

## Brief Communication

# Distribution, Demography and Migration Pattern of Neurologists in Canada, 1971–2022

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**ABSTRACT:** Neurology faces prolonged wait times in Canada, with delays worsened by the COVID-19 pandemic. As neurological disease prevalence rises, ensuring adequate access to care is essential. This study analyzes the distribution and migration patterns of neurologists in Canada from 1971 to 2022, using data from the Canadian Institute for Health Information. Neurology remains male-dominated (female-to-male ratio of 0.6), and only Ontario and British Columbia have per capita neurologist levels comparable to high-income countries. Despite stabilized migration to the USA since 2003, regional disparities persist, underscoring the need for strategies to improve retention, integrate foreign-trained professionals and enhance access across Canada.

**RÉSUMÉ :** Distribution, démographie et tendances migratoires au sujet des neurologues du Canada (1971 à 2022). La neurologie est confrontée à des temps d'attente prolongés au Canada, ces derniers ayant été aggravés par la pandémie de COVID-19. Étant donné que la prévalence des maladies neurologiques augmente, il demeure essentiel d'assurer un accès adéquat aux soins. À l'aide des données de l'Institut canadien d'information sur la santé (ICIS), cette étude entend analyser la répartition des neurologues et leurs tendances migratoires au Canada de 1971 à 2022. La neurologie reste dominée par les hommes (ratio femmes/hommes de 0,6), et seules l'Ontario et la Colombie-Britannique donnent à voir des densités de neurologues par habitants comparables à celles des autres pays à revenu élevé. Malgré la stabilisation de la migration vers les États-Unis depuis 2003, des disparités régionales persistent, ce qui souligne la nécessité d'élaborer des stratégies pour améliorer la rétention des professionnels, intégrer ceux formés à l'étranger et améliorer l'accès aux soins dans l'ensemble du Canada.

**Keywords:** neurology specialty; migration; supply; distribution

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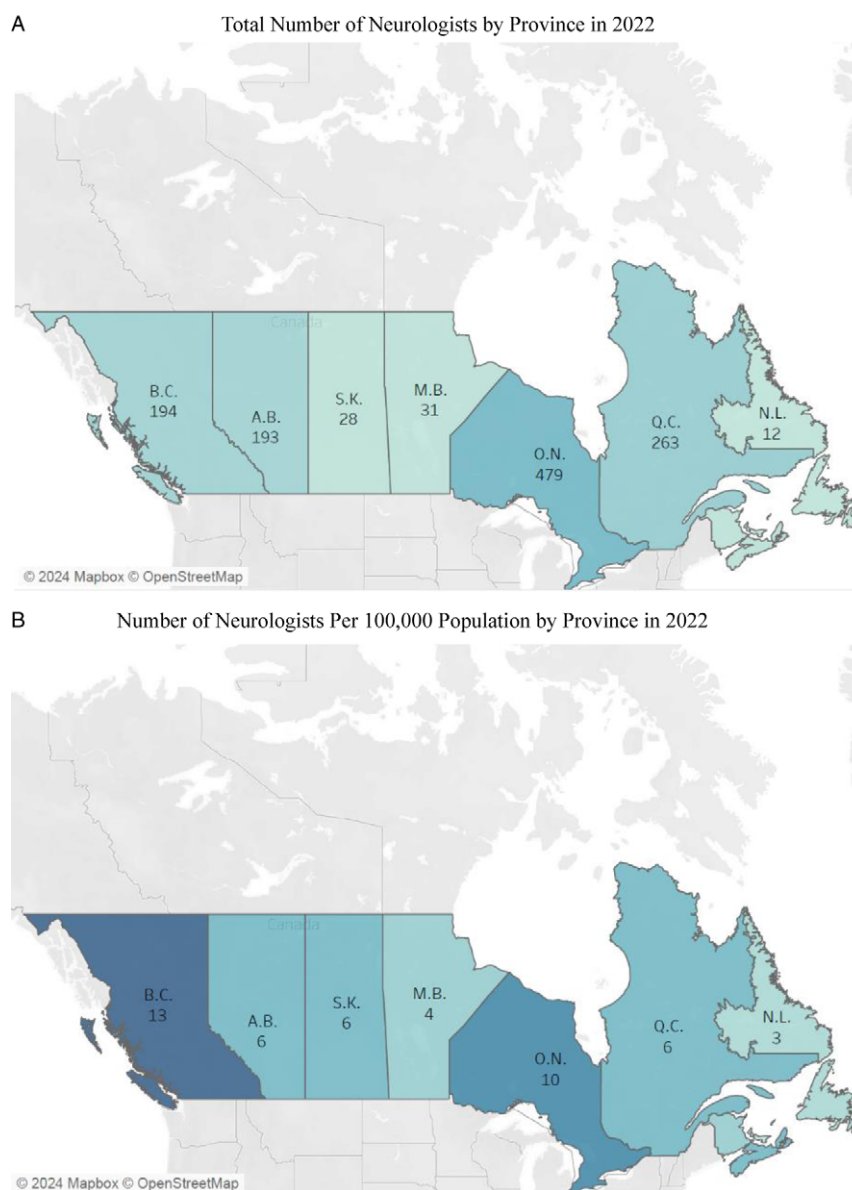
According to the latest estimates from the Global Burden of Disease study in 2021, neurological diseases have emerged as the leading cause of disability and mortality worldwide, surpassing other major health conditions.<sup>1</sup> Comprehensive analysis revealed that neurological disorders, including stroke,<sup>2</sup> Alzheimer's disease, epilepsy and migraine, account for the highest number of disability-adjusted life years, reflecting the significant impact on both mortality and quality of life.<sup>1</sup> Likewise in Canada, around 10% of the population is currently affected by neurological disorders, according to data from Canada's National Population Health Study of Neurological Conditions, with projections indicating this figure will rise in the coming decades.<sup>3</sup> This shift in the ranking highlights the critical importance of prioritizing neurological disorders in national and subnational health agendas to mitigate the extensive human and economic costs associated with these debilitating disorders. The aging of the global population,<sup>4</sup> including in Canada, further exacerbates the burden and drives up demand for neurologists, who are crucial for managing and treating a variety of neurological conditions.

Neurology is already among the specialty services with notably prolonged wait times across Canada. Even under the current situation, and prior to the anticipated multiplication of neurological diseases' burden in the next 2–3 decades, patients often face significant delays in accessing neurological care. A 2020 survey highlighted that the median waiting time for a neurology consult was 105 days, or approximately 3–4 months, placing it as the 6th longest wait time among 28 specialty services in Canada.<sup>5</sup> The shortage of neurological services and lengthy wait times have further deteriorated during and after the COVID-19 pandemic, exacerbating delays in access to essential neurological care.<sup>3</sup> This extended waiting period can lead to delays in diagnosis and treatment, potentially worsening patient outcomes, particularly for neurological conditions requiring timely intervention. Addressing these wait times is essential to improving access and quality of neurological care across Canada. As the number of individuals affected by neurological disorders continues to rise, the need for specialized neurological care becomes even more critical, necessitating an expansion in the workforce and resources

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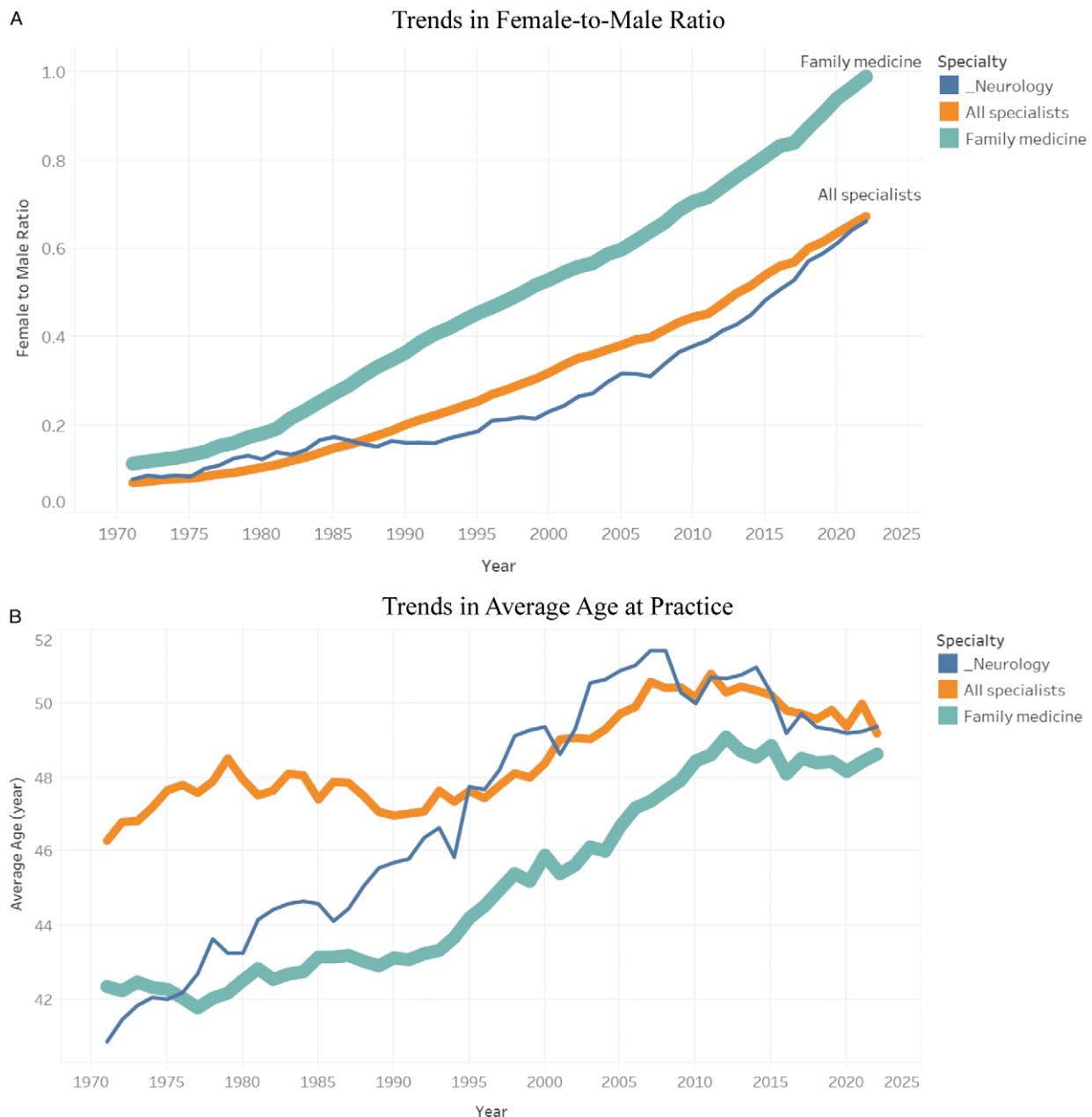
**Figure 1.** Crude number (A) and adjusted number (B) per 100,000 population of practicing neurologists by province in Canada in 2022.

dedicated to neurology to adequately address this escalating health crisis. Understanding the distribution and migration patterns of neurologists in Canada is essential for accurately assessing regional workforce needs, identifying disparities in access to neurological care and informing policy decisions to address gaps in healthcare coverage across provinces. As such, I have analyzed the supply and migration trends of neurologists practicing in Canada from 1971 to 2022.

For this study, data was obtained from the Canadian Institute for Health Information (CIHI), which compiles comprehensive information on the supply, distribution, demographics and migration patterns of physicians across Canada through Scott's Medical Database (SMDB).<sup>6</sup> This dataset spans from 1971 to 2022 and includes annual records of neurologists in each Canadian province. As per the CIHI data collection methodology, physician supply data (including neurologists) in this study includes only active physicians, defined as those holding an MD degree and a valid mailing address in Canada for the given year. Of the 102,746 physicians listed in SMDB in 2022, 96,020 met the criteria for

active status, while 6,726 were excluded based on specific criteria.<sup>6</sup> Exclusions consisted of residents (who are still in training), military physicians (whose services are generally not available to the public and whose locations may vary, including overseas) and non-registered physicians without publication consent. Additionally, semi-retired physicians were excluded due to the self-reported nature of this designation and lack of distinction between semi-retired and fully retired statuses in Scott's Directories.<sup>6</sup>

As per the CIHI database, from 1971 to 2022, the total number of neurologists in Canada has substantially increased from 183 to 1256. In 1971, the largest number of neurologists were in Quebec, Ontario and British Columbia, respectively. After five decades in 2022, Ontario had the largest increase in the number of neurologists, making it the leading province in terms of the crude number of neurologists (Figure 1A). However, when dividing these numbers by the population in each province, British Columbia outperforms Ontario with 13 neurologists per 100,000 population, indicating its superior coverage per person (Figure 1B). At the start

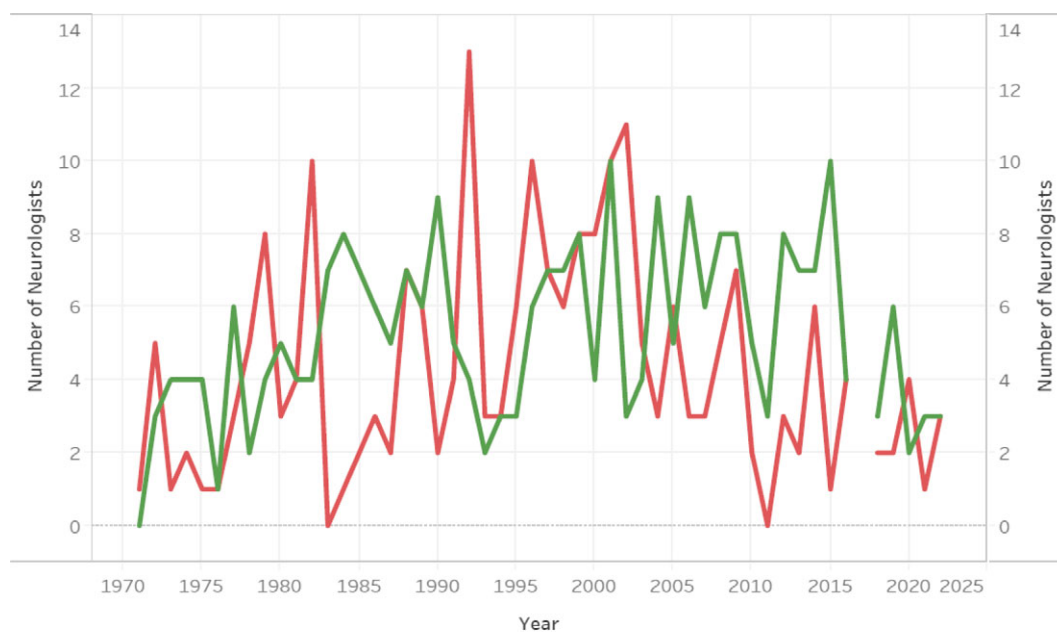


**Figure 2.** Trends in female-to-male ratio (A) and average age (B) of all specialists, family physicians and neurologists practicing in Canada from 1971 to 2022.

of the CIHI data collection, <10% of the neurologists practicing in Canada were female. However, the female-to-male ratio has gradually increased, reaching >0.6 in 2022. Yet, the neurology specialty is behind the average trend in gender equity for other specialties and family medicine over the past five decades (Figure 2A). As for age, like other specialties and overall medical practice in Canada, there has been an increasing trend in the average age of practicing neurologists in Canada during the past five decades (Figure 2B). This is consistent with data from a 2012 survey showing that the mean age of the Canadian neurologists at practice is around 50 years.<sup>7</sup> This trend reached a peak for the average age of 51 years around 2005–2006, after which there seems to be a slight decline to an average age of 49 years in 2022. According to the CIHI database, the migration of neurologists in and out of Canada follows the overall trend for other specialties. As

illustrated in Figure 3, two main waves of migrations of neurologists outside of Canada can be detected between 1975–1983 and 1990–2002 where the number of neurologists who left their practice in Canada prominently outweighs that of those entering Canada. On the contrary, from 1983 to 1990 and after the year 2003, there is an opposite pattern where the number of neurologists entering Canada slightly surpasses the number of those who emigrated from Canada to other countries.

The CIHI data is a rich longitudinal dataset that enables an in-depth evaluation of regional and national trends in the neurological workforce across five decades. The analysis of the supply and migration trends of neurologists practicing in Canada from 1971 to 2022 reveals several critical insights and actionable recommendations. Currently, Canada has more active neurologists than ever before. Yet, this growth is unevenly distributed across



**Figure 3.** Trends in migration of neurologists practicing in Canada from 1971 to 2022 (data from 2017 is missing).

■ Max. Number of physicians who moved abroad  
 ■ Max. Number of physicians who returned from abroad

jurisdictions and is not compensating for the growing demand caused by population growth and aging, as well as the backlog after the COVID-19 pandemic. The per capita number of actively practicing neurologists in Canada varies from 3 to 13 per 100,000 population. Globally, the number of neurologists varies from 0.1 per 100,000 population in low-income countries to an average of 7.1 in high-income countries and 9.2 in Europe.<sup>8</sup> Other than Ontario (10/100,000) and British Columbia (13/100,000), other Canadian provinces have <7 neurologists per 100,000 population, which is below the average of high-income countries. This nationwide disparity in neurological services should be considered for future policymaking in training neurologists and incentivizing care across Canada.

Gender equity in the medical profession varies significantly across different specialties and regions globally, including in Canada. Worldwide, women have made considerable strides in entering the medical field, yet disparities persist in specialty choices and career advancements. For instance, specialties such as pediatrics, obstetrics and gynecology often see a higher proportion of female physicians, while fields like surgery and orthopedics remain predominantly male.<sup>9</sup> In Canada, recent data indicates that while female representation in medicine has improved, with women constituting approximately 42% of all physicians, they remain underrepresented in certain high-demand specialties.<sup>10</sup> Analyzing CIHI data reveals that the neurology specialty is slightly behind the overall trend in Canada with 37.5% of neurologists identified as women, yet not different from the average of other specialties. Efforts to promote gender equity in neurology involve addressing systemic barriers, providing mentorship and creating supportive work environments to encourage women to pursue and thrive in the neurology specialty. Addressing these disparities is crucial for fostering a diverse and inclusive healthcare workforce that can better meet the needs of the Canadian population.

The previous migration waves of neurologists from Canada to the USA pose a significant challenge to the Canadian healthcare system, particularly in the field of neurology where there is already a critical shortage.<sup>11</sup> This trend, often referred to as the “brain drain,” is driven by various factors including higher salaries, better research opportunities and access to more advanced medical facilities in the USA. Current analysis of CIHI data shows that the outflow trend of neurologists from Canada to the USA has stabilized since 2003. This is in line with another analysis using data from the American Medical Association Masterfile on the graduates of Canadian medical schools.<sup>12</sup> However, sustained efforts are needed to retain neurologists by addressing salary disparities, improving working conditions and offering incentives for practice in underserved areas.

Although this study provides valuable insights into the interprovincial distribution and migration patterns of neurologists in Canada, it is limited by the lack of regional data within each province. Access to neurologists remains predominantly concentrated in large urban centers, leaving rural and remote communities underserved. A recent community survey from the USA revealed a remarkable disparity in access to neurologists in rural and micropolitan regions compared with metropolitan areas.<sup>13</sup> In Canada, as healthcare is under provincial jurisdiction, effective interventions may require collaboration between provincial health ministries and federal support to bridge these disparities. Comprehensive data at the regional level would further inform strategies to improve neurologist access across diverse geographic areas within provinces. Some such strategies include integrating qualified foreign-trained neurologists and promoting interjurisdictional mobility to address regional disparities. Policymakers need to implement targeted incentives for underserved regions, facilitate the integration of foreign-trained physicians and support gender equity in neurology training.

The practice settings of neurologists also significantly impact access to care. A considerable proportion of neurologists work within academic institutions, focusing primarily on subspecialty services rather than general neurology. It is estimated that nearly 90% of neurology residents plan to engage in subspecialty training through a fellowship program.<sup>14</sup> Moreover, some academic neurologists may dedicate their efforts exclusively to administrative leadership or educational roles, such as university teaching. While fostering academic neurology and subspecialty practice is essential for advancing neurological research, innovation and training, there is a parallel need to support and promote general neurology practice to meet the diverse care demands of patients across the country.<sup>15</sup> Addressing this balance may be critical to further reducing access disparities in neurological care in underserved regions and territories. Additionally, leveraging technology and innovative care models can enhance resource utilization and healthcare accessibility. These initiatives will help Canada build a more effective, equitable and adaptable healthcare system to meet the needs of its population.

**Author contributions.** SMF developed the research question, accessed the database, visualized the data and wrote the manuscript.

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**Competing interests.** None.

**Disclosure.** Dr Fereshtehnejad has no relevant disclosure.

## References

1. GBD 2021 Nervous System Disorders Collaborators. Global, regional, and national burden of disorders affecting the nervous system, 1990–2021: a systematic analysis for the Global Burden of Disease study 2021. *Lancet Neurol.* 2024;23(4):344–381.
2. GBD 2021 Stroke Risk Factor Collaborators. Global, regional, and national burden of stroke and its risk factors, 1990–2021: a systematic analysis for the Global Burden of Disease study 2021. *Lancet Neurol.* 2021;23(10):973–1003.
3. Appireddy R, Jalini S, Shukla G, Boisse Lomax L. Tackling the burden of neurological diseases in Canada with virtual care during the COVID-19 pandemic and beyond. *Can J Neurol Sci.* 2020;47:594–597.
4. Mitchell E, Walker R. Global ageing: successes, challenges and opportunities. *Br J Hosp Med (Lond).* 2020;81:1–9.
5. Liddy C, Moroz I, Affleck E, et al. How long are Canadians waiting to access specialty care? Retrospective study from a primary care perspective. *Can Fam Physician.* 2020;66:434–444.
6. Canadian Institute for Health Information. *Supply, Distribution and Migration of Physicians in Canada, 2022 — Methodology Notes.* Ottawa, ON, Canada. Canadian Institute for Health Information (CIHI); 2023.
7. Kirby S, Weston LE, Barton JJ, Buske L, Chauhan TS. Report of the Canadian Neurological Society manpower survey 2012. *Can J Neurol Sci.* 2016;43:227–237.
8. Bassetti CLA, Accorroni A, Arnesen A, et al. General neurology: current challenges and future implications. *Eur J Neurol.* 2024;31:e16237.
9. Winkel AF, Telzak B, Shaw J, et al. The role of gender in careers in medicine: a systematic review and thematic synthesis of qualitative literature. *J Gen Intern Med.* 2021;36:2392–2399.
10. Pickel L, Sivachandran N. Gender trends in Canadian medicine and surgery: the past 30 years. *BMC Med Educ.* 2024;24:100.
11. Sarnat HB. An American-canadian neurologist returns to Canada. *Can J Neurol Sci.* 2004;31:436–437.
12. Freeman TR, Petterson S, Finnegan S, Bazemore A. Shifting tides in the emigration patterns of Canadian physicians to the United States: a cross-sectional secondary data analysis. *BMC Health Serv Res.* 2016;16:678.
13. McGinley MP, Harvey T, Lopez R, Ontaneda D, Buchalter RB. Geographic disparities in access to neurologists and multiple sclerosis care in the United States. *Neurology.* 2024;102:e207916.
14. Mahajan A, Cahill C, Scharf E, et al. Neurology residency training in 2017: a survey of preparation, perspectives, and plans. *Neurology.* 2019;92:76–83.
15. Klebanoff LM, Safdieh JE. Modern neurology training is failing outpatients. *JAMA Neurol.* 2023;80:333–334.