Association of Gabapentin Use with Functional Limitations among Stroke Survivors: A multi-institutional electronic health records database analysis

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Background

- Gabapentin is a medication commonly prescribed for nerve pain reduction and seizure control.[1]
- Some pre-clinical studies suggest that gabapentin may also aid in functional recovery after a stroke.[2]
- Stroke survivors often experience central post-stroke pain (CPSP), mobility and gait abnormalities that can impact their overall quality of life.[3]
- With limited clinical evidence, there is a need for further research to determine the effect of gabapentin on post-stroke recovery.[4]
- This study aims to assess the effect of gabapentin on functional recovery measures such as mobility and gait abnormalities among ischemic stroke survivors.

Objective

- To assess the effect of gabapentin on functional recovery measures among ischemic stroke survivors.

Methods

- **Study Design and Data Source:** It is a retrospective cohort study utilizing electronic health record data from the TrinetX platform assessed on April 20, 2023.
- TrinetX, a cloud-based healthcare research platform provides access to electronic health records and other healthcare data of 75 healthcare organizations (HCO).
- **Cohort:** From 60 HCO, patients who had a cerebral infarction were included. All deceased patients, with ill-defined/unknown causes of mortality, were excluded.
- **Key Exposure:** Gabapentin group (GB) included 51532 patients and the control group included 291941 patients who were not been on gabapentin (Non-GB).
- Cohorts were restricted to Jan 1, 2021 - Dec 31, 2022, for the index event, ischemic stroke for the Non-GB group, and Gabapentin use after stroke for the GB group.

Outcome Variables:

1. Mobility reduction is defined as walking & moving around functional limitation or reduced mobility
2. Abnormality of gait
3. Reduced Mobility or abnormality of gait

- All the outcomes were measured after at least 90 days of the index event.

Methods

Table 1: Codes used to form the cohort in TrinetX

Keyword	Coding System	Code used in TrinetX
Gabapentin	National Library of Medicine	RXNORM:25480
Cerebral Infarction	International Classification of Diseases-10	ICD10CM: I63
Reduced Mobility	Healthcare Common Procedure Coding System	HCPCS: G8978, G8979, G8980 & Q0502
	International Classification of Diseases-10	ICD10CM: Z74.0
Gait Abnormality	International Classification of Diseases-10	ICD10CM: R26, R26.8, R26.89 & R26.9

Propensity Score Matching:

- One-to-one propensity score matching (PSM) of gabapentin users and non-users consisted of age, sex, race and ethnicity, surgery, pain, epilepsy, and seizures, diseases of the following systems: (circulatory; endocrine, nutritional, and metabolic; musculoskeletal and connective tissues; nervous; digestive; genitourinary; respiratory; mental health, behavioral and neurodevelopmental; skin and subcutaneous tissue; injury and poisoning).
- After propensity matching, a total of 51,156 adult stroke survivors in both groups. After PSM, the Standardized mean difference of all characteristics between the two groups ranges from 0-0.03, suggesting a good match.

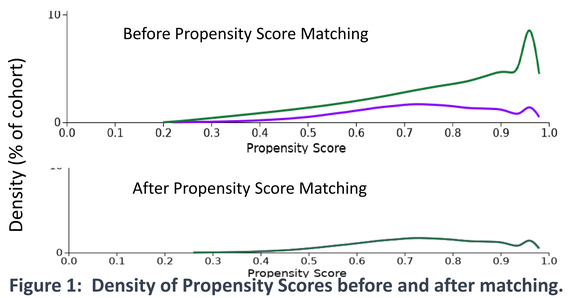


Figure 1: Density of Propensity Scores before and after matching. Purple- Gabapentin Group, green- Non-gabapentin group

Statistical Analysis:

- After the PSM of the two cohorts, the risk ratio was calculated to compare the risk of mobility reduction and abnormality of gait and its combination between the GB-group and non-GB group.
- All the analyses were considered significant at a 5% level of significance and performed on the online TrinetX platform.

Results

Figure 2: Prevalence of Gabapentin users Prevalence

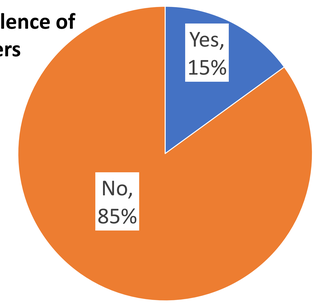
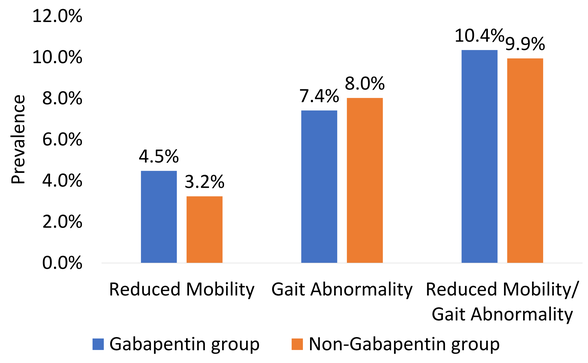


Figure 3: Outcome distribution in gabapentin and non-gabapentin group



- For the combined cohort, the average age of the adult stroke survivor was 65.2 ± 14.1 and nearly 54% of them were female, and 20% were African American.
- A majority of the patients (71%) had undergone surgery. Also, 86% had endocrine, nutritional, and metabolic diseases; 80% had diseases of the nervous system; 75% had diseases of the musculoskeletal system and connective tissue; 60% had diseases of the digestive system; 59% had mental, behavioral, and neurodevelopmental disorders; 59% had diseases of the genitourinary system; and, 55% had diseases of the respiratory system.
- We found that the GB group had a relatively higher incidence of reduced mobility (RR=1.38, 95% CI: 1.30-1.47) but not with gait abnormality (RR=0.92, 95% CI: 0.89-0.96), and combined outcome (RR=1.04, 95% CI: 1.00-1.08) compared to the non-GB group.

Table 2: Incidence of Reduced Mobility and Gait Abnormality, among Stroke Survivors in Gabapentin and Non-Gabapentin Groups, with Risk Ratios (95% Confidence Intervals)

Outcome	Events in Gabapentin Group	Events in Non-Gabapentin Group	RR (95% CI)
Reduced Mobility	2,291	1,659	1.40 (1.32, 1.49)
Gait Abnormality	3,793	4,104	1.05 (1.01-1.09)
Reduced Mobility/ Gait Abnormality	5,295	5,088	1.14 (1.10-1.18)

Discussion

- Caution should be exercised when prescribing gabapentin to stroke survivors, particularly to those who may already have mobility impairments
- The long-term effects of gabapentin use among stroke survivors should be studied.
- Patterns of gabapentin use among stroke survivors, including factors that influence prescribing patterns and potential disparities in access to the medication need to be studied.
- **Strengths:** we used a large sample size from electronic health records using the TrinetX platform and we reduce the impact of confounding variables using propensity score matching.
- **Limitations:** The retrospective nature of the study design, limitations in the accuracy of data collected from electronic health records and not accounting for the duration of gabapentin use, and unmeasured confounding variables in the PSM may have introduced biases.

References

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