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Audit

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Preparedness of Pediatric Healthcare Personnel for Emergency Airway Management: A Simulation-Based Audit in a Tertiary Care Hospital in Sri Lanka

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ABSTRACT

Introduction: Emergency airway management (EAM) in paediatrics demands a high level of preparedness, particularly in resource-limited settings. This study audited the preparedness of paediatric healthcare staff for EAM and evaluated the impact of a simulation-based intervention. **Methods:** A prospective audit was conducted using an unannounced drill with a low-fidelity manikin to assess equipment, drug availability, patient preparation, protocol adherence, and team role allocation. A re-audit was carried out following a structured training session. **Results:** Functional equipment availability increased from 40% to 80% (Z = –3.357, *p* = 0.001), while drug availability improved with the introduction of fentanyl but without statistical significance (Z = –1.000, *p* = 0.317). Patient preparation rose from 60% to 100% (*N* = 5, *p* = 0.500), protocol adherence improved from 41.2% to 82.4% (*N* = 17, *p* = 0.016), and team role allocation increased from 42.9% to 85.7% (*N* = 7, *p* = 0.250). **Conclusion:** Overall, simulation-based training significantly enhanced paediatric EAM preparedness, particularly in equipment functionality and procedural adherence, highlighting its effectiveness as a low-cost educational tool to improve patient safety and readiness for paediatric airway emergencies.

Keywords: Emergency airway management, simulation-based training, healthcare personnel preparedness

INTRODUCTION

Emergency airway management (EAM) is an integral component in the care of critically unwell patients, where a prompt response can be lifesaving (1). EAM and Advanced Life Support (ALS) are critically time-sensitive and require the immediate availability of essential equipment and trained personnel. Although acute airway emergencies mainly present to emergency departments, clinical deterioration may occur at any point during a patient's hospital stay. Emergency airway management outside fully equipped areas such as the operating theatre and the Emergency Department (ED) is often associated with the unavailability of advanced equipment and personnel, resulting in morbidity and mortality (2). Therefore, all areas of the hospital should be adequately equipped to provide acute airway management (3).

Paediatric patients, particularly neonates and infants, are more susceptible to rapid desaturation during respiratory distress due to

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smaller airways, increased oxygen demand, and shorter safe apnoea times compared to adults. Studies have shown that early recognition, prompt intervention, and the use of appropriately sized equipment can prevent adverse outcomes during airway emergencies. For instance, airway emergencies in paediatric wards demand the availability of endotracheal tubes, bag-valve masks, and laryngoscopes in a range of sizes, alongside life-saving drugs such as adrenaline and atropine (4,5). However, research indicates that problems with airway management are rarely due to anatomically difficult airways and are more commonly attributable to physiologically or situationally difficult airways (6). Hence, adequate preparation and appropriate use of airway management techniques, in accordance with established guidelines, are essential to prevent these complications (2).

A multidisciplinary team approach, with well-coordinated roles and effective communication strategies, is crucial for successful airway management. When paediatric hospitals implement dedicated airway safety programmes or protocols that include regular simulation-based training for staff, marked improvements have been observed in procedural success rates and reductions in adverse events. For example, one study reported that hospitals with such teams experienced fewer complications related to emergency airway interventions (7).

Training programmes focusing on Rapid Sequence Intubation (RSI) and difficult airway algorithms have been recognized as essential for preparing paediatric healthcare teams. Simulations provide healthcare personnel with opportunities to practice their skills and refine team communication under high-pressure situations. Incorporating advanced tools such as video laryngoscopy has also been recommended to improve intubation success, particularly in difficult cases (8,9).

The primary objective of this study was to evaluate the preparedness, knowledge, and skills of healthcare personnel in paediatric emergency intubation and to identify areas for improvement. The secondary objective is to train healthcare professionals in best practices for paediatric emergency intubation through an educational intervention, followed by a reassessment of their preparedness. Conducted at the Paediatric Professorial Unit, Teaching Hospital Peradeniya, the study involves auditing the availability and functionality of emergency airway equipment and medications, assessing team dynamics, and identifying challenges in effective airway management.

Paediatric airway emergencies differ significantly from adult cases due to anatomical and physiological variations, emphasizing the need for a high level of preparedness to ensure optimal outcomes. By examining current practices and available resources, this study aims to provide practical recommendations to improve readiness. Addressing gaps in equipment, medication availability, and team coordination will enhance airway emergency management and contribute to overall patient safety.

Our literature review revealed that, while numerous studies have been conducted on this topic in emergency departments and intensive care units, very few have focused on general paediatric wards. Therefore, this study is both timely and essential in identifying existing knowledge gaps.

METHODOLOGY

Sri Lanka is a developing country with commendable health indices. However, the COVID-19 pandemic and the recent economic crisis have had a significant impact on the healthcare system. Hospitals faced severe shortages of medical supplies during 2021–2022. This study was conducted against that background in 2023.

The study was carried out in the Professorial Paediatric Unit of the Teaching Hospital, Peradeniya, which is a tertiary care center. Healthcare workers of the Paediatric Professorial Unit—including middle-grade doctors, intern medical officers, nursing staff, and healthcare assistants—were recruited into the study.

In total, eight paediatric healthcare workers participated in the simulation drill, reflecting the typical multidisciplinary team composition involved in real-life paediatric emergency airway management. The team comprised one paediatric registrar serving as the team leader, three assisting doctors (one additional paediatric registrar, one senior house officer, and one intern medical officer), two nursing officers, and two healthcare assistants. The drill was conducted by three trained emergency medicine registrars, while participants' performance was assessed using a structured checklist by two pre-trained paediatricians who are certified Advanced Paediatric Life Support (APLS) trainers. This team composition accurately mirrors the standard number and mixes of healthcare personnel involved in paediatric airway management, ensuring that the simulation authentically represented actual ward conditions and team dynamics.

An unannounced drill was conducted in the high-dependency room of the paediatric ward using a full-body, low-fidelity manikin. To improve fidelity, attention was given to conceptual, physical, and psychological aspects. To enhance realism, the manikin was assigned a name, age, and gender, and an accompanying parent was included. Furthermore, an iPad displaying vital parameters, cardiac monitors, equipment, drugs, and a clinical scenario with a blueprint were used.

The checklist comprised the following components: availability and functionality of equipment, availability and preparation of drugs, patient preparation, structured approach to the patient and team dynamics.

Marks were awarded for each component and entered into a Microsoft Excel spreadsheet. The observations of both assessors were considered when entering the data, and a final mark was recorded based on consensus.

Implementation of Changes

Following the initial drill, a presentation on Emergency Airway Management and Advanced Paediatric Life Support was conducted for the healthcare staff. This was followed by a simulation-based training programme conducted by emergency medicine trainees to enhance staff knowledge and skills. The session covered equipment and drug preparation, patient preparation, correct procedures, structured approaches to critically ill children, role allocation, teamwork, and other soft skills.

Re-audit

Four weeks later, another unannounced drill was carried out under similar settings using the same low-fidelity manikin. As before, careful attention was given to fidelity, realism, and environmental consistency. The scenario was again run by emergency registrars, and the same two trained observers marked the checklist. Data entry followed the same procedures as in the initial audit.

Statistical Analysis

Data were analysed using SPSS software (version 24). Normality of distribution was assessed using the Shapiro–Wilk test, which revealed that the dataset did not follow a normal distribution. Therefore, non-parametric tests were used.

The Wilcoxon Signed-Rank test was applied to compare paired pre- and post-intervention median scores across the five assessment domains (equipment availability, prepared drug availability, patient preparation, procedural adherence, and team role allocation). McNemar tests were used for categorical paired comparisons to assess pre- and post-training differences in procedural adherence, patient preparedness, and team role allocation.

Necessary approval was obtained from the Head of the Department, Paediatric Professorial Unit, Teaching Hospital Peradeniya. The drills were performed using manikins, and no patients were involved; hence, there were no ethical concerns related to this study.

Clinical trial registration: Not applicable.

RESULTS

Overview of Audit Findings

The baseline audit identified considerable deficiencies in paediatric emergency airway preparedness across multiple domains, including equipment functionality, drug availability, patient readiness, procedural adherence, and team coordination. Only 40% of essential airway equipment was found to be functional, while another 40% was present but not in working condition. The remaining 20% of critical items were entirely unavailable within the unit, although accessible from other hospital areas when urgently required. These gaps posed a significant risk to the timely and safe management of paediatric airway emergencies.

Following the six-week simulation-based training programme, a re-audit demonstrated substantial improvements across nearly all domains. Functional equipment availability increased from 40% to 80%, while non-functional items decreased dramatically from 40% to 3.3%. Nevertheless, 16.6% of essential equipment—such as advanced airway adjuncts— remained unavailable within the unit and continued to be shared with other departments.

The Figure 1 illustrates comparative percentages for functional equipment, non-functional equipment, unavailable critical equipment, drug availability (fentanyl), patient preparation, procedural adherence, and team role allocation. Marked improvements were observed across most domains following the audits, with the greatest gains seen in patient preparation (60% to 100%), procedural adherence (41.2% to 82.4%), and team role allocation (42.9% to 85.7%). Dark blue bars represent values before the audit, while light blue bars indicate values after the audit (figure 1).

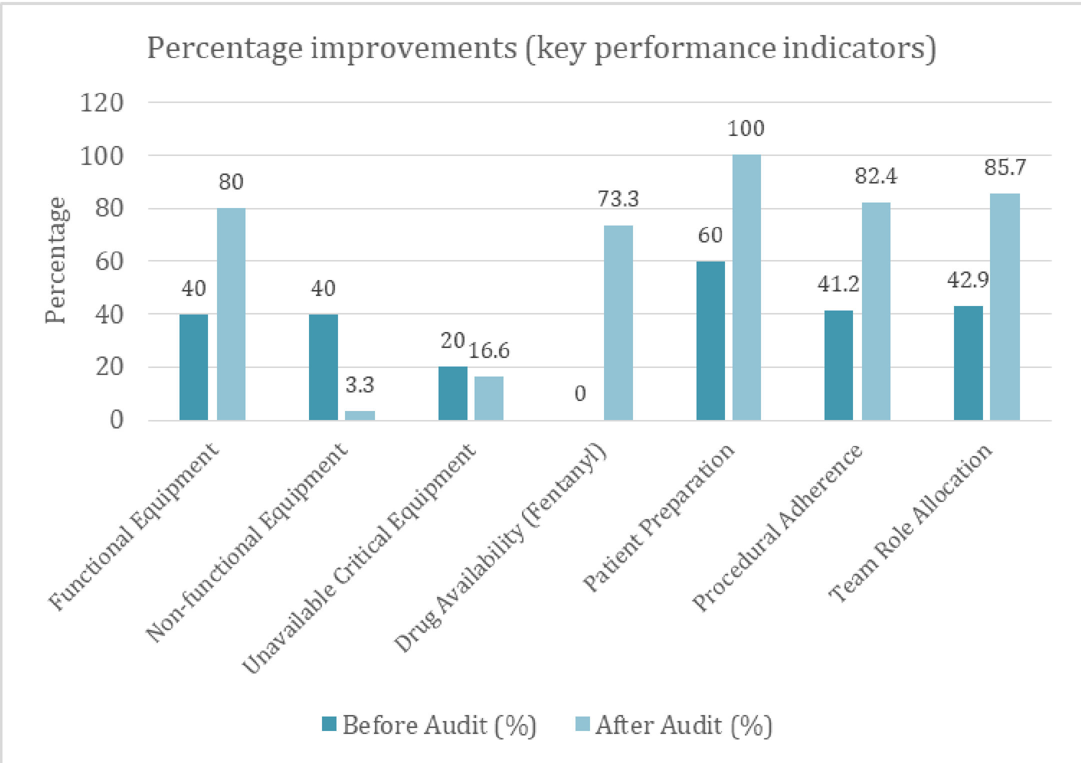

Figure 1: Key performance indicators percentage improvements before and after the audits

Equipment and Drug Preparedness

The Wilcoxon signed-rank test confirmed a statistically significant improvement in equipment availability following the intervention ($Z = -3.357$, $p = 0.001$). The median equipment score increased from 2.00 before the training to 3.00 after, indicating a clear positive effect of the simulation programme on logistical and operational readiness. These gains reflected both improved functionality of existing devices and better organisation of emergency trolleys following the teaching sessions.

In contrast, the improvement in drug availability was modest. Fentanyl, which was absent during the initial audit, was introduced into the resuscitation trolley after the educational intervention. Although this addition improved overall drug availability to 73.3%, the change was not statistically significant ($Z = -1.000$, $p = 0.317$). This finding suggests that while training enhanced awareness, external factors such as supply limitations may have constrained further progress.

Table 1: Wilcoxon Signed-Rank Test Mean Ranks

Domain	Mean Rank (Before)	Mean Rank (After)	Z-Value	P-Value
Equipment Availability	0.00	6.50	-3.357	0.001
Prepared Drug Availability	0.00	1.00	-1.000	0.317

Patient Preparation and Procedural Adherence

Patient preparation also demonstrated notable progress. Initially, 60% compliance was recorded, largely due to missed preparatory steps such as correct patient positioning, readiness of suction apparatus, and omission of nasogastric tube insertion. After training, compliance rose to 100%, reflecting improved awareness of systematic preparation prior to intubation.

Procedural adherence, assessed according to the intubation algorithm, showed one of the most marked improvements—rising from 41.2% before training to 82.4% afterwards. Steps such as declaration of plan (ABCD), pre-oxygenation, sedation and paralysis sequence, and confirmation of tube placement were performed more consistently. Statistical analysis using the McNemar test demonstrated a significant improvement in procedural adherence ($N = 17$, $\chi^2 = 5.84$, $p = 0.016$), confirming that the training intervention had a measurable effect on adherence to recommended airway protocols.

Team Role Allocation

At baseline, only 42.9% of team roles were appropriately assigned during airway management. Critical roles such as airway operator, drug administrator, monitor assistant, and recorder were not clearly designated, and no individual was identified for manual in-line stabilisation (MILS) or cricoid pressure application. The re-audit revealed significant improvement, with correct role allocation increasing to 85.7%. Despite this, the omission of a designated individual for MILS persisted, suggesting that specific task allocation needs further emphasis in subsequent training cycles.

Table 2: McNemar Test – showing the procedural adherence: number of procedures completed ("done") and not completed ("not done") before and after the training programme.

	Procedural Adherence Before	Procedural Adherence After
Done	0	7
Not Done	3	0

The McNemar test did not demonstrate a statistically significant change in team role allocation ($N = 7$, $\chi^2 = 1.32$, $p = 0.250$), although the descriptive data indicate meaningful clinical improvement. The increase in observed coordination, command clarity, and mutual support was evident during post-simulation debriefs, underscoring qualitative gains not fully captured by statistical testing.

Patient Preparedness

The analysis of patient preparedness revealed that all critical preparatory steps were not completed during the initial drill, resulting in an overall readiness score of 60%. After training, all observed teams achieved complete preparedness (100%), ensuring the availability of appropriately sized airway adjuncts, suction devices, and monitoring equipment before intubation.

However, this improvement did not reach statistical significance ($N = 5$, $\chi^2 = 0.46$, $p = 0.500$) on McNemar testing, likely reflecting the small sample size and the ceiling effect achieved after universal compliance in the re-audit.

Table 3: Summary of McNemar Test Results

Domain	No. of Steps in the algorithm	Steps done - Before	Steps done - After	P-Value	Chi square (df=1)
Procedural Adherence	17	0	7	0.016	5.84
Patient Preparedness	5	0	2	0.500	0.455
Team Role Allocation	7	1	3	0.250	1.32

Integrated Domain Comparison

Across all five domains assessed equipment availability, prepared drug availability, patient preparation, procedural adherence, and team role allocation median scores increased following the simulation-based training programme (Figure 1). The most pronounced quantitative improvements were seen in equipment readiness and procedural adherence, both demonstrating statistically significant changes, while drug availability, patient preparation, and team allocation improved qualitatively though not significantly.

Performance was assessed across five key domains: team role allocation, patient preparation, procedural adherence, drug availability, and equipment availability. Median scores increased in all domains following the training, with improvements most pronounced in drug and equipment availability (from 2 to 3). Dark blue bars represent scores before training, and light blue bars represent scores after training (Figure 2).

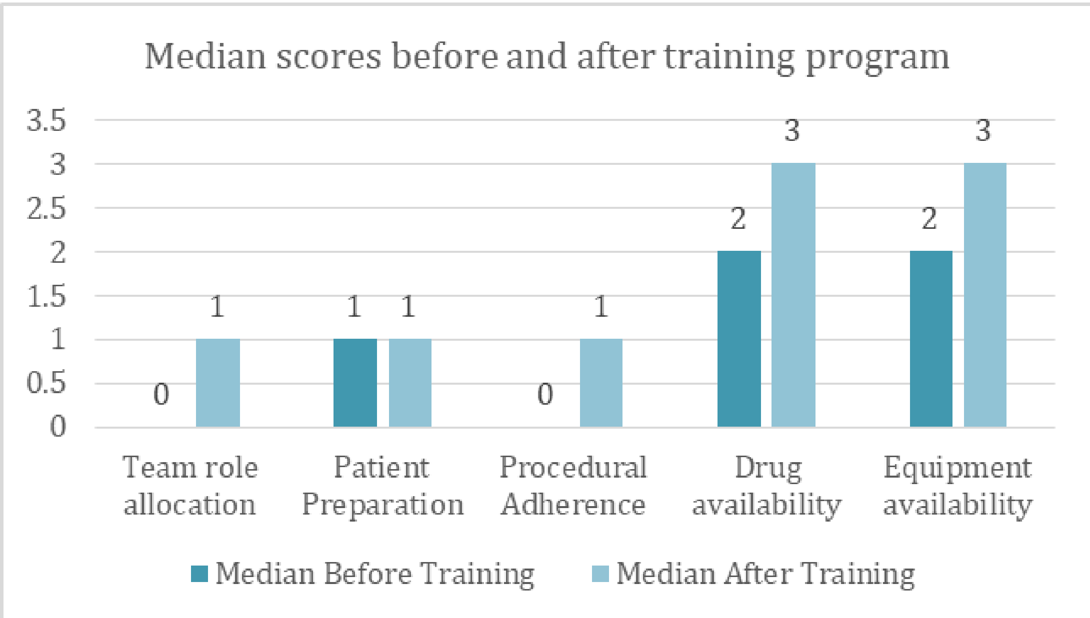

Figure 2. Median scores before and after training program

Summary of Findings

In summary, the simulation-based intervention led to measurable enhancements in paediatric airway emergency preparedness. The statistically significant improvements in equipment availability ($Z = -3.357$, $p = 0.001$) and procedural adherence ($N = 17$, $\chi^2 = 5.84$, $p = 0.016$) demonstrate the effectiveness of targeted, structured training in strengthening both technical and process-related aspects of care.

Although improvements in drug availability ($Z = -1.000$, $p = 0.317$), patient preparedness ($N = 5$, $\chi^2 = 0.46$, $p = 0.500$), and team role allocation ($N = 7$, $\chi^2 = 1.32$, $p = 0.250$) were not statistically significant, they represent clinically meaningful progress towards safer, more organised responses in paediatric emergencies.

Overall, the findings highlight the value of regular simulation-based education as a practical, low-cost strategy to enhance emergency readiness. Continued periodic audits, reinforcement of team communication skills, and administrative support to maintain equipment and drug stocks are essential to sustain and expand these gains.

DISCUSSION

This study incorporated and evaluated key principles of adult learning, specifically Crisis Resource Management (CRM) and Simulation-Based Experiential Learning. The drill and assessment process followed the framework of Kolb's experiential learning cycle, encompassing concrete experience, reflective observation, abstract conceptualisation, and active experimentation.

The findings revealed significant gaps in the availability of emergency drugs and essential equipment in the paediatric ward. The initial audit exposed several critical challenges, showing that only 40% of the listed equipment was functional, while a further 40% was present but non-operational. Additionally, 20% of essential equipment was entirely unavailable within the unit but could be accessed elsewhere. These findings align with results from other developing countries. For example, research from a general hospital in Central Ethiopia reported that only 57% of medical equipment was functional (10). Similarly, qualitative studies in district hospitals in the West Coast Winelands Region of South Africa revealed that 82% and 91% of healthcare staff perceived equipment availability as inadequate. In contrast, studies from developed countries demonstrate significantly higher levels of equipment functionality (10,11).

Following the simulation-based training intervention, the re-audit revealed substantial improvements. The availability of functional equipment increased from 40% to 80%, while non-functional equipment decreased from 40% to 3.3%. Despite these improvements, 16.6% of essential equipment remained unavailable within the unit.

Drug accessibility was another notable concern. Initially, fentanyl was absent, but following the intervention, it was stocked in the resuscitation trolley, improving overall drug availability to 73.3%. Patient preparation, which initially had a compliance rate of 60%, reached 100% in the re-audit. Adherence to procedural protocols also improved markedly, rising from 41.2% to 82.4% after the training programme. Team role allocation increased from 42.9% to 85.7%; however, the absence of a designated staff member for cricoid pressure application persisted.

To evaluate the effectiveness of the six-week simulation-based training programme in improving equipment availability and drug preparation in paediatric emergencies, Wilcoxon signed-rank tests were employed. The results indicated a statistically significant improvement in equipment availability after training ($Z = -3.357$, $p = 0.001$), with a notable increase in the mean rank of equipment availability (from 0.00 to 6.50). These results emphasise the effectiveness of simulation-based training in enhancing preparedness and resource availability.

In contrast, no statistically significant change was observed in drug preparation and availability after the training ($Z = -1.000$, $p = 0.317$). Although a minor increase in drug availability was recorded (Mean Rank = 1.00 from 0.00), this difference was not statistically significant. Similar challenges have been reported in other studies. For instance, an audit conducted in an Argentinian tertiary care hospital found that 62% of emergency drugs were unavailable and 15% were expired. After an educational intervention, the proportion of absent drugs decreased to 43% and expired drugs to 4% (12).

McNemar tests were used to analyse the intervention's impact across various domains. Procedural adherence significantly improved after training (N = 17, χ^2 = 5.84, p = 0.016), with the proportion of completed procedures increasing from 0 to 7, while incomplete procedures decreased from 3 to 0. However, patient preparedness did not show a statistically significant change (N = 5, χ^2 = 0.46, p = 0.500), suggesting that the intervention had limited impact on this area. Similarly, no significant improvement was observed in team role allocation (N = 7, χ^2 = 1.32, p = 0.250), indicating persistent gaps in this aspect. A root cause analysis of 84 reports from a Danish hospital revealed that 52% of incidents were attributed to verbal communication errors (13), emphasising the importance of structured communication protocols in emergency settings.

Further evidence from a study conducted at the University of Colorado, which analysed 24 simulation-based Emergency Medical Service (EMS) scenarios, identified 262 efficiency and patient safety issues within just 4.25 hours of video recordings. Among these, 19 incidents of unsafe medication administration were recorded across 13 scenarios, underscoring the necessity of ongoing training and strict adherence to standardised emergency protocols (14).

Re-audits demonstrated improvements across all assessed parameters following simulation-based training. Healthcare professionals—including house officers, medical officers, nursing staff, and healthcare assistants—benefited from the structured educational interventions. Continuous staff training remains a critical factor in improving knowledge, skills, and paediatric emergency intubation practices.

The regular use of standardised checklists, frequent simulation-based training sessions, routine equipment maintenance, and adherence to airway management guidelines are essential strategies for improving patient outcomes. Simulation-based education strengthens key competencies in preparation, airway management, medication administration, and teamwork—skills that are indispensable for the safe management of paediatric emergencies.

CONCLUSION

This study identified critical deficiencies in the availability of emergency airway drugs, essential equipment, and healthcare staff preparedness in paediatric emergency intubation. However, the re-audit demonstrated significant improvements in equipment functionality, drug accessibility, procedural adherence, and role allocation following simulation-based training interventions.

Based on these findings, we strongly recommend implementing standardised checklists, conducting routine audits, and organising regular training programmes for healthcare personnel to improve knowledge, skills, and preparedness in paediatric airway management. Furthermore, hospital administrators should prioritise fulfilling requests for essential equipment and emergency drugs to ensure optimal and timely patient care.

Author declaration

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Authors' contributions:

NPPWJ, WANPB, GAHS: Conceptualization and manuscript writing; PD, SK: Manuscript Reviewing and editing.

Conflicts of interest:

The authors declare that they have no competing interests with respect to the research, authorship, and/or publication of this article.

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Ethics statement:
This study was conducted using mannequins and did not involve human subjects. As there was no direct involvement of patients, ethical clearance was not required. The permission to conduct the drill and the simulation-based training was obtained from the Head of the department of Paediatrics and Director of the Hospital.

Statement on data availability:
The raw data supporting the conclusions of this article can be made available by the authors, without undue reservation.

REFERENCES

1. Umana E, Foley J, Grossi I, Deasy C, O'Keeffe F; Irish Trainee Emergency Research Network (ITERN) Collaborators. National Emergency Resuscitation Airway Audit (NERAA): a pilot multicentre analysis of emergency intubations in Irish emergency departments. BMC Emerg Med. 2022 May 28;22(1):91. doi: 10.1186/s12873-022-00644-2. PMID: 35643431; PMCID: PMC9148500.
2. Karamchandani K, Wheelwright J, Yang AL, Westphal ND, Khanna AK, Myatra SN. Emergency airway management outside the operating room: current evidence and management strategies. Anesth Analg. 2021;133(3):648–62. doi:10.1213/ANE.0000000000005631. PMID: 34348368.
3. Pillay S, Hoffman D, Parris P. Audit of emergency airway drugs and equipment at a Johannesburg hospital. Afr J Emerg Med. 2022 Dec;12(4):406-409. doi: 10.1016/j.afjem.2022.08.002. Epub 2022 Sep 15. PMID: 36187074; PMCID: PMC9489748.
4. Tweed J, George T, Greenwell C, Vinson L. Prehospital Airway Management Examined at Two Pediatric Emergency Centers. Prehosp Disaster Med. 2018 Oct;33(5):532-538. doi: 10.1017/S1049023X18000882. PMID: 30379129.
5. Levitan RM. Patient safety in emergency airway management and rapid sequence intubation: metaphorical lessons from skydiving. Ann Emerg Med. 2003 Jul;42(1):81-7. doi: 10.1067/mem.2003.254. PMID: 12827126.
6. The Royal Children's Hospital Melbourne. Emergency airway management: Clinical Practice Guidelines [Internet]. Melbourne (AU): The Royal Children’s Hospital; [cited 2025 Jul 14]. Available from: https://www.rch.org.au/clinicalguide/guideline_index/Emergency_airway_management/
7. Tollefsen WW, Brown CA 3rd, Cox KL, Walls RM. Two hundred sixty pediatric emergency airway encounters by air transport personnel: a report of the air transport emergency airway management (NEAR VI: "A-TEAM") project. Pediatr Emerg Care. 2013 Sep;29(9):963-8. doi: 10.1097/PEC.0b013e3182a219ea. PMID: 23974713.
8. Orso D, Vetrugno L, Federici N, D'Andrea N, Bove T. Endotracheal intubation to reduce aspiration events in acutely comatose patients: a systematic review. Scand J Trauma Resusc Emerg Med. 2020 Dec 10;28(1):116. doi: 10.1186/s13049-020-00814-w. PMID: 33303004; PMCID: PMC7726605.
9. Weihing VK, Crowe EH, Wang HE, Ugalde IT. Prehospital airway management in the pediatric patient: A systematic review. Acad Emerg Med. 2022 Jun;29(6):765-771. doi: 10.1111/acem.14410. Epub 2021 Dec 9. PMID: 34807481.
10. Kabeta SH, Chala TK, Tafese F. Medical Equipment Management in General Hospitals: Experience of Tulu Bolo General Hospital, South West Shoa Zone, Central Ethiopia. Med Devices (Auckl). 2023 Mar 17;16:57-70. doi: 10.2147/MDER.S398933. PMID: 36959832; PMCID: PMC10029930.
11. Eygelaar JE, Stellenberg EL. Barriers to quality patient care in rural district hospitals. Curationis. 2012 May 9;35(1):36. doi: 10.4102/curationis.v35i1.36. PMID: 23327761.
12. Fernández Achával MI, Mammi LF, Fortini Cabarcos N, Guiñazú GG, Mercedes Robledo CA, Dvorkin J, Monteverde E, Pascual C, Elias Costa C, Vainstein EO. Assessment of emergency trolley drugs in a children's hospital. Before and after study on an educational intervention. Arch Argent Pediatr. 2020 Aug;118(4):234-239. English, Spanish. doi: 10.5546/aap.2020.eng.234. PMID: 32677783.
13. Rabøl LI, Andersen ML, Østergaard D, Bjørn B, Lilja B, Mogensen T. Descriptions of verbal communication errors between staff. An analysis of 84 root cause analysis-reports from Danish hospitals. BMJ Qual Saf. 2011 Mar;20(3):268-74. doi: 10.1136/bmjqs.2010.040238. Epub 2011 Jan 5. PMID: 21209139.
14. Barata IA, Benjamin LS, Mace SE, Herman MI, Goldman RD. Pediatric patient safety in the prehospital/emergency department setting. Pediatr Emerg Care. 2007 Jun;23(6):412-8. doi: 10.1097/01.pec.0000278393.32752.9f. PMID: 17572530.