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# Pain management practices surrounding lumbar punctures in children: A survey of Canadian emergency physicians

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## CLINICIAN'S CAPSULE

### What is known about the topic?

Few physicians adhere to recommendations surrounding analgesia for pediatric lumbar punctures (LPs).

### What did this study ask?

How willing are emergency physicians to provide analgesia for pediatric LPs?

### What did this study find?

Compared to older children, the willingness to provide analgesia was suboptimal in a young infant.

### Why does this study matter to clinicians?

Knowledge translation should focus on dispelling misconceptions and emphasize the importance of analgesia for young infants undergoing LPs.

**Results:** For a 3-week old infant, 123/144 (85.4%) pediatric EPs and 231/262 (88.2%) general EPs reported a willingness to provide analgesia. In contrast, the willingness to provide analgesia was almost universal for a 16-year-old (144/144 [100%] of pediatric EPs and 261/262 [99.6%] of general EPs) and a 3-year-old (142/144 [98.6%] of pediatric EPs and 256/262 [97.7%] of general EPs). For an infant, the most common barrier cited by pediatric EPs was the perception that it produced additional discomfort (13/21, 61.9%). The same reason was cited by general EPs (12/31, 38.7%), along with unfamiliarity surrounding analgesic options (13/31, 41.9%).

**Conclusion:** Compared to a preschool child and adolescent, the willingness to provide analgesia for an LP in a young infant is suboptimal among pediatric and general EPs. Misconceptions and the lack of awareness of analgesic options should be targets for practice-changing strategies.

## ABSTRACT

**Objectives:** Lumbar punctures (LPs) are painful for children, and analgesia is recommended by academic societies. However, less than one-third of pediatric emergency physicians (EPs) adhere to recommendations. We assessed the willingness to provide analgesia among pediatric and general EPs and explored patient and provider-specific barriers.

**Methods:** We surveyed physicians in the Pediatric Emergency Research Canada (PERC) or Canadian Association of Emergency Physicians (CAEP) databases from May 1 to August 1, 2016, regarding hypothetical scenarios for a 3-week-old infant, a 3-year-old child, and a 16-year-old child requiring an LP. The primary outcome was the willingness to provide analgesia. Secondary outcomes included the type of analgesia, reasons for withholding analgesia, and their perceived competence performing LPs.

## RÉSUMÉ

**Objectifs:** Les ponctions lombaires (PL) sont douloureuses chez les enfants, et les sociétés savantes recommandent de recourir à l'analgésie. Toutefois, moins du tiers des urgentistes pédiatres (UP) respectent les recommandations. Aussi l'étude visait-elle à évaluer la volonté des UP et celle des urgentistes généralistes (UG) de procéder à l'analgésie, et à examiner les obstacles propres aux patients et aux fournisseurs de soins.

**Méthode:** Une enquête a été menée parmi les médecins inscrits dans les bases de données du réseau Pediatric Emergency Research Canada et de l'Association canadienne des médecins d'urgence, du 1<sup>er</sup> mai au 1<sup>er</sup> août 2016, concernant des scénarios possibles de PL effectuée chez un nourrisson de 3 semaines, un enfant de 3 ans et un autre de 16 ans. Le principal critère d'évaluation consistait en la

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volonté de procéder à l'analgésie. Les critères d'évaluation secondaires comprenaient le type d'analgésie, les motifs sous-jacents au non-recours à l'analgésie et la perception de la compétence pour réaliser la PL.

**Résultats:** En ce qui concerne le cas du nourrisson de 3 semaines, 123 UP sur 144 (85,4 %) et 231 UG sur 262 (88,2 %) étaient disposés à procéder à l'analgésie. Par contre, la volonté d'y recourir était quasi générale dans les cas de la PL effectuée chez l'enfant de 16 ans [144 UP sur 144 (100 %) et 261 UG sur 262 (99,6 %)] et chez l'enfant de 3 ans [142 UP sur 144 (98,6 %) et 256 UG sur 262 (97,7 %)]. La raison invoquée le plus souvent par les UP de ne pas recourir à l'analgésie était l'idée selon laquelle l'intervention causerait encore plus de

malaise (13/21; 61,9 %). Le même motif a été invoqué par les UG (12/31; 38,7 %), outre le manque de connaissances sur les différentes formes d'analgésie (13/31; 41,9 %).

**Conclusions:** Les UP et les UG n'étaient pas très disposés à recourir à l'analgésie dans le cas de la PL effectuée chez le nourrisson, contrairement à celle effectuée chez l'enfant d'âge préscolaire ou chez l'adolescent. Il faudrait donc élaborer des stratégies ciblant les idées fausses sur la douleur et le manque de connaissances sur les différentes formes d'analgésie dans le but de changer les pratiques.

**Keywords:** analgesia, emergency department, lumbar puncture, pediatrics, procedural pain

## INTRODUCTION

Children view lumbar punctures (LPs) as painful<sup>1</sup> and distressing.<sup>2</sup> Compared to adults,<sup>3</sup> subcutaneous lidocaine is underutilized in children,<sup>4</sup> despite evidence<sup>5-8</sup> and guidelines supporting its use.<sup>9-11</sup> Numerous studies demonstrate a suboptimal provision of analgesia in neonates and children undergoing LPs.<sup>12-18</sup> However, reasons behind decisions to withhold analgesia remain unknown. With respect to LPs in children, we sought to explore 1) willingness to provide analgesia (particularly, subcutaneous lidocaine) by physicians in general and pediatric emergency departments (EDs), 2) types of analgesia, 3) reasons for withholding analgesia, 4) practitioner anxiety and perceived competence performing LPs, 5) practitioner perceptions of the patient's pain during LPs, and 6) practitioner comfort with a child life specialist during an LP.

## METHODS

### Design and participants

This was an online survey of pediatric and general emergency physicians (EPs) listed in the Pediatric Emergency Research Canada (PERC) or Canadian Association of Emergency Physicians (CAEP) database as of January 2016. We hypothesized that there is a suboptimal willingness to provide analgesia to children undergoing LPs, particularly young infants.

### Protocol

Potential participants were contacted by email from April 26 to May 31, 2016. According to the Modified Dillman Tailored Design Method,<sup>19</sup> PERC members received surveys on days 3, 10, 17, 24, and 31. Due to

administrative regulations, CAEP members received surveys on days 3, 10, and 38. Consent to participate was implied by the completion of any survey item. This study received approval from the Western University Health Sciences Research Ethics Board.

### Instrument

The survey was developed *de novo* by four investigators (NP, VB, AS, and SA), according to Burns et al.,<sup>20</sup> and available in English and French. It included three clinical vignettes of children who required an LP: a 3-week-old febrile male, a 3-year-old male, and a 16-year-old female, the latter two with fever, headache, vomiting, and photophobia (see Appendix).

### Statistical analysis

The primary outcome was the willingness to provide analgesia for an LP. Data were summarized using descriptive statistics and analysed using SPSS (version 24, Armonk, NY).

## RESULTS

### Response rate

The PERC and CAEP response rates were 150/222 (67.6%) and 272/1362 (19.9%), respectively.

### Willingness to provide analgesia

For a 3-week-old male, 123/144 (85%) pediatric EPs and 231/262 (88%) general EPs reported a willingness to provide analgesia (Table 1). For a 3-year-old male,

**Table 1. Analgesia provision and perceptions for an LP performed on a 3-week-old febrile male\***

	Pediatric EP (n = 144)	General EP (n = 262)	Both (n = 16)
<i>Type of analgesia (number, %)</i>			
No analgesia	21 (15)	31 (11.8)	2 (13)
Any	123 (85)	231 (88.2)	14 (88)
Non-opioid oral: acetaminophen	53 (37)	95 (36.3)	2 (13)
ibuprofen	15 (10)	44 (16.8)	1 (6)
Local: subcutaneous local anesthetic	42 (29)	155 (59.2)	4 (25)
Topical anesthetic	95 (66)	122 (46.6)	9 (56)
Intravenous ketorolac	0	0	0
Opioid: oral opioid	0	0	0
Intravenous opioid	2 (1)	3 (1.1)	0
Procedural sedation	0	13 (5)	0
Oral sucrose	113 (79)	144 (55)	12 (75)
Pacifier	80 (56)	95 (36.3)	7 (44)
<i>Reasons for withholding analgesia (number, %)</i>			
	(n = 21)	(n = 31)	(n = 2)
Increases technical difficulty of LP	9 (43)	7 (22.5)	2 (100)
Produces additional discomfort	13 (62)	12 (38.7)	2 (100)
Analgesia is ineffective	3 (14)	4 (12.9)	1 (50)
Delays time to antibiotic administration	6 (29)	6 (19.4)	0
Will compromise cardiorespiratory status	0	2 (6.5)	0
Unfamiliar with analgesic options	1 (5)	13 (41.9)	0
LP not associated with enough pain	6 (29)	8 (25.8)	0
How competent do you feel performing an LP in this age group? (mean, SD) <sup>†</sup>	92.5 (10)	50.4 (30.2)	86.7 (18)
What degree of pain do you believe LPs are associated with in this age group? (mean, SD) <sup>‡</sup>	66.7 (17)	55.9 (18.5)	61.8 (20)
How would you rate your anxiety surrounding the performing of an LP in this age group? (mean, SD) <sup>§</sup>	20 (23)	59.8 (26.3)	27.3 (30)
How comfortable are you having a parent or a child life specialist in the room to comfort this child while you are performing an LP? (mean, SD) <sup>¶</sup>	85.2 (22)	79.1 (22.5)	85.9 (21)
*Respondent could choose more than one option. <sup>†</sup> Using a 100-mm Visual Analogue Scale anchored by 0 (not competent) and 100 (very competent). <sup>‡</sup> Using a 100-mm Visual Analogue Scale anchored by 0 (no pain) and 100 (worst pain). <sup>§</sup> Using a 100-mm Visual Analogue Scale anchored by 0 (no anxiety) and 100 (lots of anxiety). <sup>¶</sup> Using a 100-mm Visual Analogue Scale anchored by 0 (not comfortable) and 100 (very comfortable). EP = emergency physician; LP = lumbar puncture; SD = standard deviation.			

provision of analgesia was almost universal among pediatric EPs (142/144, 99%) and general EPs (256/262, 97.7%). Subcutaneous local and topical anesthetics were used by 100/144 (69%) and 117/144 (81%) pediatric EPs, respectively, and 207/262 (79%) and 144/262 (55%) general EPs, respectively. Among pediatric EPs compared to general EPs, mean (SD) competence on a 100-mm Visual Analogue Scale was higher [85.7 (14) mm versus 60 (26.5) mm, respectively], and anxiety was lower [32.8 (30) mm versus 56.3 (27.1) mm, respectively]. For a 16-year-old female, the willingness to provide analgesia was endorsed by all but one general EP. Subcutaneous local and topical anesthetics were provided by 117/144 (81%) and 131/144 (91%) pediatric EPs, respectively, and 241/262 (92%) and 61/262 (23.3%) general EPs,

respectively. Among pediatric EPs and general EPs, mean (SD) competence was high [83.9 (14) mm and 88.1 (14.8) mm, respectively], and anxiety was low [30.6 (27) mm and 27.9 (24.6) mm, respectively]. Across vignettes and respondents, comfort with a child life specialist was high (>79 mm).

## DISCUSSION

For an infant undergoing an LP, compared to a toddler and adolescent, there was less willingness to administer analgesia and less use of subcutaneous lidocaine. The American Academy of Pediatrics (AAP) recommends topical analgesia or subcutaneous lidocaine in children undergoing LPs, including neonates.<sup>9</sup> Knowledge translation strategies should focus on dispelling misconceptions

and improving awareness of analgesic options in *young infants*.

In young infants, limited use of analgesia for LPs has been described<sup>17,18</sup> along with differences in a willingness to use subcutaneous lidocaine between general and pediatric EPs.<sup>15</sup> For what we believe refers to subcutaneous lidocaine, misconceptions include increased technical difficulty and producing additional discomfort. However, subcutaneous lidocaine is associated with greater procedural success,<sup>5,21-23</sup> and the risk of “minimal” pain<sup>16</sup> from administering local anesthetic using a 30-gauge needle may be preferable to multiple LP attempts, which are necessary in almost half of young children.<sup>24</sup> The belief that LPs are not painful in young infants has been previously described.<sup>4</sup> However, neonates do experience pain from noxious stimuli<sup>25,26</sup> and with detrimental long-term consequences.<sup>27</sup>

Multimodal approaches to analgesia are supported by the AAP<sup>9</sup> and Canadian Paediatric Society (CPS)<sup>11</sup> and can involve sucrose plus pharmacologic therapy.<sup>28</sup> Despite a lack of evidence for sucrose, its use was more prevalent among pediatric than general EPs (79% versus 55%), suggesting greater familiarity or availability.

General EPs reported less competence and greater anxiety performing LPs in a young infant, possibly explaining their reluctance to administer analgesia in infants. Actual administration of analgesia may be lower than our results suggest because medical record reviews report that 24% to 80% of children receive documented analgesia for LPs.<sup>12,16,29</sup>

Barriers to the administration of analgesia to a young infant include a lack of familiarity with analgesic options (41.9% of general EPs) and a perception that it delays time to antibiotics (28.6% of pediatric EPs). Nurse-initiated protocols that facilitate early administration of topical agents such as Maxilene<sup>TM</sup> and electronic orders pre-populated with analgesic options may support adequate analgesia and optimal ED flow.

## LIMITATIONS

The low CAEP survey response rate limits generalizability to general EPs and may have been due to fewer email reminders. The adequacy of analgesic choices was not reported because there is no clear consensus as to what constitutes adequate analgesia. Finally, non-validated scales were used to measure respondent beliefs surrounding LPs.

## CONCLUSION

In contrast to older children, the willingness to provide analgesia for a young infant was not universal. Misconceptions that LPs are not sufficiently painful and incur additional discomfort and technical difficulty must be corrected. Our findings suggest a rationale for nurse-initiated protocols and strategies to improve provider knowledge surrounding analgesia in young infants.

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**Competing interests:** None declared.

## SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit <https://doi.org/10.1017/cem.2018.382>

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