

ABSTRACT NO:11
RESEARCH ARTICLE**Epilepsy as a Contributing Cause of Death Among Malignant Brain Tumour Patients in the United States, 1999–2024: A Multiple-Cause CDC WONDER Joinpoint Analysis with Relevance to the Epilepsy Treatment Gap in Pakistan**Muhammad Ahmad Baraakat¹, Hadi Ftouni², Noor Us-Sabah³, Liza Osepashvili⁴**Abstract**

Objective: Seizures are among the most disabling neurological manifestations in patients with malignant brain tumours. Pakistan faces a substantial epilepsy treatment gap and lacks integrated neuro-oncology surveillance data. This study aimed to evaluate temporal trends in epilepsy recorded as a contributing cause of death among malignant brain tumour decedents in the United States and to propose a transferable surveillance model for countries with limited epidemiological infrastructure.

Methods. A retrospective population-based ecological time-trend study was conducted using the CDC WONDER Multiple Cause of Death database from 1999 to 2024. Death certificates listing malignant brain tumours (ICD-10 C71) as the underlying cause and epilepsy or status epilepticus (ICD-10 G40–G41) as contributing causes were included. Annual proportions of malignant brain tumour deaths with epilepsy co-reported were calculated with binomial standard errors. Joinpoint regression was used to estimate Annual Percent Change (APC), Average Annual Percent Change (AAPC), and 95% confidence intervals. Reporting adhered to the STROBE guideline.

Results: The proportion of malignant brain tumour deaths with epilepsy or status epilepticus recorded as a contributing cause increased from 0.26% in 1999 to 1.45% in 2024, representing a 5.5-fold increase. No significant temporal change was observed between 1999 and 2005 (APC –7.36%; non-significant). This was followed by a significant increase between 2005 and 2020 (APC +13.05%; $p=0.006$), with a continued but non-significant rise from 2020 to 2024 (APC +5.13%). Overall, the average annual increase was significant (AAPC +6.53%; 95% CI 5.42–8.10; $p<0.001$).

Conclusion: Epilepsy was increasingly documented as a contributing cause of death among malignant brain tumour decedents in the United States over the 25-year study period, reflecting a persistent seizure burden in neuro-oncology. This reproducible population-based surveillance approach may help characterize epilepsy-related mortality and inform neuro-oncology surveillance strategies in countries lacking comprehensive registries, including Pakistan.

Keywords: Malignant brain tumour; Epilepsy; CDC WONDER

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