



## Challenges of Being Prepared for Pediatric Emergencies

Jost Kaufmann & Michael Laschat

To cite this article: Jost Kaufmann & Michael Laschat (2020) Challenges of Being Prepared for Pediatric Emergencies, Prehospital Emergency Care, 24:2, 303-304, DOI: [10.1080/10903127.2019.1626957](https://doi.org/10.1080/10903127.2019.1626957)

To link to this article: <https://doi.org/10.1080/10903127.2019.1626957>



Accepted author version posted online: 31 May 2019.  
Published online: 19 Jun 2019.



Submit your article to this journal [↗](#)



Article views: 50



View related articles [↗](#)



View Crossmark data [↗](#)

## LETTERS

## CHALLENGES OF BEING PREPARED FOR PEDIATRIC EMERGENCIES

Jost Kaufmann, MD  and Michael Laschat, MD

PREHOSPITAL EMERGENCY CARE 2020;24:303–304

Prehospital pediatric emergencies require compromises as conditions are never optimal. In addition, the personnel competencies and technical resources are not identical with those of a specialized pediatric emergency department. Pediatric emergencies are so rare that no sufficient pediatric expertise can be gained solely by working in a preclinical emergency care environment. More than 80% of emergency physicians in Germany are afraid of being overwhelmed in pediatric emergencies or have already experienced this in real life (1). Multiple shortcomings were described in simulated scenarios and in real preclinical care. For example, the preclinical care providers had difficulties during endotracheal intubation in more than two thirds of the children, whereas this only occurred in 20% of the adults in the same preclinical care structure and the same medical emergency (2). However, this is not attributable to the incidence of a “real” difficult airway, which is approximately 10 times more common in adults. Regarding drug therapy, comparable limitations have been described, since most prehospital health-care providers do not feel comfortable with their abilities to administer a correct dose for small children and infants (3).

Subsequently, the resuscitation guidelines of the European Resuscitation Council (ERC) state that any

recommendations must above all be “simple and feasible” (4). This is remarkable as a preamble to a guideline. The medical care provider is not overburdened and supported by clear, easy to remember, and feasible ways of treatment. This is precisely why those guidelines can contribute to safer care of children in emergencies.

During 142 total simulated scenarios, Hoyle et al. revealed an impressive amount of errors and deficiencies during the emergency care of children (5). The authors intended to evaluate the error rate during 4 different simulated pediatric emergency scenarios while using a state-wide implemented pediatric dosing reference (PDR). The major strength of this trial was providing the error detection by an experienced external assessment since self-reporting is an insufficient (but frequently used) method with resulting implausible error rates. Nevertheless, the inevitable stress in “real” pediatric emergencies could well lead to even higher error rates than during their reported simulation. While in the simulated scenario presented by Hoyle et al. (5) almost 70% of all doses were correct (within a range of 20% deviation from the correct dose), just 30% of drug doses met this criteria during a real-life prehospital evaluation (6).

Although the implementation of PDR had achieved a significant reduction of error rates, error rates of almost 30% were still detected. Remarkably, a factor of 10 errors occurred in 8.6% events, with an error for epinephrine proving most likely fatal (7). Additionally, several different kinds of errors occurred that were alarming, for example, errors of omission or commission, unrecognized air bubbles in syringes leading to underdosing, or one case with a syringe injected solely containing air. The injection of air bubbles was not previously described as it was not frequent. In summary, the amount and intensity of drug errors was alarming.

---

Received May 17, 2019 from Pediatric Anesthesia, Children’s Hospital Cologne, Cologne, Germany (JK, ML); Faculty for Health, Witten/Herdecke University, Witten, Germany (JK). Revision received May 27, 2019; accepted for publication May 30, 2019.

Address correspondence to Jost Kaufmann, Children’s Hospital Cologne, Paediatric Anaesthesia, Amsterdamer Str. 59, Cologne, 50735, Germany. E-mail: jost.kaufmann@uni-wh.de

© 2019 National Association of EMS Physicians

doi:10.1080/10903127.2019.1626957

Additionally, although the trial focused on medication errors, numerous amounts of severe deviations from optimal medical care were observed. Some of these observations were frightening and revealed deficiencies regarding knowledge of essential recommendations. For instance, epinephrine was not administered in 17% of cases with anaphylactic shock, which clearly is a life-threatening omission (8). Other examples are the administration of atropine without a reasonable indication, delay of checking of blood glucose in children with seizures, and ignoring recommendations for the weight estimation. All these alarming observations and error rates are not a regional phenomenon in Michigan, USA, but a globally observed problem in pediatric emergency care has been previously frequently described. Also, the lack of adherence to guidelines and recommendations has been previously repeatedly reported.

We cannot be comfortable with the observations reported by Hoyle et al. (5) and others. Children are particularly vulnerable and likely to be harmed by incorrect treatment in emergency situations. The urgent need for an improvement of training, optimization of equipment, and assurance of knowledge of the recommended treatment methods must be strongly emphasized.

Most of the drug errors and incorrect treatments could have been avoided, if the medical team would have adhered to the statewide Pediatric EMS Protocols and the PDR. A few improvements of those protocols and recommendations may be sufficient, such as avoiding more drug dilutions or placing important requirements more visibly in the manuals, as clearly stated by the authors. Additionally, the mandatory use of length-based dosing systems, serving the care providers with the amount of drug solution recommended with no calculation steps requested, and providing the best weight estimation available, should be considered. With such a device, 9 out of 10 severe drug dosing errors (>300% deviation from recommended dose) have been avoided in real-life preclinical emergency care of children (6).

However, maybe even more importantly, the EMT members' own responsibility for safety must be made clear. It has been previously reported that some medical providers are more enthusiastic about safety issues than others, and the adherence to guidelines also differs (9). A personal impression over the last decades is that there is a stronger emphasis on work-life balance by employees and a changed attitude to "the employer has to train me." Despite the legitimate demands of the employees, it

appears necessary to point out the moral and also legal obligation of personal responsibility for safe and professional care for every individual EMT member. Everyone is personally responsible for a thorough knowledge of the contents and requirements of the resuscitation guidelines for all age groups. Every caregiver has to learn these and updates them regularly. No structural or educational effort can completely achieve this for the entire EMT team. Every member has to show commitment and initiative.

## ORCID

Jost Kaufmann  <http://orcid.org/0000-0002-5289-6465>

## References

1. Zink W, Bernhard M, Keul W, Martin E, Volkl A, Gries A. [Invasive techniques in emergency medicine. I. Practice-oriented training concept to ensure adequately qualified emergency physicians]. *Der Anaesthetist*. 2004;53(11):1086–92. doi:10.1007/s00101-004-0762-5.
2. Bankole S, Asuncion A, Ross S, Aghai Z, Nollah L, Echols H, Da-Silva S. First responder performance in pediatric trauma: a comparison with an adult cohort. *Pediatr Crit Care Med*. 2011;12(4):e166–70. doi:10.1097/PCC.0b013e3181f36f6e.
3. Hoyle JD, Jr., Sleight D, Henry R, Chassee T, Fales B, Mavis B. Pediatric prehospital medication dosing errors: a mixed-methods study. *Prehosp Emerg Care*. 2016;20(1):117–24. doi:10.3109/10903127.2015.1061625.
4. Maconochie IK, Bingham R, Eich C, López-Herce J, Rodríguez-Núñez A, Rajka T, Van de Voorde P, Zideman DA, Biarent D. European resuscitation council guidelines for resuscitation 2015: section 6. Paediatric life support. *Resuscitation*. 2015;95:223–48. doi:10.1016/j.resuscitation.2015.07.028.
5. Hoyle JD, Ekblad G, Hover T, Woodwyk A, Brandt R, Fales B, Lammers RL. Dosing errors made by paramedics during pediatric patient simulations after implementation of a statewide pediatric drug dosing reference. *Prehosp Emerg Care*. 2019;1–14. doi:10.1080/10903127.2019.1619002.
6. Kaufmann J, Roth B, Engelhardt T, Lechleuthner A, Laschat M, Hadamitzky C, Wappler F, Hellmich M. Development and prospective federal state-wide evaluation of a device for height-based dose recommendations in prehospital pediatric emergencies: a simple tool to prevent most severe drug errors. *Prehosp Emerg Care*. 2018;22(2):252–9. doi:10.1080/10903127.2016.1248257.
7. Perondi MB, Reis AG, Paiva EF, Nadkarni VM, Berg RA. A comparison of high-dose and standard-dose epinephrine in children with cardiac arrest. *N Engl J Med*. 2004;350(17):1722–30. doi:10.1056/NEJMoa032440.
8. Sampson HA, Mendelson L, Rosen JP. Fatal and near-fatal anaphylactic reactions to food in children and adolescents. *N Engl J Med*. 1992;327(6):380–4. doi:10.1056/NEJM199208063270603.
9. Kaufmann J, Schieren M, Wappler F. Medication errors in paediatric anaesthesia—a cultural change is urgently needed! *Br J Anaesth*. 2018;120(3):601–3. doi:10.1016/j.bja.2017.12.008.