


SHORT REPORT

Sub-optimal treatment of paediatric migraine in an emergency department: An observational study

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Abstract

Objectives: To describe treatment of children presenting to an Australian ED with a final ED diagnosis of migraine.

Methods: Planned substudy of a retrospective cohort study of the epidemiology of headache in children was done. Primary outcome of interest was treatment administered in the ED.

Results: Thirty-five children were studied. The most commonly used medications were non-steroidal anti-inflammatory drugs, paracetamol and ondansetron. Specific anti-migraine therapy was used uncommonly. Fourteen percent of children received an opiate.

Conclusion: Treatment of migraine in children was not consistent with the available evidence regarding agents' relative effectiveness. The use of opiates is concerningly high.

Key words: emergency department, migraine, paediatric.

Introduction

Headache is the chief complaint for about 1% of paediatric ED attendances of whom 8.5–18.5% are because of migraine.^{1,2} A recent systematic review has found limited evidence comparing the effectiveness of therapies.³ Included studies were largely confined to

placebo-controlled rather than comparative trials. It found that ibuprofen (RR 1.87) and triptans (children: RR 1.67; adolescents: RR 1.32) were superior to placebo. Neither paracetamol nor dihydroergotamine was superior to placebo. Dopamine receptor antagonists are little studied in children. One small study compared intravenous prochlorperazine to ketorolac and reported that significantly more children had a pain score reduction of >50% at 1 h with prochlorperazine.⁴

Little is known about treatment of paediatric migraine in ED and its concordance with the available evidence-base. Canadian data show considerable variation in practice.⁵ Australasian data reported that the most commonly used agents were non-steroidal anti-inflammatory drugs (30%) followed by paracetamol (24%).⁶ The use of defined anti-migraine medications (chlorpromazine, sumitritan, prochlorperazine) was low (8%). Eleven percent of children received morphine and a further 25% a codeine-containing medication.

The aim of this study was to describe the treatment provided to children presenting to an Australian ED with a final ED diagnosis of migraine.

Methods

This was a planned substudy of a retrospective cohort study by

medical record review of the epidemiology of headache in children presenting to ED. It was conducted at Sunshine Hospital, a university-affiliated community hospital with an annual paediatric census of approximately 25 000.

Inclusion criteria were presentation between 1 January and 31 December 2016 with headache as a major symptom and age 2–16 years. Exclusion criteria were a history of head trauma within the previous 48 h, a ventriculoperitoneal shunt *in situ* or known intracranial conditions associated with headache. This substudy includes the cohort with an ED discharge diagnosis of migraine as recorded in the treating doctor's clinical notes as free text. The primary outcome of interest for this substudy was the treatment administered in the ED. Data were analysed by descriptive statistics using Analyse-It (Leeds, UK). The project was approved by the Western Health Low Risk Ethics Panel. Patient consent for data collection was not required.

Results

Thirty-five children had a discharge diagnosis of migraine (15.5% of total cohort). Median age was 11 years (IQR 8–15); 51% were male. Pain score data are available for 20 children. Median initial pain score was 5 (IQR 2–7). Median pre-discharge pain score was 0.5 (IQR 0–5). Nine children had a reduction in pain score of ≥ 2 points (45%, 95% CI 25.9–65.8%). Seven children had a pain score ≥ 4 at ED discharge (35%, 95% CI 8.1–56.7%).

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TABLE 1. *Treatments administered*†

Medication	<i>n</i>	%	95% CI
Non-steroidal anti-inflammatory agent	23	66	49–79%
Paracetamol	18	51	36–67%
Ondansetron	14	40	26–56%
Oxycodone	4	11	5–26%
Phenothiazine	3	9	3–22%
Triptan	1	3	0.5–15%
Metoclopramide	1	3	0.5–15%
Paracetamol/codeine	1	3	0.5–15%
Intranasal fentanyl	1	3	0.5–15%
None	5	14	6–29%

†More than one medication could be prescribed.

Medications given are shown in Table 1. Note, more than one medication could be prescribed. Fourteen percent of children received an opiate (95% CI 6.3–29.4%). Regarding paracetamol, in four cases it was nurse-initiated before medical assessment. In three of these, additional medications were prescribed by the assessing doctor.

Three children were admitted to hospital for further investigation and treatment (8.6%, 95% CI 3–22.4%).

Discussion

The available evidence regarding the relative effectiveness of migraine treatments for children is limited; however, what there is suggests that some treatments are more effective than others. It is also probably reasonable to extrapolate from adult data that opiates are relatively ineffective.

Our data suggests that treatment of paediatric migraine is sub-optimal. There is high usage of paracetamol, which has been shown to be ineffective in a recent Cochrane review.³ The high use of paracetamol may be because of it being recommended in local clinical guidelines for the treatment of headache, despite the research findings.⁷ Closer review of these guidelines makes age-based recommendations for

ibuprofen, chlorpromazine, aspirin or sumatriptan when migraine is the most likely diagnosis.

There is low usage of proven anti-migraine treatments (phenothiazines, triptans and metoclopramide, 9% combined). While the use of codeine-containing medications has reduced compared to the PREDICT study,⁶ the proportion of patients receiving an opiate is concerning high (14%). There would appear to have been little improvement in the use of evidence-based therapies since the PREDICT audit.⁶ The reduction in the use of codeine-containing medications between the PREDICT study and this study may be due to efforts, including by government, to reduce the use of these medications.

Reasons for poor compliance with the evidence may include lack of knowledge about recommended migraine treatment for children and concern about adverse effects (including extrapyramidal effects and sedation) with some medications. There may also have been a preference to avoid parenteral medications, especially in younger children.

In order to improve prescribing of effective antimigraine therapy in children, two main interventions are needed: high-quality comparative research and development and dissemination of evidence-based guidelines

specific to migraine treatment for children and adolescents.

This study has some limitations. It is single centre and thus may not be generalisable, although the findings were very similar to those of the PREDICT audit, which was multicentre.⁶ Migraine was the clinical diagnosis made by the treating clinician so it is possible some cases were miscoded. This is the 'real world' situation in the ED. Data were collected from medical records so may be subject to missing data. The study sample was relatively small, resulting in wide confidence intervals around the point estimate.

Conclusion

Treatment of migraine in children was not consistent with the available evidence regarding agents' relative effectiveness. The rate of use of opiates is concerning high. More work is needed to increase the evidence-base, develop pathways and educate clinicians about effective therapeutic approaches to paediatric migraine.

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Author contributions

AMK had the concept for the study, performed the analysis and drafted the manuscript. All authors refined the data collection tool and refined the manuscript. SK collected the data.

Competing interests

AMK is a member of the editorial board of *Emergency Medicine Australasia*.

References

1. Conicella E, Raucci U, Vanacore N *et al*. The child with headache in a pediatric emergency department. *Headache* 2008; **48**: 1005–11.
2. Kan L, Nagelberg J, Maytal J. Headaches in a pediatric emergency department: etiology, imaging, and treatment. *Headache* 2000; **40**: 25–9.

3. Richer L, Billinghamurst L, Linsdell MA *et al.* Drugs for the acute treatment of migraine in children and adolescents. *Cochrane Database Syst. Rev.* 2016; CD005220.
4. Brousseau DC, Duffy SJ, Anderson AC, Linakis JG. Treatment of pediatric migraine headaches: a randomized, double-blind trial of prochlorperazine versus ketorolac. *Ann Emerg Med.* 2004 Feb; 43: 256–62.
5. Richer LP, Laycock K, Millar K *et al.* Treatment of children with migraine in emergency departments: national practice variation study. *Pediatrics* 2010; 126: e150–5.
6. Herd DW, Babl FE, Gilhotra Y, Huckson S, PREDICT group. Pain management practices in paediatric emergency departments in Australia and New Zealand: a clinical and organizational audit by National Health and Medical Research Council's National Institute of Clinical Studies and Paediatric Research in Emergency Departments International Collaborative. *Emerg. Med. Australas.* 2009; 21: 210–21.
7. Royal Children's Hospital. *Clinical Practice Guideline: Headache*. [Cited 21 May 2019.] Available from URL: https://www.rch.org.au/clinicalguide/guideline_index/Headache/