



# Recommended Strategies for Physician Burnout, a Well-Recognized Escalating Global Crisis Among Neurologists

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Several indexes are used to classify physician burnout, with the Maslach Burnout Inventory currently being the most widely accepted. This index measures physician burnout based on emotional exhaustion, detachment from work, and lack of personal achievement. The overall percentage of physicians with burnout is estimated to be around 40%, but the proportion varies between specialties. Neurology currently has the second-highest rate of burnout and is projected to eventually take the top position. The purpose of this review is to provide a comprehensive overview focusing on the causes and ramifications of burnout and possible strategies for addressing the crisis. Several factors contribute to burnout among neurologist, including psychological trauma associated with patient care and a lack of respect compared to other specialties. Various interventions have been proposed for reducing burnout, and this article explores the feasibility of some of them. Burnout not only impacts the physician but also has adverse effects on the overall quality of patient care and places a strain on the health-care system. Burnout has only recently been recognized and accepted as a health crisis globally, and hence most of the proposed action plans have not been validated. More studies are needed to evaluate the long-term effects of such interventions.

**Key Words** physician burnout, physician stress, suicide, neurology job satisfaction, second-victim syndrome, neurologist burnout.

## INTRODUCTION

Physician burnout is defined as a psychological condition in response to chronic interpersonal stressors in the workplace,<sup>1</sup> and its prevalence is growing at an alarming rate in the US. The Maslach Burnout Inventory–Human Services Survey (MBI-HSS) outlines three key aspects to this response: 1) emotional exhaustion, 2) feelings of cynicism and desensitization or depersonalization toward work, and 3) a personal sense of lack of achievement or effectiveness. Relative to the general working US population, physicians not only experience higher rates in all subsections of the MBI (43.2% vs. 24.8% for emotional exhaustion, 23% vs. 14% for depersonalization, and 49% vs. 28% for overall burnout), but also lower rates of job satisfaction (36% vs. 61%).<sup>2</sup> Physician burnout is unfortunately no longer limited to the US, with it threatening to become a global crisis since it is now affecting countries such as India,<sup>3</sup> UK,<sup>4</sup> and China.<sup>5</sup>

Physician burnout affects not only practicing physicians, but also the standard of patient care, patient safety, and the efficiency of the overall health-care system. Studies have shown that the presence of physician burnout more than doubles the probability of unsafe patient care and significantly reduces patient satisfaction.<sup>6</sup> More than 40% of general physicians

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will report experiencing at least one burnout symptom,<sup>7</sup> but the proportion is higher in the field of neurology, with 60% of neurologists experiencing at least one symptom.<sup>8</sup> The burnout rate also varies across different types of neurologists, from residents to academic practitioners and from hospitalists to private practitioners, and neurology as a whole had the second-highest rate of burnout of 53% in 2019, after urology at 54%.<sup>7</sup> This represents a substantial increase in its prevalence since 2013, when it was ranked eighth at 41%.<sup>9</sup> The recent increasing trend in physician burnout in neurology has prompted a few approaches attempting to combat this issue. These include using technology<sup>10</sup> to shift the focus toward personal well-being, encouraging a sense of autonomy in the workplace,<sup>11</sup> utilizing positive reinforcement during residency training, and implementing art-based therapies.<sup>12</sup>

The purpose of this review is to acknowledge the looming global and national physician burnout crisis especially in the neurology specialty (in both clinical practice and residency training) and provide a comprehensive overview focused not only on the root causes and ramifications of burnout (regarding individual care, patient care, and health-care outcomes) but also methods for identifying it. This review further explores the effectiveness of existing methods and new interventions that can be implemented in neurology and other specialties in order to address this crisis.

## DISCUSSION

### Acknowledgement of the crisis

A meta-analysis of 25 studies spanning 1984 to 2003 found that female and male physicians had 2.27- and 1.14-fold higher risks of suicide, respectively, than the general population.<sup>13</sup> A study of 7,288 physicians from 2012 found that compared to high-school graduates, the risk of burnout was higher in individuals with an MD or DO degree [odds ratio (OR)=1.36,  $p<0.001$ ] but lower in individuals with a bachelor's degree (OR=0.80,  $p=0.048$ ), master's degree (OR=0.71,  $p=0.01$ ), or professional or doctoral degree other than an MD or DO degree (OR=0.64,  $p=0.04$ ).<sup>14</sup> These findings suggest that the risk of suicide among physicians is increasing. In 2012, the rate of burnout was fourth highest in neurologists (OR=1.47,  $p=0.01$ ) after emergency medicine (OR=3.18,  $p<0.001$ ), general internal medicine (OR=1.64,  $p<0.001$ ), and family medicine (OR=1.41,  $p=0.001$ ), while the work-life balance was worst in neurology.<sup>14</sup> Two major studies published in 2017 found that 66% of neurologists, 73% of neurology residents, and 55% of neurology fellows reported experiencing at least one symptom of burnout.<sup>8,15</sup>

### Factors contributing to burnout

#### Global and national burdens of neurological disease

According to the WHO, a government should spend at least 5% of the country's GDP on universal health coverage. Many countries with leading economies including India, China, and Russia do not meet this percentage.<sup>16-18</sup> Neurological diseases are the most-important cause of disability and death worldwide. Neurological conditions such as epilepsy, dementia, Alzheimer's disease, Parkinson's disease, and multiple sclerosis account for 6.3% of global disability-adjusted life years (DALYs). Furthermore, neurological disorders ranked as the leading contributor to DALYs in 2015 [250.7 million, 95% uncertainty interval (UI)=229.1–274.7 million, constituting 10.2% of global DALYs] and the second-leading cause of deaths (9.4 million, 95% UI=9.1–9.7 million, constituting 16.8% of global deaths). The number of deaths from neurological disorders increased by 36.7% between 1990 and 2015, while the DALYs increased by 7.4%. The global burden of neurological disorders has increased substantially over the past 25 years,<sup>19</sup> and the DALYs from all neurological disorders combined now surpass those from cardiovascular disease (228.9 million, excluding stroke), injuries (249.8 million), cancer (209.4 million), and mental and substance-use disorders (162.4 million).<sup>19</sup>

There are several health-care implications for patients with neurological conditions. Increasing numbers of neurology patients require careful planning by governments to ensure there are adequate providers and funding for their treatment and rehabilitation services. According to a recent WHO World Federation of Neurology Survey, there are large inequalities in the availability of neurological care across different patient populations, especially those from low- and middle-income families.<sup>19</sup> As a consequence of the shortage of neurologists globally, improving neurological care will require extensive and innovative strategies that include reducing the burnout rates of neurology physicians.<sup>19</sup>

Two-thirds of the neurological disease burden occurs in the developing world.<sup>20</sup> Although neurology originated in Africa, there is nowadays only a minimal African contribution to advancements in this field. Developing countries in Africa have a heavy burden of communicable and noncommunicable diseases, an insufficient number of workers, and poor equipment, and little medical research is performed there. There is now a greater need for neurologists in developing countries such as Africa to address the needs of the local population. International collaborations and help are required to improve the care provided to neurological patients in African countries.<sup>20</sup>

Data collected from 114 responding countries by WHO region indicate that the global median number of neurolo-

gists is 0.43 per 100,000 population. The median number of neurologists is lowest in Africa, at 0.04 per 100,000 population, followed by 0.1, 0.7, 0.8, 1.2, and 6.6 per 100,000 population in Southeast Asia, the Americas, eastern Mediterranean and western Pacific regions, and Europe, respectively. A surprisingly large proportion (42%) of countries have not reported neurological disorder data during in the last 2 years, which represent the largest barrier to addressing globally problems in the future.<sup>21</sup>

### National policies

According to the Association of American Medical Colleges, the number of people per active physician by specialty in 2015 was higher in neurology (24,001) than in internal medicine (2,817), family medicine (2,888), emergency medicine (8,121), and radiology (11,679), and is approaching that in the specialties with the highest burnout rates such as urology (32,771) and physical medicine and rehabilitation (35,074).<sup>22</sup> The US spends a very high proportion of its GDP (17.9%) on health care,<sup>16,17</sup> but the amount is disproportionately low for neurological conditions and for neurologists, according to the Centers for Medicare & Medicaid Services Physician and other Supplier Public Use File reports for Medicare Part B payments organized by providers who submitted claims in 2012 [1.8% (US\$ 1.15 billion) of US\$ 64.26 billion].<sup>23</sup> Neurology reimbursements are actually decreasing over time.<sup>24</sup>

### Work environment and hospital policies

The shortage of neurologists compared to other specialists exacerbates the current burnout rate. There is a significantly low number of practicing neurologists per patient, which increases their workload and stress levels. These physicians provide care to some of the most-vulnerable populations, but studies show that these patients have insufficient access to medical care. The required number of neurologists was ~18,180 in 2012, and this is projected to increase to 21,440 by 2025, representing an increase in the shortfall from 11% to 19%.<sup>25</sup> This includes a demand for 520 more full-time-equivalent neurologists starting in 2014. In 2012, the average wait time for new patients to see a neurologist was 34.8 business days, which was markedly longer than the 28.1 days in 2010.<sup>25</sup> Other studies have found average wait times of 24.1, 16.8, 20.3, and 15.5 days for new patient visits to neurosurgery, pediatric orthopedic surgery, family medicine, and cardiology facilities, respectively.<sup>25</sup> Furthermore, neurologists averaged 57.1 professional working hours per week in 2010, with 42.3 hours spent performing inpatient care activities.<sup>25</sup> A smaller number of neurologists per patient also increases their weekly working hours and the wait time for both new and follow-up patients.

According to the 2010 American Academy of Neurology (AAN) practice profile survey, neurologists on average distributed their time in the following manner: 72.9% to direct patient care, 9.1% to research, 9.7% to administrative responsibilities, 5.2% to teaching, and 3% to other activities. The average numbers of weekly interactions with new and follow-up patients by neurologists were 1) 3.8 and 8.5 attending encounters, respectively, 2) 8.9 and 14.2 inpatient consultations, and 3) 17.4 and 34.2 ambulatory visits.<sup>25</sup>

### Work-life balance

Work-life balance is a crucial aspect of postgraduate training in neurology. A lack of sufficient support staff, increased computer work, and increased patient volumes all lead to neurologists spending less time providing direct patient care. Poor work-life balance caused by additional clerical tasks results in family life suffering and hobbies being neglected.<sup>26,27</sup> The leading factors causing physician burnout are described in Table 1.

### Impacts of burnout

There are a few prominent reasons for burnout, including emotional exhaustion, work overburden, and psychological trauma.<sup>28</sup> While the immediate impact of burnout is on the neurologists themselves, it has widespread repercussions by affecting both their patients and placing burdens on the health-care system.

### Impact on personal life

Paradoxically, physicians often deny their symptoms and as a result exacerbate the problems associated with burnout (i.e., emotional exhaustion/detachment). They often resort to maladaptive coping strategies including drug and alcohol abuse, and exhibit suicidal tendencies and detachment from their jobs.<sup>29-31</sup> Moreover, burnout is not only a work-related issue, since it also affects their private lives and hence the people closest to them. In neurology, a significantly higher proportion of residents compared to attendings physicians experience burnout, perhaps due to the extra workload and new environment they are placed in.<sup>15</sup> In addition, both residents and practicing physicians alike suffer from so-called second-victim syndrome, which refers to psychological trauma and feelings of guilt regarding their patients, typically due to committing a medical error that results in a poor patient outcome.<sup>28,32-34</sup>

### Impact on the patient's life

Physicians who are experiencing burnout tend to become less interested in their work and often overlook underlying and more-subtle medical causes behind a patient's diagno-

sis. It is therefore not surprising that these physicians are more likely to make medical errors and compromises in the overall care of their patients.<sup>35,36</sup> Patient dissatisfaction with a

neurologist with burnout will naturally increase due to the neurologist seeming less sympathetic and genuine when dealing with them.<sup>37</sup> Burnout also increases the probability of

**Table 1.** Factors responsible for burnout among neurology residents and practicing physicians

Factors	Supporting studies
Increased hours worked per week ( $p=0.003$ )	Busis et al. <sup>8</sup>
More nights on call per week ( $p=0.013$ )	Study aim: to identify the prevalence and factors contributing to burnout, career satisfaction, and well-being in US neurologists
More outpatients ( $p=0.024$ )	Population characteristics:
Type of work	Population characteristics:
Burnout rate higher in CP neurologists [higher scores for EE ( $p=0.008$ ) and DP ( $p=0.014$ )] than in AP neurologists (63.3% vs. 55.7%, $p=0.004$ )	1,671 US neurologists responded out of 4,127 surveyed by AAN (40.5% response rate)
Type of compensation/salary	529 AP neurologists
AP neurologists more likely to get a fixed salary (42.9% vs. 23.7%, $p<0.05$ ) or salary bonus (53.3% vs. 32.8%, $p<0.05$ ) than CP neurologists	959 CP neurologists
CP neurologists more likely to receive production-based income (43.6% vs. 3.8%, $p<0.05$ ) than AP neurologists	Average age 51 years
AP neurologists have higher burnout due to more hours of work ( $p=0.006$ ) and a higher percentage of clinical time ( $p=0.043$ )	65.3% males
Higher burnout of CP neurologists associated with increased number of outpatients seen each week ( $p=0.004$ )	Nearly equal representation across the US
	Methods:
	57-question survey measuring burnout using 22-item MBI-HSS
	Neurologists with high scores for EE ( $\geq 27$ ) or DP ( $\geq 10$ ) were considered to have at least one manifestation of professional burnout
	Career satisfaction assessed using two questions from previous physician surveys regarding career and specialty choice, and questions from the Empowerment at Work and Physician Job Satisfaction Scale were used for professional satisfaction
Policies	Miyasaki et al. <sup>26</sup>
Neurologists felt that government mandates and regulations reduced direct patient care times and increased practice costs (135 text units)*	Study aim: to understand the experience and identify drivers and factors of burnout and well-being among US neurologists
Insurance mandates result in excessive paperwork and clerical tasks that serve as "pointless busywork" (142 text units)	Population characteristics: the initial study population comprised currently practicing neurologist who were members of the AAN and had a primary address in the US. Survey concluded with an open-ended question: "is there anything else you would like to share with AAN regarding burnout and well-being?"
Neurologists felt they received insufficient remuneration and were underpaid compared to other specialties based on the difficulty of their job (203 text units)	676 of 1,671 neurologist survey respondents left a free-text comment
Neurologists had the 7th-lowest salary in a comparison with 38 other specialties <sup>9</sup>	63.0% males
Administrators prioritize profits over patient care, increasing patient loads and administrative tasks without providing additional compensation (169 text units)	18.4% in solo practice, 21.6% in neurology groups, 13.3% in multiple specialties, 28.5% academic based, 12.7% hospital based, 3.7% government based, 1.8% other, 20% missing
Workload and work-life balance	38.7% employed in a hospital, 20.7% employed in private practice, 31.6% owners/partners, 9% other, 6% missing
Lack of sufficient support staff due to cutbacks or poor remuneration, increased computer work, and increased patient volumes all led to neurologists spending less time performing direct patient care (522 text units)	30.30% on fixed salary, 36.1% on salary+bonus, 33.6% on production-based income
Poor work-life balance caused by additional clerical tasks caused family life to suffer and hobbies to be neglected (169 text units)	62.8% with burnout, 7% missing
Professionalism and work dimensions	Methods: applied inductive data analysis to free-text comments ( $n=676$ ) from the 2016 AAN survey of burnout, career satisfaction, and well-being <sup>8</sup>
Lack of professional treatment by colleagues, policymakers, and the administration (304 text units)	
Loss of engagement, losing curiosity about neuroscience, enjoying practicing less, and enjoying life less (138 text units)	

**Table 1.** Factors responsible for burnout among neurology residents and practicing physicians (continued)

Factors	Supporting studies
Burnout specifically in trainees	Levin et al. <sup>15</sup>
Residents had a higher burnout rate than fellows (73.5% vs. 55.0%, $p=0.001$ )	Study aim: prevalence and factors contributing to burnout, career satisfaction, and well-being in US neurology residents and fellows
Residents (compared to fellows)	Population characteristics: looked at 354 trainee responses of the aggregate study population; response rate 37.7% <sup>8</sup>
Worked more hours per week on average (67.5 vs. 59.1 hours, $p<0.001$ )	Median age of participants: 32 years
Spent a larger proportion of time in direct patient care (82.5% vs. 67.3%, $p<0.001$ )	51.1% female
Devoted less time to research (4.1% vs. 19.3%, $p<0.001$ )	Responders well-represented the US distribution
Spent more nights per week on call (mean 1.39 vs. 1.18, $p=0.003$ )	59.9% of responders were residents and 31.4% were fellows
Cared for more inpatients on hospital days (median: 10 vs. 1, $p<0.001$ )	No significant difference in sex and geographic distributions between residents and fellows, but fellows older than residents ( $p<0.001$ )
Too-few support staff to assist with work (62.2%, 199/320). Leading cause of death in residents: 66 (4.07%) per 100,000 person-year deaths occurred due to suicide after neoplasia [80 (4.93%) per 100,000 person-year deaths]	Methods: study focused on the 938 neurology trainees and their responses that were included in the sample of a previously published survey <sup>8</sup>
Suicide rate due to drug and biological substance intakes was higher	Yaghmour et al. <sup>48</sup>
An important finding is that most suicides (49/66, 74%) occurred during years 1 and 2 of training	A systematic study of the deaths of US residents from all causes, including suicide in an ACGME-accredited program during 2000–2014
	Methods: from 381,614 residents (9,900 programs) in training, the names of residents reported as deceased were submitted to the National Death Index to learn the causes of death. Person-year calculations were used to establish resident death rates and compare them with those in the general population

\*Miyasaki et al. used a “text unit” to count how many individual survey responses mentioned the given topic/issue. For example, 135 text units means that among 676 free-text responses made by neurologists in the survey, 135 of them mentioned government mandates as a source of stress or burnout.

AAN: American Academy of Neurology, ACGME: Accreditation Council for Graduate Medical Education, AP: academic practice, CP: clinical practice, DP: depersonalization, EE: emotional exhaustion, MBI-HSS: Maslach Burnout Inventory–Human Services Survey.

misdiagnosis, leading to unsafe patient care and longer recovery times for the patient, and sometimes even puts the patient’s life in jeopardy.<sup>38</sup> In short, physician burnout significantly compromises the overall quality of patient care.

**Health-care-related impacts**

Physician burnout also strains the health-care system as a whole. Physicians who try to cope with the symptoms of burnout often reduce their hours or leave their jobs in hopes of finding employment that is less emotionally draining. This results in more physicians needing to be hired, trained, and become acclimated to the workforce, which typically takes months to years.<sup>39,40</sup> Moreover, physicians with burnout tend to make more errors, increasing the number of malpractice lawsuits.<sup>41</sup> This means that money needs to be redistributed from the health-care system to the legal system, further straining the already restricted financial resources available to hospitals/clinics, and placing increasing demands on physicians to be perfect. Table 2 describes the effects of burnout identified in previous studies.

**Resources available to identify the burnout crisis**

**Assessment**

Various scales are available for measuring physician burnout, such as the MBI, Bergen Burnout Inventory, Oldenburg Burnout Inventory, Copenhagen Burnout Inventory (CBI), Professional Quality of Life Compassion, Satisfaction and Fatigue, and Shriom-Melamed Burnout Measure. Table 3 presents strategies for identifying burnout. The MBI is considered the gold standard for measuring physician burnout, and this scale has subtypes such as the MBI–General Survey and MBI-HSS. On all MBI subscales, lower scores for personal accomplishment and higher scores for depersonalization and emotional exhaustion are correlated with higher burnout rates. The CBI was developed to address the perceived limitations of the MBI scale, and it considers core symptoms of burnout such as fatigue and exhaustion, and measures burnout at the personal, work, and client levels.<sup>42</sup>

There is also a significant argument for establishing burnout within a well-established diagnostic category such as a type of depression, rather than as a distinct entity. However,



**Table 2.** Ramifications of burnout

Factor	Supporting studies
Compromised patient care by errors made by physicians	<p>Welp et al.<sup>49</sup> Physicians lack the energy, motivation, and cognitive function to analyze minor changes/less-pressing medical issues, leading to more medical errors</p> <ul style="list-style-type: none"> <li>a. Delaying a correct prognosis of a medical condition</li> <li>b. Administering unnecessary or even harmful treatment</li> </ul> <p>Increasing burnout leads to higher mortality rates</p> <p>Motluk<sup>35</sup> Physicians who experience burnout are 2.2-fold more likely to make a medical error</p>
Health-care burden and financial losses	<p>Lee et al.<sup>39</sup> Burnout leads to physicians leaving their jobs</p> <ul style="list-style-type: none"> <li>a. Estimated cost of replacing a physician ranges from US\$ 50,000 to US\$ 1 million</li> </ul> <p>Pélissier et al.<sup>40</sup>  <ul style="list-style-type: none"> <li>a. Constant turnover among physicians increases stress in medical staff</li> </ul>           Have to become accustomed to different physician styles            Reduces the efficiency of the medical system</p> <p>Wright and Katz<sup>41</sup>            Increased number of malpractice lawsuits</p> <ul style="list-style-type: none"> <li>a. 9% of neurologists who have experienced burnout have made at least one major medical error</li> </ul>
Personal health and mental well-being of neurologists	<p>Oreskovich et al.<sup>30</sup> 25% higher risk of alcohol/drug use compared to the general population</p> <p>Center et al.<sup>31</sup>            Higher risk of suicide compared to the general population            Suicide rate is 40% higher in males and 130% higher in females            Thought that females have higher emotional ties leading to increased depression and emotional exhaustion</p> <p>Patel et al.<sup>29</sup>            Physician deny or avoid dealing with job-related stress and symptoms of burnout</p> <ul style="list-style-type: none"> <li>a. Will not seek the help of counselors</li> <li>b. Employ maladaptive coping strategies</li> </ul>

there are also advantages to considering burnout in its own diagnostic category; for example, this will allow health-care practitioners with burnout to underscore environmental and sociocultural factors that might hinder them from seeking help in the form of psychotherapy and/or medications.<sup>42,43</sup>

**Strategies for identifying burnout at the hospital level**

While burnout is a result of systemic deficiencies, most institutions operate under the assumption that physician well-being and burnout are solely the responsibility of the individual physician. This results in organizations implementing only a narrow list of generally unhelpful resolutions. Studies have shown that genuine efforts made by health-care organizations can significantly reduce physician burnout and create a less-stressful working environment. Various strategies that can be implemented by hospital administrations have been reported. The first step in improving physician burnout is recognizing the problem and demonstrating that the organization cares about the well-being of its health-care providers. Once the problem is acknowledged, burnout should

be measured as a routine institutional performance metric. Many organizations routinely assess patient volumes, patient satisfaction, the payer mix, financial performance, and quality/safety. In addition to regular burnout evaluations, hospitals should evaluate factors such as professional fulfillment/satisfaction, emotional health/stress, and fatigue. There is considerable evidence that physician satisfaction and well-being are equally important to the success of an organization. Appropriate steps and resources must therefore be implemented at the organizational level to routinely assess and improve the root causes of physician burnout.<sup>44</sup>

**Future recommended strategies**

Solutions for combating burnout should not just focus on the individual, instead being implemented at all levels. Tables 4 and 5 list the common consensus found in previous studies that have addressed burnout.

**Individual level**

Self-awareness is the biggest step to recognizing burnout at

**Table 3.** Strategies for identifying burnout

Strategies	Advantages	Disadvantages
<p>MBI; Maslach et al.<sup>50</sup></p> <p>Either 22-item or 16-item survey divided into 3 subscales to measure EE, DP, and reduced PA. Items are written as statements about personal feelings/attitudes (e.g., i feel burnout from my work) and answered in terms of the frequency at which respondents experience the feelings, ranging from 0 ("never") to 6 ("every day")</p>	<p>Widely used/known</p> <p>Three dimensions: EE, DP, and reduced PA</p>	<p>Items are negatively phrased for EE and DP and positively phrased for PA (measures frequency of positive experiences for professional efficacy as opposed to a sense of inadequacy)</p> <p>Emphasis on emotional aspects (9 items in EE compared to 5 in DP and 8 in PA)</p> <p>Commercially available</p>
<p>Bergen Burnout Inventory; Feldt et al.<sup>51</sup></p> <p>9-item survey measuring burnout in the work context. It measures 3 core dimensions of burnout: EE, cynicism, sense of inadequacy</p>	<p>Estimates the inadequacy at work for professional efficacy, taking criticism of MBI-HSS into account; maintains consistency of negative wording across burnout dimensions</p> <p>Measures intensity of burnout dimensions rather than frequency</p>	<p>Context-specific, only focusing on work</p> <p>Evidence for factorial validity is limited to managerial samples</p>
<p>Oldenburg Burnout Inventory; Halbesleben and Evangelia<sup>52</sup></p> <p>16 items that assess physical, affective, and cognitive exhaustion and disengagement in both work and academic contexts</p>	<p>Items contain a mixture of negative and positive phrases</p> <p>Covers physical and cognitive aspects of exhaustion</p> <p>Looks at both work and academic settings</p> <p>Free to use</p>	<p>Two dimensional, does not address professional accomplishment, although many believe this to be the weakest of the three sections</p>
<p>Copenhagen Burnout Inventory; Kristensen et al.<sup>53</sup></p> <p>Assesses personal burnout (6 items), work-related burnout (7 items), and client-related burnout (6 items).</p>	<p>Assesses work and client aspects of burnout in addition to personal exhaustion</p> <p>Free to use</p>	<p>One dimensional, only focuses on EE</p>
<p>Professional Quality of Life Compassion Satisfaction and Fatigue; Stamm et al.<sup>54</sup></p> <p>30-item self-reported, frequency-based survey measuring compassion fatigue and compassion satisfaction of helping professions when dealing with traumatic or stressful events. Assesses secondary traumatic stress, burnout, and compassion fatigue</p>	<p>Looks at both the negative and positive aspects of a helping profession</p> <p>Specific to helping professions such as physicians and nursing</p> <p>Widely used for risk management and intervention planning</p> <p>Free to use</p>	<p>Does not address DP or desensitization to work</p>
<p>Shriom-Melamed Burnout Measure; Shirom<sup>55</sup></p> <p>14-item survey that characterizes burnout into EE, physical fatigue, and cognitive weariness</p>	<p>Widely used in international burnout research</p> <p>Concise and short</p>	<p>One dimensional, only focusing on EE</p>

DP: depersonalization, EE: emotional exhaustion, MBI-HSS: Maslach Burnout Inventory–Human Services Survey, PA: personal accomplishment.

the individual level. Self-care should be promoted in order to cultivate well-being and resilience, and encourage communication among peers, mentors, and experts.<sup>45</sup> It is worthwhile to encourage exercise, yoga, mindfulness activity, and frequent get-togethers with peers along with families in order to share experiences and work-related issues, and promote the work–life balance.<sup>36,46</sup>

**Training level**

Like training programs in the US, training programs in de-

veloping countries should establish guidelines for the maximum working hours per week and the maximum numbers being on 24-hour call. In order to mitigate the risk of burnout among resident physicians, residency programs should evaluate and keep track of burnout levels in the same way that they evaluate performance levels.

**Administrative/hospital level**

Reducing the administrative workload can reduce burnout and increase satisfaction among neurologists.<sup>15</sup> Providing

**Table 4.** Methods adopted for addressing burnout

Intervention	Supporting studies
Use of technological smartphone apps	<p>Yeo et al.<sup>10</sup></p> <p>Design</p> <p>7 residents and fellows</p> <p>Smartphone app that instructed users to immediately perform meditation at random times throughout the day</p> <p>Randomized 6-months trial where members received 1 mindfulness lecture followed by 6 months of using of a smartphone app</p> <p>Results</p> <p>Results were analyzed (based on the MBI) at the start of the study and every 3 months after it</p> <p>Those who used the app exhibited higher resilience and personal achievement</p> <p>No significant improvement in burnout or psychological distress</p> <p>Conclusion</p> <p>Smartphone apps may improve overall well-being but do not directly reduce burnout</p>
Positive vs. negative reinforcement	<p>Ratliff et al.<sup>11</sup></p> <p>Design</p> <p>Longitudinal study involving 48 neurology residents</p> <p>Residents were monitored when being either praised or negatively reinforced by attending/co-residents and patients</p> <p>Results</p> <p>Originally 63% of the sample experienced high-to-moderate levels of EE</p> <p>Receiving praise resulted in reduced EE (<math>p=0.04</math>)</p> <p>Disapproval resulted in higher levels of EE (<math>p=0.08</math>)</p> <p>Conclusions</p> <p>The use of positive/negative reinforcement may reduce one of the factors related to burnout</p>
Art-based forms of therapy	<p>King et al.<sup>12</sup></p> <p>Design</p> <p>24 resident medical students and staff members in a neurology department</p> <p>1-hour art-therapy session</p> <p>Performed creative arts and crafts task using supplies such as canvass, glue, and scissors</p> <p>Results analyzed using a posttask survey</p> <p>Results</p> <p>21 of 24 participants said the task helped them relax and that they had an overall positive experience</p> <p>20 of 24 participants said they would participate again in art-based therapy</p> <p>Conclusions</p> <p>Art-based therapy may help to reduce overall stress and increase positive feelings in physicians, but more studies are needed to reach a definitive conclusion</p>

EE: emotional exhaustion, MBI: Maslach Burnout Inventory.

appropriate training on electronic health records (EHRs), user-friendly technology, and additional support from allied health-care and non-health-care personnel will give physicians more time to focus on their patients rather than on patient records. Professional development opportunities, flexible working hours, and distributing job roles might also provide additional relief.

#### National level

The AAN has published guidelines to address this issue at the national level<sup>45</sup> that include training programs for EHRs, creating more funding for new training programs, encouraging advocacy leadership forums to train more neurologists,

organizing visits with lawmakers to address unspecified factors that contribute to burnout in neurology, and advocating for physician-friendly national policies, meaningful quality measures, and fair reimbursements.

#### Solving the global crisis

Burnout is recognized as a global phenomenon due to the widespread nature of the imbalance between the global disease burden and available resources. Efforts are being made to increase the number of neurologists and allied health-care providers globally. Increasing the percentage of GDP spent on health care and allocating more funding to training and treatments related to this neurological disorder would signif-



**Table 5.** Recommended strategies and guidelines

Strategy	Descriptions of the steps
Minimize nonessential clerical tasks <sup>15</sup>	<ul style="list-style-type: none"> <li>“Busywork” (especially that involving EHRs) should either be minimized or delegated to supporting staff to complete</li> <li>Utilize and develop/perfect new technologies that automatically import conversations into EHRs in order to reduce time spent manually inputting data after every patient visit</li> </ul>
Increase the autonomy of neurologists in the workplace	<ul style="list-style-type: none"> <li>Assert control over professional lives</li> <li>Increase involvement with professional organizations to support interests</li> </ul>
Make EHR technology easier to understand <sup>15</sup>	<ul style="list-style-type: none"> <li>Implement training programs to teach physicians how to better understand and use EHRs</li> <li>Work with EHR vendors to make technology more user-friendly and clinically helpful</li> <li>Adapt technology to practice, not vice versa</li> <li>Decrease the number of unnecessary clerical tasks</li> </ul>
Implementation of and education about better coping skills/mechanisms	<ul style="list-style-type: none"> <li>Increase the availability of counseling and support groups for neurologists</li> <li>Encourage open sharing among peers and colleagues in the workplace</li> </ul>
AAN recommendations <sup>45</sup>	<p>Individual level</p> <ul style="list-style-type: none"> <li>Promote self-care to cultivate well-being and resilience, and increase engagement</li> <li>Encourage participation in individual courses/consultations</li> <li>Create a website with tips, tools, and strategies for combating burnout</li> <li>Encourage exercise, yoga, and talking to peers/colleagues</li> </ul> <p>Organizational level</p> <ul style="list-style-type: none"> <li>Implement different ways to use EHRs</li> <li>Implementation of a daily team huddle to increase communication and smooth the daily flow/coordination<sup>56</sup></li> <li>The AAN Live Well, Lead Well Program is a 1- or 2-day leadership program for neurologists<sup>57</sup></li> <li>Develop lasting leadership skills to promote positivity in the workplace</li> </ul> <p>National level</p> <ul style="list-style-type: none"> <li>Create educational programs about EHRs</li> <li>The AAN Palatucci Advocacy Leadership Forum trains neurologists to become legislative advocates through coalitions, societies, and other methods</li> <li>Organize visits with lawmakers to address unspecified factors that contribute to burnout in neurology</li> <li>Advocate for physician-friendly national policies, meaningful quality measures, and fair reimbursements</li> <li>Create a registry tool to facilitate meeting regulation requirements</li> </ul>
Increase importance of neurology relative to other specialties	<ul style="list-style-type: none"> <li>Encourage administrators and policymakers to view neurologists (and other physicians alike) as human beings with limitations</li> <li>Raise awareness of the importance of neurology in order to increase respect for the field</li> </ul>
Increase effectiveness of support staff	<ul style="list-style-type: none"> <li>Actively reorganize health-care structures and training so that support staff are more effective and helpful</li> <li>Move toward team-based medicine/care to alleviate the workload on individual neurologists</li> <li>Utilize advanced nurse practitioners to reduce the clinical workload</li> </ul>

AAN: American Academy of Neurology, EHR: electronic health record.

icantly reduce the burden on physicians. According to the WHO, only 24% of countries report stand-alone neurological health policies, despite there being a major deficit in low- and middle-income countries.<sup>21</sup> More countries need to adopt uniform policies for neurological disorders. The global crisis could be reduced by encouraging collaboration activity and exchange programs, such as those involving training physicians and allied health-care providers (psychologists, neu-

roradiologists, electroencephalography technicians, physical therapists, occupational therapists, and speech therapists), neurological diseases awareness education partnerships with patients, and the supply of drugs.<sup>21</sup> Only 12% of the surveyed countries report a separate budget for neurological disorders, and so this proportion needs to be increased. A consequence of the shortage of neurologists is that neurological care is provided by primary health-care providers in 91% of countries

with unknown levels of expertise and training for neurological disorders. This problem can be mitigated by increasing budgets to start new residency training programs or to increase the strength of current programs.<sup>21</sup> Moreover, tele-neurology can serve as a powerful tool for increasing global access to health care and alleviating the shortage of neurologists.<sup>47</sup>

## CONCLUSION

This study has highlighted the global burnout crisis and provided comprehensive information on the responsible factors, ramifications, and identification methods. We applied a multidisciplinary approach to address burnout in neurology. Unfortunately, data on the implementation and postimplementation effects of such approaches are scarce, and so more studies are needed to determine the effectiveness of such strategies in the prevention and treatment of burnout.

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### Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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