Air Medical Journal 38 (2019) 421–425

Contents lists available at ScienceDirect

Air Medical Journal

journal homepage: http://www.airmedicaljournal.com/

Original Research

Assessment of Pain Management During Interfacility Air Medical Transport of Intubated Patients

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A B S T R A C T

Objective: The management of pain is an important component of care in the prehospital and transport setting. However, recent evidence suggests that pain control is infrequently achieved in these settings. The objective of the current study was to determine the proportion and frequency of opioid analgesia provided to intubated patients during interfacility transport by an air medical transport system.

Methods: This was a health records review examining electronic records of intubated patients transported by Ornge from July 2015 to November 2015. Cases were identified using Ornge database, and intubated patients were selected based on the inclusion criteria. A standardized data extraction form was piloted and used by a single trained data extractor. The primary outcome was whether analgesia was provided. Secondary outcomes included the frequency of administration and dose adequacy of an opioid analgesia; the analgesic used; adverse events; and the impact of age, sex, past medical history of chronic pain, or reason for transfer on pain management.

Results: Of the 500 potential patient transports, 448 met our inclusion criteria. Among the 448 patients, 295 (65.8%) were men, 327 (73.0%) received analgesia, and 211 (64.3%) received more than 1 dose during transport (median frequency of 2 doses, interquartile range = 1 to 3). The average transport time was 135 minutes, and repeated dosing (> 1 repeat dose) occurred primarily (45.5%) in transports of over 180 minutes. Fentanyl was the most commonly used analgesic (97.9%), and the most common dose was 50 μg (51.8%). Adverse events occurred in 8 patients (2.5%), most commonly new hypotension (mean arterial pressure < 65 mm Hg, n = 5). There was no significant difference in the administration of analgesia based on the patient's age or sex (68.0% of female patients and 75.6% of male patients received analgesia). Interestingly, only 30.8% of patients repatriated to their originating hospital received analgesia compared with 72.3% of patients undergoing their initial transfer to a higher level of care.

Conclusion: Seventy-three percent of intubated patients transported by Ornge received an opioid analgesic, most commonly fentanyl. We found no clinically relevant difference in the administration of analgesics based on age, sex, past medical history of chronic pain, or reason for transfer other than repatriation to the originating hospital.

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Patients undergoing interfacility transport are often critically ill and may require intubation before or during transport. Tracheal tubes and mechanical ventilation are painful, and intubated patients require proper ongoing analgesia. Pain is often undermanaged in intubated patients because the assessment of pain is challenging in this patient population.[1] Therefore, several guidelines have been proposed to better assess the level of pain experienced by intubated patients and to provide adequate analgesics and sedation on an ongoing basis to hospitalized intubated patients.[2-4] Validated and reliable behavioral pain assessment tools, such as the Behavioral Pain Scale,

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1067-991X/$36.00
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https://doi.org/10.1016/j.amj.2019.09.002

the Adult Nonverbal Pain Scale, and the Critical Care Pain Observation Tool (CPOT), have been used to assess pain in nonverbal critically ill patients.[2,5,6] These proposed guidelines and validated assessment tools were not designed with a transport setting in mind and have not been validated for use during air medical transport.

There are no clear guidelines for assessing and managing the pain of intubated patients in prehospital or air transport settings. Much of the available literature on the management of pain in the prehospital and transport medicine setting is limited to trauma patients. This includes the National Prehospital Evidence-Based Guideline model for prehospital pain management in trauma patients[7-9] and that related to the pain management of children with traumatic injuries.[10] A 10-year retrospective study by Albrecht et al[1] found the prevalence of oligoanalgesia to be 43% among 1,202 adult trauma patients, and physician practice variations to be a primary contributing factor to oligoanalgesia. A more recent study evaluating opioid management in injured children in the prehospital setting found analgesic administration in only 5% of patients in both cases of before and after implementation of best practice guidelines.[11] Furthermore, only 18% of patients had documented pain assessments before protocol changes, and this percentage remained the same after implementation of best practice guidelines. This is consistent with other literature reporting very low rates of pain treatment in this population.[11,12] However, no published guidelines currently exist for analgesia in intubated patients undergoing interfacility transport.[7] The provision of analgesia by transport personnel may vary depending on the location, availability of analgesic agents, and scope of practice. A qualitative study by Walsh et al[13] identified some common themes leading to the reluctance of paramedics to administer analgesia, including reluctance to administer opioids without objective signs of pain as well as a lack of knowledge regarding the degree of pain control.

The primary objective of this study was to determine the proportion of intubated patients receiving analgesia. We also sought to identify the most commonly used analgesics by paramedics, as well as whether age, sex, past medical history of chronic pain, or reason for transfer (whether it was repatriation or to a higher level of care) influenced their pain management during transport. Finally, we sought to quantify and describe any adverse outcomes related to the administration of an analgesic.

Methods

Study Design and Setting

We completed a health records review examining electronic patient care reports (ePCRs) of intubated patients transported by Ornge between July and November 2015. The study was conducted in the Province of Ontario, Canada (1,076,395 km^2/415,600 $miles^2$). Ornge is the exclusive provider of air medical and land critical care transport in Ontario, serving a population of 13.5 million people using a fleet of helicopters, fixed wing aircraft, and land critical care transport vehicles. Ornge is the largest program of its kind in Canada, transporting more than 19,000 patients each year.

Ornge Pain Management Protocol

The Ornge medical directives and standing orders outline the use of the CPOT as the pain scale and the Richmond Agitation-Sedation Scale (RASS) as a measure of sedation level for adult intubated patients. The protocol recommends the administration of fentanyl, morphine, or hydromorphone to titrate to a pain score of 0 to 2 on the CPOT (which ranges from 0-8).[2] The protocol also recommends the administration of midazolam, ketamine, or propofol for a sedation score of −4 on RASS (score between +4 to −5) in all mechanically ventilated patients.[2] According to these directives, pain and sedation should be assessed every 30 minutes during the entire transport.

Study Population

We reviewed Ornge ePCRs to identify a list of all intubated patients over 18 years old using the specific procedure code for intubated patients. Patients were excluded if they were under the age of 18, were allergic to opioids, died before transport, were part of scene calls (transported directly from the scene rather than from a sending facility), were on noninvasive positive-pressure ventilation, or were accompanied by a physician or nurse from the sending facility. This study received approval from the Ornge Research Ethics Boards and Ornge.

Outcome Measures

Our primary outcome measure was the administration of an opioid analgesic to intubated patients during interfacility transport. The secondary outcomes included determining the most commonly used analgesic and the impact of a patient's age, sex, past medical history of chronic pain, or reason for transfer to a higher level of care or repatriation to the home hospital on pain management. Additionally, we determined whether sedatives were used during the transport of intubated patients and, more specifically, which of the 3 sedatives (propofol, ketamine, or midazolam) were used. Finally, we counted and described the adverse outcomes possibly related to the administration of analgesia. The types of adverse outcomes as determined a priori included new episodes of tachycardia (heart rate > 100 beats/min), hypotension (mean arterial pressure [MAP] < 65 mm Hg), hypoxemia (O_2 saturation < 95%), rash, arrhythmia (ventricular fibrillation or tachycardia, pulseless electrical activity, asystole and atrial fibrillation, or flutter) and death during transport. These adverse outcomes were listed in the ePCRs as having occurred after analgesic administration.

Data Collection

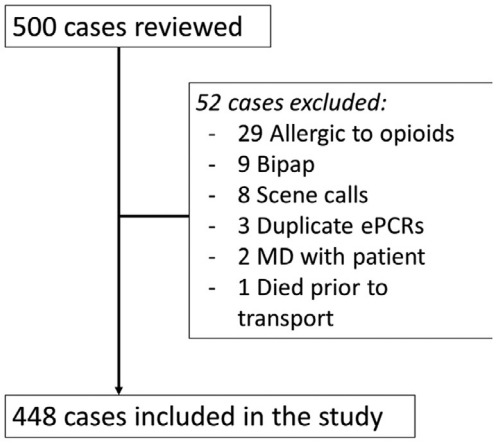
We used a standardized data extraction form to record a priori defined variables. This data extraction form was first generated from and piloted using a set of 10 charts by the primary investigator Ornge, which was then used to create the final tool. The finalized data extraction form was used by a singled trained extractor Ornge to extract data from all Ornge ePCRs. All relevant information was then entered into an electronic database.

Analyses

We report descriptive statistics including frequency counts and percent ratios. Continuous variables are reported as means with their standard deviations and medians with their interquartile ranges (IQRs). We used the unpaired Student *t*-test for statistical significance calculations for age and transport time and the chi-square test for all other dichotomous variables. However, we did not account for multiple comparisons in making these comparisons. Our sample size was determined by pragmatic considerations based on the resources and data available. We performed all data analysis using Excel (2016 Version 1711; Microsoft Corporation, Redmond, WA).

Results

We identified 500 potentially eligible intubated patients during the study period. Of these, 448 met the inclusion criteria (Fig. 1). Patient and system characteristics for the included patients are presented in Table 1. The mean age and weight of intubated patients were 56.5 years (range, 19-93 years) and 84.7 kg (range, 32-223 kg), respectively. Two hundred ninety-five patients (65.8%) were male, and 181 patients (40.4%) were already receiving pain medication. Only 20 patients (4.5%) had a documented past medical history of chronic pain. The most common reasons for transfer to a higher level of care included acute neurologic conditions (21.7%) and trauma (20.5%). The average transport time was 135 minutes (range, 14-352 minutes; IQR = 90 and 162 minutes).



Bipap = Bilevel Positive Airway Pressure; Scene Calls = Intubated out-of-hospital; ePCRs = electronic prehospital care records.

Figure 1. Study Cohort and Exclusions

Table 1
Patient and System Characteristics

All patients	N = 448
Mean age, y (range)	56.5 (19-93)
Mean weight, kg (range)	84.7 (32-223)
Male, n (%)	295 (65.8)
PMHx of chronic pain, n (%)	20 (4.5)
Pain medication provided by referring facility, n (%)	181 (40.4)
Reason for transfer, n (%)	
Neurologic conditions	97 (21.7)
Trauma	92 (20.5)
Sepsis	65 (14.5)
Intubation	65 (14.5)
Cardiac condition/STEMI	53 (11.8)
Repatriation to home hospital	26 (5.8)
Toxic overdose	22 (4.9)
End organ failure	17 (3.8)
Postoperative	5 (1.1)
Others	6 (1.3)
Mean transport time, min (range)	135 (14-352)

PMHx = previous medical history; STEMI = ST-elevation myocardial infarction.

Of the 448 eligible patients, 327 (73.0%) received analgesia, among which 116 (35.5%) received only 1 dose of analgesia. The remaining 211 patients (64.5%) received more than 1 dose of analgesia during transport with a median frequency of 2 doses (IQR = 1-3, Fig. 2). Pain scores of 0 or 1 on the CPOT were achieved in all patients after the administration/titration of opioid analgesia. Unfortunately, RASS scores were rarely documented in the patient records. An increasingly smaller number of patients received increasing numbers of repeated doses of analgesia (Fig. 2). In patients with repeated opioid administration, it was often unclear, based on the available documentation, if the pain score was assessed and an opioid readministered accordingly, but the pain score of 0 or 1 was ultimately achieved and documented in all patients who received opioids.

Of the 3 possible choices of analgesics (morphine, hydromorphone, or fentanyl) available to paramedics, fentanyl was the predominant analgesic used (97.9% of patients). Morphine and hydromorphone were used in 4 (1.2%) and 3 (0.9%) patients, respectively. The frequency of various doses of fentanyl administered to patients is shown in Figure 3. The most commonly administered dose of fentanyl was 50 μg, with nearly half of those receiving fentanyl being administered this dose.

There was no significant impact of age, sex, or past medical history of chronic pain on the pain management of intubated patients (Table 2). Additionally, repatriation to the originating hospital was associated with a lower likelihood of receiving analgesia (Table 3). In contrast, the current use of pain medication (ie, patients receiving pain medication at the referring facility) was associated with a higher likelihood of receiving in-flight analgesia (Table 2). The average transport time was also significantly higher for patients receiving analgesia when compared with those not receiving any pain medication (141 vs. 119 minutes, $P = .008$). Sedation was used in 246 of 327 (75.2%) patients receiving analgesia, and there was no overall difference in sedatives given to patients receiving analgesia. However, the administration of individual sedatives (propofol, ketamine, or midazolam) was significantly different in the 2 groups (Table 2). Among all intubated patients transported, 48 patients did not receive any analgesia or sedation during transport.

Finally, there were 8 reported adverse events potentially related to opioid administration (Table 4). This included hypotension (MAP < 65 mm Hg) in 5 patients and arrhythmias in 2 patients, both of which were transient and resolved quickly during transport.

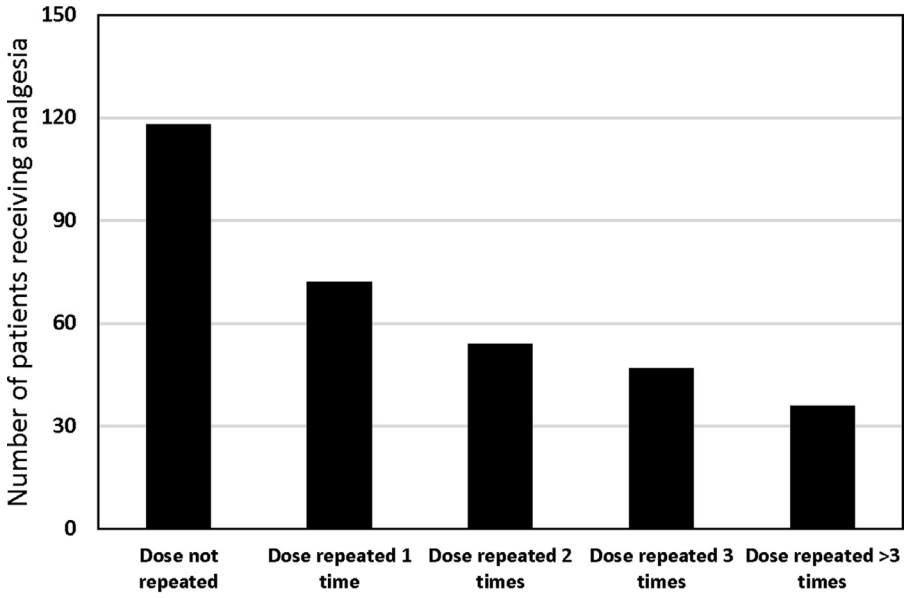


Figure 2. The Number of Patients Receiving Repeat Doses of Analgesia

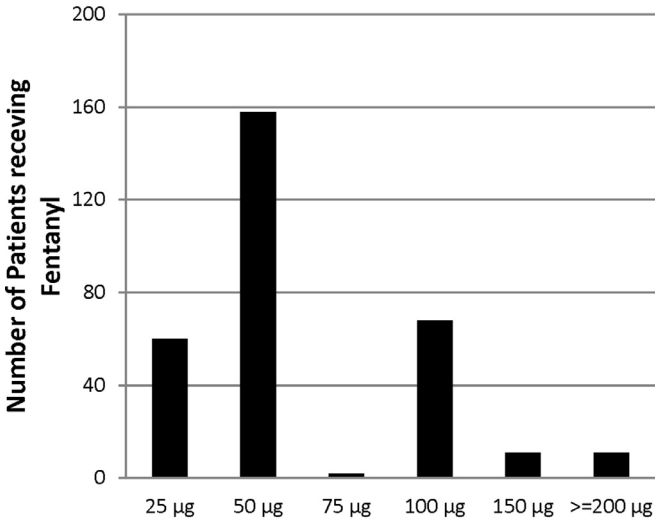


Figure 3. The First Dose of Fentanyl Administered

There was 1 patient death during transport. The adverse events were documented during transport after analgesic administration. However, no causality can be attributed to pain management in this observational study.

Discussion

This study sought to determine the proportion of intubated patients receiving analgesia during interfacility transport; identify the most commonly used analgesic agent; and establish whether a patient's age, sex, reason for transfer, or past medical history of chronic pain influenced pain management. The study also sought to describe potential adverse events potentially related to analgesic administration. Of the 448 intubated patients transported, almost three quarters received analgesia. Fentanyl was the predominant analgesic used, typically in a dose of 50 μg, which does not appear to be weight based. There was no correlation between the patient's age, sex, or various reasons for transfer to a higher level of care and pain management. However, patients moved to a higher level of care more frequently received pain medication, and those being repatriated to the originating hospital did not receive pain medication as frequently. Additionally, there was an association between the length of transport and the administration of analgesia. The study identified 8 potential adverse events that occurred after analgesic administration. Although there is no clear causation or relationship between analgesic administration and these events, the frequency (1.8%) of the events suggests analgesic administration is safe in the hands of skilled providers. We identified that the majority of intubated patients transported by Ornge appropriately received analgesia. Additionally, we identified a reason to further examine why some patients may not have received analgesia and how analgesic administration can be further improved.

Fentanyl was the most commonly used analgesic. This is not surprising given Ornge's medical directives and standing orders for pain management in intubated patients recommend the use of fentanyl. The most commonly administered dose of fentanyl was 50 μg, likely a result of the set Ornge protocol that paramedics are required to follow. For example, the maximum cumulative dose dictated by the Ornge protocol for fentanyl is 3 μg/kg/h. Although the 50-μg doses might not be enough for all cases, it is probably sufficient for relatively short transports. Additionally, a CPOT score of 0 or 1 was achieved in all patients after the administration of the analgesic dose. This may also explain the use of the relatively small 50-μg doses. Finally, patients repatriated to the home hospital did not receive pain medication as frequently as those being transferred to a higher level of care, and it is possible that this patient cohort had either less severe injuries or their injuries had been managed before transfer and, therefore, were less likely to be experiencing severe pain.

There was no association of analgesic administration with past medical history of chronic pain; however, significantly more patients currently taking pain medication as provided by the originating hospital received analgesia. Additionally, there was a significant difference in the time of transport between the patients who received analgesia in comparison with those who did not receive any pain medication. These results are intuitively expected because there is a higher likelihood of analgesic administration for patients who are currently on pain medication as well as on longer transports. Moreover, there is a high possibility of no documented administration of analgesia in short transportations even if paramedics followed their protocols.

Table 2
The Impact of Patient and System Characteristics on Pain Management

Analgesic Administered	Yes (n = 327)	No (n = 121)	*P* Values
Mean age	56.1	57.6	.43
Male, n (%)	223 (68.2)	72 (59.5)	.08
Female, n (%)	104 (31.8)	49 (40.5)	
Reason for transfer, n (%)			
Neurologic conditions			
Yes	76 (23.2)	21 (17.4)	.19
No	251 (76.8)	100 (82.6)	
Trauma			
Yes	72 (22.0)	20 (16.5)	.21
No	255 (78.0)	101 (83.5)	
Sepsis			
Yes	47 (14.4)	18 (14.9)	.90
No	280 (85.6)	103 (85.1)	
Intubation			
Yes	47 (14.4)	18 (14.9)	.90
No	280 (85.6)	103 (85.1)	
Cardiac condition/STEMI			
Yes	39 (11.9)	14 (11.6)	.93
No	288 (88.1)	107 (88.4)	
Toxic overdose			
Yes	17 (5.2)	5 (4.1)	.64
No	310 (94.8)	116 (95.9)	
End organ failure			
Yes	13 (4.0)	3 (2.5)	.45
No	314 (96.0)	118 (97.5)	
Postoperative			
Yes	3 (0.9)	2 (1.7)	.48
No	324 (99.1)	119 (98.3)	
Others			
Yes	4 (1.2)	2 (1.7)	.48
No	323 (98.8)	119 (98.3)	
PMHx of chronic pain, n (%)			
Yes	17 (5.2)	3 (2.5)	.22
No	310 (94.8)	118 (97.5)	
Pain medication provided by referring facility, n (%)			
Yes	152 (46.5)	29 (24.0)	<.0001
No	175 (53.5)	92 (76.0)	
Mean transport time (min)	141	119	.0008
Sedatives used, n (%)			
Propofol			
Yes	138 (42.3)	34 (28.3)	.0071
No	189 (57.6)	87 (71.7)	
Ketamine			
Yes	40 (12.3)	34 (28.3)	.0001
No	287 (87.7)	87 (71.7)	
Midazolam			
Yes	101 (31.0)	16 (13.3)	.0002
No	226 (69.0)	105 (86.7)	

PMHx = previous medical history; STEMI = ST-elevation myocardial infarction.

Table 3
The Impact of Repatriation to the Home Hospital on Pain Management

Reason for Transport	Analgesic Administered, n (%)	No Analgesic Administered, n (%)	Total, n
Repatriation to the home hospital	8 (30.8)	18 (69.2)	26
Transport to a higher level of care	319 (75.6)	103 (24.4)	422
Total	327	121	448

P value = <.0001.

Table 4
Adverse Events After Analgesic Administration

Adverse Events, n (%)	N = 8
Hypotension (MAP < 65 mm Hg)	5 (62.5)
Arrhythmia (VF/VT, PEA, etc.)	2 (25.0)
Death during Transport	1 (12.5)

MAP = mean arterial pressure; PEA = pulseless electrical activity; VF/VT = ventricular fibrillation/ventricular tachycardia.

As mentioned previously, the choice of fentanyl as the analgesic in 97.2% of patients is the preferred option based on Ornge's medical directives and standing orders. This is supported by the current literature. Both fentanyl and morphine were found to be effective analgesics in the prehospital and transport setting.[14-18] Furthermore, a recent prospective study by Murphy et al[19] found intranasal fentanyl to be a safe and effective option for the management of acute pain. In the present study, we found no correlation of pain management with patient age or sex. Similar to our study, an older retrospective cohort study on patients with a Glasgow Coma Scale score > 12 transported in a metropolitan area reported no significant sex differences in the administration of analgesia.[20]

This study was performed in a large air medical and land critical care transport service with well-trained advanced and critical care paramedics and an existing pain management protocol. Another advantage of the study is that the data were extracted from a reliable database with standardized definitions, which would limit the number of missed cases because of miscoding of intubation interventions in the database.

We have to acknowledge the limitations of our health record review. First, the study has a relatively small sample size. Second, the option for analgesia and dosing was dictated primarily by existing protocols. This can explain the limited the use of morphine and hydromorphone observed in this study. Third, it is challenging to assess pain in intubated patients even though intubated patients were supposed to be assessed for pain score and sedation score every 30 minutes. Unfortunately, the RASS scores were rarely documented, and there is also limited documentation on sedation received before transport, both of which could be confounding variables that could not be addressed in this study. Adverse events related to analgesic administration are rare in this patient population, which also makes it difficult to draw conclusions from our relatively small sample size. Finally, there was only 1 data abstractor for the assessment and data collection for over 500 cases. This limitation was minimized by using a standardized data collection form containing a coded manual to record a priori defined variables.

Conclusion

In summary, 73% of intubated patients transported received an opioid analgesic, most commonly fentanyl. We found no correlation between patient's age, sex, past medical history of chronic pain, or reason for transfer to a higher level of care. However, we observed a lower administration of analgesia in patients repatriated to the home hospital in comparison with those being transferred to a higher level of care. Finally, even though there was no overall difference in sedatives given to patients receiving analgesia in comparison with those who received no analgesia, the administration of individual sedatives (propofol, ketamine, or midazolam) was significantly different in the 2 cohorts.

Supplementary materials

Supplementary material associated with this article can be found in the online version at https://doi.org/10.1016/j.amj.2019.09.002.

References

1. Albrecht E, Taffe P, Yersin B, et al. Undertreatment of acute pain (oligoanalgesia) and medical practice variation in prehospital analgesia of adult trauma patients: a 10 yr retrospective study. *Br J Anaesth*. 2013;110:96–106.
2. Barr J, Fraser GL, Puntillo K, et al. Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit: executive summary. *Am J Health Syst Pharm*. 2013;70:53–58.
3. Chou R, Gordon DB, Leon-Casasola OA de, et al. Management of postoperative pain: a clinical practice guideline from the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia, Executive Committee, and Administrative Council. *J Pain*. 2016;17:131–157.
4. Hasegawa R. Consideration of pain felt by patients in the ICU. *J Intensive Care*. 2017;5:4–5.
5. Rijkenberg S, Stilma W, Endeman H, et al. Pain measurement in mechanically ventilated critically ill patients: Behavioral Pain Scale versus Critical-Care Pain Observation Tool. *J Crit Care*. 2015;30:167–172.
6. Rijkenberg S, Stilma W, Bosman RJ, et al. Pain measurement in mechanically ventilated patients after cardiac surgery: comparison of the Behavioral Pain Scale (BPS) and the Critical-Care Pain Observation Tool (CPOT). *J Cardiothorac Vasc Anesth*. 2017;31:1227–1234.
7. Gausche-Hill M, Brown KM, Oliver ZJ, et al. An evidence-based guideline for prehospital analgesia in trauma. *Prehosp Emerg Care*. 2014;18(suppl 1):25–34.
8. Mellion SA, Adelgais K. Prehospital pediatric pain management: continued barriers to care. *Clin Pediatr Emerg Med*. 2017;18:261–267.
9. Parker M, Rodgers A. Management of pain in pre-hospital settings. *Emerg Nurse*. 2015;23:16–21.
10. Rutkowska A, Skotnicka-Klonowicz G. Prehospital pain management in children with traumatic injuries. *Pediatr Emerg Care*. 2015;31:317–320.
11. Browne LR, Shah MI, Studnek JR, et al. Multicenter evaluation of prehospital opioid pain management in injured children. *Prehosp Emerg Care*. 2016;20:759–767.
12. Izsak E, Moore JL, Stringfellow K, et al. Prehospital pain assessment in pediatric trauma. *Prehosp Emerg Care*. 2008;12:182–186.
13. Walsh B, Cone DC, Meyer EM, et al. Paramedic attitudes regarding prehospital analgesia. *Prehosp Emerg Care*. 2013;17:78–87.
14. Fleischman RJ, Frazer DG, Daya M, et al. Effectiveness and safety of fentanyl compared with morphine for out-of-hospital analgesia. *Prehosp Emerg Care*. 2010;14:167–175.
15. Galinski M, Dolveck F, Borron SW, et al. A randomized, double-blind study comparing morphine with fentanyl in prehospital analgesia. *Am J Emerg Med*. 2005;23:114–119.
16. Kanowitz A, Dunn TM, Kanowitz EM, et al. Safety and effectiveness of fentanyl administration for prehospital pain management. *Prehosp Emerg Care*. 2006;10:1–7.
17. Middleton PM, Simpson PM, Sinclair G, et al. Effectiveness of morphine, fentanyl, and methoxyflurane in the prehospital setting. *Prehosp Emerg Care*. 2010;14:439–447.
18. Weldon ER, Ariano RE, Grierson RA. Comparison of fentanyl and morphine in the prehospital treatment of ischemic type chest pain. *Prehosp Emerg Care*. 2016;20:45–51.
19. Murphy AP, Hughes M, Mccoy S, et al. Intranasal fentanyl for the prehospital management of acute pain in children. *Eur J Emerg Med*. 2017;24:450–454.
20. Lord B, Cui J, Kelly A-M. The impact of patient sex on paramedic pain management in the prehospital setting. *Am J Emerg Med*. 2009;27:525–529.