

ORIGINAL ARTICLE

Consigning "brutacaine" to history: a survey of pharmacological techniques to facilitate painful procedures in children in emergency departments in the UK

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Objective: To determine the proportion of emergency departments in the UK that use modern pharmacological methods of pain and anxiety control in children, such as analgesia with intranasal diamorphine, procedural sedation using ketamine or midazolam, and adrenaline–cocaine gel, TAC or LAT for anaesthetising wounds in children.

Methods: A survey UK Emergency Departments conducted by email, post and telephone.

Results: Of the 183 (70%) of UK Emergency Departments responding, sedation is achieved using ketamine in 27% and using midazolam in 54%. In 55% of emergency departments intranasal diamorphine is used for analgesia and 41% use at least one of the topical local-anaesthetic mixtures to anaesthetise wounds before suturing.

Conclusions: About half of UK emergency departments use modern pharmacological methods of procedural pain control in children. There is still considerable potential to improve the management of pain in children.

The physical restraint of struggling children during painful procedures, appropriately called "brutacaine", should no longer be an acceptable part of modern practice.¹ Most procedures can be achieved with a minimum of distress for the child by using a combination of non-pharmacological technique, such as distraction, and pharmacological methods such as procedural sedation with midazolam or ketamine, and topical local anaesthetic mixtures to anaesthetise wounds before suturing.^{1–3} Mixtures that are available in the UK include adrenaline–cocaine gel, lignocaine–adrenaline–tetracaine gel (LAT) and tetracaine–adrenaline–cocaine gel (TAC). Intranasal diamorphine can be used for minor procedures such as changing burns dressings, and is also highly effective for treating pain from other causes.⁴ Our objective was to determine the proportion of emergency departments in the UK that use intranasal diamorphine, ketamine or midazolam for procedural sedation, and adrenaline–cocaine gel, TAC or LAT for anaesthetising wounds in children.

METHODS

The survey was conducted using a simple tick-box questionnaire. As we could not find an up-to-date list of emergency departments in the UK, the questionnaire was initially sent as an attachment to all members of the British Association for Emergency Medicine (BAEM) who were on the association's email list. Responses from members outside the UK, members who work in departments that do not see children, duplicate responses from the same department and unidentifiable responses were excluded from the results. The responses were compared with the list of emergency departments in the UK in the 2002 BAEM Directory, and the same questionnaire was faxed to those departments from which we could not identify a response. Finally, one of the investigators (GC) contacted consultant and middle-grade doctors from the remaining departments by telephone to complete the survey. This meant that an explanation of any questions was also available at this stage.

RESULTS

We received a total of 214 responses to the survey. Of these, 31 were excluded as 18 were duplicate responses from the same department, 6 contained no useful information, 4 were from outside the UK and 3 were from members whose departments do not treat children. In all, 88 emailed questionnaires, 38 faxed questionnaires and 57 questionnaires completed by telephone were included in the results. In total, we received responses from 183 of the 283 major emergency departments in the UK in the 2002 BAEM Directory who treat children. This represents a 70% response rate.

Table 1 summarises the results. Overall, medical staff from 27% of the emergency departments in the UK said that their department uses ketamine by one or both routes, 54% said their departments use midazolam by at least one route and 41% said their departments use at least one of the topical local-anaesthetic mixtures to anaesthetise wounds before suturing. Children's emergency departments showed a variation in practice similar to that observed nationwide. However, 4% of responders commented that they were unclear about what adrenaline–cocaine gel, TAC or LAT were, and 2% commented that their departments had been unsuccessful in introducing local anaesthetic gels because of the resistance within their hospital trust or difficulties in obtaining these products.

DISCUSSION

This is the first survey of pharmacological methods that are used to facilitate painful procedures in children in emergency departments in the UK. Overall, we had responses from 70% of the major emergency departments in the UK, which is sufficient to gain a useful insight into the practice nationwide.

Most emergency departments in the UK use procedural sedation for children, with midazolam used by 54% and ketamine used by 27%. Our results are similar to those of a

Abbreviations: BAEM, British Association for Emergency Medicine; LAT, lignocaine–adrenaline–tetracaine gel; TAC, tetracaine–adrenaline–cocaine gel

Table 1 Proportion of emergency departments in the UK using pharmacological methods of facilitating procedures in children

Pharmacological technique	Proportion of emergency departments in the UK
Intranasal diamorphine	55%
Intramuscular ketamine	18%
Intravenous ketamine	19%
Oral midazolam	47%
Intranasal midazolam	21%
TAC	18%
AC	17%
LAT	14%

AC, adrenaline-cocaine gel; LAT, lignocaine-adrenaline-tetracaine gel; TAC, tetracaine-adrenaline-cocaine gel.

survey in Australia and New Zealand, where midazolam is used by 77% and ketamine by 12%.⁵ Ketamine has been used widely in the US for many years.⁶ Ketamine is used less widely than midazolam despite evidence that ketamine is more reliable at providing procedural sedation in children.¹ In addition, midazolam has been reported to have problems with respiratory depression and "hyperexcitation". By contrast, there is good evidence that ketamine can be used safely in emergency departments.²

There have been concerns that the use of ketamine in the UK may result in prolonged stays in the emergency department. However, the Department of Health document Clinical Exemptions to the Four Hour Emergency Care Target states that patients should remain in the emergency department if that is the safest place for them to be (http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4091871&chk=bDwC%2B%2B). Transferring a child who is recovering from sedation with ketamine could increase the incidence of emergence phenomena and they are therefore clinical exemptions. It is interesting that more emergency departments in the UK give ketamine intravenously despite the BAEM guidelines, which state that emergence phenomena are less common when ketamine is used intramuscularly (<http://www.emergencymed.org.uk/BAEM/Clinical%20Effectiveness%20Committee/CEC%20Guidelines.asp>). We did not investigate the use of oral ketamine, which was an oversight, because there are studies to show that it is an effective route of administration.^{7,8}

Although we investigated only oral and intranasal use of midazolam, in Australia and New Zealand midazolam is given by a wide range of routes, including intramuscular and per rectum. It is unclear what advantages these routes confer.

Overall, 41% of emergency departments in the UK use at least one of the topical local anaesthetic gels to anaesthetise wounds before suturing. This is comparable to use in with Australia and Zealand, where these products are used by 30% of departments. We could not find any evidence of how widely these products are used in North America. These products are as effective as infiltrated lignocaine for wounds on the head and neck, but their use is limited by being less effective on other areas of the body and being contraindicated adjacent to mucous membranes or on areas of end-artery supply. These limitations may explain why there is resistance to their introduction in some hospital trusts, but there are still a considerable number of children who benefit from them. It became apparent that many doctors in the emergency departments thought that adrenaline-cocaine gel, LAT and TAC topical local anaesthetics referred to a eutectic mixture of local anaesthetics and tetracaine

(Ametop) which should not be used on broken skin. This may have led to the emailed and faxed results overestimating the true proportions of departments using these products.

Intranasal diamorphine is being used in only 55% of emergency departments in the UK. This is disappointing, as intranasal diamorphine is easier to give than intravenous morphine, less painful to give than intramuscular morphine, and achieves peak plasma concentrations much more quickly than oral morphine.^{4,9} The BAEM guideline for management of pain in children states that those with severe pain should be treated with intravenous morphine or intranasal diamorphine within 20 min of arrival in the department (http://www.emergencymed.org.uk/BAEM/CEC/assets/cec_pain_in_children.pdf). However, the recent Healthcare Commission report into standards of care in emergency departments in the UK showed that only 53% of children with moderate or severe pain after a fracture of the wrist or elbow received appropriate analgesia within 1 h of arrival to hospital (www.healthcarecommission.org.uk/InformationForServiceProviders/ReviewsAndInspections/AcutePortfolio/Guidance/fs/en?CONTENT_ID=4000208&chk=T4tCBU). Widespread adoption of intranasal diamorphine might well improve these results when the nationwide supply of diamorphine has been restored. The Department of Health says that this is due to the major manufacturer having technical problems with the freeze-drying process and that there is no end to the shortages in sight at present (http://www.aagbi.org/release_Temp_Shortages_of%20Anaesthetic_drugs.html). There is evidence that other opiate drugs are also effective when given via the intranasal route, and clinical studies to establish an alternative to intranasal diamorphine would be most welcome.¹⁰

This survey has considerable limitations. There are drugs that are used to facilitate procedures that we did not ask about, and some respondents were unfamiliar with the terminology that was used. Both problems could have been prevented by piloting the questionnaire. In addition, we obtained responses from only 70% of emergency departments in the UK, which could affect the accuracy of the results.

Many alternative strategies to the use of "brutacaine" for painful procedures in children are available. Most emergency departments in the UK use procedural sedation, although midazolam is still used more widely than ketamine, despite ketamine being more effective and having a better safety profile. Intranasal diamorphine is used by 55% of emergency departments in the UK. When the national shortage has been resolved, increasing the use of intranasal diamorphine nationwide could improve the management of children in severe pain.

Overall, just over half of the emergency departments in the UK are using modern pharmacological methods for reducing pain and distress in children. There is still considerable potential to improve management by more widespread use of these techniques.

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