

Pediatric EM

Reported practice variation in pediatric pain management: a survey of Canadian pediatric emergency physicians

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ABSTRACT

Objectives: To describe pediatric emergency medicine (PEM) physicians' reported pain management practices across Canada and explore factors that facilitate or hinder pain management.

Methods: This study was a prospective survey of Canadian pediatric emergency physicians. The Pediatric Emergency Research Canada physician database was used to identify participants, and a modified Dillman's Total Design Survey Method was used for recruitment.

Results: The survey response rate was 68% (139 of 206). Most physicians were 31 to 50 years old (82%) with PEM training (56%) and had been in practice for less than 10 years (55%). Almost all pain screening in emergency departments (EDs) occurred at triage (97%). Twenty-four percent of physicians noted institutionally mandated pain score documentation. Ibuprofen and acetaminophen were commonly prescribed in the ED for mild to moderate pain (88% and 83%, respectively). Over half of urinary catheterizations (60%) and intravenous (53%) starts were performed without any analgesia. The most common nonpharmacologic interventions used for infants and children were pacifiers and distraction, respectively. Training background and gender of physicians affected the likelihood of using nonpharmacologic interventions. Physicians noted time restraints to be the greatest barrier to optimal pain management (55%) and desired improved access to pain medications (32%), better policies and procedures (30%), and further education (25%).

Conclusions: When analgesia was reported as provided, ibuprofen and acetaminophen were most commonly used. Both procedural and presenting pain remained suboptimally managed. There is a substantial evidence practice gap in children's ED pain management, highlighting the need for

further knowledge translation strategies and policies to support optimal treatment.

RÉSUMÉ

Objectifs: L'étude visait à décrire les pratiques, déclarées par les intéressés, en matière de prise en charge de la douleur en médecine d'urgence pédiatrique (MUP), au Canada, et à examiner les facteurs qui facilitent ou, au contraire, entravent le traitement de la douleur.

Méthodes: Il s'agit d'une enquête prospective, menée parmi des urgentologues pédiatres au Canada. La base de données du Groupe de Recherche en Urgence Pédiatrique du Canada pour les médecins a servi à repérer les sujets éventuels, et une version modifiée de la Dillman's Total Design Survey Method a été utilisée aux fins de participation.

Résultats: Le taux de réponse à l'enquête a atteint 68% (139 participants sur 206). La plupart des médecins étaient âgés de 31 à 50 ans (82%) avaient reçu une formation en MUP (56%) et pratiquaient depuis moins de 10 ans (55%). Le dépistage de la douleur au service des urgences (SU) se faisait presque toujours au moment du triage (97%). Vingt-quatre pour cent des médecins ont fait état d'une documentation obligatoire sur l'évaluation de la douleur dans leur établissement. L'ibuprofène et l'acétaminophène (88% et 83%, respectivement) étaient souvent prescrits au SU pour le soulagement de la douleur légère ou modérée. Plus de la moitié des sondages vésicaux (60%) et des piqûres intraveineuses (53%) étaient effectués sans analgésie. Les interventions non pharmacologiques les plus courantes chez les nourrissons et les enfants étaient les sucettes et la distraction, respectivement. La formation reçue et le sexe des médecins avaient une incidence sur les probabilités de recours à des interventions non pharmacologiques. Les

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médecins ont indiqué que les contraintes de temps étaient le principal obstacle à la prise en charge optimale de la douleur (55%) et qu'ils désiraient un accès accru aux analgésiques (32%), de meilleures politiques et interventions (30%) et de la formation supplémentaire (25%).

Conclusions: En cas d'analgésie, l'ibuprofène et l'acétaminophène étaient utilisés très souvent. La prise en charge de la douleur, tant à l'arrivée qu'au moment des interventions, laissait à désirer. Les données recueillies révèlent

d'importantes lacunes en matière de pratique, dans la prise en charge de la douleur chez les enfants au SU, d'où la nécessité d'élaborer d'autres stratégies et politiques concernant l'application des connaissances en appui au traitement optimal.

Keywords: emergency department, oligoanalgesia, pain, pediatric, survey

Half of all emergency department (ED) visits are for painful conditions,¹⁻³ with 78% of patients experiencing pain during their ED stay.^{1,4} Children are at especially high risk for experiencing pain during their visit and frequently receive inadequate analgesia.⁴⁻¹⁰ Inadequate management of children's pain can be attributed to multiple factors, including fear of adverse reactions, difficulty in the recognition of pain, fear of dependency, fear of overprescribing, and the misperception that neonates and young children do not experience pain as intensely as adults.¹¹⁻¹⁴ ED-specific barriers to optimal pain management include time constraints, space limitations, interruptions in continuous care, and the involvement of multiple health care providers in patient care.^{15,16} Most pediatric pain is preventable or treatable, yet its management in the ED continues to be suboptimal.^{2,10,11,17}

The importance of adequate analgesia is well recognized. The World Health Organization and multiple professional pain societies mandate that optimal pain management should be a fundamental human right.^{11,15} Untreated pain in children can lead to negative physical and psychological consequences, including poor health outcomes and maladaptive behaviours.¹⁸⁻²⁰ The medical literature has long demonstrated many effective pharmacologic and nonpharmacologic interventions (NPIs) for pediatric pain.^{15,21-25} The frequency and success of application of these interventions by Canadian pediatric emergency physicians has not been reported. The purpose of this study was to describe reported practice patterns for pediatric emergency medicine (PEM) physicians and to explore factors that facilitate or hinder pain management.

MATERIALS AND METHODS

Study design

This study was a descriptive, cross-sectional survey of pediatric emergency physicians across Canada.

Participants were contacted through Pediatric Emergency Research Canada's (PERC) database of practicing PEM physicians who have consented to allow their contact information to be shared with researchers for surveying purposes. A modified version of Dillman's Total Design Survey Method was used for initial contact and follow-up to obtain the highest response rates possible.²⁶ An advance notice email was sent to physicians on day 0 and followed by the survey on days 7, 21, and 35 via Checkbox (<<http://www.checkbox.com>>). Nonresponders to the electronic copy of the survey were mailed a paper copy on day 49. Consent to participate in the study was implied in completion of the survey. The University of Alberta's Health Research Ethics Board approved this study prior to its implementation.

Participants

Physicians who were members of the PERC database in 2009 comprised the study population. At the time of survey administration, there were 206 physician members in the database. PERC is a network of health care professionals from nine Canadian provinces who were involved in PEM at the time of the study.

Survey tool

A novel survey tool was developed based on the current literature and expert opinions as no appropriate tool existed in the literature. The survey was pilot tested to ensure readability, sensibility, and face and content validity. The survey included questions regarding the demographic characteristics of ED practitioners (e.g., age, sex, years of practice, education); institutional analgesia protocols (e.g., use of pain measurement tools, pain screening and documentation, nurse-initiated protocols, use of procedural sedation, available distraction techniques); current personal practice for common procedures and painful conditions (e.g.,

otitis media, femur fracture, intravenous [IV] insertion, lumbar puncture [LP]); and perceived facilitators or barriers to effective pain management. Respondents were asked to elaborate on answers in written text in some cases, and two team members (S.A., S.J.C.) thematically coded such responses.

Data analysis

Data entry and analysis were performed using the *SPSS-PC* version 10 statistical package (SPSS Inc., Cary, NC). Overall response rates were calculated. Descriptive statistics were used to characterize the demographics of the sampled population. Responses were cross-tabulated and compared based on background training, gender, age, and years in practice. The Fisher exact test was used in cross-tabulations to compare binary and categorical data, whereas the Cochran-Armitage trend test was used when ordinal data were involved in the cross-tabulations; *p* values less than 0.05 were considered to be statistically significant.

RESULTS

Demographics

Of the 206 physicians surveyed, 139 completed the survey (response rate of 68%). Table 1 presents the characteristics of survey respondents.

Policies and protocols

Almost half (46%, 64 of 139) of physicians reported a lack of mandatory documentation of pain in the ED. Fifty-one percent (70 of 138) of physicians stated that it was a hospital policy to screen for pain, 22% (30 of 138) indicated that they did not have pain-screening policies, and 28% (38 of 138) of physicians were unaware if their department had such a policy. When taking place, most pain screening in EDs was reported to occur at triage (97%, 134 of 138). Sixty-five percent (91 of 139) of physicians reported that their department used a tool to quantify pain in children. A numeric scale was the most common tool used, with 77% of physicians (69 of 90) reporting its use. The Faces Pain Scale-Revised was the second most commonly used tool (53%, 48 of 90). Sixty-two percent (85 of 138) of physicians reported that their

Table 1. Physician respondent characteristics

Characteristic	Number of respondents (%)
Age (<i>n</i> = 137)	
≤ 30 yr	1.5
31–40 yr	50.4
41–50 yr	32.1
> 51 yr	16.1
Gender (<i>n</i> = 136)	
Male	46.3
Years in practice (<i>n</i> = 133)	
≤ 5	24.8
6–10	30.1
11–15	15.0
> 15	30.1
Percent clinical practice (<i>n</i> = 138)	
≤ 25	8.0
26–50	20.3
51–75	17.4
> 75	54.3
Training background (<i>n</i> = 139)	
Pediatrics	60.4
FRCP(EM)/ACEP/CCFP(EM)	15.1
PEM	53.7
Province of origin (<i>n</i> = 99)	
British Columbia	8 (7.5)
Alberta	19 (17.8)
Manitoba	3 (2.8)
Ontario	44 (41.1)
Quebec	16 (15.0)
Nova Scotia	7 (6.5)
Newfoundland	1 (1)
Saskatchewan	1 (1)

ACEP = American College of Emergency Physicians; CCFP(EM) = Canadian College of Family Physicians – Emergency Medicine; FRCP(EM) = Fellow of the Royal College of Physician – Emergency Medicine; PEM = Pediatric Emergency Medicine Fellowship.

department used nurse-initiated pain treatment protocols. Of these, 40% (55 of 138) were for acetaminophen, 27% (37 of 138) were for ibuprofen, and 5% (7 of 138) were for topical anesthetics prior to IV insertion (e.g., eutectic mixture of local anesthetics [EMLA; lidocaine-prilocaine], amethocaine [Ametop], lidocaine [Maxilene]). Less than half (46%, 52 of 113) of physicians reported having a policy for use of topical anesthetic cream.

Procedural sedation

Eighty-four percent (113 of 135) of physicians reported that their department had a policy for procedural sedation. During procedural sedation,

77% (105 of 136) of physicians reported having one staff physician present, 30% (41 of 136) reported having two staff physicians present, 81% (110 of 136) reported having a registered nurse present, and 51% (69 of 136) reported having a respiratory therapist present. When reducing a forearm fracture, most physicians “often or always” used ketamine (80%, 106 of 132). Propofol was used “often or always” by 14% (17 of 119), and an anxiolytic/opioid combination was used “often or always” by 24% (29 of 120) of physicians.

Pharmacotherapy

Physician reports of preferred analgesia for painful presentations are presented in Figure 1. In addition to 27% of physicians reporting the use of codeine “often or always” for acute otitis media (AOM) (see Figure 1), codeine was reported to be used “sometimes” by 36% (47 of 130) of physicians.

Figure 2 presents physician reports of preferred analgesia for procedure-related pain management. Although topical lidocaine for urinary catheterization was used “often or always” by 26% of physicians, it was reported to be used “never or rarely” by 50% (59 of 117). For IV insertion, 98% (110 of 112) of physicians reported “never or rarely” choosing infiltrated lidocaine, and 94% (104 of 11) reported “never or rarely” using vapocoolant spray. Oral glucose for IV insertion was reported to be used “never or rarely” by 50% (61 of 122), “sometimes” by 36% (44 of 122), and “often or always” by 14% (17 of 122) of physicians. For LP, in addition to 68% of physicians reporting the

use of topical anesthetic, 52% (66 of 128) of physicians reported using infiltrated lidocaine.

Nonpharmacologic interventions

Treatment of AOM with readily available NPIs was reported by 23% (32 of 139) of physicians. Eighteen percent (25 of 139) of physicians reported that they would treat pain from a surgical abdomen with NPIs, whereas 85% (59 of 139) reported that they would treat femur fracture pain with NPIs. When considered for use, choices of NPI for presenting pain included distraction, parental soothing, positioning, and comfort. The presence of a child-life specialist was also assessed, and 65% (90 of 138) of respondents indicated that they had access to such a specially trained individual in their ED.

Less than half of respondents reported using NPIs to treat the pain associated with procedural interventions in children. Specifically, 20% (29 of 139) of physicians reported using NPIs for urinary catheterization, 25% (35 of 139) for venipuncture, 30% (42 of 139) for LP, 14% (20 of 139) for forearm fracture reduction, and 33% (46 of 139) for suturing. When considered for use, choices of NPI for procedural pain included distraction, swaddling, oral sucrose, and maternal breastfeeding.

Eighty-five percent (95 of 112) of physicians reported inviting parents to remain present during painful procedures more than half of the time. Background training had no statistically significant effect on the likelihood of parents being invited to stay. In addition, physicians were not significantly more likely to invite

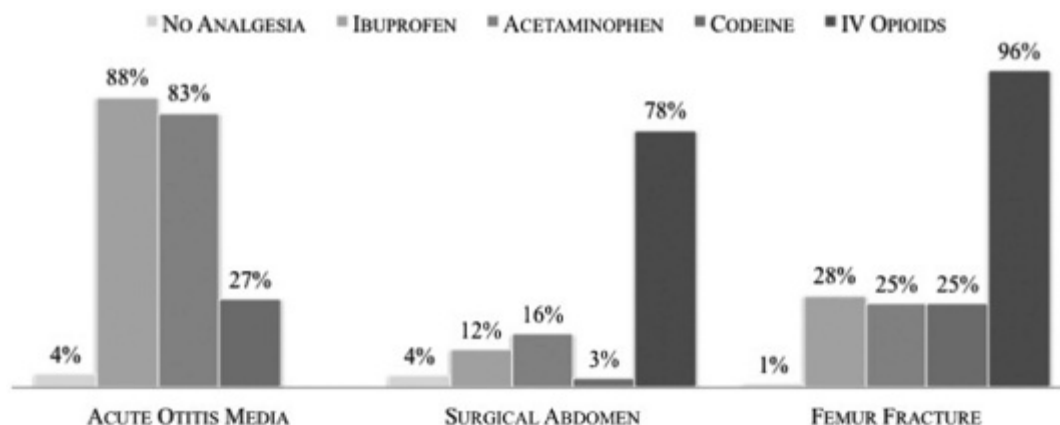


Figure 1. Analgesia used for painful presentations ($n = 139$). Percentages shown are for the number of respondents “often or always” providing the specified analgesia. IV = intravenous.

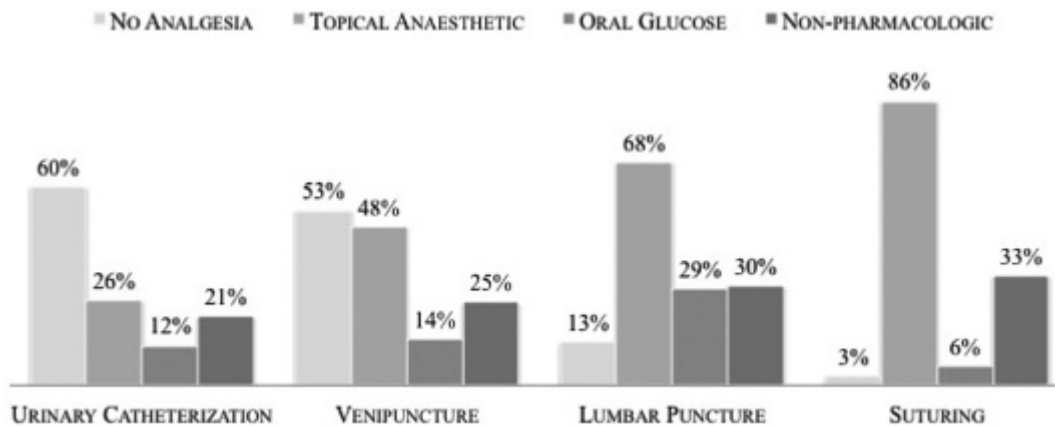


Figure 2. Analgesia used for painful procedures ($n = 139$). Percentages shown are for the number of physicians “often or always” providing the specified analgesia. For urinary catheterization, topical anesthetic refers to lidocaine jelly. For venipuncture and lumbar puncture, topical anesthetic refers to lidocaine-prilocaine (EMLA), amethocaine (Ametop), or lidocaine (Maxilene). For suturing, topical anesthetic refers to lidocaine-epinephrine-tetracaine.

parents to stay based on clinician age ($p = 1.00$), gender ($p = 0.28$), years in practice ($p = 0.90$), or percentage of time spent in clinical practice ($p = 0.87$).

Report of invitation of parental presence, use of a pain distraction kit, and presence of the child-life specialist did not have a statistically significant effect on the likelihood of physicians suggesting the use of breastfeeding, pacifiers, sucrose, or swaddling in infants. Similarly, report of invitation of parental presence and presence of a child-life specialist had no statistically significant effect on the likelihood of using glue, topical anesthetics for IV insertion, or topical anesthetics for LP in older children. A pain distraction kit had no statistically significant effect on the likelihood of using glue or topical anesthetics for LP. However, when a pain distraction kit was present in the ED, physicians were significantly more likely to intervene with topical anesthetics for IV insertion ($p = 0.04$).

Practitioner influences on pain management

Eighty percent (94 of 117) of physicians reported providing a pacifier to children less than 12 months of age during IV insertion, 55% (63 of 115) reported using oral sucrose, 56% (63 of 113) reported using swaddling, and 20% (24 of 117) reported allowing breastfeeding. The correlation between physician demographics and use of pain-limiting strategies in children younger than 12 months is presented in Table 2.

Most physicians (83%, 109 of 131) reported that they would use glue to repair a cheek laceration in a child older than 6 years of age, whereas nitrous oxide for painful cast application (14%, 19 of 133) and vapocoolant spray for IV insertion (7%, 9 of 127) were considered less frequently. Table 3 presents the correlation between physician demographics and the use of pain-limiting strategies in older children.

Table 2. Correlation of physician characteristics with reported use of pain-limiting strategies in neonates < 12 months of age

Characteristic	Breastfeeding	Pacifier	Glucose	Swaddling
Background training				
Pediatrics	*	*	*	*
FRCP(EM)/ACEP	*	Less likely ($p = 0.01$)	Less likely ($p = 0.02$)	*
CCFP(EM)	*	*	*	*
PEM	*	*	*	Less likely ($p = 0.02$)
Older age	*	*	*	More likely ($p = 0.01$)
Years in practice	*	*	*	More likely ($p = 0.04$)
Female gender	More likely ($p = 0.007$)	*	*	*

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 *Statistically nonsignificant.

Table 3. Correlation of physician characteristics with reported use of pain-limiting strategies in children > 6 years of age

Characteristic	Topical anesthetics for LP	Topical anesthetics for IV insertion	Nitrous oxide for cast application	Glue for laceration
Background training				
Pediatrics	*	*	*	*
FRCP(EM)/ACEP	*	*	*	*
CCFP(EM)	*	*	*	*
PEM	More likely ($p = 0.02$)	*	*	*
Older age	More likely ($p = 0.04$)	*	*	*
Years in practice	Less likely ($p = 0.001$)	*	*	*
Female gender	*	*	*	*

ACEP = American College of Emergency Physicians; CCFP(EM) = Canadian College of Family Physicians – Emergency Medicine; FRCP(EM) = Fellow of the Royal College of Physician – Emergency Medicine; IV = intravenous; LP = lumbar puncture; PEM = Pediatric Emergency Medicine Fellowship.
*Statistically nonsignificant.

Perceived facilitators and barriers

Perceived barriers to pediatric pain management are presented in Table 4. Table 5 presents changes felt to optimize pain management in the ED. Areas in which physicians reported wanting more education are presented in Table 6.

DISCUSSION

Pain management is an essential component of emergency care for children as pain is highly prevalent in this setting.^{1,2,15} It is important that emergency health care providers caring for children recognize and treat pain appropriately.^{4,10,15} To our knowledge, this is the first Canadian study to describe PEM physicians' approaches to pain management in pediatric ED settings.

In our study, common procedures with minimal visual cues to pain, such as urinary catheterization, IV insertion, and LP, had a trend of reporting the provision of less analgesia, as opposed to more visible sources of pain, such as lacerations. Despite the availability of effective topical analgesic agents for urinary catheterization, which is known to be pain and anxiety provoking,^{27,28} 60% of physicians in our study reported providing no analgesia for pediatric urinary catheterizations. Similarly, although IV insertion is known to cause moderate pain in infants and many options exist to limit this pain,^{15,20,21,25,29} only half of physicians reported that they “often or always” used analgesia for venipuncture. LP is another procedure for which multiple effective analgesic interventions exist and are recommended in the literature.^{10,15,21,30,31} However, based on self-report, only two-thirds of

Table 4. Perceived barriers to optimal pain management (n = 102)

Barrier	% (number of respondents)
Lack of time/disruption of flow	54.9 (56)
Education issues/ED “culture”	36.3 (37)
Staffing/human resources issues	31.4 (32)
Difficulty identifying and quantifying pain	21.6 (22)
Lack of access to medications	15.7 (16)
Lack of policies/poor policy adherence	15.7 (16)
No child-life specialist	11.8 (12)
Other	21.6 (22)

ED = emergency department.

Table 5. Ideal changes to optimize pain management in the ED (n = 79)

Change	% (number of respondents)
Increased access to drugs	31.6 (25)
Improved policies and procedures	30.4 (24)
Increased education for physicians and registered nurses	25.3 (20)
Improved triage policies/procedures	13.9 (11)
Improved pain measurement	12.7 (10)
Improved staffing/human resources	12.7 (10)
Access to a child-life specialist	10.1 (8)
More timely medication administration	7.6 (6)
Other	20.3 (16)

ED = emergency department.

Table 6. Areas in which physicians would like more education (n = 45)

Area	% (number of respondents)
Evidence-based pain management	26.7 (12)
Psychological interventions	20.0 (9)
Procedural sedation practices and drugs	17.8 (8)
Pain measurement	6.7 (3)
Protocol implementation	6.7 (3)
Pain management for infants	4.4 (2)
Strategies to change ED culture of pain	4.4 (2)
Not interested in further pain education	8.9 (4)
Other	6.7 (3)

ED = emergency department.

physicians used topical anesthetic, and less than one-third used oral sucrose when performing an LP.

It is unsettling that our study demonstrated that over half of surveyed physicians did not report using well-established, effective, and minimally invasive pain management techniques for common procedures. Although our study demonstrated higher than previously reported rates for providing analgesia,³⁰ one would expect that nearly all children undergoing painful procedures would receive analgesia. This undertreatment may be a result of clinicians focusing on the medical diagnosis and management of the disease and not the child's experience. Given that these procedures are part of daily medical practice for physicians, their potential for causing a child distress and harm may become less obvious, both over time and with repeated test ordering. Our physician respondents cited time and staffing limitations as barriers to providing such interventions for procedural pain, so we urge administrators to consider the provision of analgesia as an essential part of the ED care experience.

Physicians more consistently reported treating painful conditions (versus procedural pain) with pharmacologic pain management. It was encouraging that in our study, treatment of the pain from AOM with the use of ibuprofen or acetaminophen was reported by most practitioners, which is in keeping with guidelines from the American Academy of Pediatrics.³² The pain associated with a surgical abdomen and fractures was reported to be rarely untreated, and IV opioids were the most common choice of analgesia, as is consistent with current best evidence.^{6,8,33–35}

Codeine was still used by over 25% of physicians in 2009 for presenting pain. An informal survey of the PERC membership in 2012 indicated that this practice has decreased significantly. Multiple pediatric fatalities have since been reported with codeine use.^{36,37} In addition, there is emerging evidence that codeine may be less effective in some populations; given its complex pharmacogenomic profile, up to 50% of individuals are potentially unable to convert codeine to the active metabolite morphine.^{36,38} Ultimately, the use of codeine is becoming less common over time, and other options need to be considered. Ibuprofen appears to have emerged as a reasonable first-line medication for mild to moderate pain.^{39,40} Oxycodone and oral morphine may be feasible alternatives or adjuncts for moderate to severe pain and are gaining popularity with clinicians. Further research is needed to determine the optimal opioid analgesic for moderate to severe pain in children.

In this study, physician practice patterns were not the only factor contributing to oligoanalgesia in the pediatric ED. Most pain screening was reported to occur at triage, yet less than two-thirds of physicians reported that nurse-initiated analgesia protocols were available. There were limited options for analgesia available to triage nurses as reported by physicians, namely, ibuprofen and topical anesthetics. Given that children's pain begins well before their arrival at the ED, treatment at the first contact with a health care provider (e.g., triage) should be optimized with universal availability of nurse-initiated pain protocols and increased treatment options at triage (e.g., addition of midpotency oral opioids). Topical anesthetic cream was available as part of a venipuncture protocol to only 5% of physicians, even though it has been definitively proven to be efficacious for multiple painful procedures.^{10,13,15,21,25,30,38} In addition, half of physicians reported having either no screening policies for pain or were unaware of screening policies, and half reported no requirement for pain documentation in their EDs. This may be due to a lack of knowledge of existing policies as the commonly employed Canadian Triage and Acuity Scale (CTAS) includes documentation of a pain score for triaged patients. Previous studies have demonstrated suboptimal pain measurement and documentation; Drendel and colleagues showed that attending a pediatric-specific ED was associated with lower rates of pain documentation compared to general EDs.⁴ Corwin and colleagues

have demonstrated that when a comprehensive pain screening, assessment, and management policy is implemented in a pediatric ED, there are significant improvements in the rates of analgesic administered, frequency of pain reassessment, and management of procedural pain.¹⁴ In Canadian pediatric EDs, more widespread use of policies and procedures to identify, document, and treat pain may improve provision of analgesia in the pediatric population.

Over half of physicians identified time constraints as their primary barrier to providing adequate analgesia to children. This suggests that some emergency clinicians are not recognizing optimal pain management as an essential part of clinical care but rather as a secondary goal to be achieved when time and circumstances permit. Such a perception would be incongruent with the World Health Organization's and many key North American organizations' views on the treatment of pain.^{11,15} Many physicians indicated that a lack of adequate staffing or education regarding pain management strategies were additional perceived barriers to optimal pain care.

There were several limitations to our study. Given the study design, a key limitation is that our data are based on self-report and may not reflect actual practice. Respondent bias may be present. Given that we surveyed physicians who are voluntary members of a pediatric emergency research network database, this may have selected for physicians whose work is more strongly influenced by current research. Furthermore, as respondents were all PEM physicians working in Canadian tertiary care centres, the results of our study may not be entirely generalizable to community EDs or outside of Canada. Some of the procedures that physicians were questioned about may typically fall into the realm of nursing care (e.g., urinary catheterization, IV insertion), and as such, their reported practice variation may reflect their perceived importance of treating pain rather than actual practice. The study tool used had not been previously validated, which may lead to unpredicted errors in data collection. Finally, although the response rate was adequate, a higher response rate may have led to more robust results. Despite these limitations and physicians potentially portraying "best case practice," our results still demonstrated suboptimal management of pain for children in the ED.

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