Pre-hospital treatment of acute trauma pain: an observational study

Tratamento pré-hospitalar da dor traumática aguda: um estudo observacional

Tratamiento prehospitalario del dolor traumático agudo: un estudio observacional

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Abstract

Objective: To describe and analyze the effectiveness of nurses' interventions in pain reduction among patients with traumatic injury.

Methods: Prospective cohort study conducted in the Immediate Life Support Ambulances in Portugal from March 1, 2019 to April 30, 2020. We have collected data on the kind of interventions implemented and the time elapsed during rescue procedures. To investigate the course of acute trauma pain, a 11-point Numeric Rating Scale was used. Changes in the level of pain registered throughout the three assessment moments were studied using linear mixed-effects models with random intercepts to account for the repeated measurements conducted on the same patient. These changes were assessed before and after the administration of the pain relief interventions.

Results: 596 patients were included in this study. Most of them were male (65.9%) and had a mean age of 53.05±19.72 years. There was a reduction in the average pain intensity of 2.44 points ($p<0.005$), between the beginning and end of the assessment, and a reduction of 39.62% among the patients who were experiencing a level of pain equal to or greater than 7 (46.7% vs 7.08%, $p<0.05$). Measures involving the use of morphine, cryotherapy and relationship-based measures have proven to be effective. Comfort measures as a whole do not seem to have a significant impact on pain relief.

Conclusion: Pre-hospital pharmacological and non-pharmacological nurses' interventions have proven to be effective in reducing pain. Comfort measures have not been proved to be effective, so their potential must be rethought and enhanced.

Resumo

Objetivo: Descrever e analisar a eficácia das intervenções levadas a cabo pelos enfermeiros para reduzir a dor dos doentes com lesões traumáticas.

Métodos: Estudo de coorte prospetivo realizado junto das Ambulâncias de Suporte Imediato de Vida em Portugal, entre 1 de março de 2019 e 30 de abril de 2020. Foram recolhidos dados sobre o tipo de intervenções implementadas e sobre o tempo que durou a aplicação dos procedimentos de salvamento. De forma a poder estudar a evolução das dores traumáticas agudas, foi utilizada uma Escala de Classificação Numérica composta por 11 pontos. As alterações do nível de dor registadas ao longo dos três momentos de avaliação realizados foram estudadas utilizando modelos lineares mistos com interceptos aleatórios para se

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poder analisar as medidas repetidas aplicadas ao mesmo paciente. Estas alterações foram avaliadas antes e depois da aplicação das intervenções para alívio da dor.

Resultados: 596 pacientes foram incluídos neste estudo. A maioria era do sexo masculino (65,9%) e tinha média de idade de 53,05±19,72 anos. Houve redução na intensidade média da dor na ordem dos 2,44 pontos (p<0,005) entre o início e o fim da avaliação, e redução de 39,62% entre os pacientes que apresentavam nível de dor igual ou superior a 7 (46,7% contra 7,08%, p<0,05). As medidas que envolvem o uso de morfina, crioterapia e intervenções de suporte emocional provaram ser eficazes. As medidas de conforto como um todo não parecem ser capazes de ter um impacto significativo no alívio da dor.

Conclusão: As intervenções pré-hospitalares farmacológicas e não farmacológicas levadas a cabo pelos enfermeiros provaram ser eficazes na redução da dor. As medidas de conforto não provaram ser eficazes, pelo que o seu potencial deve ser repensado e reforçado.

Resumen

Objetivo: Describir y analizar la eficacia de las intervenciones llevadas a cabo por los enfermeros para reducir el dolor de los enfermos con lesiones traumáticas.

Métodos: Estudio de corte prospectivo realizado con las Ambulancias de Soporte Inmediato de Vida en Portugal, entre el 1º de marzo de 2019 y el 30 de abril de 2020. Se recopilaron datos sobre el tipo de intervenciones implementadas y sobre el tiempo que duró la aplicación de los procedimientos de salvamento. De forma a poder estudiar la evolución de los dolores traumáticos agudos, se utilizó una Escala de Clasificación Numérica compuesta por 11 puntos. Las alteraciones en el nivel de dolor registradas a lo largo de los tres momentos de evaluación realizados fueron estudiadas utilizando modelos lineales mixtos con interceptos aleatorios para posibilitar el análisis de medidas repetidas aplicadas con el mismo paciente. Estas alteraciones fueron evaluadas antes y después de la aplicación de las intervenciones para el alivio del dolor.

Resultados: 596 pacientes fueron incluidos en este estudio. La mayoría era del sexo masculino (65,9 %), con un promedio de edad entre de 53,05±19,72 años. Hubo una reducción en la intensidad promedio del dolor del orden de 2,44 puntos (p<0,005) entre el inicio y el fin de la evaluación y una reducción del 39,62 % entre los pacientes que presentaban un nivel de dolor igual o superior a 7 (46,7 % contra 7,08 %, p<0,05). Las medidas que involucran el uso de morfina, crioterapia e intervenciones de soporte emocional probaron que son eficaces. No parece que las medidas de confort, de forma general, sean capaces de tener un impacto significativo en el alivio del dolor.

Conclusión: Las intervenciones prehospitalarias farmacológicas y no farmacológicas llevadas a cabo por los enfermeros comprobaron que son eficaces en la reducción del dolor. Las medidas de confort no comprobaron ser eficaces, motivo este por el que se debe volver a pensar su potencial y reforzarlo.

Introduction

Acute pain is a common complaint among trauma patients, with a 70% prevalence in the pre-hospital setting,[1] however, although this is a known common problem, over 40% of adults have insufficient pre-hospital pain relief.[2]

Pain is a consequence of a pathological or traumatic event or of an invasive or noninvasive healthcare intervention.[3,4] Nevertheless, the undertreatment of pain remains a widespread problem in the pre-hospital emergency setting largely due to the failure to assess pain by health workers, the lack of national/institutional (in Portugal) guidelines for pain management and the limitation of currently available therapies.[5] Studies have demonstrated the importance of university-level education and continuing training to enhance the level of knowledge and improve the attitude of nurses in regard to pain management issues.[6,7] This leads to inadequate acute pain management, which will have relevant physiological and psychological consequences and direct negative effects on the patient's prognosis[8-10] that may include increased levels of anxiety and cardiac complications.[2] Therefore, effective pain treatment is a key indicator of quality in healthcare supply.[11]

Although pre-hospital treatment is based mainly on pharmacological interventions whose application is structured by action protocols,[12,13] there are still non-pharmacological interventions that may bring several benefits, even though they are less commonly used. Non-pharmacological interventions lead to considerable average pain relief and achieve clinically relevant pain relief in a large number of patients. Some of these non-pharmacological interventions, like immobilization, reposition, compression, coldpacks and others, are poorly documented in the prehospital phase, which does not allow us to identify its real level of evidence.[14]

Pain management requires a careful balance between effective pain relief and the need to prevent the negative consequences of pharmacological treatment. A wise option may be the combination of pharmacological and non-pharmacological interventions since previous studies have already demonstrated that non-pharmacological pain treatment is associated with a decrease in the possible negative

effects that may be caused by the use of pharmacological treatment alone.[15]

Early and effective pain management is important to reduce the immediate and delayed consequences of acute pain. Oligoanalgesia is a risk factor for developing chronic pain and the ineffective management of acute trauma pain can result in decreased productivity and decreased quality of life for patients.[14] Thus, this study aims to describe and analyze the effectiveness of nurses' interventions in pain reduction among patients with traumatic injury.

Methods

This study was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[16]

This is a prospective cohort study conducted in the Immediate Life Support Ambulances (ASIV) in mainland Portugal and the Azores from March 1, 2019 to April 30, 2020. All ASIVs have pre-hospital RNs as team leaders in attendance services.

Structured observational questionnaires were provided to 172 RNs who agreed to participate in the study and have regular clinical practice with trauma patient's management.

Adult trauma patients were included if they had (1) an age over 17 and (2) injuries from blunt or penetrating force mechanisms, falls, road accidents and explosions. The exclusion criteria were the following: trauma patients who died before arriving at the emergency room; trauma patients with (suspected) injuries from heat and cold or chemical toxicants. Patients under the influence of alcohol or other psychoactive substances were not eligible for the study.

Pain treatment implemented by ASIV nurses followed the National Institute of Medical Emergency of Portugal (INEM) *guidelines*, which supervises all pre-hospital practice in Portugal. The administered interventions were divided into two main groups: pharmacological and non-pharmacological measures. This study included the following non-pharmacological interventions: relationship-based measures (therapeutic touch, active listening, hand holding and therapeutic presence without the use of touch); cryotherapy; heat application; distraction; immobilization; extremity elevation; presence of family and friends; comfort measures (comfortable position). The pharmacological measures available in ASIV in Portugal are the following: paracetamol, morphine and tramadol. The pain was stratified into 3 classes: mild pain, described as a severity of less than 4 on a 0-10 pain scale; moderate pain, described as a severity between 4 and 6; and severe pain, described as a severity of more than 6 on a 0-10 pain scale. The present study assessed pain intensity by patients' self-reporting pain.

The Data Collection Tool was designed by the principal investigator. The variables related to the socio-demographic and clinical backgrounds of the rescued victims were the following: age, gender, and anatomical location of trauma, type of injury, time of rescue, transportation time and type of interventions administered. To assess the course of acute trauma pain, we used vital sign measurements and a 11-point Numeric Rating Scale (NRS), a valid and reliable one-dimensional assessment method.[17] For this purpose, patients were assessed in three moments: before (T1), during (T2) and after (T3) nurses' interventions.

The principal investigator conducted specific training for RNs so they could complete the questionnaire with information on treatment given to trauma victims. This training was important to achieve data standardization and to reduce the risk of bias. The nurses included in the study were not involved in the data managing and analysis.

Continuous variables were described as means, standard deviations and medians and categorical variables as frequency and percentages. The change in the patients' level of pain was assessed, in a first phase, by comparing the difference in pain recorded in the first and third moments of pain assessment (Δ_PAIN) and its significance was assessed with the use of the Sign test and the Wilcoxon test for paired observations. $\Delta\_PAIN > 0$ means a decrease in pain between the first and last moments (T1 and T3, respectively). McNemar's test was used to compare the proportion of patients with a pain level above

4 (and above 7) between the first and the last moment of pain assessment. Primarily, *Δ_PAIN* was considered to study the association between changes in pain intensity and each variable of interest. Spearman's correlation coefficient was used to assess the association between *Δ_PAIN* and age. The association with qualitative variables was investigated using the Mann-Whitney test.

Changes in pain intensity across the three assessment moments were studied using linear mixed-effects models with random intercepts to account for the repeated measurements of the same individual. Models were estimated to assess each treatment, but results are presented for the significant ones only. Models were adjusted for patient-related variables including age, gender, anatomical location of trauma and type of injury (blunt or penetrating). Only results related to treatments that have proved to be significant are presented. The first moment of observation is considered the reference time; the second moment is called T2 and the third T3. The models include main effects for treatments and time, in addition to their interaction (the product of treatment by Ti, i=2,3). In the final models, nonsignificant terms were removed.

Statistical Analysis was performed using version 26.0 of IBM SPSS Statistics and R software. The R package "nlme" was used to estimate the linear mixed-effects models. A 2-sided $p<0.05$ was considered statistically significant.

The study was approved by the INEM and by Azores Regional Civil Protection and Fire Service (SRPCBA). This study is part of the project "Evidências para Não Arriscar MaisVidas: do pré-hospitalar ao serviço de urgência e a alta (MaisVidas)", with reference: PROJ/UniCISE /2017/0001 and got favourable ethical approval from the Tondela Viseu Hospital Centre Ethics Committees. The exemption from the obligation to obtain the consent of victims was granted.

Results

A total of 596 patients were included in this study. 65.9% (*n*=393) of them were male. The mean age was 53.05 ± 19.72 years. The most common trauma observed among the victims was cranioencephalic trauma (43.8%, *n*=261), followed by lower limbs trauma (38.9%, *n*=232), thoracic trauma (34.2%, *n*=204) and upper limbs trauma (33.6%, *n*=200). Blunt trauma was observed in 79.0% (*n*=471) of the trauma victims assessed (Table 1).

Table 1. Patients' characteristics (n=596)

Variables	Mean±SD	Median (IQR)
Age, years	53.05±19.72	54.0 (37.0-69.0)
Rescue time elapsed from the initial approach to presentation at the reference hospital, minutes	69.63±28.97	66.0 (48.0-85.0)
	n(%)	
Gender, male	393(65.9)	
Monotrauma/Politrauma	280/316(47.0%/53.0%)	
Anatomical location of trauma,		
Cranioencephalic trauma	261(43.8)	
Neck trauma	97(16.3)	
Thoracic trauma	204(34.2)	
Abdominal trauma	101(16.9)	
Pelvic trauma	85(14.3)	
Upper limbs trauma	200(33.6)	
Lower limbs trauma	232(38.9)	
Vertebromedular trauma	131(22.0)	
Type of trauma		
Blunt	471(79.0)	
Blunt and penetrating	30(5.0)	
Penetrating	95(15.9)	

SD – standard deviation; IQR – interquartile range

Regardless of the applied treatment, our results showed that there is a 2.44 points reduction, on the 11-point NRS, in the average pain intensity, from the beginning to the end of the assessment procedure ($p<0.005$). At the beginning of the assessment, 46.7% of the victims had pain intensity greater or equal to 7 (high intensity of pain), whereas during the last assessment there was a significant reduction, with 7.08% of the victims reporting such level of pain ($p<0.005$). However, the administration of pain relief measures is not always associated with an improvement in the pain assessment numerical scale. Paracetamol, tramadol, distraction, extremity elevation, presence of family and friends, and comfort measures were not effective enough, as the difference in the mean values of pain was unexpectedly smaller in the group of patients to whom these measures were administered (Table 2). Trauma victims who received relationship-based measures experienced a significantly greater reduction in pain intensity compared

to victims who did not receive these measures (*Δ_PAIN*=2.49±2.38 vs *Δ_PAIN*=1.54±1.95, $p<0.05$). The same was observed for victims who received cryotherapy, with significant improvements in the levels of pain (*Δ_PAIN*=2.94±2.50 vs *Δ_PAIN*=2.33±2.32, $p<0.05$). Age is negatively associated with *Δ_PAIN* ($\rho_{spearman}$ =-0.114, p=0.007), which indicates a slight tendency for lower pain reduction in older patients.

To further explore the impact of each of the previous treatments on the patient's pain intensity, separate linear mixed-effects models were estimated for each treatment. The results are summarized in table 3. The negative signs of the estimated regres-

Table 2. Pain severity evolution following the interventions applied by nurses in pre-hospital emergency care

Variable	n	Pain severity						p-value
		Before the nurse's intervention		After the nurse's intervention		Δ_PAIN[d]		
		mean±SD	Md	mean±SD	Md	mean±SD	Md	
Pain Severity		5.55±3.04	6	3.12±2.16	3	2.44±2.37	2	<0.005[a]
NRS: 4-10		7.17±1.81	-	3.87±1.96	-	3.29±2.19	-	<0.005[a]
NRS: 7-10		8.29±0.10	-	4.23±2.05	-	4.05±2.05	-	<0.005[a]
NRS: 4-10, n(%)		404(71.50)		223(39.47)		-		<0.005[b]
NRS: 7-10, n(%)		264(46.7)		40(7.08)		-		<0.005[b]
Relationship-based measures								
Yes	565	5.6±3.01	6	3.14±2.15	3	2.49±2.38	2	0.02[c]*
No	31	4.21±3.35	3,5	2.68±2.29	2	1.54±1.95	1	
Pharmacological								
Paracetamol								
Yes	171	5.48±3.03	6	3.08±2.19	3	2.40±2.14	2	0.98[c]
No	425	5.58±3.04	6	3.13±2.15	3	2.45±2.45	2	
Tramadol								
Yes	79	5.21±2.88	5	2.88±2.18	3	2.32±2.70	1	0.31[c]
No	517	5.61±3.06	6	3.15±2.16	3	2.46±2.31	2	
Morphine								
Yes	252	5.89±2.89	7	3.26±2.21	3	2.63±2.31	3	0.11[c]
No	344	5.30±3.12	5	3.01±2.12	3	2.29±2.40	2	
Non-Pharmacological								
Cryotherapy								
Yes	107	5.88±2.87	7	2.94±1.97	3	2.94±2.50	3	0.05[c]*
No	489	5.48±3.07	6	3.15±2.20	3	2.33±2.32	2	
Heat Application								
Yes	15	6.00±2.63	8	2.67±1.72	3	3.33±2.31	3	0.17[c]
No	581	5.54±3.05	6	3.12±2.17	3	2.42±2.37	2	
Distraction								
Yes	223	5.33±3.21	6	3.06±2.34	3	2.26±2.32	2	0.14[c]
No	373	5.69±2.92	6	3.15±2.12	3	2.54±2.99	2	
Immobilization								
Yes	470	5.69±2.63	6	3.22±2.16	3	2.47±2.40	2	0.54[c]
No	126	5.06±3.21	5	2.72±2.11	3	2.34±2.23	2	
Extremity elevation								
Yes	66	5.39±3.04	5	2.97±2.35	3	2.42±2.41	2	0.66[c]
No	530	5.57±3.04	6	3.13±2.14	3	2.44±2.36	2	
Presence of family and friends								
Yes	144	5.30±3.02	5	3.07±2.12	3	2.23±2.31	2	0.30[c]
No	452	5.63±3.04	6	3.13±2.18	3	2.5±2.40	2	
Comfort measures								
Yes	321	5.51±3.03	6	3.17±2.20	3	2.33±2.33	2	0.31[c]
No	275	5.61±3.05	6	3.05±2.12	3	2.56±2.41	2	

Δ_PAIN - represents the difference between pain recorded in the first and third assessment moment. NRS - Numeric Rating Scale. SD – Standard Deviation. Md – Median
* Statistically significant.
(a) Sign test and Wilcoxon signed test for paired observations
(b) McNemar's test
(c) Mann-Whitney test
(d) Calculated for patients with pain assessment in both the first and third moments (n=565).
(e)(f) Calculated for patients with NRS>3 (NRS>6) in the first moment.

sion coefficients for T2 and T3 indicate a reduction in pain intensity from T1 to T2 and from T1 to T3, respectively, in the group of patients who did not receive any treatment. Since the signs of the estimated coefficients for the Treatment*Ti interactions are also negative, this means that the pain reduction is greater among patients who are part of the treatment group.

Comfort measures had no significant impact on pain intensity or on its evolution over time. As for the pharmacological measures, only morphine had a significant effect on the decrease of pain intensity between the first moment, T1, and the third, T3 (p=0.04, for both unadjusted and adjusted models). Also, a positive effect of morphine was observed at T1 (though not significant for the adjusted model – p=0.06). This would be expected since morphine is a form of treatment administered to patients who are experiencing a higher level of pain. As far as non-pharmacological measures are concerned, only cryotherapy showed a significant effect on the reduction of pain between T1 and T3 (p=0.003, for both unadjusted and adjusted models). Immobilization has a positive effect at T1 (though not significant enough for the adjusted model – p=0.05), which indicates a higher level of pain, at T1, among patients who were immobilized. However, immobilization does not significantly contribute to a reduction in pain over time. Relationship-based measures have also proved to be effective in reducing pain (p=0.007 and p=0.006, for the unadjusted and adjusted models, respectively) (Table 3). It is worth noticing that after adjusting for the effect of morphine, cryotherapy and relationship measures maintain a significant effect in pain reduction.

All models provide clear evidence that pain intensity tends to decrease over time, however, for patients who are receiving morphine, cryotherapy or relationship-based measures this reduction is significantly higher.

Table 3. Estimated linear mixed-effects models to assess the impact of nurses' interventions on pain across the three assessment moments

Variables	Unadjusted model		Adjusted model	
	Coefficient Estimate (SE)	p-value	Coefficient Estimate (SE)	p-value
Morphine – Morph				
Morph (Yes)	0.52 (0.22)	0.02	0.39 (0.20)	0.06
T2	-1.37 (0.10)	<0.005	-1.37(0.10)	<0.005*
T3	-2.32 (0.11)	<0.005	-2.32 (0.11)	<0.005*
Morph*T2	-0.14 (0.16)	0.37	-0.15 (0.16)	0.36
Morph*T3	-0.33 (0.16)	0.04	-0.33 (0.16)	0.04*
Relationship-based Measures – Rel				
Rel (Yes)	1.37 (0.48)	0.005	1.17 (0.46)	0.01*
T2	-0.93 (0.36)	0.009	-0.91 (0.36)	0.01*
T3	-1.51 (0.36)	<0.005	1.50 (0.36)	<0.005*
Rel*T2	-0.53 (0.3647)	0.15	-0.55 (0.36)	0.13
Rel*T3	-0.99 (0.37)	0.007	-1.00 (0.37)	0.006*
Non-pharmacological measures: Immobilization – Imob; Cryotherapy - Cryoth				
Imob	0.60 (0.24)	0.01	0.43 (0.22)	0.05
Cryoth	0.36(0.28)	0.16	0.21 (0.27)	0.43
T2	-1.41 (0.09)	<0.005	-1.41 (0.09)	<0.005*
T3	-2.34 (0.09)	<0.005	-2.34 (0.09)	<0.005*
Cryoth*T2	-0.14 (0.21)	0.50	-0.14 (0.21)	0.50
Cryoth*T3	-0.62 (0.21)	0.003	-0.62 (0.21)	0.003*

SE - Standard Error
* Statistically significant

Discussion

The ASIV are a Portuguese pre-hospital rescue response where nurses play a crucial role. In addition to the importance attached to relief measures to improve the hemodynamic status of trauma victims, one of the priorities of pre-hospital health workers is the treatment of pain.[18]

The results show that the mean value of pain intensity and the number of victims with pain intensity of 7 or higher decrease after the nurses' intervention (5.55±3.0 vs 3.12±2.16; 46.7% vs 7.08%, respectively). Some studies recommend that when a patient's level of pain is above 4 on the pain assessment numerical scale, therapeutic intervention should be initiated to reduce that pain intensity to a value below 4, or at least to achieve a 3 point reduction.[18] Our study showed that 71.5% of the victims had an initial level of pain of 4 or higher, with a subsequent reduction to 39.5% in the final assessment stage. The use of pharmacological measures continues to be a priority to relieve pain.[19,20] The data collected from our research support the importance of morphine, in the relief of pain, but it also emphasizes the importance of non-pharmacological measures and of relationship-based measures.

A hostile environment is responsible for an increased pain perception,[21] so we believe that the use of measures that can help promote a safe and trusted environment, in an adverse setting like pre-hospital trauma care, will contribute to improving pain treatment. Our data also shows that relationship-based measures are associated with a reduction of pain throughout the whole assessment process and the results obtained are statistically significant. The use of relationship-based measures, and of others, do not replace the importance of pharmacological measures, however they seem to be crucial to treat other phenomena that are responsible for increasing the patient's perception of pain. The treatment of pain requires a multidisciplinary approach that will focus on the biological, psychological and environmental components.[22]

This study also showed that most trauma victims experience pain reduction; however, this relief is not effective enough since it only represents a 2.44 (±2.37) average score on the NRS. On the other hand, if only victims with initial pain greater than 3 are considered, an average reduction of 3.29 (±2.19) is observed. This evidence is highlighted in the literature, which continues to prove that interventions conducted during pre-hospital care are not entirely effective in this regard.[18,23]

Immobilization, a measure that was used with people who were experiencing a higher mean and median pain value (mean=5.69±2.63, median=6 vs mean=5.06±3.21, median=5), does not contribute to pain relief in the final assessment. Immobilisation is an important measure or technique used in the prevention of injuries caused by trauma but is also responsible for high rates of discomfort.[24,25] It is a non-pharmacological measure frequently recommended for pain relief,[1] although the bibliography available is incapable of demonstrating its efficacy.[26] Our research could not establish that comfort measures offer an effective benefit.

It is possible that there is a bias in the treatment effects because the interventions applied are various and, as such, are deeply heterogeneous.[27] However, ethically and morally, and since this is an emergency scenario, we could not deprive trauma victims of the application of several interventions simultaneously to analyze the individual effects of each intervention.

Although this study offers some important results for treating pain in the pre-hospital setting, some limitations must have to be taken into account. First, since trauma presents in most cases more than one anatomical location, it is not possible to determine which measures offer better efficacy for each location. Second, we consider that the comfort measures have not been sufficiently explored during the data collection process, leaving little explanation on the real impact these measures may have on pain relief. Another important limitation is related to the relationship-based measures. The relationship-based measures (therapeutic touch, active listening, hand holding and therapeutic presence without the use of touch) were considered as a whole, and it was not possible to study each one individually. Future research should seek to study these measures individually and thus gain an accurate understanding of their actual effectiveness. Therapeutic touch was administered by RN, however there is no information about the existence of certification for the application of the intervention, which may constitute an important bias.

Acute traumatic pain management requires a multidisciplinary approach, so if emphasis is placed exclusively on pharmacological measures, the overall treatment will be ineffective. We believe that cryotherapy and relationship-based measures are effective as a complement to pharmacological measures. On the other hand, the lack of evidence regarding the effectiveness of comfort measures should not convey an idea that they can be ruled out; on the contrary, we firmly believe that these measures should be rethought and reinforced, since the negative effect that immobilisation has on the pain intensity felt by the victim can be reversed with the implementation of effective comfort measures.

Conclusion

The intervention of pre-hospital nurses working with the ASIV in Portugal has been effective in reducing pain. Measures such as the use of morphine,

cryotherapy and relationship-based measures have proven to be effective. Pre-hospital nurses use several measures to relieve their patients' pain intensity, pharmacological, non-pharmacological and the combination of both. Pre-hospital pain management should integrate important interventions that will also influence pain perception, as evidence shows that an approach to this phenomenon focusing exclusively on organic measure is ineffective.

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Collaborations

Mota M, Santos MR, Santos E, Henriques C, Matos A and Cunha M contributed to the design of the project, writing of the article, relevant critical review of the intellectual content, analysis and interpretation of data and final approval of the version to be published.

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