Developmental Outcomes and Risk Factors in Moderate to Late Preterm Infants: A Retrospective Study

Yousif Khawajeh[1], A/Prof Wei Qi Fan[1,2], Dr Wei Ling Lean[1,2]
University of Melbourne[1], Northern Health[2]

RESEARCH WEEK 20-24 OCTOBER 2025 INSPIRED RESEARCHERS Northern Health

Introduction

- Moderate to late preterm (MLPT) infants (32^{+0} to 36^{+6} weeks) make up the majority of all preterm births but are underrepresented in developmental research.
- Although previously considered low risk, MLPT infants are now recognised to have neurodevelopmental vulnerabilities.
- The absence of risk-stratified data limits clinicians' ability to guide structured follow-up and early intervention.

Methodology

- **Design:** Retrospective cohort study (2018–2020)
- **Setting:** Northern Health – Epping, Level 5 Neonatal Unit
- **Participants:** 796 MLPT infants screened; 264 included with at least 12 months of follow-up
- **Exclusions:** Infant deaths, congenital anomalies, congenital infections, insufficient or no outpatient follow-up data
- **Data Collection:** Electronic medical records (CPF), outpatient notes, allied health referrals. The diagnosis of NDI was determined from the attending physician's documentation in the patient record
- **Analysis:** Chi-square, Mann-Whitney U, and logistic regression (SPSS v30), Firth's penalised logistic regression

Results

Table 1. Univariate Analysis of Risk Factors for Neurodevelopmental Impairment (n = 264)

	Risk Factors	Normal Outcome	NDI	*P* Value
Demographics				
	Moderate Preterm, No. (%)	66 (32.0%)	14 (23.7%)	0.212
	Late Preterm, No. (%)	139 (67.5%)	45 (76.3%)	–
	Birthweight, median (IQR), g	2188.5 (1921-2472.5)	2220 (1790-2620)	0.841
	Male, No. (%)	105 (51.0%)	38 (64.4%)	0.068
	Female, No. (%)	101 (49.0%)	21 (35.6%)	–
Maternal Risk Factors				
	Maternal Diabetes, No. (%)	59 (28.6%)	26 (44.1%)	**0.025**
	Pre-eclampsia, No. (%)	29 (14.1%)	5 (8.5%)	0.257
	Chorioamnionitis, No. (%)	5 (2.4%)	1 (1.7%)	0.739
	Other/Chronic Illness, No. (%)	14 (6.8%)	3 (5.1%)	0.636
Antenatal Risk Factors				
	Steroid Administration, No. (%)	79 (38.3%)	21 (35.6%)	0.700
	PPROM, No. (%)	39 (18.9%)	13 (22.0%)	0.597
Birth Risk Factors				
	Apgar Score of <7 at 5 Minutes, No. (%)	2 (1.0%)	3 (5.1%)	**0.041**
	Resuscitation, No. (%)	90 (43.7%)	25 (42.4%)	0.857
	*Birth Trauma, No. (%)	5 (2.4%)	3 (5.1%)	0.293
Neonatal Risk Factors				
	Hypoglycaemia, No. (%)	58 (28.2%)	10 (16.9%)	0.082
	Hypothermia, No. (%)	34 (16.5%)	11 (18.6%)	0.700
	Culture-Negative Sepsis, No. (%)	10 (4.9%)	2 (3.4%)	0.633
	NG Feeds, median (IQR), hrs	48 (5-240)	23 (0-192)	0.119
	*Surfactant, No. (%)	6 (2.9%)	3 (5.1%)	0.417
	Jaundice, No. (%)	90 (43.7%)	30 (50.8%)	0.330
	Respiratory Support, No. (%)	57 (27.7%)	12 (20.3%)	0.258
	IUGR, No. (%)	45 (21.8%)	17 (28.8%)	0.265
Clinical Course				
	†Age at Discharge, median (IQR), days	738 (515-1096)	1574 (815-2075)	<0.001

A *p*-value of <0.05 was considered statistically significant.
Abbreviations: IUGR: Intrauterine Growth Restriction; NDI: Neurodevelopmental Impairment; NG: Nasogastric; PPROM: Preterm Prelabour Rupture of Membranes.

Table 2. Multivariate Predictors of Neurodevelopmental Impairment (Logistic Regression, n = 264)

	Risk Factors	Adjusted *OR*	95% *CI*	*P* Value
Demographics				
	Male	2.134	(1.125–4.048)	0.020
	Late Preterm	1.182	(0.556–2.512)	0.664
Maternal Risk Factors				
	Maternal Diabetes	1.868	(0.985–3.541)	**0.056**
Birth Risk Factors				
	Apgar Score of <7 at 5 minutes	12.553	(1.533–102.787)	**0.018**
Postnatal Risk Factors				
	Hypoglycaemia	0.394	(0.172–0.905)	0.028
	NG Feeds	0.716	(0.348–1.473)	0.363
	Respiratory Support	0.571	(0.254–1.282)	0.174
	IUGR	1.737	(0.869–3.475)	0.118

P-values were calculated from multivariate logistic regression.
A *p*-value of <0.05 was considered statistically significant.

Cohort Summary:

- 30.3% moderate preterm, 69.7% late preterm
- Median gestational age: 34^{+5} (IQR 33^{+5}–35^{+5})
- Median birthweight: 2190g (IQR 1900–2496g)
- No significant difference in NDI rates between moderate and late preterm groups.

Key Findings:

- 22.3% of MLPT infants were diagnosed with NDI
- Maternal diabetes and male sex trended towards increased risk of NDI

Conclusion

- NDI affects a substantial proportion of MLPT infants, reinforcing the need for developmental surveillance.
- Maternal diabetes and male sex may be clinically relevant and warrant further research.
- Evidence-based follow-up strategies are needed to optimise early identification and early intervention in MLPT infants.

References/Acknowledgements

Ethics approval: Northern Health QA 55.2024.
Cheong et al. (2017, 2024); Fernández de Gamarra-Oca et al. (2021); Jois (2018); Kugelman & Colin (2013); Lee et al. (2023); Qian et al. (2025)