

Short and Long-term Outcome Following Intraventricular Haemorrhage Among Preterm Infants in CUMH

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Abstract

Introduction: Intraventricular haemorrhage (IVH) is bleeding that occurs within the ventricles of the brain.¹ It is the most common neurological condition associated with prematurity worldwide.^{2,3} Post-haemorrhagic ventricular dilatation (PHVD) is a known complication of IVH.^{4,5} There is limited research regarding IVH and PHVD in Ireland.

Objectives: To describe the long-term neurodevelopment outcomes following IVH in pre-term neonates, and the short-term outcomes that may contribute. To determine the degree of ventricular dilatation that occurred before intervention and compare these values with the recommendations.

Methods: Retrospective chart review in the Department of Neonatology, Cork University Maternity Hospital (CUMH). All neonates with a gestational age of less than 29 weeks or a birth weight of less than 1,500 grams who were admitted to the neonatal intensive care unit in CUMH from 2018 to 2022. 34 neonates with a congenital anomaly or birth defect were excluded. The total number of participants included was 374. Variables were collected from a pre-existing database (Vermont Oxford Network) and electronic health records. Cranial ultrasounds (CRUSS) were performed by a radiologist. CRUSS measurements (Levene index, anterior horn width and thalamo-occipital distance) were performed by the investigator, a medical student. PHVD was defined as a ventricular index greater than the 97th centile for gestational age according to the graph published by M.I. Levene.⁶ Measurements were performed on all grade 2, 3 and 4 IVH. Measurements were performed on grade 1 IVH if ventriculomegaly was reported by the radiologist. Neurodevelopmental impairment was defined as more than 1 standard deviation below the mean score in any domain of the Bayley Scale of Infant and Toddler Development Assessment (BSID).

Results: High-grade IVH (grade 3 or 4) was associated with higher rates of the composite outcome of neurodevelopmental impairment or death on Kruskal Wallis test ($p=0.021$), though this became insignificant following adjustment for confounding factors on multivariable logistic regression ($p>0.05$). High-grade IVH was associated with higher rates of mortality ($p<0.001$) and higher rates of PHVD ($p<0.001$) on Kruskal Wallis test and lower scores in the motor domain of the BSID assessment ($p=0.049$) on Spearman rank correlation. There was no association between PHVD (RR=0.746, 95% CI:0.52-1.06) or cranial ultrasound measurements ($p>0.05$) and the composite outcome on Kruskal Wallis test and AUC-ROC analysis respectively. Lower birth weight (OR=0.998, 95% CI:0.996-0.999, $p=0.007$), male sex (OR=2.31, 95% CI=1.26-4.23, $p=0.007$) and oxygen support at 28 days (OR=1.20, 95% CI:1.02-1.39, $p=0.023$) were independent predictors of the outcome on multivariable logistic regression. The number of neonates that received intervention was too small for analysis.

Conclusion: Following adjustment for confounding factors, the association between higher grades of IVH and the outcome of neurodevelopmental impairment or death was no longer statistically significant. This highlights the importance of considering the full clinical picture prior to predicting the outcome of preterm neonates with IVH. Parents should be informed of the importance of attending assessments and follow-up appointments to provide early intervention and support in cases of impairment.