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Analgesia Protocols for Burns Dressings: Challenges with Implementation

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Abstract

Background: The aim of this study is to compare doctors' knowledge regarding analgesia in paediatric burns patients in a setting where analgesia protocols are provided but not reinforced to a setting where the same protocols are used but with constant re-enforcement from burns surgeons.

Methods: We reviewed questionnaires completed anonymously by doctors managing burns children in the Pietermaritzburg (PMB) Hospital Complex and the referral hospitals.

Results: The questionnaire was completed by 43 doctors with 53% of the participants working in the referral hospitals. Procedural sedation was given by 98% of doctors. All PMB doctors giving procedural sedation used ketamine compared to 39% in the referral hospitals, which was statistically significant ($X^2 = 18.237$; $p < 0.001$). Eighty percent of PMB doctors were aware of the correct doses of ketamine and compared to 8% of referral doctors. This was statistically significant ($X^2 = 21.778$; $p < 0.001$). When assessing the adequacy of analgesia, all of the doctors from PMB used a scoring system or clinical impression. In the referral doctor group, 54% used a scoring system, 38% used the child screaming as an indicator of inadequate analgesia.

Conclusion: We have identified a discrepancy in knowledge between staff in an academic burn centre and those in peripheral referral hospitals. This discrepancy translates into differences in quality of burn analgesia which patients receive. Ongoing efforts must be directed towards changing the culture of district institution and strengthening attempts to standardize care across the region.

Introduction

Pain is virtually synonymous with burn injuries and all children with a burn will experience pain, regardless of the cause, size or depth of the burn.¹ Pain control remains inadequate globally, despite the longstanding recognition that inadequate pain control can have adverse physiological and emotional sequelae on children.^{1,2,3,4} There is little in the literature on

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Conflict Of Interest

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

analgesia in paediatric burns patients in South Africa. Although specialist burn services in South Africa generally use analgesia protocols, the management of pain in district hospitals is less well structured. Inadequate training in the management of burn related pain, combined with a poor understanding of how the hypermetabolic response alters pharmacodynamics suggests that the quality of care of burns patients is heterogenous and may vary according to the level of hospital.

In South Africa, patients with burns which would be referred to specialist centers in highincome countries, are often managed at district level institutions by junior and or inexperienced staff. In light of this the Pietermaritzburg Burn Service (PBS) has developed analgesia protocols to standardize and facilitate care in both the district and referral institutions. The protocol was developed by a team of surgeons and anaesthetists with extensive local knowledge regarding drug availability as well as clinical experience with burn dressing changes. The doctors in the referral hospitals are either junior or if they are senior lack training in burns. The PBS protocol was intended to be safe and practical as dressing changes are done in wards and out-patient clinics with little to no electronic monitoring. Ketamine has a proven track record in terms of safety in our setting and is readily available. The protocol was implemented in the PBS and distributed to all district hospitals referring to the PBS. This project focuses on the success of implementation of the protocol and aims to identify and quantify any discrepancy in the quality of burn care between patients in the two different settings.

Clinical guidelines or protocols have become prominent in clinical practice over the past three decades.⁵ Protocols, can benefit both patients and health care providers in the sense that they improve health outcomes, and promote distributive justice by advocating for improved service delivery and highlighting under-recognized and marginalized health problems and clinical services. In addition, they provide clinical decision support to health care workers by providing firm recommendations and guidance to inexperienced clinicians.^{5,6} Protocols promote standardization of care and this is especially relevant in conditions where direct supervision by senior clinicians is not possible. There are limitations to protocols and these revolve around the impact the inherent biases and clinical experience of the group developing the guidelines, have on the recommendations.⁷ In addition the inappropriate application of protocols by inexperienced staff may be problematic. Protocols can be exceptionally useful to inexperienced healthcare professionals.

Methodology

The Pietermaritzburg Burn Service (PBS) operates across the regional (Edendale Hospital) and Tertiary (Greys Hospital) Hospitals in Pietermaritzburg. The Burn Service consists of two burns surgeons who have access to 40 beds in the metropolitan dedicated to burns patients. Thirty of these beds, with six high care beds are at Edendale Hospital and ten beds are at Greys Hospital. The patient load annually consists of 500–600 patients who are managed as inpatients and a further 500 patients who receive exclusively outpatient care. The PBS provides support to 19 district hospitals in the western third of Kwa Zulu Natal Province. This is a deeply rural area and the PBS delivers support via a combination of direct outreach visits as well as a number of secure social media platforms which allow for

direct confidential sharing of patient images and clinical details. All burn patients in western KZN are discussed with or seen by the two burn surgeons. Burns in western KZN are managed according to “The PMB Way Burns Protocols”. These are available physically and electronically throughout all the hospitals in western KZN.

All medical officers and registrars working in the PBS have access to “The PMB Way Burns Protocols” (Table 1) which includes analgesia protocols (Table 1). They are directly supervised by the two burn surgeons and undertake a three-month rotation in the burns service. The presence of the burn surgeon ensures constant reinforcement of the burns protocols. The analgesia protocols should be adhered to for every dressing change in both the wards and in the clinic. The staff in the referral hospitals manage a wide spectrum of diseases and only care for burns patients occasionally. These hospitals have “The PMB Way Burns Protocols” available to them, however they do not have the benefit of content reinforcement and clinical structure provided by the burns consultants.

This study was conducted through an anonymous, voluntary questionnaire which was completed over a six-month period, from June to November 2018. All medical officers and registrars working in the PBS were invited to complete the questionnaire and all doctors working in the referral district hospitals, who were encountered in outreach visits were invited to complete the questionnaire. Questions which were thought relevant to testing knowledge of analgesia for burns dressings and relevant to the analgesia protocol were included in the questionnaire. The questions were intended to highlight practical knowledge or lack thereof. The questionnaire collected information regarding demographics including the level of hospital where the doctor worked and the number of years of experience as working as a doctor. It also evaluated the use of procedural sedation, including drugs and dosages and the assessment of adequacy of analgesia.

Data was collected on to an excel spreadsheet. In terms of the analysis of the data, continuous variables are presented as means (\pm SD) and categorical variables are presented as frequencies (%). Chi-square Tests are used to compare groups where the sample size allowed. Due to the limited sample size available in the group of Pietermaritzburg doctors, further statistical analysis was not always possible, in this case simple statistics is used. All analyses were performed using SPSS version 25.

Results

The results are summarized in Tables 2 and 3. When assessing the adequacy of analgesia, 58% (11/19) of the doctors from Pietermaritzburg used a scoring system, either the FLACC score¹¹ or the Universal Pain Score (Faces)¹² to assess if the patient was in pain. Forty two percent (8/19) used clinical impression to assess pain. In the referral doctor group, 54% (13/24) used a scoring system (FLACC or FACES) to assess for pain, 38% used the child screaming as an indicator of inadequate analgesia and three doctors (8%) admitted to using no system at all to assess for adequacy of analgesia. One hundred percent of the doctors working in the PBS provided an initial dose of analgesia followed by a top up dose as required. Only 75% of the doctors in the referral hospitals provided top up doses of analgesia with 25% of them providing a single dose of analgesia regardless of its efficacy.

Discussion

Although adequate analgesia is an essential part of burn management there are wide variations in practice across the world. A recent survey by the American Burn Association found that opioids and benzodiazepines are the mainstay of the burn wound analgesia in the United States. This is simply not practical or safe in our setting. Although multimodal distraction has also been described with good results it is too expensive for a low-income country. Ketamine is cheap, safe, practical and effective and remains the cornerstone of our protocols.^{8,9,10}

The “PMB WAY” has had a dramatic effect on the culture of burns care in our center and we have nurtured a culture which does not tolerate or ignore children in pain. Unfortunately, we have been less successful in transmitting this same culture to our district hospitals as evidenced by the fact that there appears to be a statistically significant difference in the knowledge and understanding of analgesia and in compliance to the available analgesia protocols between the group of doctors in the PBS and those in the referral institutions.

After multiple outreach visits to the hospitals who refer to us, it became apparent that the protocol was not being adhered to. In some cases, the doctors were aware of the protocol but were not adhering to it as they were uncomfortable using ketamine, which is the cornerstone of the protocol and in other cases they were not aware of the protocol. At the time of the questionnaires being completed, all of the hospitals did have ketamine and dormicum.

There is a misconception that burns are just painful and that there is not much concern about tailoring analgesia to individual patients. Although we acknowledge that ideally pain management should be tailored to the individual patient, a high turnover of doctors in the referral hospitals, varying levels of experience of the doctors administering the analgesia for the burns patients and the fact that some of these doctors very seldom manage burns patients, we feel that managing pain according to a protocol is the safest option to ensure that patients receive adequate analgesia. There is a dedicated burns service which the doctors have constant access to should they wish to discuss their patient and they can then get advise tailored to their patient should the protocol analgesia not offer adequate analgesia. Pain assessment in children is challenging. Staff often ignore or do not recognize the subtle signs of pain and only consider a child to be in pain when they are screaming. Doctors who do not use some form of assessment of adequacy of analgesia are less likely to give top up doses of analgesia as necessary.

Kochman et al have shown the FLACC score to be an appropriate observational tool to assess acute pain in children between the ages of 6 months and 5 years, however, this study was not specific to the burn population.¹³ We use the FLACC score as we are most familiar with it. It is one of three scores recommended in the ISBI (International Society for Burn Injury) guidelines.¹⁴ The other two scales, the COMFORT-B¹⁵ and the POCIS scales, however, have been validated in the setting of children with burns¹⁶ and could be useful additions to our protocol.

It is often also very challenging to differentiate between anxiety and pain, especially in children. Part of our protocol includes the addition of an anxiolytic if we suspect that difficult pain control may be due to anxiety.

The challenge remains the implementation of such protocols and a number of obstacles to their widespread adoption have been described in the literature. Grol and Grimshaw describe the complexity of change management even when the issue is clearly clinically beneficial such as hand hygiene. Attitudes amongst health care workers need to be challenged. These include: dressings changes in burn injured patients are just a painful experience, it's the nature of the injury, this is how it has always been done. There is a very real possibility that health care providers suffer from compassion fatigue themselves. Without strong local champions it is difficult to change an organisational culture. In the PBS strong and dynamic leadership has re-enforced the implementation of the protocols.

The failure to implement protocols in the district hospitals is multi-factorial. High turnover of staff prevents the development of any sort of institutional memory in remote district hospitals. It is not possible to visit every one of these peripheral hospitals in the beginning of each year to reintroduce the protocols each year.

Conclusion

We have identified a discrepancy in knowledge between staff in an academic burn center and those in peripheral referral hospitals. This discrepancy translates into differences in quality of burn analgesia which patients receive. Ongoing efforts must be directed towards changing the culture of district institution and strengthening attempts to standardize care across the region.

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Highlights

- The majority of doctors do attempt give some form of procedural sedation
- Few doctors in referral hospitals give ketamine as part of procedural analgesia protocols
- Only half of the doctors in the peripheral referral hospitals assess adequacy of analgesia
- Compliance to analgesia protocols is variable when there is not constant re-enforcement

Table 1:

“The PMB Way Analgesia Protocols”

| Background Analgesia and Sedation | | | |
|--|--|--|---|
| | Drug | Paediatric | Adult |
| IV access/ICU/high care | Ketamine | 1mg/kg IVI titrations quick onset quick offset | 1mg/kg IVI titrations quick onset quick offset |
| Ward Dose 1 | Ketamine Midazolam | 5mg/kg/per os 0.25mg/kg per os mixed together 20–30 mins to work | 5mg/kg/per os 2.5 – 5 mg per os mixed together 20–30 mins to work |
| Ward Dose 2 (for pain score > 3) | Ketamine NO Midazolam | half the previous dose ketamine IMI 5–10 mins onset | 100mg ketamine IMI 5–10 mins onset |
| Ward Dose 3 (for pain score > 3) | Ketamine NO Midazolam | half the previous dose ketamine IMI | 100mg ketamine IMI |
| The final total dose of Ketamine given at the procedure must be written as the script for the following dressing change, do not leave the inadequate dose as the prescription | | | |
| Clinic | Ketamine OR Methoxyfluorane OR Morphine | 5mg/kg IMI 0.5 mis inhaled - | 5mg/kg IMI 1-2mls inhaled 10–15mg IMI |
| Emergency Department | Ketamine Morphine Fentanyl | 5mg/kg IMI - - | 5mg/kg IMI 0.05mg/kg IVI 50 – 100mcg IVI |
| Background Analgesia and Sedation | | | |
| | Drug | Paediatric | Adult |
| these are oral doses unless otherwise stated | | | |
| Mandatory | Paracetamol (syrup = 120mg/5ml) | 15 mg/kg 6hrly | 1g 6 hrly |
| Mandatory | Tilidine (1 drop = 2.5 mg) | 1 mg/kg 6 hrly | - |
| Mandatory | Tramadol | - | 50 – 100mg 6hrly |
| Add if pain not controlled and for donor site pain | Ibuprofen (100mg/5mls) | 10mg/kg 8 hrly | 400mg 8hrly |
| Consider contraindications: Curling's ulcer, acute kidney injury, comorbidities | | | |
| Background Analgesia and Sedation | | | |
| | Drug | Paediatric | Adult |
| Consider if >15%TBSA/pain still uncontrolled | Morphine syrup 1mg/ml | Start at 0.2 mg/kg 6 hrly Increase frequency up to 2 hrly then increase dose by 25%, consider infusion | 0.2 mg/kg 6 hrly Increase frequency up to 2 hrly then increase dose by 25%, consider infusion |
| Add if pain not controlled OR neuropathic pain | Clonidine (25mcg tablets that cannot be broken) | 25mcg 8 hrly increase to maximum 50mcg 8 hrly | 75mcg 8hrly increase in increments of 25mcg per dose up to 150mcg 8hrly |
| Add if pain at night/difficulty sleeping | Amitryptiline | - | 25mg nocte, can be increased to 50 and then 75mg nocte |
| For neuropathic pain and or severe itch | Pregabalin 75 or 150mg tabs mixed into suspension for paed | start at 25mg 12hrly, increase in 25mg increments to max 75mg 12 hrly | start at 75mg 12 hrly, increase to max 150mg 12hrly |
| | Gabapentin 100 mg or 300 mg tablet | 10mg/kg 8hrly, increments of 100mg/dose up to 600mg 8 hrly | 300mg 8 hrly, increase up to 600mg 8 hrly |

| Background Analgesia and Sedation | | | |
|--|---|---|---|
| | Drug | Paediatric | Adult |
| Add if neuropathic pain and no gabapen-tin/pregablin | Tegretol 200mg tabs | - | 200mg 12 hrly increase to max 1200mg/day (400mg 8 hrly) |
| If itch and no pregaba/gabapentin | Allergex | 0.1mg/kg start 12hrly, can be increased to 8 hrly | 4mg 8 hrly |
| | Pyridoxine | - | 25mg daily |
| For ICU patients/large TBSA burns (MORPHINE mixed as a 1mg/ml solution ie. 10 mg in 10 ml or 50mg in 50 ml) | Morphine IVI Remember this needs to be weaned and not stopped suddenly! (wean the infusion rate then move to bolus dosing and increase the dose interval over time) | 0.1mg/kg loading dose then 0.1mg/kg/hour infusion increase to effect, reload and increase rate by 0.05mg/kg | 0.1mg/kg loading dose then 0.1mg/kg/hour infusion increase to effect, reload and increase rate by 0.05mg/kg |
| For PTSD OR anxiety OR opioid withdrawal | Valium | 2.5 mg nocte, titrate to effect can be increased to 8 hrly | 5 mg nocte, titrate to effect can be increased up to 5-10mg 4hrly |
| For Delirium | Haloperidol | - | 2.5 – 5mg 8hrly |

Table 2 :

Demographics

| PBS | Referral | Overall | | |
|--|-----------------|------------------|------------------|------------------|
| Number of Participants (%) | | 20 (47%) | 23 (53%) | 43 (100%) |
| Mean Years Qualified as a doctor (\pmSD) | | 7.2 (\pm 3.0) | 9.6 (\pm 7.3) | 8.6 (\pm 5.9) |

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Table 3 :

Procedural Analgesia

| | PBS | Referral | Overall | Statistically Significant Difference |
|--|--------------|-----------------|----------------|---|
| Procedural Sedation Given | 100% (20/20) | 96% (22/23) | 98% (42/43) | |
| Ketamine Use (%) | 100% (20/20) | 39% (9/23) | 67% (29/43) | $\chi^2= 18.237$; $p< 0.001$ |
| Midazolam Use | 65%(13/20) | 17% (4/23) | 40%(17/43) | |
| Correct Dose of Ketamine Known | 80%(16/20) | 8%(2/23) | 42%(18/43) | $\chi^2= 21.778$; $p< 0.001$ |
| Aware there is no maximum Ketamine dose | 50%(10/20) | 4% (1/23) | 26% (11/23) | |

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