

# Development and Domestication of a Clinical Guideline for Pharmacological Pain Management of Trauma Patients in Prehospital Setting

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## Abstract

**Introduction:** Inadequate management of acute traumatic pain in the prehospital stage is a fact, which has many physical and mental adverse effects. No clinical guideline for the pain management of prehospital trauma patients in Iran has been published yet. **Aims:** This study aimed at development and domestication of a clinical guideline for pharmacological management of pain in prehospital trauma patients. **Materials and Methods:** A multistage evolutionary study method was used. First, a systematic review of articles, books, and guidelines for prehospital acute pain management with a comprehensive approach was carried out, then clinical guidelines with the most relevance to the topic were selected, and their quality was evaluated with AGREE tools. Finally, the initial guideline was developed based on the recommendations of the most comprehensive ones. The Delphi method and experts panel were used to summarize the information and finalize the clinical guidelines recommendations. **Results:** A total of 38 clinical guidelines and 150 related articles were found, of which five more comprehensive clinical guidelines and the most relevant topics were identified and reviewed. The recommendations that were agreed on by the Delphi stage were considered as the final recommendations, and others were reviewed again in the panel of experts by making the necessary changes. Finally, the domestic clinical guideline with 52 recommendations in three areas (general, assessment, and drug recommendations) was developed. **Conclusions:** Iran prehospital emergency organizations can use the recommendations of this clinical guideline to improve the quality of care, satisfaction, and protect patients' right.

**Keywords:** Acute pain, emergency medical service, guideline, pain management, prehospital care, trauma

## INTRODUCTION

The statistics reveal that Iran is among the high ranking countries in the field of casualties, incidents, and accidents (300–500 thousands of injured persons in the year).<sup>[1]</sup> Recent studies show that the prevalence of pain in trauma patients in the (prehospital) emergency care setting is 52%–91%,<sup>[2-4]</sup> As pain is the first and main complaints of them, and the most important issue that needs to be addressed from their point of view.<sup>[2]</sup>

The pain management is central to the care of injured patients<sup>[5-7]</sup> unfortunately not seen in the prehospital emergencies.<sup>[3]</sup> This

study showed that only 42% of patients received traumatic pain treatment, and only 15% of them experienced pain relief.<sup>[8]</sup> Pain management has always been one of the main concerns and challenges of medical emergency technicians.<sup>[9]</sup> The

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provision of prehospital emergency services by technicians, under the supervision of a doctor-in-charge, is provided in a direct guidance through telephone or wireless (online) or in a preset and written protocol (offline).<sup>[10]</sup>

Experts suggest that the assessment and management of pain should be carried out by prehospital technicians in the primary step. Using medical guidelines reduce the on-scene times; it can improve medical quality provision and reduce disparities, it will ensure that treatment is based on the best available evidence, as well;<sup>[11,12]</sup> also, it can help in prehospital pain management. These strategies are often developed and published by professional and international organizations.<sup>[13]</sup>

There are few studies about prehospital pain management in Iran. In Masoudi Alavi *et al.* study, it has been mentioned that there is a need to undertake further research and develop educational programs on effective analgesic practice in pain management.<sup>[14]</sup> In some areas of Iran, due to the geographical extent and the lack of facilities through the country, direct access to the resident doctor is difficult. Therefore, the development of domestic medical guidelines has a paramount importance.<sup>[15]</sup> On the one hand, the indigenization of medical guidelines will prevent re-work, save resources, and increase the effectiveness of guidelines.<sup>[13]</sup> On the other hand, in the Iranian Emergency Medical Service (EMS), there are no guidelines for identifying, assessing, and managing pain relief in prehospital trauma patients. In addition, the aim of the fifth development plan of the country, as well as the Strategic Goal No. 75 of the Ministry of Health, emphasize the development and use of medical guidelines and the establishment of an evidence-based health-care system.<sup>[16]</sup> Therefore, the development of a medical guideline for pain management in a Prehospital Emergency Organization and EMS Center of Isfahan University of Medical Sciences was carried out.

## SUBJECTS AND METHODS

The present study is a multistage one (review and quality assessment). In the review section, clinical guidelines were searched using a library study (books and articles about acute pain management) and electronic databases during 2013–2018, mainly from Medline, Science Direct, PubMed, Elsevier, Google Scholar, and specialized international databases, with the keywords (prehospital,<sup>[17]</sup> acute pain, pharmacological, pain management [control], guideline) [Table 1].

### Methodological evaluation and data extraction

A total of 38 clinical guidelines and 150 related articles were found; all guidelines were reviewed independently by two authors. Five more comprehensive clinical guidelines and the most relevant topics were identified and reviewed by the research team; the quality of them was specified by AGREE toolkit,<sup>[18]</sup> which is currently a tool of international standard for the assessment of the validity and quality of clinical guidelines.<sup>[19]</sup>

AGREE items include:

**Table 1: International Databases Providing Guidelines**

National Guidelines Clearinghouse
Guidelines international network
National Institute for Clinical Excellence
Scottish Intercollegiate Guidelines Network
Registered nurses' Association of Ontario
National Health and Medical Research Council
Cochran library

1. The overall objective (s) of the guideline is<sup>[17]</sup> specifically described
2. The clinical question (s) covered by the guideline is<sup>[17]</sup> specifically described
3. The patients to whom the guideline is meant to apply are specifically described
4. Stakeholder involvement
5. The guideline development group includes individuals from all the relevant professional groups
6. The patients' views and preferences have been sought
7. The target users of the guideline are clearly defined
8. The guideline has been piloted among the target users
9. Rigor of development
10. Systematic methods are used to search for the evidence
11. The criteria for selecting the evidence are clearly described
12. The methods used for formulating the recommendations are clearly described
13. The health benefits, side effects, and risks have been considered in formulating the recommendations
14. There is an explicit link between the recommendations and the supporting evidence
15. The guidelines have been externally reviewed by experts prior to its publication
16. A procedure for updating the guidelines is provided
17. Clarity and presentation
18. The recommendations are specific and unambiguous
19. The different options for management of the condition are clearly presented
20. Key recommendations are easily identifiable
21. The guideline is supported with tools for application
22. Applicability
23. The potential organizational barriers in applying the recommendations have been discussed
24. The potential cost implications of applying the recommendations have been considered
25. The guideline presents key review criteria for monitoring and/or audit purposes
26. Editorial independence
27. The guideline is editorially independent from the funding body
28. Conflicts of interest in guideline development members have been recorded.

Finally, the following three clinical guidelines were selected with a score of 85, 75, and 65 percent, respectively, for the development of domestic guidelines.

1. Acute pain management: Scientific evidence (Australian and New Zealand College of Anesthetists) (ANZCA)<sup>[20]</sup>
2. An evidence-based guideline (EBG) for prehospital analgesia in trauma<sup>[17]</sup>
3. National Model EMS Clinical Guidelines (The National Association of State EMS Officials) (NASEMSO).<sup>[16]</sup>

In developing the domestic guideline recommendations, authors tried to use those with highest scores, and, if necessary, make recommendations from other available guidelines. According to the country's conditions and recent researches, some recommendations were modified or added by the research team. At the end of each recommendation, the level of its evidence was determined based on medical guidelines of the source of the recommendation (if provided). Evidence leveling was done, as shown in Table 2.

Then, closed questions tables were designed to measure the indigenization of each recommendation. In this table, four domestic areas have been considered: necessity of service, usefulness, conceptuality, and feasibility. The formal and content validity of the tables (draft guideline) was obtained with the cooperation of five faculty members of Isfahan Nursing and Midwifery School, Iran. In the second part of the research, which was a qualitative and discovery type, the classical Delphi method and experts' panel were used to obtain an agreement between them (experts and users) [Table 3].

First, a number of specialists from various occupations in the Isfahan University of Medical Sciences who have been involved in pain management (including emergency medicine specialists, anesthesiologists, and specialist care specialists, orthopedics specialists, medical pharmacists, nursing professors, and several users) were selected by purposive sampling. Furthermore, inclusion criteria, including expertise and specialty in acute pain management with at least 5 years' clinical working and affinity to cooperation, have been considered. Those who declined to continue cooperation were excluded from the study. They were asked to complete the draft guideline by rating them in four areas related to each recommendation with a 5-point Likert scale. Individuals were assigned to serve on each recommendation, writing their comments and suggestions; then, guideline drafts were collected; the average number of individuals comments for each service was calculated separately and the percentage of contributors' agreement in terms of priority (necessity), utility, conceptuality, and feasibility for each recommendation was calculated; in Delphi method, decisions about recommendations with <70% were agreed on in the experts panel (22 practitioners – 3-EMS technician's, 6-Emergency nurses, 2-General practitioners, 3-Emergency medicine specialists, 1-Intensive care specialist, 1-Orthopedic specialist, 1-Medical pharmacist, and 5-Nursing Ph.Ds). Experts panel was held in the faculty of nursing and midwifery of Isfahan by formal invitation to experts who participated in Delphi phase and a representative from guideline users.

**Table 2: Definition of the level of evidence**

Ia: Evidence obtained from meta-analysis or systematic reviews of randomized controlled trial
Ib: Evidence obtained from at least one randomized controlled trial
IIa: Evidence obtained from at least one well-designed controlled study without randomization
IIb: Evidence obtained from at least one other type of well-designed quasi-experimental study, without randomization
III: Evidence obtained from well-designed nonexperimental descriptive studies, such as comparative studies, correlation studies, and case studies
IV: Evidence obtained from expert opinions

**Table 3: Distribution of experts, participated in the Delphi surveys**

Profession	Delphi stage (%)	Specialist panel (%)
Emergency medical technician	3 (14)	0 (0)
Emergency nurse	6 (27)	1 (12.5)
General physician	2 (9)	0 (0)
Emergency medicine specialist	3 (14)	2 (25)
Fellowship of intensive care	1 (4)	0 (0)
Orthopedic specialist	1 (4)	0 (0)
Clinical pharmacologist	1 (4)	0 (0)
PhD of nursing	5 (24)	5 (62.5)
Total	22 (100)	8 (100)

Recommendations assumed from expert opinions were corrected or modified. Finally, the domestic guideline for acute pain management in prehospital emergency situations, consisting of 52 recommendations in different areas, was developed and indigenized.

## RESULTS

### Characteristics of users and guideline using considerations

#### Guideline users

Emergency medical technicians with an intermediate degree (or its equivalent) in related courses that have successfully completed pain management courses and doctors of 115 emergency centers.

#### Guideline entry criteria

All patients with acute traumatic pain.

#### Criteria of the prohibition of pharmaceutical control of pain in prehospital emergency conditions

1. Patients with a low consciousness, Glasgow Coma Scale (GCS) <15, according to the Glasgow CMS
2. Patients with severe respiratory distress and symptoms of ventilation reduction and hypoxia (oxygen saturation <90% after supplementation with oxygen)
3. Patients with unstable vital signs (systolic pressure below 100, heart rate <60, and respiratory rate <10 in adults)
4. Patients with multiple traumas (a diagnosis of "multiple trauma" implies the presence of two or more separate

injuries, at least one or a combination of which endangers the patient's life<sup>[18]</sup>

5. Patients with severe abdominal trauma or patients with an abnormal cause of pain
6. Pregnant patients
7. Intoxicated patients (affected by alcohol or drugs)
8. Patients with psychiatric disorders
9. The undesirable tendency of patients (or legal guardian) to receive sedative drugs
10. Most of the above-mentioned are a relative ban on the use of pain management drugs and can be changed with the emergency doctor's direct advice.

### The recommendations of this medical guideline are in 52 cases and in three domains

1. General recommendations, 13 lines
2. Assessment recommendations, 7 lines
3. Medicinal recommendations, 32 lines.

### General recommendations for pain management in prehospital emergency conditions

1. Training courses on pain management in educational curriculum and in-service training (reeducation) should be considered for up-to-date information<sup>[18]</sup>
2. Training, collaboration and inter-occupational instruction (if possible) in relation to pain management in different medical service providers to improve pain management; includes: emergency medical technicians, doctors of 115 emergency centers, emergency medicine specialists, physicians, and hospital nurses
3. The list of provided health care services, and the results of the actions, vital signs, the characteristics and severity of pain before and after the management should be recorded in the referral form to the reference hospital (Patient Care Report [PCR]) and reported to the command room of emergency medical center.<sup>[20]</sup>
4. It is suggested that emergency departments consider a separate section in the PCR form which is delivered to the referral hospital to assure proper registration of quality and pain management measures<sup>[18]</sup>
5. Before applying this guideline, training courses for pain management should be provided to the emergency medical technicians, and in the event of agreement in the authorized period, they are allowed to use specialized medication on pain management<sup>[2]</sup>
6. Full patient assessment based on the PHTLS protocol or routine organizational instructions; according to the mechanism of the incident<sup>[20]</sup>
7. All patients with acute traumatic pain, regardless of the duration of transmission, should be considered as candidates for pain management (ANZCA, EBG)<sup>[20]</sup>
8. Pain evaluation, as a part of public health care for all patients (EBG)<sup>[17]</sup>
9. Before doing pain management, a brief and comprehensive pain assessment should be done by OPQRST method and reported to the reference hospital (PCR) in the delivery form and reported to the EMS<sup>[2]</sup>

10. The decision to control the post-traumatic (PT) pain is based solely on the medical evaluation of the patient, the severity of the pain and the scene of the incident (PHECC)
11. During pain management, attention should be paid to the needs, wishes and intention of the injured person and drug management should be done with the permission of the patient or legal guardian<sup>[20]</sup>
12. In order to maximize the efficacy and minimize the adverse drug interactions, multidisciplinary pain management (multidrug management) and nonpharmacological (physical and psychosocial) management will be complementary if possible
13. As a rule, the severity of PT pain, the level of consciousness (GCS), hemodynamic status, vital signs, O<sub>2</sub> sat, and patient's response to treatment interventions should be monitored, managed and recorded on the transfer form of referral hospital (PCR); and also, a report to the EMS.<sup>[18]</sup>

\* At the time of GCS assessment, the patient's past histories, such as dementia or the presence of neurological disorders and the history of GCS records <15 should be considered.

### Recommendations for posttraumatic pain assessment in prehospital emergency center

14. Do not judge pain severity; simply ask the patient's status and age or by an appropriate means (RNAO)
15. Assessing the severity of pain among children under 4 with observational tools (ANZCA, EBG)<sup>[20]</sup>
16. Evaluate the pain intensity among 4–12-year-old children using self-report tools (ANZCA II, EBG)<sup>[17,20]</sup>
17. The evaluation of pain intensity among adults over 12 years, using self-report tools (analog 0–10) (ANZCA II, EBG)<sup>[20]</sup>
18. Assess the patient's pain who has difficulty verbally expressing pain (self-report) by using nonverbal tools (such as Wong-Baker and NRS) or, if necessary, using appropriate tools based on behavior observation (RNAO III)
19. Assess pain before and after the pain management procedures during the transfer path and at the time of reaching the health center and submit it to the referral hospital (PCR) in the delivery form and report to the emergency room command center (NASEMSO)<sup>[16]</sup>
20. In all emergency systems, pain measuring instruments (0°–10°) should be used as much as possible to create a single language and the same understanding of pain.<sup>[2]</sup>

### Recommendations and pharmacological measures to manage acute injuries in prehospital emergency setting

21. A history of underlying diseases (especially asthma, heart and digestive diseases, liver, and kidney failure) should be investigated, recorded and reported for all cases [Figure 1]<sup>[20]</sup>
22. Drug allergies (especially those related to dermatologic drugs) should be investigated, recorded, and reported for all cases (NASEMSO)<sup>[16]</sup>
23. Before and 5 min after the injection of the medicine, the vital signs of the injured person are evaluated, and in case of decreased level of consciousness or unstable



vital signs\*, the pain control drugs measures should be postponed to the desired level (NASEMSO, EBG).<sup>[16]</sup>

\*Systolic blood pressure <90 mmHg, heart rate <60 beats/min or breathing <10 per/min for a healthy adult.

24. Before the administration of injectable painkillers, intravenous injection, cardiac monitoring and pulse oximetry should be conducted, and supplemental oxygen should be given if oxygen saturation is <90%, and if oxygen saturation is improved, the medication is prescribed (NASEMSO)<sup>[16]</sup>
25. After injecting analgesics (especially narcotics and ketamine), take precautionary measures with regard to breathing and use a capnography if available<sup>[20]</sup>
26. Be sure to refer to the prohibition of medications and the guideline dosage. If you need to change any of the above, contact your doctor at the emergency department<sup>[20]</sup>
27. Oral medications should not be prescribed among patients with abdominal pain or patients in need for an emergency operating room (ANZCA)<sup>[20]</sup>
28. An intranasal or subcutaneous injection of narcotic drugs in prehospital emergency setting is not as likely as possible (ANZCA)<sup>[20]</sup>
29. At the time of prescribing narcotics, the naloxone should be always available (NASEMSO)<sup>[16]</sup>
30. Due to the need for accurate monitoring of drug side effects, it is only recommended to use them after a decision to transfer the injured patients to a medical center is made<sup>[20]</sup>
31. In cases, in which an intra-muscular or an intra-venous drug is administered and the patient is not sent to medical centers for any reason, the injured person has to be monitored at least 15 min regarding drug side effect<sup>[20]</sup>
32. After the injection, accurate care should be provided.

The vital signs and the level of consciousness should be checked; if any adverse effects are observed according to the guidelines, be adequately addressed and consulted with the emergency physician<sup>[20]</sup>

33. In order to control mild pain among adult patients (pain intensity 1–3 of 10°), on patient’s request, use oral acetaminophen 15 mg/kg (total dose of 1 g) alone or oral ibuprofen 10 mg/kg (total dose of 800 mg) (NASEMSO).<sup>[16]</sup>

Note: The combination of oral acetaminophen and ibuprofen is more effective than taking alone (ANZCA Level I (Cochrane Review)).<sup>[20]</sup>

34. In order to control the moderate-to-severe pain among adult patients (pain intensity from 4° to 10° to 10°), use intravenous morphine 0.1 mg/kg body weight, or intravenous fentanyl (slow infusion) at 1 µg/kg body weight accessibility form (EBG, PHECC, and ANZCA II).<sup>[20]</sup>

Note 1: Fentanyl requires high concentrations (usually 300 µg/ml) and special tool as a nasal atomization device (ANZCA).<sup>[20]</sup>

Note 2: Fentanyl is preferable to morphine among patients over 70 years, impaired renal function, and injuries with complete hemodynamic stability.<sup>[20]</sup>

35. In order to control the severe pain, if available, add a 0.5–1 mg dose of hydromorphone to a narcotic drug (UH 2016).
36. If there is still moderate-to-severe pain after 5 min of the first dose of narcotic, and there is no serious adverse effect (deep sedation, hypotension, hypoxia, symptoms of ventilation, and anaphylaxis), the second dose should be half of the initial dose (EBG, ANZCA II).<sup>[20]</sup>

Note: Fentanyl is administered maximum 4 µg/kg of body weight (EBG) and morphine up to a final dose of 20 mg and hydromorphone to a final dose of 2 mg.<sup>[17]</sup>

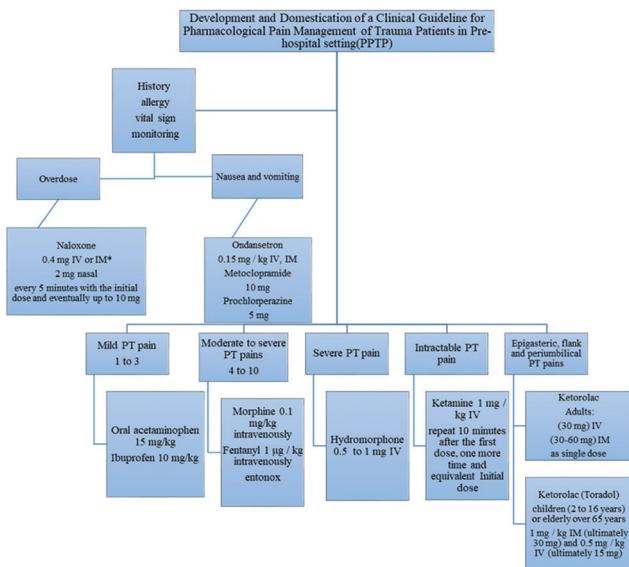
37. It is recommended to reduce the dose of injectable drugs (hydromorphone, fentanyl, and morphine) in the elderly (over 65 years of age) to a half of the adult dose and every 5 min, based on the assessment of pain, if no symptoms occur, the next dose of narcotic is prescribed at half of the initial dose (ANZCA).<sup>[20]</sup>

Note 1: The dose of fentanyl for intramuscular injection in elderly patients is equivalent to adult dose (EBG).<sup>[17]</sup>

Note 2: In the management of acute pain among elderly patients, the use of drugs (preferably fentanyl) is preferable to nonsteroidal anti-inflammatory drugs due to fewer side effects.<sup>[20]</sup>

Note 3: In the management of mild-to-moderate pain among elderly patients, the use of acetaminophen as the first line of treatment is recommended (ANZCA).<sup>[20]</sup>

38. Among patients with drug addiction, if no adverse reactions due to excessive consumption of narcotic drugs are observed, next narcotic doses (in the case of moderate-to-severe pain) should be used at the same initial doses.<sup>[20]</sup>
39. In order to control the moderate-to-severe pain



**Figure 1:** Pharmacological management of acute pain in prehospital emergency medical service. \*IV: Intravenous, IM: Intramuscular, PT: Posttraumatic

(pain intensity of 4°–10°), if the narcotics are not available or prohibited, use a slow infusion of intravenous acetaminophen (appendix) of 15 mg/kg (total dose of 1 g).<sup>[20]</sup>

Note: Acetaminophen is an effective agent for the control of acute pain and the incidence of adverse events (ANZCA Level I Cochrane).<sup>[20]</sup>

40. In the event of a head injury or loss of consciousness, consult with the emergency physician.<sup>[20]</sup>
41. In the control of moderate-to-severe pain and to control pain in painful conditions, if available and appropriate training, use Entonox (a mixture of 50% nitrous oxide and 50% oxygen) as an effective and safe analgesic by self-prescribing. Use the mask (PHECC, ANZCA II).<sup>[20]</sup>

Note: Entonox gas should be administered by mask, and at the time of administration, the ventilator should be switched on. If possible, keep the vehicle's window open.

42. Do not use narcotic drugs due to the possibility of increased side effects among those who have just received Entonox gas (nitrous oxide) (MAINE 2013)
- 43 Use a single dose of intravenous Ketorolac (30 mg) or intramuscular ketorolac (30–60 mg) in adults (NASEMSO).<sup>[16]</sup>

\*Use Ketorolac (Toradol) for children (2–16 years) and in the elderly over 65 years at a dose of 1 mg/kg IM (ultimately 30 mg) and 0.5 mg/kg of body weight, respectively (ultimately 15 mg) (NASEMSO).<sup>[16]</sup>

Note 1: The use of Ketorolac is in a single dose and is not repeatable (NASEMSO).<sup>[16]</sup>

Note 2: Ketorolac is a preferred pain killer for abdominal pains (NCCEP).

44. In order to control a severe and intractable PT pain, if available, low doses of IV or IM Ketamine are recommended as a safe and effective pain killer drug (ANZCA II).<sup>[20]</sup>

\*Intravenous Ketamine is given at a dose of 1 mg/kg (or subcutaneous) with 1 mg/kg body weight, and if there is still severe pain 10 min after the first dose, one more time (equivalent to the initial dose) can be repeated.

\*Note: In the event of adverse reactions such as seizures and ketamine-induced hallucinations, intravenous or intramuscular midazolam should be administered at a dose of 2.5 mg.

\*Low-dose ketamine has good efficacy in controlling pain and has no side effects. However, in the event of nystagmus, the injection should be discontinued (6).

45. In case of symptoms of overdose of the opioid drugs (respiratory depression and reduced respiratory rate <10 breaths/min or severe hypotension), ventilation and administration of naloxone 0.4 mg (intramuscularly or intravenously slowly and dilute or 2 mg intra-nasal until

the ventilation is improved) every 5 min with the initial up to 10 mg is recommended. (NASEMSO).<sup>[16]</sup>

46. In case of hypotension (blood pressure <90 mmHg), after injection of narcotics, use a 200 ml normal saline as a bolus IV, if necessary the dose can be repeated (NASEMSO).<sup>[16]</sup>
47. In adults, in the event of nausea and vomiting caused by narcotic drugs, intravenous or intramuscular injection of: 1-Ondansetron (slow injection), parenteral or oral administration of 0.15 mg/kg (ultimately 8 mg) 2-Metoclopramide 10 mg (can be repeated 20–30 min later) should be used. If no improvement occurs, intramuscular or intravenous prochlorperazine 5 mg can be administered IV (NASEMSO).<sup>[16]</sup>
48. Precise monitoring of the side effects of metoclopramide should be made, and 5 mg of biperiden ampoule should be used if any extrapyramidal side effects occur.<sup>[20]</sup>
49. In case of nausea and vomiting, normal saline can be used up to 500 ml in adults or 10–20 ml/kg in children if there is no prohibition (such as congestive heart failure or renal failure) (NASEMSO).
50. It is advisable to consult with the doctor of emergency service center if a higher dose of a drug is required in any of the cases which are mentioned in the guideline or in a particular case, in which the use of the medication is prohibited.<sup>[20]</sup>
51. 5 min after pain management, the level of consciousness, vital signs (blood pressure, pulse rate, and respiration), the percentage of hemoglobin saturation with oxygen and the pain intensity of the patient should be evaluated, reported and recorded using previous instruments (NASEMSO, EBG).<sup>[16]</sup>
52. It is recommended that the changes and characteristics of the pain and drugs (name of the drug, dose, administration, and time of use), and all previous treatments and medical history of the injured person, be recorded on special transfer forms and delivered to the referral medical center; also a copy of the documents must be sent to the dispatch unit of the emergency center.<sup>[20]</sup>

## DISCUSSION

No clinical guideline for the pain management of prehospital trauma patients in Iran has been published yet. We tried to use several international guidelines to develop and domesticate a comprehensive guideline with regard to Iran health policies and economic status. In this guideline in addition to the experts panel, we benefited from guideline users including EMS technicians and emergency nurses who are involved in the process of pain management. Authors suggest that Iran EMS center be required to equip the ambulances with the recommended devices such as ventilator, capnography, and other devices necessary for pain management. With regard to this issue we used phrases as “if possible” or “if available.” The domestic clinical guidelines include 52 recommendations in three areas (general, assessment, and drug recommendations). Different aspects of acute pain management according to

**Table 4: Determination of type of facilities which can be provided by prehospital technicians or paramedics**

Facilities	Person permitted to provide care	
	Technician	Paramedic
Identification, assessment, record, and report of pain	*	*
The administration of oral analgesic (acetaminophen, ibuprofen)	*	*
Ketorolac and acetaminophen intravenously after training and permission acquired	*	*
Fentanyl intranasally after training and permission acquired	*	*
The administration of narcotic and ketorolac (low dose) intravenously after training and permission acquired	Consult with online physician	*
Administration of Entonox as self-administration after training and permission acquired	*	*

\* Technician or paramedic who can provide care was shown

prehospital settings include: identification, assessment, pain assessment, principles of pharmacological management of pain, and drug side-effect management have been taken into account. In the Delphi study phase, the recommendations that were agreed on more than 70% regarding four areas related to each of them were accepted as the final recommendation, and for the majority of them (94%), the agreement of contributors was more than 70%; so, there was no need to repeat the Delphi process for consensus. Furthermore, with respect to the three recommendations, the agreement of <70 percent was obtained within the scope of four areas related to each of them, discussed and concluded in the presence of the expert panel; after the corrections and approval by the majority of members, their final recommendations were as follows: Recommendation No. 25, which was not agreed on by the Delphi group in the area of executive competence (42%), was presented in the panel of experts; they suggested the text of the recommendation should be amended and in the part of “if possibility of using injectable drugs (especially narcotics and Ketamine) to monitor the patient’s breathing precisely, using waveform capnography” as outlined in the guideline. In addition, with respect to nasal fentanyl, the agreement was <70% (69% consensus), and the original text recommends “If IV- line is not needed (or cannot be accessed), intranasal fentanyl spray at 200 µg” was deleted and incorporated in Recommendation 34, corrected as shown in the guideline. In order to provide the executive function of the recommendation, the proposal of an atomization device for prescribing fentanyl in the nose was submitted to the Ministry of Health Equipment and Modernization Office. Recommendation 41, which, in terms of operational capability (68%), did not reach the consensus of the Delphi group; the panel decided to emphasize safety and training in relation to Entonox gas and the text of the recommendation “In the control of moderate-to-severe pain and for controlling pain in painful interventions, if available, Entonox (a mixture of 50% nitrous oxide and 50% oxygen) is used as a safe and effective analgesic by self-prescribing, using a mask” as presented in the domestic guideline was corrected. Panel members decided about the technician of each recommendation (based on the results of the Delphi stage); also, they decided: technicians with an intermediate degree are allowed to evaluate the pain and the administration

of other painkillers listed in the guideline, except for the administration of injectable narcotics and Ketamine (low dose).

Panel members concluded that the drug recommendations provided in the guideline are not completely available and impractical according to the country’s facilities and limitations; so, with regard to the limitations, one of the injectable narcotics (preferably morphine) was considered necessary and use of them by a technician should be subject to permission from the EMS physician or according to the domestic guidelines [Table 4]. Updating guidelines is highly recommended given the results of new articles and new evidence; so, the research team decided to update the clinical management guideline for the injured patients in the prehospital emergency center every 5 years.

## CONCLUSIONS

This clinical guideline has been indigenized according to the facilities of Iran, used by prehospital emergency technicians and physicians. It is hoped that proper use of this guideline can improve the pain management in the prehospital setting. Of course, it should be noted that the effectiveness of medical guidelines is directly related to the formulation, training, and practice of guidelines. If there is no proper training for the users, and this is not practiced, it will not work well.

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## Conflicts of interest

There are no conflicts of interest.

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