New-Onset Focal Seizures in Children: Aetiology, Comorbidities and Outcomes

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INTRODUCTION

- **Epilepsy**: presence or high probability of multiple unprovoked seizures[1]
- Identification of **aetiologies** can lead to optimal diagnosis and treatment but **majority** of focal epilepsy aetiology are **unknown**[2]

AIMS

- Examine **causes**, **comorbidities**, and **treatment outcomes** in new-onset focal seizures in children

METHODS

- **Inclusion Criteria: age** (1mo to 18yo), **admission year** (2018 to 2022), **site** (Children's Hospital at Westmead)
- **Data Analysis**: **statistical tests** and **cluster analysis** (identify associations between aetiologies and comorbidities / treatment outcomes), **multivariable logistic regression** (identify predictors of drug resistance / medication effectiveness)

RESULTS

- Children with new-onset focal seizures (n = 65), median **age** = 4.9 years, M:F = 1:1, 83% abnormal **EEG**, 17% abnormal **MRI/CT**, 50% neurodevelopmental **comorbidities**, 45% **explosive** onset of seizures
- Children with **known aetiology** were associated with **explosive**-onset seizures, **focal neurological** abnormalities, abnormal **neuroimaging** findings and **drug resistance** ($p < 0.05$)

Table 1. Risk factors for drug resistance ($p < 0.05$)

Characteristics	OR (95% CI)
Aetiologies	
Genetic	26.2 (2.33 – 484.4)
Structural	8.20 (1.20 – 77.8)
Inflammatory	30.0 (2.71 – 544.6)
Neurodev Disorders	8.21 (1.53 – 71.6)

Table 2. Predictors for seizure reduction amongst ASMs ($p < 0.05$)

Characteristics	OR (95% CI)
Carbamezepine	11.9 (3.03 – 47.7)
Levetiracetam	4.07 (1.11 – 16.9)

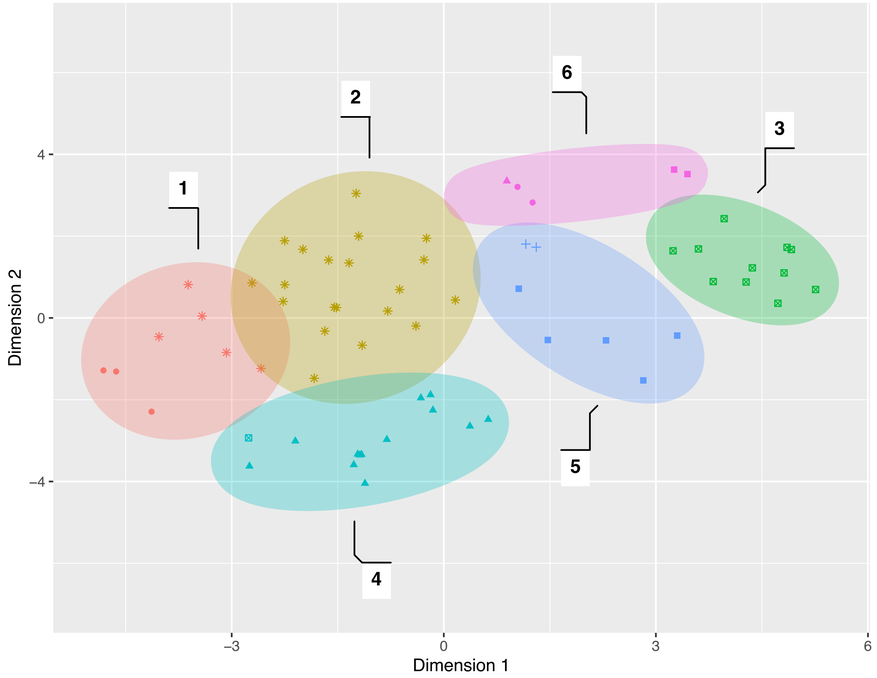

Figure 1. Predominant aetiology of patients in clusters: 1 = unknown/genetic, 2 = unknown, 3 = structural, 4 = self-limited, 5 = inflammatory/metabolic, 6 = inflammatory/genetic

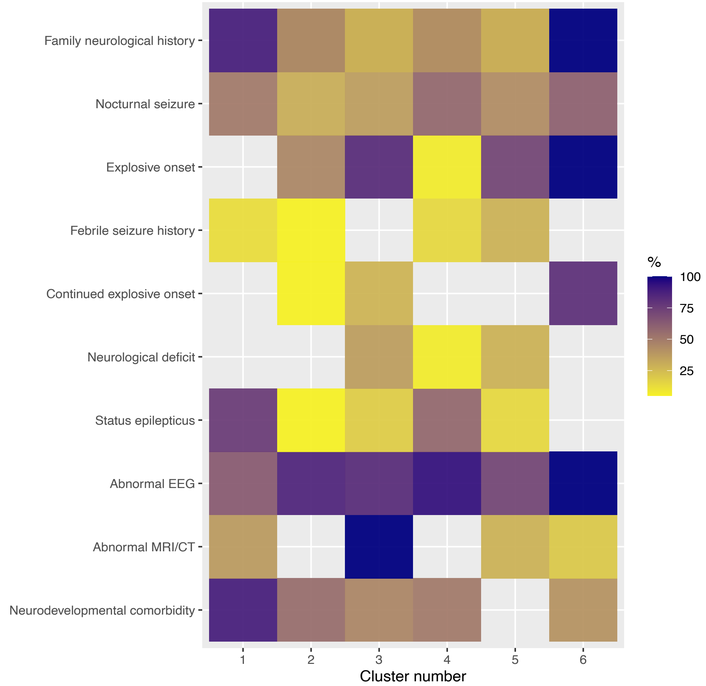

Figure 2. Explosive onset of seizures is predominant in Clusters "structural", "inflammatory/metabolic", "inflammatory/genetic", and abnormal neuroimaging findings and neurological deficits are relatively prevalent in Cluster "structural"

CONCLUSIONS

- Our study highlights the prevalence of secondary **aetiology**, **neuro-comorbidities** and **drug resistance** in **new-onset focal seizures** in children, which has significant treatment implications.
- Seizures with unknown causes require further investigation for improved interventions.

REFERENCES

1. Fine, A., & Wirrell, E. C. (2020). Seizures in Children. Pediatr Rev, 41(7), 321-347. https://doi.org/10.1542/pir.2019-0134
2. Aeby, A., Ceulemans, B., & Lagae, L. (2022). Treatment of Focal- Onset Seizures in Children: Should This Be More Etiology-Driven? Front Neurol, 13, 842276. https://doi.org/10.3389/fneur.2022.842276

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