

ORIGINAL ARTICLES

Improving the delivery of analgesia to children in pain

L J Somers, M W Beckett, P M Sedgwick, D C Hulbert

Abstract

Objectives—To improve the time taken for children arriving to the accident and emergency (A&E) department in pain to receive analgesia. Delivery within 30 minutes of triage was taken as an achievable goal.

Methods—262 children who had received analgesia in the “minor injuries” area of West Middlesex University Hospital A&E department were studied over a four month period. Current practice was indicated over the first two months by retrospectively looking at data from 129 children’s A&E cards. A Paediatric Pain Protocol was then introduced and another 133 children’s cards studied to see if this had made an improvement. The protocol for those children aged over 4 years differed to that for children aged 4 years and under.

Results—For children aged 4 years and over, the introduction of the protocol significantly increased the number that received analgesia within 30 minutes of triage: 55.3% (n=54) post-protocol versus 34.0% (n=33) pre-protocol (p=0.003). However, for children aged 4 years and under there was no change in the proportion that received analgesia within 30 minutes of triage: 56.7% (n=17) post-protocol versus 59.4% (n=19) pre-protocol (p=0.829).

Conclusions—The introduction of a simple Paediatric Pain Protocol has improved the time taken to deliver analgesia to children arriving in this A&E department.

(Emerg Med J 2001;18:159–161)

Keywords: paediatric analgesia; pain relief

Although pain is a common reason for patients to attend the accident and emergency (A&E) department,^{1,2} several studies have shown that pain is poorly treated in children^{3–5} particularly in A&E.^{6,7} Pain assessment may be difficult, yet well validated pain assessment tools are available⁸ and are in use in paediatric oncology and surgical practice.⁹ We undertook a study to measure the improvement in delivery of analgesia to children after the introduction of a

pain assessment scoring system combined with staff education.

Method

We studied children under 16 presenting with painful injuries to the “minor injuries” area of the A&E department of West Middlesex University Hospital, a district general hospital seeing both adults and children. Throughout the study the time between the child being triaged and the delivery of an analgesic was taken as an indicator of the quality of care; ideally pain relief should be given as soon as possible. The choice of analgesia or the use of other methods of reducing pain, for example, splintage, were not considered in this study. We recognise that the time of arrival at the A&E department and time of triage are different.

The study consisted of two parts. The first part was a retrospective review of consecutive paediatric A&E cards over a two month period (during May to June 1998) to obtain the time between triage and delivery of analgesia. It was assumed that where no painkiller had been prescribed at any time during a child’s attendance he or she had not been in pain. After this review had been completed a Paediatric Pain Protocol was introduced into the department.

The protocol had three elements:

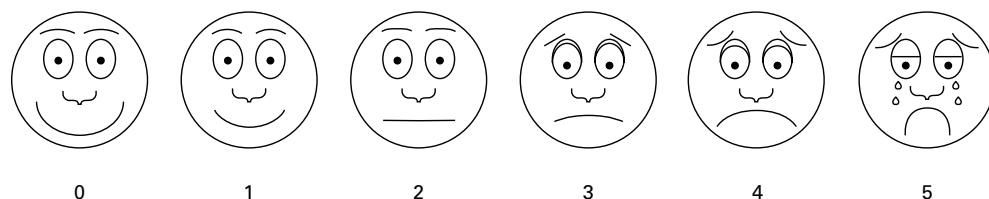
- 1 An education programme was introduced for medical and nursing staff, and reinforced by posters in the department. The educational programme consisted of teaching by registrars and consultants to the senior house officers (SHOs) and nurses, particularly those less familiar with paediatric analgesia.
- 2 Advice from the pain specialists and our two paediatric A&E sisters was sought. In particular we wished to dispel the myth that stronger forms of analgesia (for example, opioids) should not be given to children. As long as adequate monitoring and resuscitation facilities are available the use of these analgesics should be encouraged where indicated.
- 3 All children 4 years and over in pain were assessed at triage using the Wong-Baker faces scale.
- 3 When a child was found to be in significant pain an A&E doctor was asked to make an immediate assessment and prescribe appropriately. At the time of the study nurse

Accident and
Emergency
Department, West
Middlesex University
Hospital, London
L J Somers
M W Beckett
D C Hulbert

Department of Public
Health Sciences, St
George’s Hospital
Medical School,
London
P M Sedgwick

Correspondence to:
Miss Hulbert, Emergency
Department, Southampton
University Hospitals NHS
Trust, Tremona Road,
Southampton SO16 6YD,
UK

Accepted for publication
4 September 2000



Explain to the child that each face is for a person who feels happy because he has no pain (hurt) or sad because he has some or a lot of pain.

- Face 0 is very happy because he doesn't hurt at all.
- Face 1 hurts just a little bit.
- Face 2 hurts just a little bit more.
- Face 3 hurts even more.
- Face 4 hurts a whole lot.
- Face 5 hurts as much as you can imagine, although you don't have to be crying to feel this.

Ask the child to choose the face that best describes how they are feeling.
Recommended for children age 4 years and older

Figure 1 Wong-Baker Faces Pain Scale. Adapted from Whaley L, Wong DL. Nursing care of infants and children. 3rd ed. St Louis: The CV Mosby Company, 1987. With permission.

prescribing for children was not the practice in this A&E department.

The Wong-Baker faces scale (fig 1) has been validated for children of 4 years and over¹⁰ and was already in use on our paediatric wards. The scale was not used in children under 4 years in our study because of unreliability.¹¹ In this subgroup the protocol consisted of points 1 and 3 only. Triage nurses were instructed that a pain score of 3, 4 or 5 should lead to immediate medical review. After the protocol had been introduced a further two months records during July and August 1998 were examined.

STATISTICS

After verifying distribution assumptions, the difference between the pre-intervention and post-intervention groups in age was tested using the *t* test for two independent samples (test statistic denoted by *t*). Differences between the groups in categorised age, sex and diagnosis was tested using the χ^2 test (test statistic denoted by χ^2). Kaplan-Meier survival curves were derived to display the cumulative probability of time until administration of analgesia; differences between the groups in time until administration was tested using the log rank test. The level of significance was set at 5%.

Table 1 Presenting characteristics of the pre-intervention and post-intervention groups

	Pre-intervention (n=129)	Post-intervention (n=133)	Test statistics
Age (y)	mean=7.9, SD=4.14	mean=8.20, SD=4.24	<i>t</i> =0.63, df=200, p=0.53
Age			
≤4	32 (24.8)	30 (22.6)	$\chi^2=0.18$, df=1, p=0.668
>4	97 (75.2)	103 (77.4)	
Sex			
Girls	52 (40.3)	55 (41.4)	$\chi^2=0.03$, df=1, p=0.864
Boys	77 (59.7)	78 (58.6)	
Diagnosis			
Soft tissue	62 (48.1)	56 (42.1)	$\chi^2=8.39$, df=3, p=0.039
Fracture/dislocation	54 (41.9)	52 (39.1)	
Laceration	4 (3.1)	17 (12.8)	
Burn	9 (7.0)	8 (6.0)	

Percentages shown in parentheses.

Results

Groups were labelled "pre-intervention" and "post-intervention". The notes of 262 paediatric patients with painful injuries were examined in total. The characteristics of each group are shown (table 1). Although there was a difference between the groups in diagnoses this was not thought to be clinically significant.

Age was categorised into under 4 years, and 4 years plus as intervention differed between these subgroups; namely the use of the Wong-Baker Faces Scale. Although the data are not presented, the pre-intervention and post-intervention groups within each age group had similar numbers with comparable sex and diagnoses distribution.

For those children under 4 years, the plots of the cumulative proportion for each of the pre-intervention and post-intervention groups are displayed (fig 2). The two curves are very similar and there is no evidence of a difference between the two groups in the time taken to receive analgesia (log rank test statistic=0.19; df=1; p=0.660). After approximately two hours the curves are difficult to interpret because the number of children remaining is

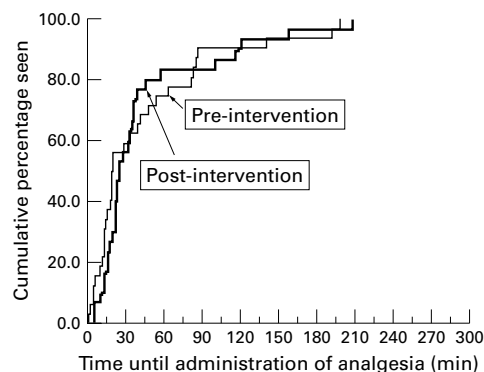


Figure 2 For the under 4 year olds, plot of cumulative proportion of group having received analgesia against time (min) for the pre-intervention (n = 32) and post-intervention (n = 30) groups separately.

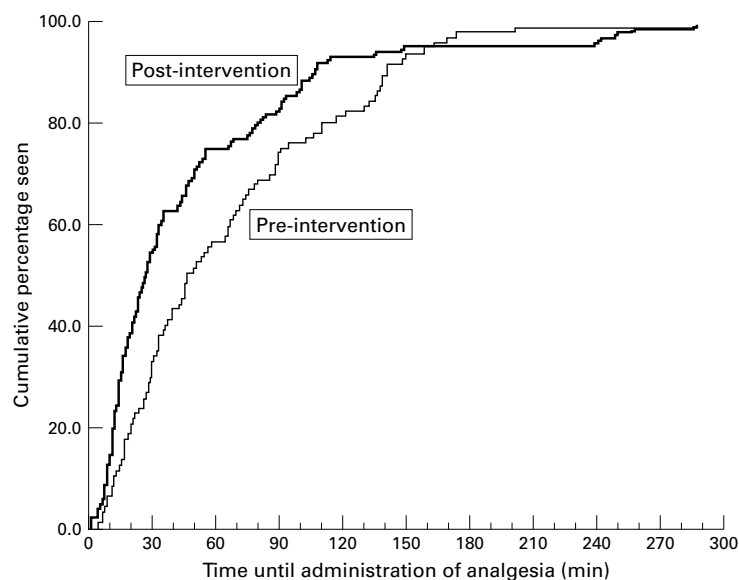


Figure 3 For the over 4 year olds, plot of cumulative proportion of group having received analgesia against time (min) for the pre-intervention ($n = 97$) and post-intervention ($n = 103$) groups separately.

small. The proportion of children given analgesia within 30 minutes prior to intervention was 59.4% ($n=19$) compared with 56.7% ($n=17$) after intervention, a difference of -2.7% (95% confidence intervals: -27.3% to 21.9%). This difference was not significant at the 5% level ($\chi^2=0.05$; $df=1$; $p=0.829$).

For those children aged 4 years and over, the plots of the cumulative proportion for each of the pre-intervention and post-intervention groups are shown (fig 3). Up to approximately 170 minutes the post-intervention curve is above that of the pre-intervention group, indicating that the post-intervention group received analgesia sooner after triage. The two curves differ significantly at the 5% level (log rank test statistic=6.11; $df=1$; $p=0.013$). However, the curves cross after approximately 160 minutes. It is difficult to interpret this as having any importance because the number of children remaining is very small in both groups. Thirty four per cent ($n=33$) of the pre-intervention group received analgesia within 30 minutes compared with 55.3% ($n=54$) of the post-intervention group, a difference of 21.3% (95% confidence intervals: 7.9% to 34.5%). This difference was significant at the 5% level ($\chi^2=9.17$; $df=1$; $p=0.003$).

Discussion

Ideally all children in pain should receive effective analgesia immediately on arrival to A&E. In practice this is difficult to achieve in a busy department with many other demands being made on the staff. We have found that the introduction of a simple Paediatric Pain Protocol based on the Wong-Baker faces scale has reduced the time for children in pain to receive analgesia. In our study almost 56% received pain killers within half an hour of triage after

the intervention. It is of interest that there was no improvement in the delivery of pain relief to children under 4 years who cannot be assessed using the Wong-Baker Faces pain scale. This presumably reflects the difficulty still faced when assessing this age group for pain.

Because of the timing of the study there may have been unintentional bias introduced. Clearly the experience and the confidence of the A&E SHOs is different between May to June and July to August. In addition there is a seasonality to children's injuries both related to time of the year (summer versus spring) and school attendance (school term versus school holiday). For future studies we would hope to compare the same time period and subsequent years. It would also be helpful to repeat the study with larger numbers at a greater number of centres to standardise the results.

It was assumed in the study that the pain score prompted the appropriate analgesia to be prescribed. This was not assessed separately and clearly warrants further attention.

Nurses prescribing at triage to children in pain would undoubtedly improve the situation and this should be considered in the near future. It has been implemented widely and successfully for adults in many A&E departments. It is to be hoped that it would help to avoid any long waits for analgesia that children may suffer.

We would like to thank the A&E staff at West Middlesex University Hospital for their enthusiastic cooperation in this trial.

Contributors

Lisa Somers initiated and coordinated the formulation of the study, discussed core ideas, designed the protocol, collected the data, participated in data analysis, writing and editing the paper. Michael Beckett discussed core ideas, participated in project design, data presentation, writing and editing of the paper. Philip Sedgwick participated in the analysis of the data and its interpretation. Diana Hulbert was a co-initiator of the study, discussed core ideas, participated in writing and editing of the paper. She is the guarantor of this paper.

Funding: none.

Conflicts of interest: none.

- Selbst SM, Henretig FM. The treatment of pain in the emergency department. *Pediatr Clin North Am* 1989;36:965-80.
- Selbst SM, Clark M. Analgesic use in the emergency department. *Ann Emerg Med* 1990;19:1010-13.
- Schechter NL. The undertreatment of pain in children: an overview. *Pediatr Clin North Am* 1989;36:781-93.
- Friedland LR, Pancioli AM, Duncan KM. Pediatric emergency department analgesic practice. *Pediatr Emerg Care* 1997;13:103-6.
- Johnston CC, Gagnon AJ, Fullerton L, et al. One-week survey of pain intensity on admission to and discharge from the emergency department: a pilot study. *J Emerg Med* 1998;16:377-82.
- Sandhu S, Driscoll P, Nancarrow J, et al. Analgesia in the accident and emergency department: do SHOs have the knowledge to provide optimal analgesia? *J Accid Emerg Med* 1998;15:147-50.
- Goodacre SW, Roden RK. A protocol to improve analgesia use in the accident and emergency department. *J Accid Emerg Med* 1996;13:177-9.
- Keck JF, Gerkenmeyer JE, Joyce BA, et al. Reliability and validity of the faces and word descriptor scales to measure procedural pain. *J Pediatr Nurs* 1996;11:368-74.
- Tyler DC, Tu A, Douthit J, et al. Toward validation of pain measurement tools for children: a pilot study. *Pain* 1993;52:301-9.
- Wong DL, Baker CM. Pain in children: comparison of assessment scales. *Pediatric Nursing* 1988;14:9-17.
- Ferguson L, Beattie TF. Measurement of pain in children in the emergency department. *J Accid Emerg Med* 1998;15:140.