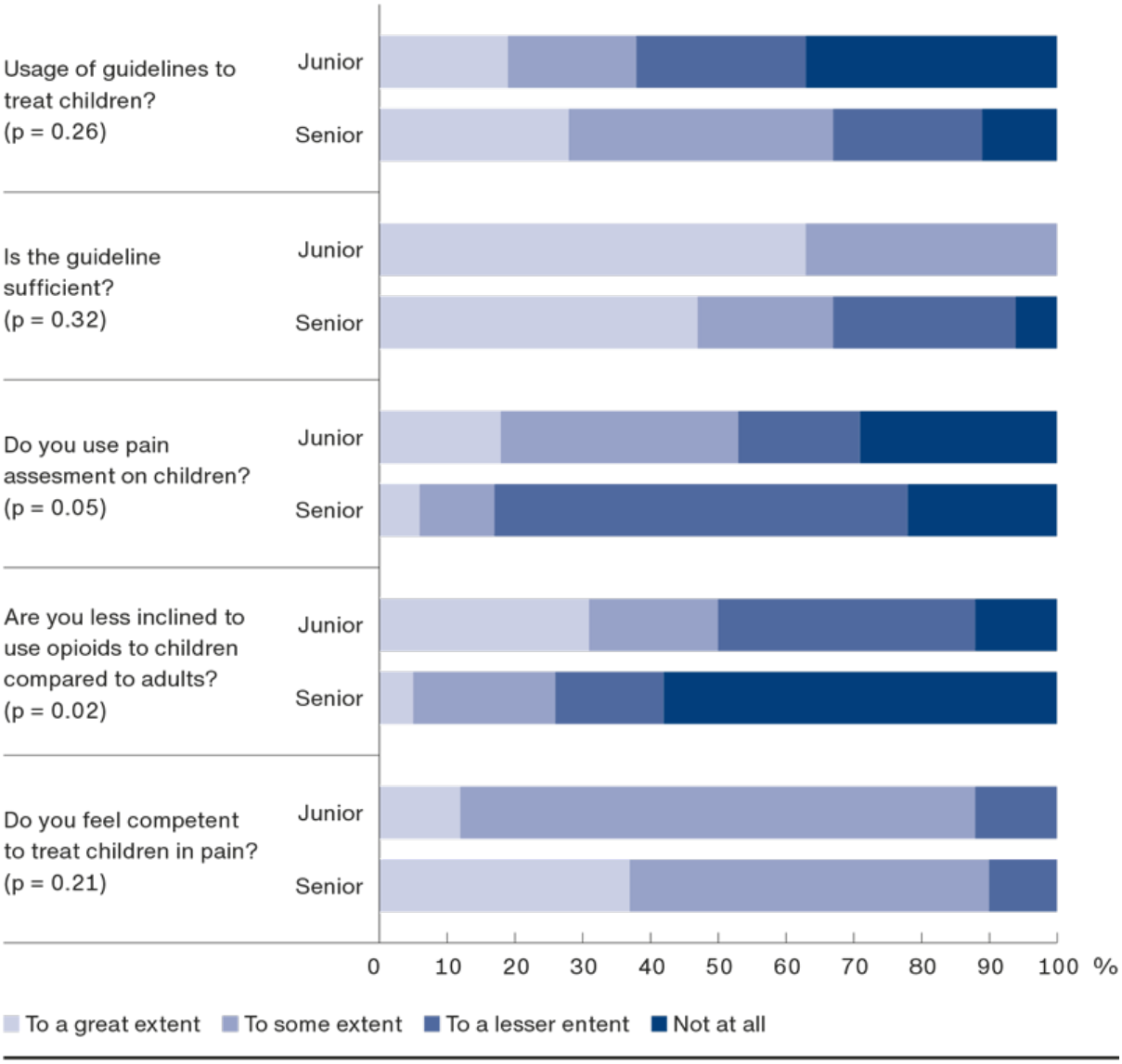
Nineteen (91%) of the 21 EDs consented to participate in the telephone interview. Two (11%) EDs only wanted us to contact the senior doctor on call. Three (16%) departments asked that we contact a junior and a senior doctor of their choice. Nineteen senior doctors and 17 junior doctors were interviewed.

Education and local guidelines

All doctors replied that children were a frequent patient group in the ED, and almost all doctors had treated children in the ED. Senior doctors had received education and been introduced to a guideline from the department on managing children in pain more often than junior doctors. All the doctors knew where to find the guideline for acute treatment of pain in children, but only six (35%; 95% confidence interval (CI): 16-62%) of the junior doctors and 13 (68%; 95% CI: 43-86%) of the senior doctors were familiar with the guideline (Table 3).

Two (11%) of the senior doctors answered that they never used the guideline (**Figure 1** and **Supplementary files:** https://www2.ugeskriftet.dk/files/a09220540_-_supplementary.pdf), whereas six (38%) of the junior doctors replied that they never used the guideline (Figure 1 and Supplementary files).

FIGURE 1 The junior and senior doctors' replies to questions regarding usage of guidelines and managing children in pain in the emergency departments. The result is presented as percentage distribution and with p values.



The doctors were asked if the guideline was sufficient to provide the preconditions for providing pain treatment of children. All the junior doctors who answered this question replied either to “a great extent” or “to some extent.” Four (27%; 95% CI: 9-56%) of the senior doctors answered that the guideline was sufficient “to a lesser extent” and one (7%; 95% CI: 1-40%) reported “not at all” (Figure 1 and Supplementary files).

Pain assessment

Fifteen (83%) senior doctors and eight (47%) junior doctors reported infrequently using pain assessment for children (Figure 1). Three (17%) senior doctors reported using pain assessment regularly, either “to a great extent” or “to some extent”, whereas nine (53%) of the junior doctors reported using pain assessment regularly (Figure 1).

Opioids

We asked the doctors if they were less inclined to give opioids to children with a dislocated fracture than to adults with the same type of fracture. Eleven (58%; 95% CI: 34-78%) senior doctors would prescribe opioids to children to the same degree as to adults, and two (13%; 95% CI: 3-42%) of the junior doctors replied the same (Figure 1). In contrast, eight (50%) of the junior doctors and five (26%) of the senior would be less inclined to use opioids for children (Figure 1). Senior doctors were thus significantly ($p = 0.02$) more inclined to give children opioids than junior doctors.

Non-pharmacological strategies

Seventeen (89%; 95% CI: 64-98%) of the senior doctors and nine (53%; 95% CI: 29-76%) of the junior doctors knew of and used non-pharmacological strategies in the department.

Competence

Fifteen (88%) junior doctors and 17 (90%) senior doctors reported that they were competent in treating children in pain (Figure 1).

DISCUSSION

We found that all EDs had or referred to a guideline on pain treatment of children. These guidelines varied, especially in three areas: 1. pain assessment tools for children were not mentioned in 15% of the EDs' guidelines; 2. 65% of the EDs did not include a dose schedule for the recommended pharmacological treatments in their guidelines; and 3. 30% of the EDs did not mention non-pharmacological measures. All of the doctors reported that they knew where to find the guidelines, but a considerable share of them did not use them. The majority of the doctors felt competent in treating children. However, they also reported not using pain assessment on children on a regular basis and almost half of the junior doctors did not know any non-pharmacological methods. Furthermore, a clear reluctance was observed to give opioids to children, mostly among junior doctors often working in the ED.

We found that not all guidelines in the EDs contained pain assessment tools for children, which correlates with findings in other studies where a deficiency in pain assessment and documentation has been reported [4, 10, 11]. Pain scores have only been documented in around half of the examined paediatric patients in several studies [4, 13], and a significant association between pain score documentation and use of any analgesic, particularly opioids, in children has been found [4].

Approximately one third of the EDs had guidelines that included a dosage schedule. The shortage of easily available dosage schedules may be part of the explanation for the documented undertreatment of children in pain [2, 3, 14]. Physicians in the ED have previously expressed that more education and clearer policies are needed to improve the pain treatment of children [15].

In the telephone interviews, most of the doctors reported that they did not use pain assessment tools "regularly" or "at all" for children. This may possibly be explained by the shortage of pain assessment tools found in the guidelines.

This study shows that 26% of the interviewed senior doctors and 50% of the junior doctors were less inclined towards giving opioids to children than to adult patients. Several previous studies comparing adult and paediatric patients have shown that children receive less analgesia than adults [4, 16, 17], which our findings supported. The overall reluctance to give children opioids has several explanations, i.e. fear that introducing opioids at an early age may lead to addiction, concerns about masking physical signs and concerns about the

safety of using and/or over-prescribing narcotics to children [9, 17]. Our study found that only 45% of the EDs had an antidote with a dosage schedule described in their pain treatment guidelines for children, potentially complicating the usage of opioids by children.

Interestingly, both senior and junior doctors reported feeling competent in treating children in pain despite the lack of pain assessment and the reluctance to give opioids. Less than a third of the junior doctors reported having been introduced to a guideline and receiving any education in treating children in pain.

Previously, international studies have found that despite the existence of a guideline and/or a protocol, a gap between recommended care and clinical practice was observed in the EDs. It has been suggested that guideline adherence may be influenced by patient factors (age, time presentation, comorbidity, etc.) and organisational factors (time management and lack of personnel) [18, 19]. Further investigation is this area is highly relevant.

The findings of our study lead us to suggest implementation of a uniform/national guideline including information about who to contact for help and comprising thorough education in acute pain treatment of children, a subject that does not have a strong presence either in medical school or foundation year work.

Strengths and limitations

Part II of this study has some selection biases as two departments did not consent to participating, but also because three departments decided to select the respondents and two departments asked us not to contact the junior doctor on call. Furthermore, telephone interviews have some limitations. The answers may potentially have differed if the phone call had been made on a different day with another interviewer and/or respondent or several doctors in each ED. Furthermore, the answers might be influenced by recollection bias.

CONCLUSION

This study found that the national guideline is far from well implemented.

We suggest implementing a national guideline in the EDs in Denmark. This would solve the absence of pain assessment tools, non-pharmacological methods and the shortage of dosage schedules in some EDs' guidelines. Alignment across EDs would ensure that best practices are shared and developed in collaboration. Furthermore, we suggest that an awareness of the under treatment of children in pain be brought to the doctors' and clinical staff's attention.

Correspondence *Stine Fjendbo Galili*. E-mail: s.galili@clin.au.dk

Accepted 10 January 2023

Conflicts of interest none. Disclosure forms provided by the authors are available with the full text of this article at ugeskriftet.dk/dmj.

Acknowledgements The authors take this opportunity to express their gratitude to the participating emergency departments for the help received and the time contributed by the junior and senior doctors on call and by the support staff.

Cite this as Dan Med J 2023;70(3):A09220540

REFERENCES

1. Institute of Medicine (US) Committee on Advancing Pain Research C and E. Pain as a public health challenge. 2011. https://www.ncbi.nlm.nih.gov/books/NBK92516/ (8 Oct 2021).
2. Dong L, Donaldson A, Metzger R et al. Analgesic administration in the emergency department for children requiring hospitalization for long-bone fracture. Pediatr Emerg Care. 2012;28(2):109-14. doi: 10.1097/PEC.0b013E3182442C25.
3. Keating L, Smith S. Acute pain in the emergency department: the challenges. Rev Pain. 2011;5(3):13-7. doi: 10.1177/204946371100500304.
4. Brown JC, Klein EJ, Lewis CW et al. Emergency department analgesia for fracture pain. Ann Emerg Med. 2003;42(2):197-205. doi: 10.1067/mem.2003.275.
5. Grunau RE, Holsti L, Peters JWB. Long-term consequences of pain in human neonates. Semin Fetal Neonatal Med. 2006;11(4):268-75. doi: 10.1016/J.siny.2006.02.007.
6. Anand KJS, Scalzo FM. Can adverse neonatal experiences alter brain development and subsequent behavior? Biol Neonate. 2000;77(2):69-82.
7. Nielsen KJ, Pedersen AH, Rasmussen K et al. Work-related stressors and occurrence of adverse events in an ED. Am J Emerg Med. 2013;31(3):504-8. doi: 10.1016/J.ajem.2012.10.002.
8. Wier LM, Yu H, Owens PL et al. Overview of children in the emergency department, 2010. In: Healthcare Cost and Utilization Project - statistical briefs. Rockville (MD), USA: Agency for Healthcare Research and Quality, 2006. Statistical Brief .
9. Maurice SC, O'Donnell JJ, Beattie TF. Emergency analgesia in the paediatric population. Part I: current practice and perspectives. Emerg Med J. 2002;19(1):4-7. doi: 10.1136/emj.19.1.4.
10. Price A, Ong J, Isedale G et al. Documenting and treating acute pain in children. Emerg Nurs. 2011;19(3):18-20. doi: 10.7748/en2011.06.19.3.18.c8554.
11. Crocker PJ, Higginbotham E, King BT et al. Comprehensive pain management protocol reduces children's memory of pain at discharge from the pediatric ED. Am J Emerg Med. 2012;30(6):861-71. doi: 10.1016/j.ajem.2011.05.030.
12. Aagaard G, Molin S, Walther-Larsen S et al. Akutte smerter hos børn – vurdering og behandling. Danish Paediatric Society, 2019.
13. Herd DW, Babl FE, Gilhotra Y et al. Pain management practices in paediatric emergency departments in Australia and New Zealand: a clinical and organizational audit by National Health and Medical Research Council's National Institute of Clinical Studies and Paediatric Research in Emergency Departments International Collaborative. Emerg Med Australas. 2009;21(3):210-21. doi: 10.1111/j.1742-6723.2009.01184.x.
14. Walther-Larsen S, Pedersen MT, Friis SM et al. Pain prevalence in hospitalized children: a prospective cross-sectional survey in four Danish university hospitals. Acta Anaesthesiol Scand. 2017;61(3):328-37. doi: 10.1111/aas.12846.
15. Ali S, Chambers A, Johnson DW et al. Reported practice variation in pediatric pain management: a survey of Canadian pediatric emergency physicians. CJEM. 2014;16(5):352-60. doi: 10.2310/8000.2013.131261.
16. Selbst SM, Clark M. Analgesic use in the emergency department. Ann Emerg Med. 1990;19(9):1010-3. doi: 10.1016/s0196-0644(05)82565-x.
17. Hennes H, Kim MK, Pirrallo RG. Prehospital pain managemant: a comparison of providers' perceptions and practices. Prehosp Emerg Care. 2005;9(1):32-9. doi: 10.1080/10903120590891705.
18. Ebben RHA, Vloet LCM, Verhofstad MHJ et al. Adherence to guidelines and protocols in the prehospital and emergency care setting: a systematic review. Scand J Trauma Resusc Emerg Med. 2013;21:9. doi: 10.1186/1757-7241-21-9.
19. Lamhoot T, Shoshan NB, Eisenberg H et al. Emergency department impaired adherence to personal protective equipment donning and doffing protocols during the COVID-19 pandemic. Isr J Health Policy Res. 2021;10(1):41. doi: 10.1186/S13584-021-00477-7.