



Adherence to Clinical Guidelines and Hypoglycaemia Incidence in High-Risk Late Preterm and Term Infants: An Audit from a Regional Australian Hospital

Kothari P^{1,2}, Kothari N^{1,2*}, Hariprakash S¹ and Jeevan A³

¹Department of Paediatrics, Mildura Base Public Hospital, Australia

²Monash Rural Health, Monash University, Australia

³Department of Neonatology, Canberra Hospital, Australia

***Corresponding author:** Nakul Kothari, Adjunct Senior Lecturer (Practice), Monash University. Paediatrics Department, Mildura Base Public Hospital, Mildura, Victoria, 3500, Australia, Tel: +61 350 223 333; Email: nakulkothari@gmail.com

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Abstract

Background: Neonatal hypoglycaemia is a known risk factor for poor neuro-developmental outcome. Adherence to – guidelines have shown to decrease the incidence of hypoglycaemia in high-risk infants. **Methods:** This retrospective observational study assessed adherence to clinical guidelines for hypoglycaemia screening in late preterm and term infants at Mildura Base Public Hospital. **Result:** Of the 602 deliveries, 101 infants were at risk, with 33 cases of hypoglycaemia detected among 83 eligible infants. Adherence to guidelines significantly reduced hypoglycaemia incidence by 84%. However, delays in initiating feeds and conducting blood glucose tests highlight areas for improvement. **Conclusion:** Our findings underscore the importance of guideline adherence and timely intervention in mitigating hypoglycaemia risk.

Keywords: Hypoglycaemia; Infants; Adherence; Protocol; Clinical Guidelines; Quality Improvement Project

Abbreviations

AGA: Appropriate for Gestational Age; BGL: Blood Glucose Level; CPAP: Continuous Positive Airway Pressure; IDM: Infant of Diabetic Mother; LGA: Large for Gestational Age; SD: Standard Deviation; SGA: Small for Gestational Age.

Introduction

Neonatal hypoglycaemia has a potential for adverse neurodevelopmental outcomes. Despite its prevalence and clinical significance, the management of neonatal hypoglycaemia remains variable, with adherence to clinical

guidelines posing a considerable challenge in many healthcare settings. Adherence to guidelines has shown to decrease the incidence of hypoglycaemia. However, there is still limited data on the adherence of guidelines for managing neonatal hypoglycaemia. Adhering to the guidelines is highly desirable in at-risk infants to improve both short term and long-term outcomes. We conducted an audit to look for association between adherence rate and incidence of hypoglycaemia in at-risk infants at Mildura Base Public Hospital. By addressing this objective, our study will provide insights in adherence rate of feeding guidelines, hence improving neonatal care practices for at-risk infants in regional hospital settings.

Materials and Methods

Study Aim and Objective

This retrospective observational study aims to assess adherence to clinical guidelines for screening and managing hypoglycaemia among late preterm and term infants at risk, born at Mildura Base Public Hospital over a period of 9 months, from November 1st, 2022, to July 31st, 2023. The primary objective is to compare the hypoglycaemia incidence in at risk infants where clinical guidelines were followed as opposed to non-adherence [1].

Study Design and Methodology

This was a retrospective observational study design, utilizing data extracted from patient files within the medical records department at Mildura Base Public Hospital. Participants included late preterm (34+0 weeks to 36+6 weeks) and term (37+0 to 42+0) infants born between November 1st, 2022, and July 31st, 2023, identified as at risk of hypoglycaemia. At risk infants of hypoglycaemia include infants of diabetic mothers, large for gestational age and small for gestational age [2].

Inclusion and Exclusion Criteria

All late preterm and term infants born within the specified timeframe at Mildura Base Public Hospital meeting the eligibility criteria are included. Exclusion criteria encompass infants who received intravenous fluids infusion prior to first blood glucose level (BGL) measurement, infants initiated on nasogastric feeds prior to first BGL due to poor latch and babies who could not be monitored for first 3 consecutive BGL measurements due to early discharge or a transfer to different health facility [3].

Guideline Adherence

At MBPH we follow clinical practices guidelines from Safer Care Victoria for identifying and management of infants at risk of hypoglycaemia. The current recommendations are to initiate feeds within first hour and check the BGL at 2 hours of birth. If the BGL was < 1.5 mmol/L, the practice was to secure IV access and commence on IV therapy. If the BGL was normal for 3 consecutive readings, then the BGL monitoring was ceased. Infants who were symptomatic had a BGL check prior to the 2 hours mark and were excluded from the study [4].

Data Collection and Management

Data collection involved an audit of current practices in managing at-risk infants for hypoglycaemia. Data was collected manually from physical patient records by the study authors and stored securely on the Mildura Base Public Hospital network drive, accessible only via password-protected computers. Data was secured in an excel sheet in data extraction form. Personal details were anonymized before analysis, and access to analysed data was restricted to the investigators. Data will be destroyed after 7 years following completion of study analysis [5].

Data Analysis and Data Privacy

Statistical analyses are performed using RStudio version 4.2.2. A multivariable logistic regression model is applied to assess the association between adherence to feeding guideline protocol and the outcome of hypoglycaemia, adjusting for known risk factors such as time to first feed, weight for age, and infants of diabetic mothers requiring insulin [6].

Data entry and access were restricted to research staff, with information protection ensured through password access. Data analysis was conducted on de-identified data, and findings were presented in aggregate form.

Results

During the study period spanning nine months, a total of 602 deliveries occurred at Mildura Base Public Hospital. Among these, 101 infants were identified as at risk for hypoglycaemia based on predefined criteria. After applying inclusion and exclusion criteria, a final cohort of 83 infants was included in the analysis. 18 infants were excluded from the study, 4 preterm infants were commenced on intravenous fluids, 1 preterm infant was commenced on nasogastric feeds due to prematurity, and 13 infants were excluded as they were commenced on CPAP for respiratory distress.

Of the included infants, the baseline characteristics were similar as shown in Table 1. Among the 83 at-risk infants included in the analysis, protocol adherence was seen in 43 infants compared to non-adherence in 40 infants. Out of 83, 33 cases of hypoglycaemia were detected during the study period. This represents a noteworthy incidence rate, underscoring the significance of neonatal hypoglycaemia as a clinical concern in this population.

	Total	Protocol adherence	Protocol non-adherence	P value
	n = 83	n = 43, Mean (SD)	n = 40, Mean (SD)	
Mean Gestational age Mean (SD) in weeks	38.0 (\pm 1.66)	38.2 (\pm 1.48)	37.83(\pm 1.83)	0.313
Birth weight in grams (SD)	3194 (\pm 735)	3258.37 (\pm 717.41)	3124.5 (\pm 757.33)	0.411
Sex (male)	45	24	21	0.934
LGA	23	15	8	0.205
SGA	19	10	9	1
AGA	41	22	19	0.909
IDM	23	14	9	0.437

Table 1: Baseline Characteristics.

Analysis of adherence to the hypoglycaemia feeding guideline protocol revealed a significant reduction of 84% in the incidence of hypoglycaemia among at-risk infants when adherence to the protocol was observed compared to instances of non-adherence. This finding remained significant after adjusting for key confounding factors such as

time to first feed, weight for age, and maternal diabetic status (Odds Ratio: 0.16 (Chi-square = 34.4, Degrees of Freedom = 5); 95% Confidence Interval: 0.03 to 0.95; P value = 0.04), as shown in Table 2. This underscores the efficacy of adherence to protocol in mitigating the risk of hypoglycaemia among at-risk infants.

	Adherence	Non-Adherence	Odds Ratio (95% CI)	P Value
Hypoglycaemia	6/43 (14%)	27/40 (68%)	0.16 (0.03 to 0.95)	0.04

Table 2: Outcome.

Discussion

The study findings highlight the critical role of adherence to hypoglycaemia guidelines in mitigating the risk of hypoglycaemia among at-risk infants. Notably, delays in initiating the first feed following birth and in conducting the initial blood glucose test were observed, indicating potential gaps in the implementation of protocol recommendations.

Comparing our findings with existing international literature, our study represents a significant contribution as the first Australian audit of hypoglycaemia guidelines in a regional referring hospital setting. Prior audits primarily hail from international contexts, with limited representation from Australia. Notably, our study builds upon previous research by providing detailed information on adherence to guideline recommendations and screening practices specific to our hospital setting.

The observed adherence rate to the hypoglycaemia guideline, while moderate, suggests room for improvement. Our findings align with previous Australian audits from tertiary hospitals, indicating that guideline adherence may be suboptimal across various healthcare settings. Factors contributing to non-adherence may include the complexity of the guideline itself, lack of staff education and awareness, and variations in clinical interpretation. Late detection of hypoglycaemia remains a concern, as evidenced by delays in

blood glucose testing despite screening efforts. These delays, albeit improved compared to previous audits, suggest the need for on-going monitoring and quality improvement initiatives to ensure timely detection and intervention.

Lack of data in this domain has been a hurdle to formulate appropriate strategies to achieve better outcomes. The practical approach will be more acceptable to all stakeholders including the midwives. This is the main strength of our study. Our study's limitations include its retrospective nature and the use of point-of-care glucometers may introduce variability in glucose readings, potentially impacting the accuracy of hypoglycaemia incidence estimates.

In response to our audit findings, several changes have been implemented, including enhanced staff education, increased support for breastfeeding after Caesarean section, and improvements in blood glucose monitoring procedures. These changes reflect a commitment to optimizing guideline adherence and improving neonatal care practices.

Moving forward continued efforts to simplify guidelines, enhance staff education, and foster a culture of adherence are essential. Multifaceted strategies, including audit and feedback mechanisms, facilitated by local team leaders, hold promise for improving guideline adherence and ultimately enhancing patient outcomes. Additionally, ongoing research and updates to guidelines will be crucial in addressing

evolving clinical needs and advancing neonatal care practices.

Conclusion

Efforts will focus on implementing targeted interventions aimed at improving adherence to hypoglycaemia guidelines and optimizing neonatal care practices at Mildura Base Public Hospital. These interventions may include regular staff education and training programs to enhance awareness of protocol recommendations, streamlining of processes to facilitate timely initiation of feeds and blood glucose testing, and ongoing monitoring and quality improvement initiatives to ensure sustained adherence to guidelines.

Additionally, future research endeavours may involve longitudinal studies to assess the long-term impact of guideline adherence on neurodevelopmental outcomes in at-risk infants. By continuing to evaluate and refine neonatal care practices, the aim is to further enhance patient outcomes and ensure the provision of high-quality care for infants at risk of hypoglycaemia in regional hospital settings.

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