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EDITORIAL

Protecting tiny patients: preventing perioperative hypoglycaemia in paediatric surgery

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Perioperative care in children presents formidable challenges, particularly in low- to middle-income countries (LMICs) like South Africa, where high rates of morbidity and mortality demand urgent intervention. The South African Paediatric Surgical Outcomes Study (SAPSOS) and the African Paediatric Surgical Outcomes Study (ASOS-Paeds) revealed a stark contrast in surgical outcomes for children in Africa compared to high-income countries (HICs).[1-3] A secondary analysis of the SAPSOS multicentre cohort highlighted a threefold increase in anaesthesia-related serious adverse events and a tenfold rise in the risk of perioperative cardiac arrest compared to HICs.[4] Understanding the frequency and nature of perioperative adverse events in LMICs is essential for improving outcomes.

In this issue of SAJAA, Viljoen et al. present a prospective observational study on perioperative critical events in 206 paediatric patients aged up to 12 years at Rahima Moosa Mother and Child Hospital in Johannesburg, South Africa.[5] The study reveals a significant 34% cumulative incidence of critical events, with hypoglycaemia being the most prevalent, affecting one in five patients. Though limited to a single site, this study provides vital insights into perioperative events in South African children and underscores the pressing need for tailored management strategies.[5] Notably, it underlines the necessity for reducing hypoglycaemia, in line with the Safe Anaesthesia for Every Child (SAFETOTS) initiative by the European Society for Paediatric Anaesthesiology (ESPA), which prioritises maintaining normoglycaemia as a key perioperative factor.[6] Although various dextrose concentrations were used to manage hypoglycaemia, the total dose administered and, more crucially, the effectiveness of these interventions were not documented. This is important because both the duration and severity of hypoglycaemia can significantly impact subsequent harm. Respiratory adverse events, typically the most frequent perioperative anaesthesia-related critical event in this age group, were the second most common in this study, occurring in 11% of cases. Although a trend suggested a higher incidence in younger children, the confidence intervals were not statistically significant (0.4 to 1.0). Other critical events included emergence delirium (2.4%), cardiovascular complications (1.9%), and temperature abnormalities (0.5%). The study found no significant associations between age, weight, ASA classification, or type of surgery and critical events, though this may be attributed to the small sample size limiting the statistical power to detect such associations.

The relatively high incidence of hypoglycaemia reported in this study aligns with rates observed in single-centre studies from Egypt and the United States of America at 26.2% and 21.0%, respectively.[7,8] However, these rates are significantly higher than those reported in the SAPSOS, ASOS-Paeds, and APRICOT studies.[1-3] Understanding the wide variation in reported incidence is challenging due to several factors. One key difference is that glucose levels were measured in every patient undergoing procedures in Viljoen's study. This practice is uncommon in many South African, African, and European institutions. Direct comparisons between studies are complicated by varying definitions of hypoglycaemia and a lack of consensus on what constitutes clinically significant perioperative hypoglycaemia in children and its long-term outcomes. These discrepancies raise concerns about the risk of unnoticed perioperative hypoglycaemia and underscore the need for standardised definitions across all age groups. This is crucial, as data suggest that perioperative dysglycaemia can lead to severe complications, such as seizures, prolonged recovery, higher infection rates, and potential neurological damage.[7] The current study did not address these outcomes. It lacked long-term follow-up to determine whether the high incidence of critical events had enduring clinical implications. Still, further research is urgently needed to address these vital issues.

Previous studies have identified several important risk factors for hypoglycaemia, including prolonged fasting, failure to thrive (weight-for-age <5th percentile), the presence of a feeding tube, history of poor feeding, and abdominal surgery.[8,9] While this study did not identify significant risk factors for hypoglycaemia, the authors acknowledged limitations in assessing these factors, noting that prolonged fasting is likely a significant contributor and has been previously recognised as a concern in paediatric surgical patients in South Africa.[10] They specifically suggested that difficulties in implementing and adhering to fasting guidelines in LMICs include their institution's lack of a clear protocol for clear fluids, heavy patient loads, unpredictable surgery schedules, equipment issues, and administrative delays. These challenges, along with additional problems such as high patient-to-staff ratios, communication gaps, and inadequate staff

training, are likely reflective of paediatric anaesthetic practice across many South African public sector hospitals. Although the Paediatric Anaesthesia Community of South Africa (PACSA) endorsed reducing fasting times in 2019 to align with British and European guidelines, the impact of this change remains unclear, and the findings of this study suggest that implementation may be inadequate. Future research should focus on evaluating adherence to these guidelines and identifying patients at risk of perioperative hypoglycaemia to develop targeted prevention strategies.

Successful prevention of perioperative complications, such as hypoglycaemia, requires a coordinated, multidisciplinary approach and full buy-in from all stakeholders. Hospitals must ensure optimal adherence to updated fasting protocols, provide continuous staff education, and actively involve parents in understanding and following these guidelines. A collaborative strategy involving surgeons, anaesthesiologists, paediatricians, and nurses is crucial. Additionally, integrating these safety findings into national guidelines, conducting regular audits, and implementing quality improvement initiatives are essential for enhancing clinical practices. The action points in Table I offer a structured approach to addressing these issues and should be a key component of any comprehensive strategy. Future research should explore the incidence, risk factors, and long-term impacts of perioperative hypoglycaemia and focus on developing standardised preventive strategies, including fasting and glucose monitoring protocols, to reduce these risks.

Table I: Summary of action points:

1. Implement and adhere to updated fasting protocols.
2. Conduct ongoing training for healthcare staff on best practices.
3. Educate parents on the importance of fasting guidelines.
4. Ensure multidisciplinary collaboration in perioperative care.
5. Increased vigilance in the monitoring of perioperative glucose levels.
6. Research preventive strategies and long-term outcomes.

The findings from this Johannesburg academic hospital urgently call for action. The alarmingly high incidence of hypoglycaemia highlights an immediate need for policy and practice changes. By adopting evidence-based protocols, investing in staff training, and fostering multidisciplinary collaboration, healthcare providers can substantially mitigate the risks associated with hypoglycaemia in paediatric surgery. Prioritising paediatric surgical safety is crucial both in South Africa and globally; targeted interventions and improved practices can reduce critical events and ensure a safer surgical environment for children everywhere.

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