# Unequal Access to Relief: A Systematic Review of Healthcare Disparities in Trigeminal Neuralgia Treatment

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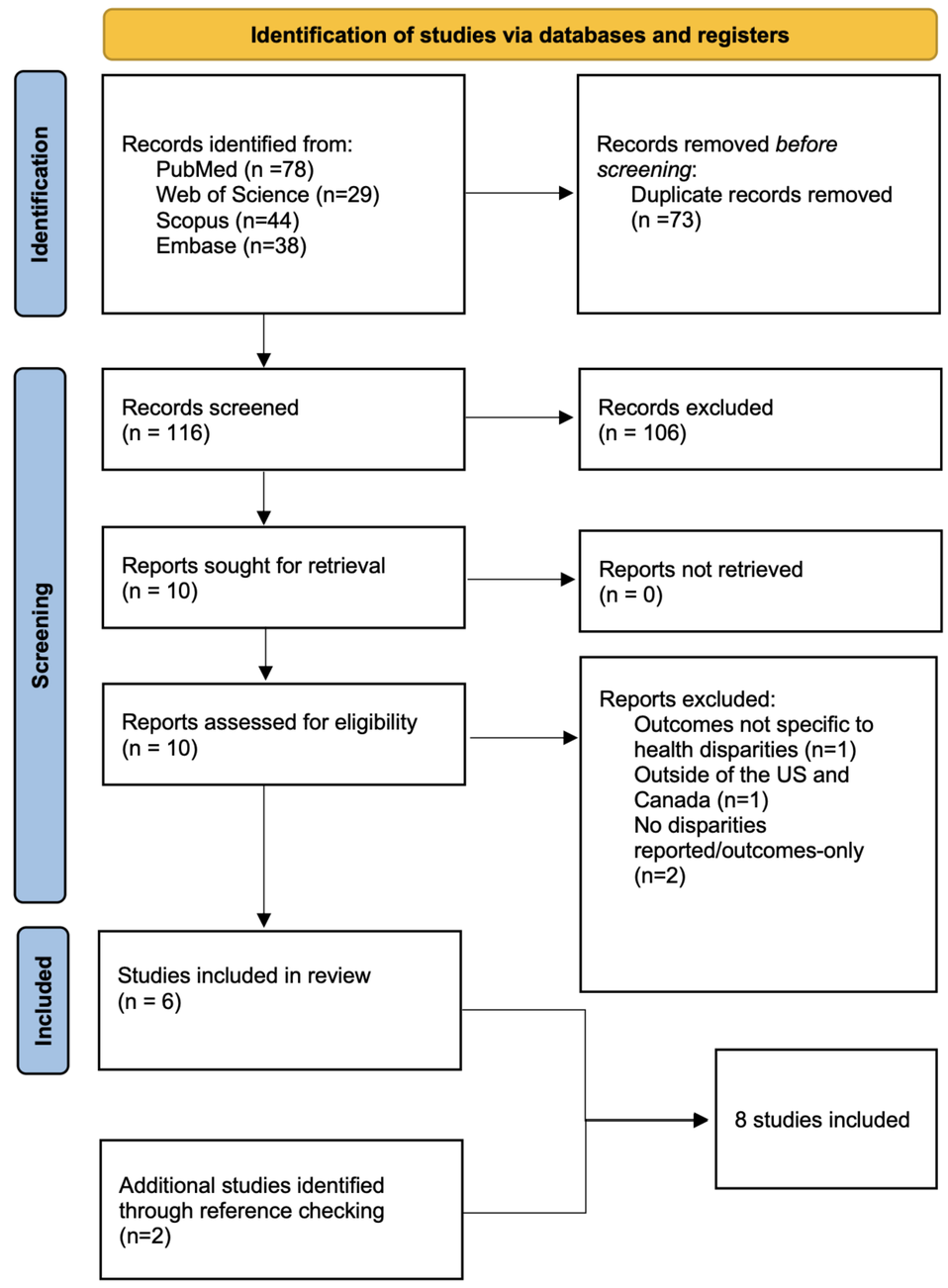
## Introduction

In patients with medically refractory trigeminal neuralgia (TN), non-medical modalities stereotactic radiosurgery (SRS), percutaneous rhizotomy, and microvascular decompression (MVD), are commonly employed. Despite extensive research on the outcomes and prognostic factors, there is limited literature on how health disparities influence treatment indication and allocation for patients. This systematic review evaluated healthcare disparities in terms of race, socioeconomic status (SES), age, gender, and their respective roles in determining treatment for TN.

## Material and Methods

A systematic literature search was carried out utilizing the MEDLINE (PubMed), Web of Science, Scopus, and Embase electronic databases from conception to June 2025 using PRISMA guidelines.




## Results

Eight articles were included in our study, encompassing a total of 12,617 patients. Racial and ethnic disparities were observed in five studies, with Asian/Pacific Islander patients being more likely to undergo MVD, whereas Black patients were more likely to undergo rhizotomy compared with other treatments. Similarly, black patients were observed to be less likely to undergo both any procedure and MVD compared to white patients. However, some studies found no differences in delay to neurosurgical referral and no difference in time to intervention once assessed by neurosurgery. SES disparities were assessed in three studies found. Higher SES was associated with a greater likelihood of receiving rhizotomy as a surgical treatment, and greater access to high-volume centers. Though SES did not seem to impact time to referral. In terms of age and gender, six studies were found assessing these disparities. Older patients experienced the highest utilization of SRS as a medical intervention for TN and were less likely to be treated at high-volume hospitals. Gender disparities were seen as females experiences significantly longer delays from symptom onset to specialist referral.

| Study (country) | N | Race/ethnicity | SES/insurance | Age/sex |
|---|---|---|---|---|
| **Wang 2013 (USA)** | 8980 | Asian/PI higher MVD; Black higher rhizotomy ($p<0.0001$). | Lowest income: more rhizotomy; middle: more SRS; private→MVD; Medicare→rhizotomy/SRS ($p<0.0001$). | Older age → SRS/rhizotomy; median age MVD 58 vs rhizotomy 70 vs SRS 72 ($p<0.0001$). Sex: NS. |
| **Reinard 2017 (USA)** | 652 | Black vs White: any procedure 21% vs 34% ($p<0.001$); MVD 15% vs 24% ($p=0.012$). ER diagnosis 31% vs 8% ($p<0.001$). | Insurance type NS; in neurosurgery-referred subgroup, +$10k income associated with lower odds of procedure (OR 0.89; $p=0.028$). | Age not predictor of procedure (per +10 yrs OR 0.99; $p=0.903$). |
| **So 2023 (USA)** | 921 | Delays to neurosurg eval similar by race, but pathways differ: Asian less prior rhizotomy; 'Other' more repeat MVD. After referral, Black/'Other' faster to MVD ($p<0.001$; $p=0.01$). | — | — |
| **Reyes 2024 (USA)** | 229 | No difference in timely referral/intervention; Black less prescribed steroids and oxcarbazepine ($p=0.04$; $p=0.029$). | ADI and insurance not associated with referral time or med use (all NS). | Older age and female sex associated with longer referral delay ($p<0.01$; $p=0.02$); older age → gabapentin use ($p=0.02$). |
| **Kalkanis 2003 (USA)** | 1590 (1240 w/ race) | Black patients less likely treated at high-volume MVD hospitals/surgeons; race predicts hospital ($p=0.02$) & surgeon volume ($p=0.008$). | Higher-income ZIP + private insurance → higher-volume centers/surgeons ($p<0.001$; payer $p=0.002$). | Older age less likely high-volume hospital/surgeon ($p<0.001$; $p=0.002$); trigeminal nerve section more common in females ($p=0.03$). |
| **Li 2020 (USA)** | 214 | — | — | MVD younger than SRS (median 60 vs 72; $p<0.001$); sex: NS ($p=0.964$). |
| **Hitchon 2016 (USA)** | 195 | — | — | MVD younger than rhizotomy/SRS (57 vs 75 vs 73 yrs; $p<0.0001$); more women undergoing surgery ($p=0.045$). |
| **Hung 2022 (Canada)** | 100 | — | — | Female longer time to surgery after specialist referral: total interval 121 vs 68 months ($p=0.018$); referral interval 53 vs 20 months ($p=0.007$). |

## Conclusion

This study revealed the presence of disparities in TN treatment based on race, SES, age, and gender. These disparities highlight the need for further research and interventions to ensure equitable access to appropriate surgical treatment for all patients with TN.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## References