

Long term neurological outcomes in survivors of foetomaternal haemorrhage: A systematic review

Abeer Ziyad Hussein, Brigitte Vollmer, David Howe, Fenella Kirkham, University of Southampton

Background: Foetomaternal haemorrhage

- Foetal blood cells leak into maternal circulation, before or during delivery.
- Massive blood loss can lead to severe complications: anaemia and neurological damage such as cerebral palsy or developmental delay

Aims

- 1 Determine proportion of children with poor neurological outcome at least 12 months after exposure to FMH
- 2 Determine if degree of anaemia predicts poor neurological outcome after 12 months
- 3 Determine whether additional exposure to birth asphyxia predicts neurological outcome after 12 months

Methods

Search

Search terms
Foetomaternal, haemorrhage, neurological outcomes (cerebral palsy etc), neonates
Boolean operators (AND, OR) to refine search

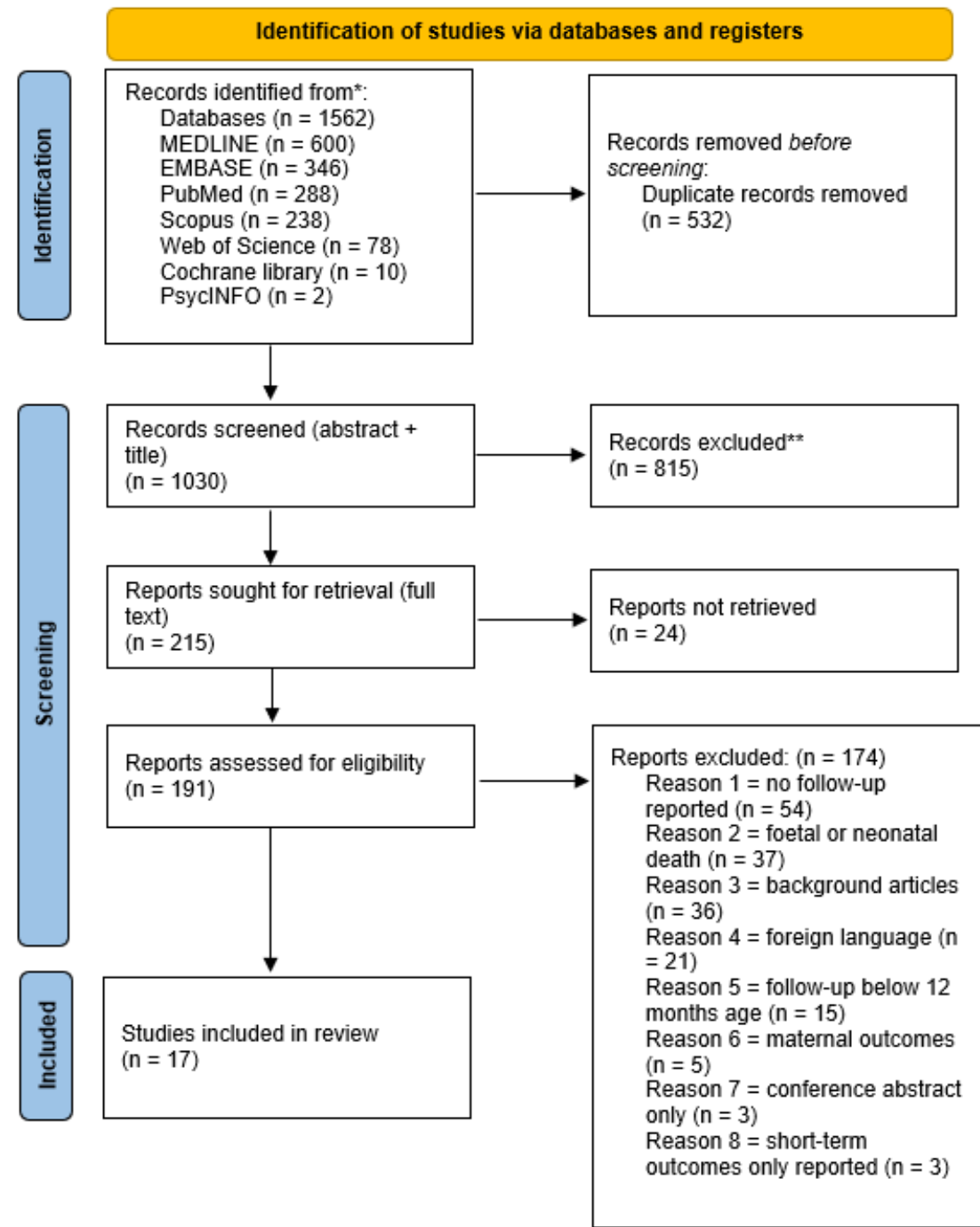
Search strategy
• 7 databases searched
• Screened by two reviewers
• Later excluded papers not in English

Quality check
• Joanna Briggs Institution (JBI) checklist for case reports
• CASP checklist for cohort studies

Quality: CASP

Poor, moderate, good

PRISMA diagram

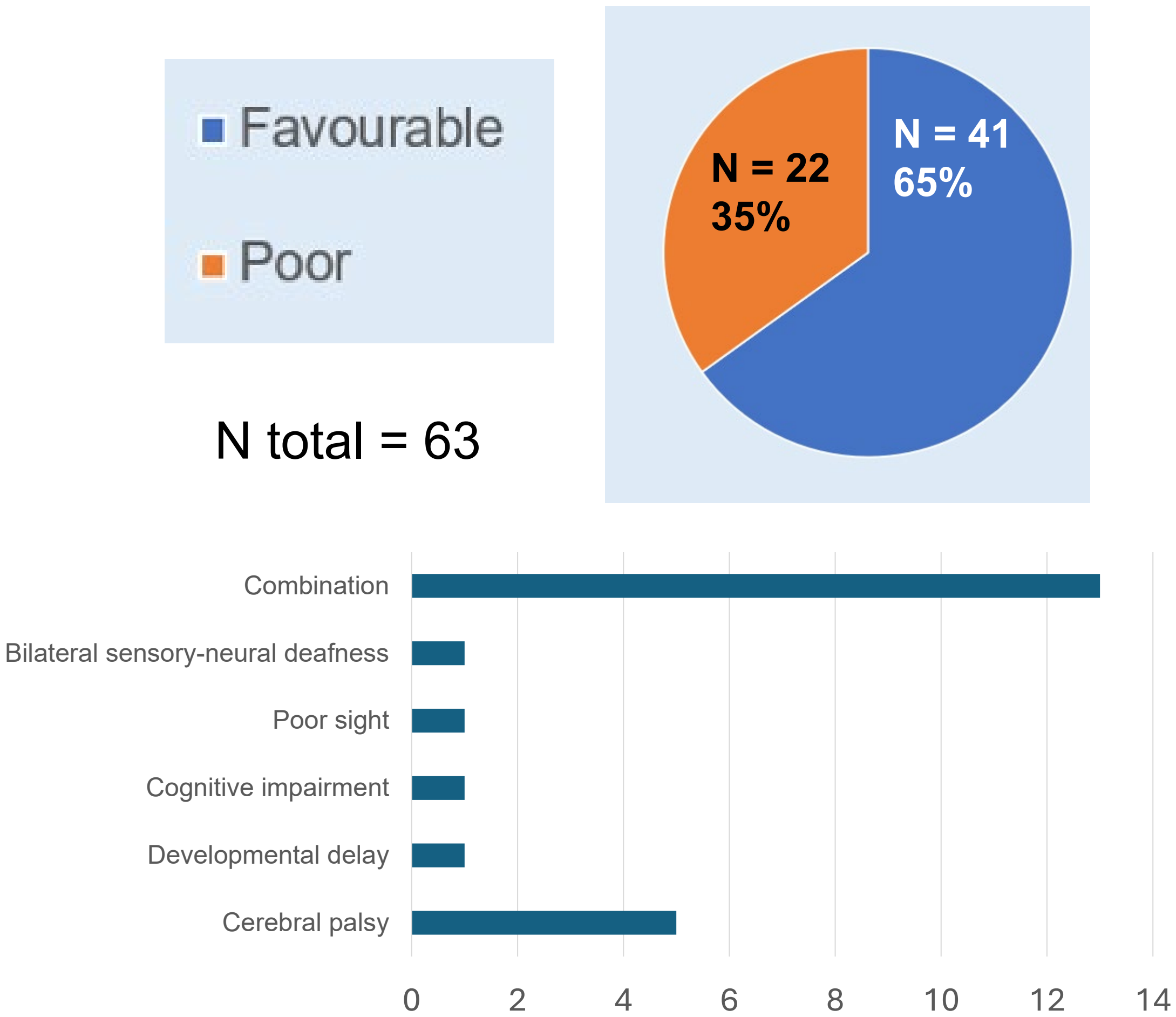


Data extraction:

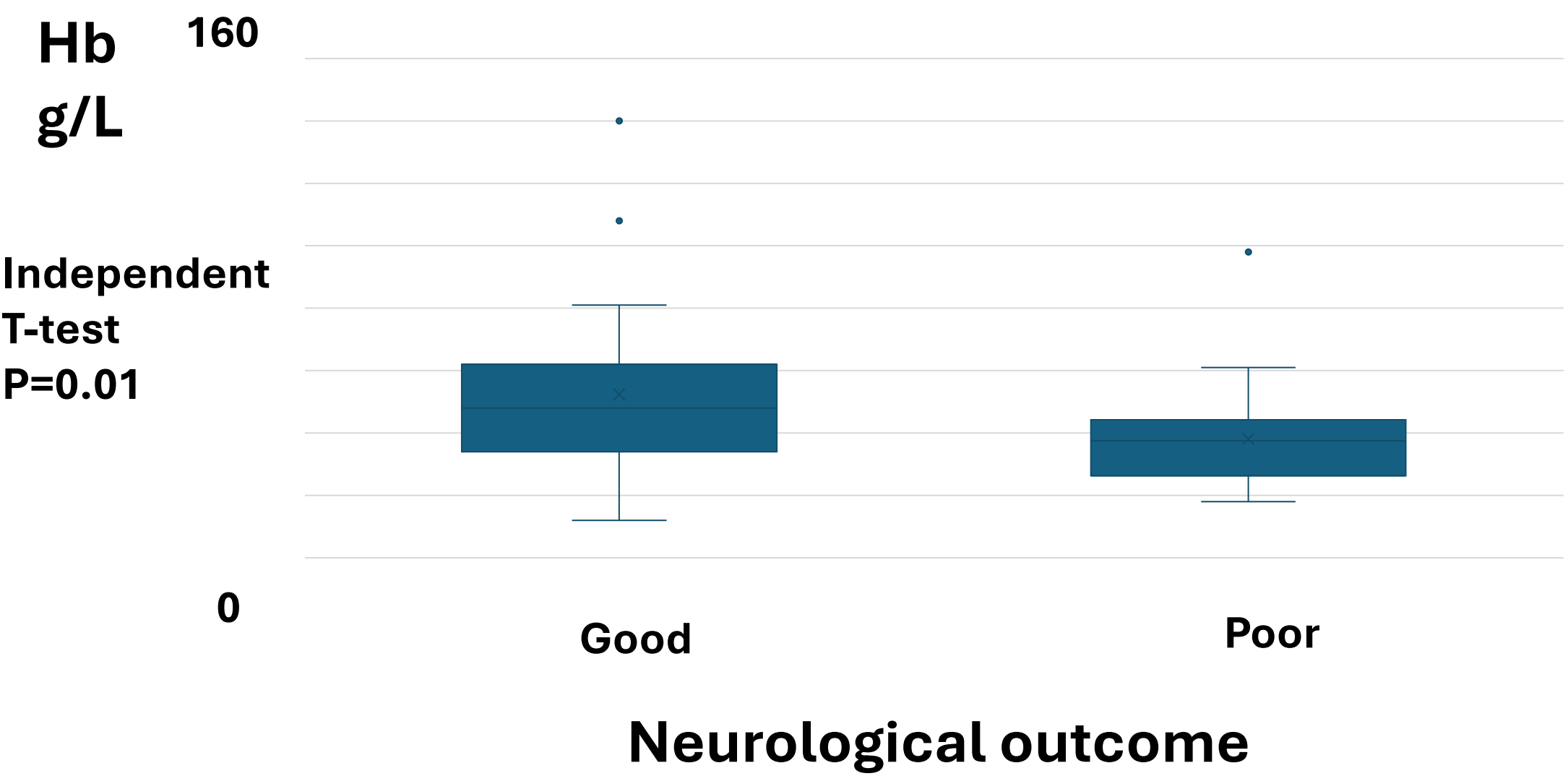
- Study characteristics
- Neonatal haemoglobin
- Gestational age
- Apgar scores at 1 and 5 minutes
- Age at follow up (months)
- Long term outcome: Favourable or poor (Cerebral palsy, cognitive impairment, epilepsy etc)

Results 1: proportion with neurological problems

Author	Cohort	Total N (% of cases with FMH)	Number followed up to 12 months	Mean follow-up (months)	Number with Neurological problems (%)	CASP score for quality (n/14)
Rubod ¹	Lille	42 (100)	31	59	1 (2)	6
De Almeida ²	Manitoba	26 (100)	11	15	1 (4)	7
Tao ³	Hangzhou	8 (100)	6	29	0 (0)	10
Kadooka ⁴	Kagoshima	18 (100)	18	23	9 (50)	13
Loureiro ⁵	London	20 (85)	16	90	10 (59)	9
Leijser ⁶	Leiden	127 (0.7)	1	24	1 (*)	12
Total			83		22 (20)	



Results 2: effect of haemoglobin



Reference range for neonatal Hb = 140 – 240 g/L

Results 3: effects of haemoglobin and birth asphyxia

Predictor	Favourable outcome (Mean±SD)	Poor outcome (Mean±SD)	P-value from independent t-tests
Neonatal Hb (g/L) (n=63)	52.4±24.9	38.1±17.2	0.020
Apgar 1 min (n=61)	4.9±2.9	3.0±1.9	0.010
Apgar 5 min (n=57)	6.7±2.4	6.3±6.7	0.636
Birthweight (g) (n=51)	2443.2±664.2	2620.8±635.4	0.344
Gestational age (w) (n=63)	36.6±3.7	37.1±3.3	0.662
Cord pH (n=43)	7.21±0.13	7.05±0.12	<0.001

Results 3: Multiple regression

Forward binary logistic regression: Hb is a risk factor independent of Apgar at 1 min

Predictor of neurological outcome	Odds ratio	Lower CI	Upper CI	P-value
Neonatal Hb	0.97	0.93	1.01	0.058
Apgar 1 min	0.79	0.61	0.949	0.049

Discussion

- 2 new papers^{7,8}
- Longer follow up is needed for survivors of FMH
- Effects of FMH are detrimental: cerebral palsy
- Neonates with higher haemoglobin more likely to have better outcomes
- Higher Apgar scores at 1 minute predicted better outcomes
- Key is to tackle anaemia as soon as possible
- More info such as time neonatal Hb was measured is key for more information
- Current gas machines also give haemoglobin - ?add to notes