

# Wound Care Differences in Paediatric Emergency Department: A Questionnaire Based one-centre study Before Developing and Implementing Minor-Trauma Care SOP

Lina Simonyte (✉ [lina.simonyte95@gmail.com](mailto:lina.simonyte95@gmail.com))

Lietuvos sveikatos mokslu universitetas Medicinos fakultetas <https://orcid.org/0000-0002-8910-6981>

Lina Matukynaite

Lietuvos sveikatos mokslu universitetas Medicinos fakultetas

Algirdas Dagys

Lietuvos sveikatos mokslu universiteto ligonine Kauno Klinikos Vaiku ligu klinika

Lina Jankauskaite

Lietuvos sveikatos mokslu universiteto ligonine Kauno Klinikos Vaiku ligu klinika

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## Research article

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# Abstract

**Background:** Paediatric minor traumas/wounds are one of the most common reasons to visit paediatric emergency department (PED). In this study we evaluated how different specialty physicians in PED treat wounds and what methodologies they used before developing a unified wound care SOP.

**Methods:** A prospective Questionnaire based one centre study was conducted in PED of Hospital of Lithuanian University of Health Sciences Kauno Klinikos. All the physicians/fellows working in PED were asked to voluntarily fill anonymous questionnaire after each patient who required wound management.

**Results:** In total, 166 questionnaires were collected and 148 were analysed. Mean age of the patients was 5.91 [3.13-8.13] years. Average laceration length was 1.75 [1.0-2.0] cm. The main injury area was forehead (28.4%), hairy part of the head composed 22.3% of all the wounds. Wounds did not differ in length treated by EM and surgical physicians; GP and paediatricians managed smaller wounds. Most wounds were cleaned with chlorhexidine gluconate or combination with hydrogen peroxide. 33.8% of wounds were sutured. In 12.8% suturing was combined with Steri-Strips™. In 43.2% of the cases no needle methods were used. Suturing was most often chosen by the surgical specialty clinician/fellow (66.7%). 48% of the patients were given anaesthesia (mostly locally). 8.7% of suturing cases received no anaesthesia at all. 4 children were prescribed antibiotics for aftercare. The check-up date for sutures removal was associated with location of the wound.

**Conclusion:** this study revealed differences between various specialty physicians and fellows working in PED with regard to wound management starting with wound cleaning to laceration aftercare and recommendations. Thus, it led to a wound care SOP development seeking unified and evidence-based methodology of wound management and aftercare in PED.

## Background

Injury is one of the leading reasons of paediatric acute care accounting over 20% of paediatric emergency department (PED) visits [1,2]. Half of all performed procedures in PED is attributed to laceration repair [3]. In most of the cases paediatric lacerations are in the scope of practice of non-surgeon as the majority are 2 cm or less, superficial and have slight risk of complications [4]. Over time, with the advent of new and patient-acceptable methods of analgesia, sedation and wound management, it has become possible to treat wounds in an innovative ways [5]. However, widely accepted laceration care standards do not exist, so old and in these days sometimes controversial laceration repair practices persist, despite the fact of reliable up-to-date evidence-based treatment strategies. The wound care of different specialty physicians is highly variable and depend on clinician's experience, training program and individual preference [6]. In most of the cases very young specialists expand their knowledge by word-of-mouth and informal training. Our paediatric emergency team consists of physicians and fellows of various training levels in minor and major trauma and different training programs. Moreover, in case of a very specific issue of minor trauma (lack of experience, somewhat complicated cases, social aspects of the PED visit) a specialist, such as Oral and Maxillofacial surgeon and others may support the team. Thus, our aim of the study was to identify laceration repair strategies between different PED clinicians, fellows and specialist. Additionally, our purpose stemmed from the changes in fellow training which happened on the national and local level. Furthermore, in 2016 a new PED started to operate in trauma and emergency care centre of our tertiary university hospital. With growing number of visits (up to 32 000 and 40 500 paediatric patients in 2017 and 2018 respectively) and ¼ being major and minor paediatric traumas, we observed a big necessity to standardize and develop specific guidelines for paediatric trauma care. At present, our facility has a standard operating procedure (SOP) for major traumas, however, there are no specific care recommendations for minor traumas, such as wounds and lacerations. Thus, our goal following this study was to develop those recommendations and introduce them into PED practice.

## Methods

### 1. Study design and study population

This was a prospective Questionnaire based single-centre study conducted in a Paediatric Emergency Department (PED) of Hospital of Lithuanian University of Health Sciences Kauno Klinikos (LSMU KK). The data was collected between October 2017 and January 2018. All physicians and fellows working in PED were asked to voluntarily fill an anonymous questionnaire after each patient who required wound care (suturing, stripping etc.). Our inclusion criteria were based on other studies and recommendations and were as following: acute laceration, no exposure of mucosa and referral to PED less than 12 hours after traumatic event. Wounds of any length, width and depth were included. We excluded animal and human bites, patients with chronic diseases (diabetes, immunodeficiency, cancer etc.), chronic wounds, heavily contaminated or infected wounds and if patient required hospitalization [7–9].

## 2. Local paediatric emergency team

Our PED teams consist of emergency physician and/or general paediatrician. On the daily basis, paediatric, emergency (EM) and general practice (GP) fellows are working in the PED. The wound care as well as laceration repair education of different specialty physicians and fellows is very variable. After the new emergency physician training program was developed and implemented into LSMU, by 2017 first emergency fellows finished their residency and started working in PED. Their training program includes minor and major adult and paediatric trauma care as well as laceration repair strategies (suturing, stripping etc.). Paediatric fellows as well as paediatricians do not have specific training in wound management, as well as Lithuanian regulation on paediatric practice do not include suturing. Thus, this competence was not obligatory to be added into paediatric teaching curriculum. Meanwhile, suturing as well as standard wound and laceration care are included in the curriculum of GP fellowship. Therefore, tactics of wound/laceration care strongly depends on fellows/physician's knowledge, training and experience. Most of the EM fellows start to work in PED in their fourth and fifth year of training, thus, they are highly experienced in minor trauma care. Meanwhile, paediatric fellows continuously attend PED starting from the second year of training.

## 3. Questionnaire

A questionnaire was developed consisting of questions about demographic data, such as patient's age and gender, as well as basic questions, such as wound localization, length, depth/size, hours after injury and the choice of wound treatment. Moreover, physicians and fellows were asked to fill-in their specialty and year of training (fellow physician) (*Additional file 1*). This questionnaire was validated by a local bioethical committee and PED administration and it was not used before in other studies. A questionnaire was dropped out due to data insufficiency or if inclusion criteria were not met. This was ensured by an independent observer who assessed whether the wound met all the criteria for inclusion in the study. An independent observer was PED administrator (having training in paediatrics) which was not involved in acute wound care at the time of procedure.

## 4. End points

Our primary endpoint was to evaluate physician/fellow wound closing preference and observe differences if any in wound management and aftercare recommendations. As secondary endpoint was to develop laceration repair-wound management guidelines.

## 5. Ethical consent

Permission to conduct the study was issued by Kaunas Regional Biomedical Research Ethics Committee Protocol No.: BE-2-54. The study was conducted in accordance with Declaration of Helsinki and good clinical practice guidelines.

## 6. Statistical analysis

Data were analysed by Microsoft Office 16.0 and IBM SPSS Statistics version 23.0 software (SPSS Inc., Chicago, IL, USA) for Windows. Descriptive statistics was used to describe basic features of the study. Continuous variables are expressed as mean  $\pm$  standard deviation or median and interquartile range. The Chi-square ( $\chi^2$ ) criterion and one-way ANOVA was used for statistical analysis of qualitative characteristics. A p-value of  $<0.05$  was considered statistically significant.

# Results

## 1. General findings

In total, 166 questionnaires were collected. Only 148 met the inclusion criteria and were submitted for further analysis (*Figure 1*). The mean age of the patients was 5.91 [3.13-8.13] years. Average laceration length was 1.75 [1.0-2.0] cm. 55.4% of all cases were dermal wounds, 43.3% were evaluated as superficial and just 1.4% were subdermal wounds. The main injury area was forehead (28.4%), hairy part of the head consisted 22.3% of all the wounds, limbs - 14.2%, 12.2% - chin, area around the eyes - 11.5%.

## 2. Wound care team characteristics

52% of all lacerations were managed by EM physician/fellows. 21.6% of the children were treated by GP fellows or paediatric physicians as well as fellows. In 26.4%, the team was supported with surgical speciality clinicians and/or fellows (Ophthalmologist, Ear-nose-throat doctor or Oral and Maxillofacial Surgeon) (*Figure 1*). All EM fellows were in the 4<sup>th</sup> year of their training. Most of the surgical speciality fellows were in the 3<sup>rd</sup> year of their residency or younger and only 11.4% (n=4) were 4<sup>th</sup> year fellows. Majority of GP and paediatric fellows were 2<sup>nd</sup> (55.6%) or 3<sup>rd</sup> year (37%) residents. Older patients were managed by EM physicians/ fellows compared to GP and paediatricians and fellows (6.88 [4.2-9.85] years vs 4.27 [2.6-5.2] years respectively,  $p < 0.05$ ). The length of laceration which were treated by surgical specialties or EM physicians/fellows did not differ (2.03 [1.1-2.9] vs 1.8 [1.0-2.0]cm respectively,  $p > 0.05$ ). GP fellows and paediatric doctors and fellows took care of smaller wounds - 1.23 [0.5-1.0] cm ( $p < 0.05$ ).

## 3. Pain management and anaesthesia

52% of the patients received no sedation/anaesthesia (n=77). Most of them (n=37) were treated by EM physician/fellow. Main choice of GPs and paediatric fellows was anaesthesia free laceration treatment tactics as well, i.e. 84.4% (n=27) of all their managed cases. We observed that it correlated with wound repair method and patient's age; in 90% of the cases where wound repair method was chosen as non-invasive or laceration was left to self-heal there was no anaesthesia applied ( $R = 0.8$ ,  $p < 0.05$ ). However, 6 children (3 treated by EM and 2 by a surgeon) of all the suturing cases (n=69) received no anaesthesia. Those children were likely to be older (7.5 [5.63 - 9.13] years). In general, we observed higher tendency older children to receive no anaesthesia (mean age 7.68 [5 -10] years) compared to those (n=3) who underwent general anaesthesia (4.47 [2.88 - 5.83] years). Local infiltration anaesthetic was chosen in 35.8% of the cases as follows: lidocaine 2% - in 35.1% (n=52) of the cases and one child received procaine 1% (mean age 7.68 [5-10] years). In contrast, younger children were given topical anaesthetics/analgesics as following: lidocaine spray in 4.7% (n=7) of the cases (mean age 4.13 [3.58 - 5.17] years), EMLA was not used as monotherapy. Six children were applied both topical (EMLA or lidocaine spray) and local injectable anaesthetics; for 2 children topical EMLA application or lidocaine injection proceeded general anaesthesia (*Table 1*). EM and surgical specialties applied local anaesthesia in 38.3% (n=31) and 54.8% (n=23) of the cases respectively. The data with regard to oral/intravenous pain medication was missing thus it was not included in our data analysis.

## 3. Wound care

### Cleaning

In 6.8 % of all lacerations no cleaning method was applied. There was no correlation with laceration depth, wound closing method or physician speciality. In 68.1% (n=101) of all the wound cleaning cases, chlorhexidine gluconate (ChG) was chosen alone or in combination (*Table 2*). It was most often combined with hydrogen peroxide (HP) which we noted to be the second solution to be selected for irrigation (alone or in combination). 11.5% of children lacerations were cleaned with NaCl 0.9% and 3.4% with tap water. In 6.8 % of all wounds no cleaning method was applied, and no correlation with laceration depth, wound closing method or physician speciality was found.

EM physicians and fellows cleaned 95% (n=72) of their treated wounds and they preferred ChG (n=26) or hydrogen peroxide 3% alone (n=6) or in combination (n=25). From all the specialities, EM used HP alone or in combination statistically significantly more often compared to others (n=35 vs n=2 (surgeons) vs. n=6 (paediatrics, GP)  $p < 0.05$ ). Other irrigation solution preferences between specialities were not statistically significant ( $p > 0.05$ ) (*Table 3*).

### Repair

Suturing was first method of choice for the surgical speciality clinician or fellow and it accounted for 66.7% from all the cases referred to a specialist and for 37.7% of all performed suturing. GP fellows, paediatric physicians or fellows sutured just in 15.7% of the cases (n=5), EM physicians/fellows performed suturing in 49.4% (n=38) (*Table 3*). 33.8% of the wounds were sutured only. In 12.8% of all the cases suturing was combined with Steri-Strips™. Suturing was chosen for older children compared to non-invasive wound care methods (7.3 [4.67 – 9.96] vs 4.57 [2.46 – 6] years respectively,  $p = 0.008$ ). In 43.2% (n=64) of the cases clinicians or fellows preferred closing with no-needle methods as following: 10.1% of all the cases were closed with tissue adhesive and 33.1% with Steri-strips™. After initial wound assessment, 10.1% were referred home without any specific wound management (*Figure 2*). Self-healing was favoured for patients 6.16 [3.5 - 7.05] years old.

### After care

In all of the cases, removal of sutures and control was referred to the local GP. Most of the patients (47.6%) received recommendations to remove stitches in 7-10 days, following with the 41.5% of children who were advised to refer for stitches' removal in 5-7 days.

In 8.5% of the cases, patients were informed to remove stitches after 3-5 days. Removal after 10-14 days was advised for – 2.4% of the children. We observed that suture removal time recommendation was chosen according to laceration location: for laceration in forehead, hairy head parts, sutures removal mainly was recommended after 7-10 days; for chin, mouth – after 5-7 days, and for limbs almost equally often 5-7 and 7-10 days.

Four (2.7%) patients were prescribed antibiotics: Amoxicillin in 3 patients of whom 2 received suturing and one Steri-strips™. One child after suturing was administered Cefadroxil.

## **Discussion**

In our study, we evaluated how wound/laceration care/management is performed in our PED. Moreover, we analysed the differences in laceration repair between clinicians and fellows of various specialties working in PED.

Wound/laceration management and care are usually a big challenge for doctors with regard to what treatment tactics to use. For this purpose, certain methodologies are being developed and used to enable physicians and fellows to choose and follow the appropriate wound evaluation and management technique. Despite the large proportion of patients with minor trauma referring to our hospital, our PED still does not have a unified and accepted wound care SOP. As a result, young physicians and residents working in PED have to follow word-of-mouth or their own personal knowledge and not always use correct or study/evidence-based practices.

### -General findings

We observed no difference in length of the wound being treated by surgical specialties or EM doctors/fellows. Interestingly, we noted that paediatricians and GP fellows managed smaller and shorter wounds. This could be the reason why they chose no-needle techniques more often. Also, EM physicians treated older children than paediatric doctors/fellows and GP fellows. Our personal observation leads to hypothesis that paediatricians and GPs have higher clinical experience in caring for smaller children and communicating with them, thus, were more involved in their care in PED. However, this does not reflect the situation regarding all clinical cases/diseases referring to PED.

### -Wound management and anaesthesia

In our study, most of the cases of paediatric wounds were small, superficial with a slight risk of complications. According to the results of questionnaires, most of the wounds were small and usually not deep. Non-invasive wound management techniques could usually have been sufficient for such wounds. However, we have noticed that almost half of all wounds were sutured. We observed that older children were chosen suturing (7.3 [4.67 - 9.96] years), however, younger children received non-invasive treatment methods (4.57 [2.46 - 6] years). Interestingly, anaesthesia was not used in six suturing cases and the age of these patients was about 7.5 [5.63 - 9.13] years old. Typically, anaesthesia is not given when the wound is left to self-heal or treated by non-invasive techniques (gluing or stripping). The fact that a significant number of the wounds during suturing procedure were not anesthetized (8.7%, n=6) raises a concern. Painful experiences/procedures during primary care/emergency or hospital visits lead to increased anxiety or fear associated with medical care. Moreover, it can contribute to disturbed sleep, mood swings or post-traumatic stress disorder [10]. Even in the presence of needle fear or to avoid injection, the literature indicates needle-free local anaesthesia (e.g., lidocaine, tetracaine and adrenaline gel) may be used [11]. In our study, topical anaesthesia was applied to only about one in ten patients using a lidocaine spray or EMLA gel (alone or combined with another anaesthesia method). In addition, younger patients were more likely to receive topical anaesthesia for wound care (4.13 [3.58 - 5.17] years). According to the study performed by Kristin Olsen et al., EMLA gel is effective for about 30-60 minutes. This topical anaesthetic can be applied to healthy skin and access directly into the wound should be avoided. Lidocaine spray is more suitable for mucous membranes. Thus, it can be safely used in any age and must be applied to avoid increased anxiety and pain which can worsen procedural outcomes. We noticed that EM physicians or fellows chose local anaesthesia in more than 1/3 of their wound repair cases, surgical specialists used this type of anaesthesia in half of their cases. We observed that most commonly infiltration with lidocaine solution was performed, which is reported in the literature as one of the most reliable types of anaesthesia because of its quick and sufficient action [13]. The medium age of patients who received local injectable anaesthesia was 7.68 [5-10] years old. In our study general intravenous anaesthesia was extremely rare, and other studies described it as an option. This method was given for patients who were approximately 4.47 [3.58 - 5.17] years old. It is offered to apply this method for younger and more scared children [13]. We also noticed that some specialists combined two methods of anaesthesia. We can only speculate that this could be due to the failure of one anaesthesia method selected. Interestingly, our study demonstrated that GP and paediatricians used anaesthesia-free methods more than other specialties. It could be related to wound characteristics per se as GP and paediatricians/fellows were more likely to treat smaller wounds. However, lack of experience in suturing or lidocaine injections can be the biggest stimulus to select needle-free approaches.

#### -Wound cleaning/irrigation

The data regarding wound cleaning/irrigation are controversial. Some of the studies suggest tap water as a safe irrigation solution with no increased infection risk [15,16]. Several investigators found no difference between various antiseptic solutions but indicated that Chlorhexidine 0.02% or Hydrogen peroxide 3% (HP) causes cell damage and thus worsens wound healing [15,16]. Surprisingly, we detected that these two solutions were chosen most frequently for wound cleaning. EM physicians and fellows preferred ChG and HP alone or in combination in most of the cases. Other specialty physicians and fellows chose ChG in 45.2% and HP in 6.1% of the cases (in 19.6% of the cases both irrigation solutions were used). Other solutions as tap water or NaCl were less preferred. It is quite an interesting observation as our study excluded animal bites or heavily contaminated wounds.

#### -Techniques of wound repair

After analysis, we realised that all wounds received primary wound closure or were left to heal by itself. Majority of the wounds were treated non-surgically with tissue adhesives or tape, and only 47% (69/148) were sutured. According to different data, sutures are recommended for larger wounds and in the case of strong skin tension due to the risk of separation of the wound edges. Although, it is associated with higher risk of infection caused by needle trauma and the type of suture within the wound [17]. Tape and tissue adhesive can be used for minor trauma with minimal skin tension. Studies show that tissue adhesives have significantly shorter time of wound treatment compared with suturing [17-19]. However, they also have certain disadvantages, such as the ability of wound separation or require special learning skills. Our study revealed that

paediatricians/paediatric fellows and GP fellows preferred Steri-strips™ and tissue adhesive. Meanwhile, surgical specialties chose suturing in most of the cases. EM physicians/fellows performed both methods almost equally. There are many circumstances that could have led to these results. One of the reasons could be education and experience related to primary wound diagnostics and treatment selection. As our PED working teams are mixed (paediatrician, EM physician, paediatric-, EM- and GP fellows) methods can relate to individual choice, previous experience and study curriculum. Our paediatricians do not have that much experience in suturing as this was and still is not covered in their curriculum, so these physicians prefer non-invasive methods to invasive. Recently, updates in paediatric residency curriculum has been made with regards to trauma care and wound management leading to improved knowledge, skills and experience in paediatric fellows. Emergency fellowship is a new residency program in which residents are taught to treat minor trauma by suturing and using tissue adhesive or Steri-strips™. They have enough knowledge to decide which method should be used in a specific situation.

#### -Aftercare

The probability of infection of small wounds or lacerations is less than 6.3% [20]. However, the choice of antibiotic prescription depends on the wound itself and the mechanism of the injury. Patients with chronic comorbidities or immune deficiencies are expected to receive systemic antibiotics after wound treatment. When a wound is infected, contaminated, or contains foreign bodies, and when it is an animal bite, antibiotics should be prescribed [21]. Antimicrobial agents that act on gram+ microorganisms can sometimes be selected even with minimal trauma. These could be first-generation cephalosporins or macrolides in the case of allergy to penicillin. [Amoxicillin-clavulanic acid](#) can be used for animal bites [22]. In our study, 4 children received systemic antibiotics (3 of them - amoxicillin and 1 cefadroxil). None of them had any comorbidities which could have any influence to wound healing (e.g. immunodeficiency, coagulation system disorders, etc.). Wounds were not contaminated. Even with only four cases, antibacterial treatment should be chosen wisely as overtreatment leads to increased antimicrobial resistance [23].

Different guidelines recommended to remove sutures after 7 to 14 days from scalp, after 5 days from face area, after 3 days from eyelids and neck and after 8 to 10 days from extremities [24]. We documented that physicians and fellows' recommendations were not cohesive and did not adhere to any international recommendations of wound after-care. Stitches from head area were recommended to be removed after 7 to 10 days, from face area after 5-7 days and from extremities after approximately 5-10 days. This again confirmed our aim to implement unified wound management and care guidelines.

## Limitations

Our study has several limitations. The questionnaire could have been more accurate regarding location of laceration, as our physicians had to fill open type questions, e.g. to answer "head" was inaccurate because we could not predict if it was hairy or no-hairy part of the head. Thus, such answers were excluded. Also, questionnaire could have more detailed information about analgesia before procedure, wound depth, skin tension and reasons of physician's choice. Another limitation is that we did not include larger wounds. We did not ask parents in parallel what their preferences for wound management were. Also, we did not estimate paediatric patient's anxiety level before procedure which could have influenced the laceration repair method. Moreover, we did not monitor the duration of one or other method and the length of stay in PED.

## Conclusion

In our study we evaluated what wound care methodologies are used in our PED. We have noticed that there are a lot of differences in wound cleaning, anaesthesia and primary treatment not only between doctors of different specialties, but also in the same specialty. This showed how important wound management and after-care SOP was. Children are a sensitive group of patients and it is important to unify wound management techniques and to develop a single and evidence-based methodology that could be used by different specialty physicians and fellows.

## Recommendations

After this study, we developed a wound diagnostic/management and after-care SOP. When the paediatric patient comes to PED, first of all bleeding control should be provided, if it is necessary the X-Ray has to be done when fracture or debris are suspected. However, pain evaluation and control have to be prioritised and proper analgesia has to be ensured based on our pain management SOP (S1). Then, wound evaluation should follow. Primary wound treatment should be preferred if laceration is not infected, without visual contamination and if the wound is not older than 12 hours. Local or topical anaesthetics have to be given in case of suturing or even non-invasive treatment methods, such as gluing or stripping. In case if a child is anxious or scared, general anaesthesia is recommended. Wound revision, cleaning and closure based on type, depth and location of the wound should be performed. If it is necessary, antibiotics have to be prescribed and the main choice for that should be 1<sup>st</sup> generation cephalosporins. Child's as well as parents' compliance and social environment has to be evaluated (if further check-ups will be recommended). If the wound is sutured, stitches have to be removed after 3-5 days from the face area, after 5-7 days from hairy head parts and from extremities and other parts of the body – after 7-10 days (*Figure 3*).

## Abbreviations

ChG - Chlorhexidine Gluconate

cm – Centimetre

EM – Emergency medicine

EMLA - Eutectic mixture of local anaesthetics

ENT – Ears, nose and throat doctors

GP – General practice

HP – Hydrogen peroxide

N – Number of cases

NaCl - Sodium chloride

OMFS – Oral and Maxillofacial Surgeons

PED – Paediatric Emergency Department

SOP - Standard Operating Procedures

NSAID - Non-steroidal anti-inflammatory drugs

## Declarations

### ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Permission to conduct the study was issued by Kaunas Regional Biomedical Research Ethics Committee Protocol No.: BE-2-54. All participants undersigned the formal consent form. The study was conducted in accordance with Declaration of Helsinki and good clinical practice guidelines.

### CONSENT FOR PUBLICATION

Not applicable

### AVAILABILITY OF DATA AND MATERIAL

The dataset is accessible at the corresponding author upon a reasonable request.

### COMPETING INTERESTS



All authors declare no competing interests.

## FUNDING

This study received no internal nor external funding.

## AUTHORS' CONTRIBUTIONS

LS and LM design the study. LJ and AD supervised the study and data collection. LS, LM and LJ collected and managed the data and drafted the manuscript. LM analysed the data. LS, LJ and AD edited the manuscript. LS takes responsibility for the paper as a whole. All Authors read and approved the manuscript.

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## References

1. Merrill CT, Owens PL, Stocks C. Pediatric Emergency Department Visits in Community Hospitals from Selected States, 2005: Statistical Brief #52. Healthcare Cost and Utilization Project (HCUP) Statistical Briefs. 2006.
2. Seo DH, Kim MJ, Kim KH, Park J, Shin DW, Kim H, et al. The characteristics of pediatric emergency department visits in Korea: An observational study analyzing Korea Health Panel data. Kamolz L-P, editor. PLoS One. 2018 May 24;13(5):e0197929.
3. Spiro DM, Zonfrillo MR, Meckler GD. Wounds. *Pediatr Rev*. 2010 Aug 1;31(8):326–34.
4. Otterness K, J Singer Adam. Updates in emergency department laceration management. *Clin Exp Emerg Med*. 2019;6(2):97–105.
5. Hollander JE, Singer AJ. Laceration Management. *Ann Emerg Med*. 1999 Sep;34(3):356–67.
6. Gottrup F. Education in Wound Management in Europe with a Special Focus on the Danish Model. *Adv Wound Care*. 2012 Jun;1(3):133–7.
7. Zehtabchi S, Tan A, Yadav K, Badawy A, Lucchesi M. The impact of wound age on the infection rate of simple lacerations repaired in the emergency department. *Injury*. 2012 Nov;43(11):1793–8.
8. Ste-Marie-Lestage C, Adler S, St-Jean G, Carrière B, Vincent M, Trottier ED, et al. Complications following chin laceration reparation using tissue adhesive compared to suture in children. *Injury*. 2019 Apr;50(4):903–7.
9. Mankowitz SL. Laceration Management. *J Emerg Med*. 2017 Sep;53(3):369–82.
10. McMurtry CM, Pillai Riddell R, Taddio A, Racine N, Asmundson GJG, Noel M, et al. Far From “Just a Poke.” *Clin J Pain*. 2015 Oct;31:S3–11.
11. Lambert C, Goldman RD. Pain management for children needing laceration repair. *Can Fam Physician*. 2018 Dec;64(12):900–2.
12. AstraZeneca, Wilmington D. EMLA Cream (lidocaine 2.5% and prilocaine 2.5%). Package Insert; 2005.
13. Olsen K, Weinberg E. Pain-Less Practice: Techniques to Reduce Procedural Pain and Anxiety in Pediatric Acute Care. *Clin Pediatr Emerg Med*. 2017 Mar;18(1):32–41.
14. Crystal CS, McArthur TJ, Harrison B. Anesthetic and Procedural Sedation Techniques for Wound Management. *Emerg Med Clin North Am*. 2007 Feb;25(1):41–71.
15. Weiss EA, Oldham G, Lin M, Foster T, Quinn JV. Water is a safe and effective alternative to sterile normal saline for wound irrigation prior to suturing: a prospective, double-blind, randomised, controlled clinical trial. *BMJ Open*. 2013 Jan 16;3(1):e001504.

16. Fernandez R, Griffiths R. Water for wound cleansing. *Cochrane Database Syst Rev*. 2012 Feb 15;
17. Edlich RF, Rodeheaver GT, Thacker JG, Lin KY, Drake DB, Mason SS, et al. Revolutionary Advances in the Management of Traumatic Wounds in the Emergency Department During the Last 40 Years: Part II. *J Emerg Med*. 2010;38(2):201–7.
18. Otterness K, Thode HC, Singer AJ. Methods of laceration closure in the ED: A national perspective. *Am J Emerg Med*. 2019 Jul 25;158365.
19. Kim H, Kim W, Kang GH, Jang YS, Choi HY, Kim JG, et al. Comparison of Leukosan SkinLink with surgical suture for traumatic laceration repair: A randomized controlled trial. *Medicine (Baltimore)*. 2018;97(25):e10918–e10918.
20. Navanandan N, Renna-Rodriguez M, DiStefano MC. Pearls in Pediatric Wound Management. *Clin Pediatr Emerg Med*. 2017 Jan;18(1):53–61.
21. Mankowitz SL. Laceration Management. *J Emerg Med*. 2017 Jan;53(3):369–82.
22. Rivera RF, Fagan M. Laceration Repair. In: *Urgent Care Medicine Secrets*. Elsevier; 2018. p. 270–8.
23. Lipsky BA, Dryden M, Gottrup F, Nathwani D, Seaton RA, Stryja J. Antimicrobial stewardship in wound care: a Position Paper from the British Society for Antimicrobial Chemotherapy and European Wound Management Association. *J Antimicrob Chemother*. 2016 Nov;71(11):3026–35.
24. David M deLemos M. Closure of minor skin wounds with sutures. In: Anne M Stack, MDAllan B Wolfson M, editor. *UpToDate*. Waltham, MA.; 2018.
25. Forsch RT, Little SH, Williams C. Laceration Repair: A Practical Approach. *Am Fam Physician*. 2017 May 15;95(10):628–36.
26. Kévalas, R. (2015). *Urgentika Pediatrije*. UAB “INDIGO print”
27. Hauer, J., & Jones, B.L. (2018). Evaluation and management of pain in children. Retrieved from [https://www.uptodate.com/contents/evaluation-and-management-of-paininchildren?search=pediatricpainmanagement&source=search\\_result&selectedTitle=1~150&usage\\_type=default&display\\_rank=1#H12](https://www.uptodate.com/contents/evaluation-and-management-of-paininchildren?search=pediatricpainmanagement&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1#H12)

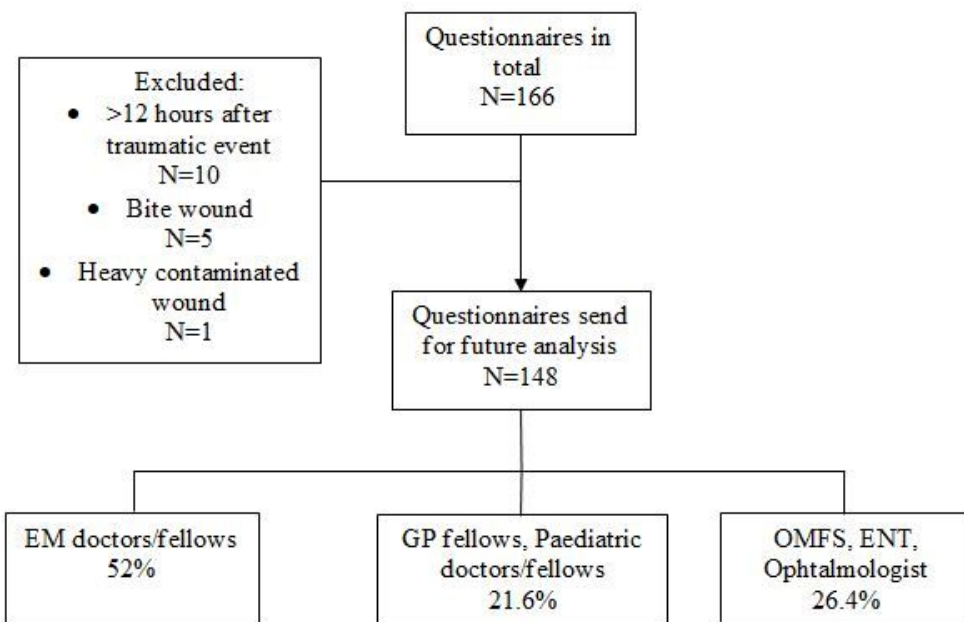
## Tables

Anaesthesia method	Cases (%)
General anaesthesia	2.0%
EMLA	0%
Lidocaine spray	4.7%
Lidocaine 2%	35.1%
Procaine 1%	0.7%
No sedation/anaesthesia	52%
More than 1 method used	5.4%

Wound cleaning method/irrigation solution	Cases (n)	Cases (%)
ChG	67	45.2%
NaCl 0.9%,	17	11.5%
No cleaning	10	6.8%
HP 3%	9	6.1%
Tap water	5	3.4%
<b>More than 1 irrigation solution n=40 (27%)</b>		
ChG + HP 3%	29	19.6%
NaCl 0.9% + HP 3%	5	3.4%
ChG + NaCl 0.9%	3	2.0%
ChG + Betadine Antiseptic Solution + NaCl 0.9%	2	1.3%
NaCl 0.9% + Betadine Antiseptic Solution	1	0.7%

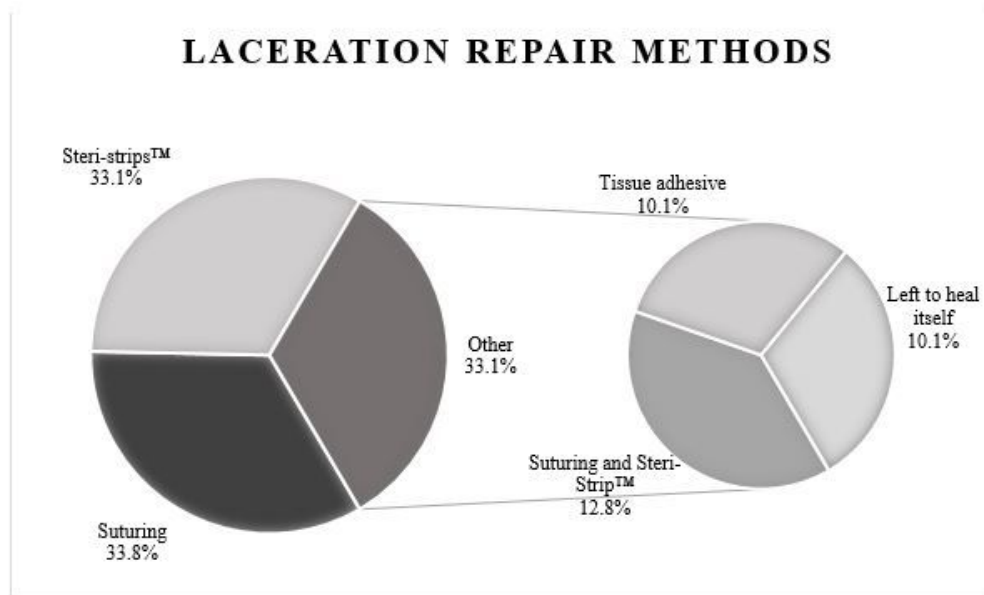
Specialty	Surgical	GP and paediatric	Emergency Medicine
Cases (N)	39	32	77
Anaesthesia	Local 54.8% (N=23)	Anaesthesia free 84.4% (N=27)	Anaesthesia free 45.1% (N=37) Local anaesthesia 38.3% (N = 31)
Suturing (% from all the cases)	N=26	N=5	N=38
Irrigation solution	No preference	No preference	Hydrogen peroxide (N=35)

## Figures



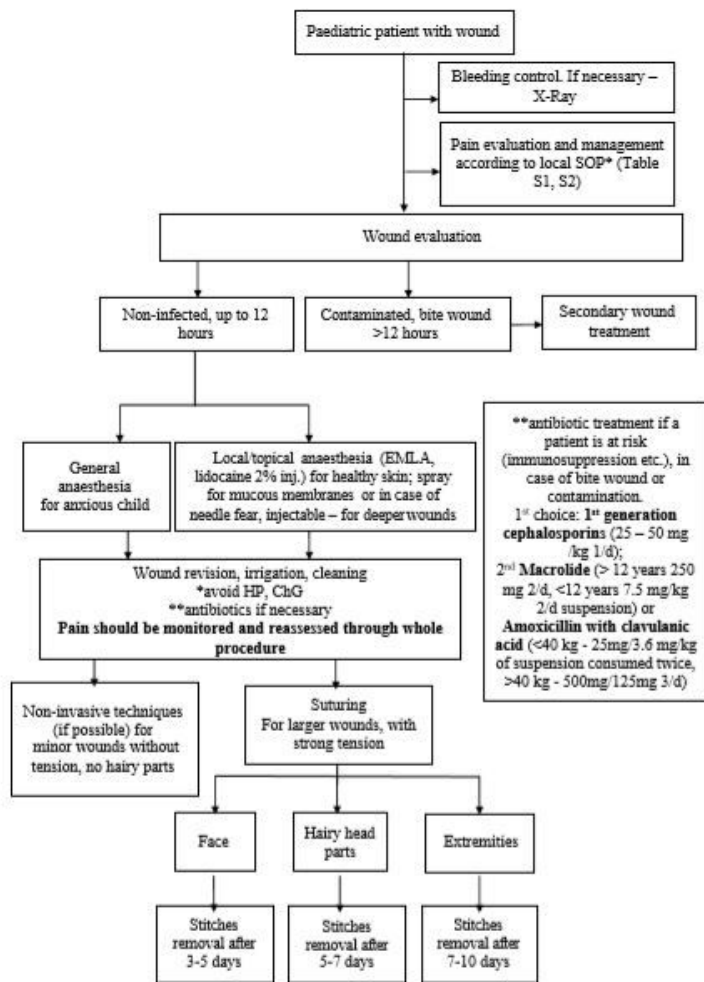
**Figure 1**

General characteristics of the study N: Number of cases; EM: Emergency medicine; GP: General practice; OMFS: Oral and Maxillofacial Surgeons; ENT: Ears, nose and throat doctors.



**Figure 2**

Choice of wound management



**Figure 3**

Wound diagnostic/management algorithm (Adapted from Forsch Rt et al., 2017 [25]) EMLA: Eutectic mixture of local anaesthetics; ChG: Chlorhexidine Gluconate; HP: Hydrogen peroxide; AB: antibiotics.

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Additionalfile1.docx](#)
- [TableS1.docx](#)
- [TableS2.docx](#)