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Physician burnout: contributors, consequences and solutions

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Physician burnout, a work-related syndrome involving emotional exhaustion, depersonalization and a sense of reduced personal accomplishment, is prevalent internationally. Rates of burnout symptoms that have been associated with adverse effects on patients, the healthcare workforce, costs and physician health exceed 50% in studies of both physicians-in-training and practicing physicians. This problem represents a public health crisis with negative impacts on individual physicians, patients and healthcare organizations and systems. Drivers of this epidemic are largely rooted within healthcare organizations and systems and include excessive workloads, inefficient work processes, clerical burdens, work–home conflicts, lack of input or control for physicians with respect to issues affecting their work lives, organizational support structures and leadership culture. Individual physician-level factors also play a role, with higher rates of burnout commonly reported in female and younger physicians. Effective solutions align with these drivers. For example, organizational efforts such as locally developed practice modifications and increased support for clinical work have demonstrated benefits in reducing burnout. Individually focused solutions such as mindfulness-based stress reduction and small-group programmes to promote community, connectedness and meaning have also been shown to be effective. Regardless of the specific approach taken, the problem of physician burnout is best addressed when viewed as a shared responsibility of both healthcare systems and individual physicians. Although our understanding of physician burnout has advanced considerably in recent years, many gaps in our knowledge remain. Longitudinal studies of burnout's effects and the impact of interventions on both burnout and its effects are needed, as are studies of effective solutions implemented in combination. For medicine to fulfil its mission for patients and for public health, all stakeholders in healthcare delivery must work together to develop and implement effective remedies for physician burnout.

Keywords: burnout, healthcare delivery, physician health, physician impairment, professional, well-being.

Background

What is burnout?

As first described by Freudenberger [1] and subsequently developed by Maslach and colleagues [2, 3], chronic stress associated with emotionally intense work demands for which resources are inadequate can result in burnout. Burnout is a work-related syndrome involving emotional exhaustion, depersonalization and a sense of reduced personal accomplishment [2]. Amongst physicians, emotional exhaustion includes feeling "used up" at the end of a workday and having nothing left to offer patients from an emotional standpoint. Depersonalization includes feelings of treating patients as objects rather than human beings and becoming more callous towards patients. A sense of reduced personal accomplishment encompasses feelings of ineffectiveness in helping patients with their problems and a lack of value of the results of work-related activities such as patient care or professional achievements.

Importantly, burnout is distinct from conceivably related constructs such as job dissatisfaction, fatigue, occupational stress and depression [2, 4]. Although burnout correlates with these problems, it may be present in their absence or absent in their

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presence [5]. As a work-related phenomenon, burnout is further distinguished from depression. In particular, the emotional exhaustion domain of burnout has been suggested to map more closely to depression [6], but the depersonalization and low personal accomplishment domains of burnout do not correlate well with depression or other psychological issues [7, 8].

How is physician burnout measured?

The most widely accepted standard for burnout assessment is the Maslach Burnout Inventory (MBI), which includes a Human Services Survey applicable to healthcare professionals [2]. This instrument is comprised of 22 items, each scored from 0 to 6 based on self-reported frequency of the feeling addressed by each item. The emotional exhaustion domain consists of nine items for a total score range of 0–54. The depersonalization domain consists of five items for a total score range of 0–30. The personal accomplishment domain consists of eight items for a total score range of 0–48. It is recommended that the quantitative totals be reported where possible, but classification into tertiles is possible based on the normative data from the instrument's development. In this scheme, emotional exhaustion scores of 27 or greater, depersonalization scores of 10 or greater and personal accomplishment scores of 33 or less are considered indicative of high levels of burnout in each domain for physicians.

Historically, emotional exhaustion has been held to be the dominant domain of burnout [9], but depersonalization may actually align more strongly with the most negative consequences of burnout [10, 11]. Therefore, conceptions of burnout that address only emotional exhaustion are incomplete [4, 12]. Because research on physicians has often found the personal accomplishment domain of burnout to correlate only weakly with outcomes, however, one common approach has been to focus on the emotional exhaustion and depersonalization domains. Thus, although not described in the development of the MBI, overall burnout (perhaps more fully described as the presence of important or impactful burnout symptoms) has commonly been defined as a high level of either emotional exhaustion or depersonalization [4, 13].

Despite robust evidence in support of the MBI for measuring physician burnout, its length can limit its use in assessing burnout outside of structured research studies. Shorter assessment tools are of interest for larger surveys of physicians or for institutional assessments. According to this focus, we have evaluated the single items within these domains with the greatest factor loadings across studies, "I feel burned out from my work" for emotional exhaustion and "I have become more callous toward people since I took this job" for depersonalization [14, 15]. In studies of more than 10 000 medical students and physicians, we found strong correlations between these single items and their respective emotional exhaustion and depersonalization domain scores from the full MBI, and area-under-the-curve measures of 0.94 and 0.93, respectively, against the full MBI domains. In addition, replacing the full MBI with these single items in physician studies yielded similar parameter estimates in models of burnout associations and no differences in summary study conclusions. These items have subsequently been applied in numerous physician burnout studies.

Alternative abbreviated assessments have been proposed. McManus applied a shortened MBI using three items from each domain [16], but validity evidence in support of this approach is lacking. An even more parsimonious approach is to use a single item, as applied in the Physician Work Life and MEMO studies [5, 17–19]. This measure uses a 1–5 scale on which respondents indicate "how severe is my burnout." Correlations with the emotional exhaustion domain of the full MBI have been demonstrated to be moderate [20–22], and lower than correlations for the single items directly drawn from the MBI as might be expected [23]. This measure also offers only weak correlations with the depersonalization domain of burnout [23], limiting its application as a true burnout measure as described previously.

Measures developed separate from the MBI framework also exist [3, 24, 25], in part in response to debate concerning the optimal conceptualization of physician burnout [26]. These include the Copenhagen Burnout Inventory [27] and the Oldenburg Burnout Inventory [28, 29]. However, despite ongoing efforts to refine burnout instruments, the MBI remains the current "gold standard" for burnout assessment [3, 25], with the full MBI representing the preferred version when possible.

Why is physician burnout important?

Physician burnout has received increased attention in recent years as prevalence rates of burnout

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symptoms near or exceeding 50% have been documented in national studies of both physicians-in-training [30–33] and practicing physicians in the United States [34–37]. National data from other countries are less widely available, but the existing literature suggests similar issues are present worldwide [3, 34, 38–46]. Importantly, although older studies in Denmark [27] and Norway [47] did not find higher burnout rates amongst physicians than in several other professions, more recent studies from the United States have found that burnout rates are markedly higher amongst practicing physicians than individuals in other careers, even after adjusting for work hours and other factors [32, 36, 37]. Physician burnout matters because it is associated with negative consequences on patient care [48–51], the physician workforce and healthcare system costs [52, 53], and physicians' own care and safety [54, 55], as shown in Fig. 1 and described further below.

Consequences to patient care

Cross-sectional studies have linked physician burnout with suboptimal patient care practices [5, 46, 56, 57], as well as with a doubled risk of medical error [51] and a 17% increased odds of being named in a medical malpractice suit [58]. These associations do not prove that burnout affects patient care, and medical errors have certainly been associated with subsequent distress [59]. However, the longitudinal Internal Medicine Resident Well-Being (IMWELL) Study found that higher levels of burnout were associated with increased odds of reporting a major medical error in the subsequent 3 months. Self-perceived major medical errors were also associated with worsening burnout, depressive symptoms and decrease in quality of life, suggesting a bidirectional relationship between medical errors and distress [48, 50]. Additional research across East Asia, Europe, the Middle East and North America generally supports these associations,

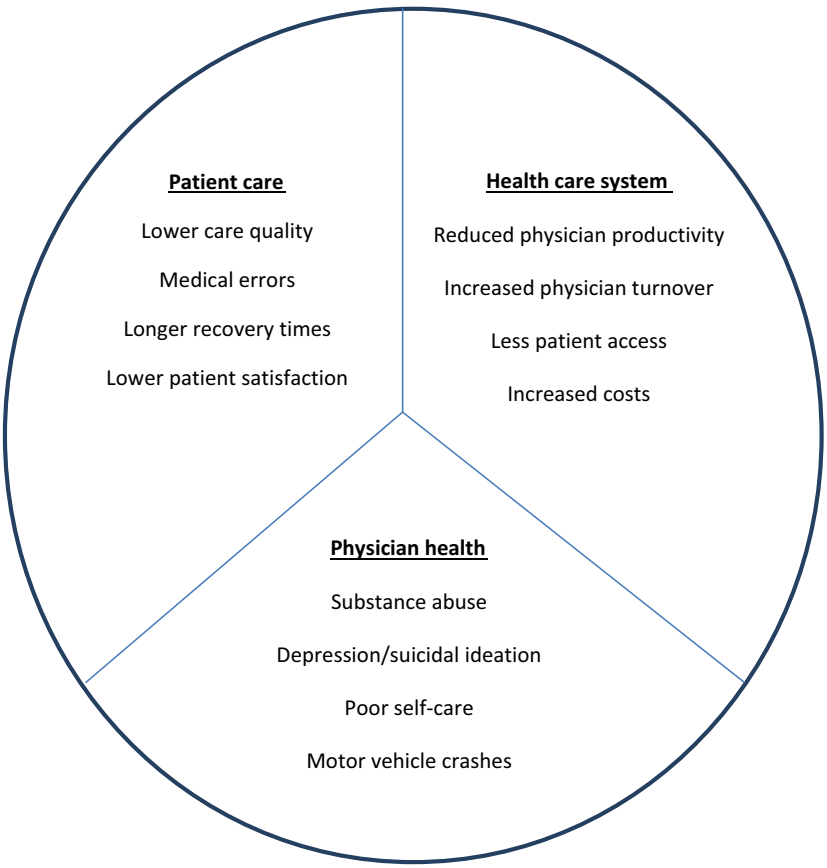

Fig. 1 *Consequences of physician burnout.*

although not all studies have consistently found a relationship between burnout and adverse patient outcomes and additional prospective studies better supporting causality are needed [60–62]. Other studies have found that increased emotional exhaustion levels of physicians working in intensive care units are associated with higher standardized patient mortality ratios [63] and lower perceived quality of interpersonal teamwork [64]. Increased physician depersonalization levels have been shown to relate to longer recovery times for hospitalized patients postdischarge [65].

Cross-sectional studies have also reported significant correlations between physician burnout and both job satisfaction [66–68] and patients' satisfaction with their hospital care [65, 69], between physician job satisfaction and patients' satisfaction with their health care [70] and between physician job satisfaction and patient-reported adherence to medical advice [60, 71]. These associations suggest a potential impact of burnout on patient satisfaction and physician–patient relationships, with attendant effects on healthcare outcomes.

Consequences to the physician workforce and healthcare system costs

Cross-sectional studies have associated physician burnout with decreased productivity [72], job dissatisfaction [67] and more than doubled self-reported intent to leave one's current practice for reasons other than retirement [73, 74]. Considering actual practice changes, a longitudinal study of physicians using the single-item MBI-based measures reported that each 1-point increase in emotional exhaustion or 1-point decrease in job satisfaction between 2011 and 2013 was associated with a 28% and 67% greater likelihood, respectively, of reduction in professional effort and work hours over the ensuing year according to payroll records [53]. If extrapolated to the national level in the United States alone, the effective result on lost productivity annually is estimated to equate to the loss of the graduating classes of seven medical schools [75]. Other studies further support the relationship between burnout symptoms and physicians leaving their clinical practices [67, 76]. In addition to the obvious effects on physicians' lives, these practice changes may reduce patient access to physician care and further strain healthcare systems already struggling to meet the needs of the populations they serve [52, 77].

Physician turnover also has financial implications for healthcare organizations. Estimated costs to replace one physician range from hundreds of thousands to well over one million U.S. dollars, depending on specialty, practice location and the duration of the unfilled vacancy [78–80]. Several small studies point to the possibility of increased referrals and greater resource utilization amongst physicians experiencing burnout or high workloads [81, 82]. Physician burnout may also increase healthcare expenditures indirectly via higher rates of medical errors [48, 50, 51] and malpractice claims [51, 58], absenteeism and lower job productivity [72, 83, 84], as previously noted. A conservative estimate of the cost of burnout-related turnover exceeds 5000–10 000 US dollars per physician per year, with the actual figure almost certainly running much higher due to additional costs related to these indirect factors [79, 85].

Consequences to physician health

Along with the previously noted correlations with depression [6, 38, 86], physician burnout is associated with physician impairment more broadly [87], including a 25% increased odds of alcohol abuse/dependence [88] and a doubled risk of suicidal ideation [54, 89]. The latter connection is critical because physicians are at increased risk of suicide compared to the general population, with the suicide rate amongst male physicians being 40% higher than other males in the population and the suicide rate amongst female physicians being 130% higher than other females in the population [90]. Physician burnout is also associated with increased risk of motor vehicle crashes and near-miss events, even after adjusting for fatigue [55].

Contributors to physician burnout

Work factors

Work-related stressors drive physician burnout [2, 3, 5, 91, 92]. Inefficient work processes and environments (e.g. requiring physician-entered comprehensive documentation and electronic instruction communication, so-called computerized physician order entry, and other tasks not maximizing the time physicians spend working at the top of their licences) contribute to burnout symptoms [93–95]. Use of computerized physician order entry has been associated with 29% greater rates of physician burnout [93]. Other aspects within the work environment that drive clerical burden likely also contribute to burnout,

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particularly when these factors do not contribute to meaning in physicians' work activities [93–95]. Excessive workloads (e.g. long work hours, frequent overnight call duties and high work intensity), work–home conflicts, loss of support from colleagues and deterioration in control, autonomy and meaning at work have each been associated with burnout amongst physicians [36, 38, 49, 67, 69, 93, 96–104]. For example, multivariable analyses of data from cross-sectional studies of physicians have reported independent relationships between burnout and work hours (a 3% increased odds of burnout for each additional hour per week), night or weekend call duties (3–9% increased odds for each additional night or weekend on call), time spent at home on work-related tasks (2% increased odds for each additional hour per week) and work–home conflicts (greater than doubled risk of burnout when present). The importance of meaning in work is further illustrated by the finding that physicians who spend less than 20% of their work effort on the activity they find most personally meaningful are nearly three times more likely to be burned out than those who spend at least 20% of their work effort on such an activity [69].

Burnout symptom rates have consistently been demonstrated to differ across medical specialties, with some specialties associated with 40% lower burnout rates (e.g. preventive and occupational medicine) and others associated with up to threefold increased odds of burnout (e.g. emergency medicine, general internal medicine and neurology) in comparison with other specialties [36, 37, 67, 69, 93, 101, 105], suggesting there are unique aspects of the work lives in these specialties that contribute to differing burnout risks. There may also be distinct work-related drivers for physicians in private practice, as several studies have found higher burnout rates in these practices relative to academic or other practices, independent of specialty, work hours and other factors [37, 76, 93, 101]. Physician payment models appear to impact burnout as well, with physicians reporting purely incentive- or performance-based incomes experiencing far higher burnout rates than salaried physicians [67, 106].

Organizational climate factors (e.g. negative leadership behaviours and limited interprofessional collaboration, opportunities for advancement and social support for physicians) also influence burnout [107]. For example, how well leaders engage their constituents and seek input from, inform, mentor and recognize individuals for their contributions relates to burnout and career satisfaction amongst the physicians they lead [107]. Large national studies of physicians also suggest organizations and leaders that provide physicians with increased control over workplace issues are more likely to employ physicians with higher career satisfaction and lower reported stress [92, 108]. The roles of societal factors and differences in healthcare systems in physician burnout remain unclear [27, 32, 36, 37, 47].

Individual factors

Cross-sectional studies of physicians have found independent relationships between burnout and physician sex, age, educational debt, relationship status, age of children and spousal/partner occupation [33, 37, 67, 69, 109]. Although sex is not consistently an independent predictor of burnout after adjusting for age and other factors, some studies have found female physicians to have 20–60% increased odds of burnout, as shown in Table 1 [18, 33, 37, 93, 105, 110–112]. A Norwegian study reporting burnout scores found higher exhaustion levels amongst women, in whom burnout was notably linked with work–home conflicts, and higher disengagement levels amongst men, in whom burnout was most strongly predicted by workload [113]. Younger physicians also appear to be at increased risk of burnout symptoms, with those less than 55 years old at more than double the risk of those older than 55. However, it is unclear whether these findings fully account for the possible impact of burnout on earlier retirements noted previously, and the subsequent underrepresentation of older physicians in burnout prevalence studies that would result. Having a child younger than 21 years old has been found to increase the risk of burnout by 54% and having a spouse/partner who works as a nonphysician healthcare professional has been shown to increase burnout risk by 23%. Individual characteristics, such as personality and interpersonal skills, and personal experiences may influence how physicians cope with stress [16, 114–116]. However, individuals who choose to become physicians do not appear to be inherently more vulnerable to stress and burnout, emphasizing the importance of work-related, organizational and healthcare system factors in the current physician burnout crisis [91, 117].

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Table 1 *Gender differences in rates of high burnout symptoms amongst physicians in selected international studies (results reported as odds ratios with 95% confidence intervals for rates amongst women versus men)*

Study	Population	Rate of high emotional exhaustion	Rate of high depersonalization	Rate of overall burnout
McMurray *et al.*, 2000 [18]	US nonsurgical physicians	NR	NR	1.60 (95% CI NR, $P < 0.05$)
Toyry *et al.*, 2004 [110]	Physicians in Finland with children	1.74 (1.45–2.09)	0.63 (0.52–0.76)	NR
West *et al.*, 2011 [33]	US internal medicine residents	1.31 (1.20–1.42)	1.10 (1.00–1.21)	1.22 (1.12–1.33)
Shanafelt *et al.*, 2012 [105]	US surgeons	NR	NR	1.41 (1.17–1.71)
Wang *et al.*, 2014 [112]	Chinese physicians in Shanghai	NR	NR	1.09 (0.72–1.62)
Shanafelt *et al.*, 2015 [37]	US physicians	NR	NR	1.29 (1.14–1.46)

NR, not reported.

Strategies to prevent and mitigate physician burnout

Both individual-focused and structural or organizational solutions are required to address physician burnout, and a growing body of evidence confirms that both approaches can be effective [118–121]. These approaches generally align with the recognized drivers of burnout previously described, as shown in Table 2. Selected key publications on contributors, consequences and solutions for physician burnout are identified in Table 3. Although intervention studies have found benefits for burnout, they also suffer from a number of limitations. These include generally short follow-up periods, a narrow focus on single interventions rather than combined approaches and relatively limited application of randomized controlled trial designs, particularly for structural or organizational solutions [120, 121]. In addition, transferability of results across specialties or healthcare systems remains largely unexplored. Acknowledging these limitations, the intervention literature collectively has demonstrated absolute reductions in the proportion of physicians with burnout symptoms of 14% for emotional exhaustion, 4% for depersonalization and 10% for overall burnout symptoms as defined by the presence of emotional exhaustion and/or depersonalization [120]. Importantly, not only do both categories of approaches offer at least modest benefit, but both are necessary, and addressing physician burnout should be viewed as a shared responsibility across healthcare systems, organizations, institutions and individual physicians [49, 91, 122].

Evidence-based strategies employable by individual physicians include mindfulness, stress management training, communication skills training, exercise programmes and self-care efforts and participation in small-group programmes oriented around promoting community, connectedness and meaning [118–121]. Organizational strategies have proven more difficult to study to date, but in the United States, restrictions on resident duty hours have reduced burnout rates. Additional studies have shown benefit from reducing physician hours in intensive care units and on teaching rotations [120]. These approaches align with excessive workload as a driver of burnout. Locally developed practice changes to promote efficiency and satisfaction have also been shown to offer benefit [120]. More broadly, Shanafelt and Noseworthy have outlined specific strategies healthcare organizations should consider to promote physician well-being and address burnout [91]. Extending approaches already discussed, these include institutional support and advocacy for peer support and community [123, 124] and careful attention to how well stated and lived values align within an organization.

Additional interventions informed by cross-sectional research may also offer benefit. Although data on the impact of these interventions are lacking, benefits might be expected from specific

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Table 2 *Common drivers and selected solutions for physician burnout*

Driver	Organization-level solutions	Individual-level solutions
Excessive workload	Fair productivity targets Duty hour limits Appropriate distribution of job roles	Part-time status Informed specialty choices Informed practice choices
Work inefficiency and lack of work support	Optimized electronic medical records Nonphysician staff support to offload clerical burdens Appropriate interpretation of regulatory requirements	Efficiency and skills training Prioritize tasks and delegate work appropriately
Lack of work–home integration	Respect for home responsibilities in setting schedules for work and meetings Include all required work tasks within expected work hours Support flexible work schedules, including part-time employment	Reflection on life priorities and values Attention to self-care
Loss of control and autonomy	Physician engagement in establishing work requirements and structure Physician leadership and shared decision-making	Stress management and resiliency training Positive coping strategies Mindfulness
Loss of meaning from work	Promote shared core values Protect physician time with patients Promote physician communities Offer professional development opportunities Leadership training and awareness around physician burnout	Positive psychology Reflection/self-awareness of most fulfilling work roles Mindfulness Engagement in physician small-group activities around shared work experiences

attention to career fit [69], how work and home responsibilities are integrated [101, 102] and reflection on personal values and how one's work aligns with those values [91].

Regardless of the approach taken, valid assessment of physician burnout is required. We have previously reviewed instrument recommendations, but measurement should occur at both the individual and organizational level [91]. Anonymous online tools exist, allowing individual physicians to privately gauge their level of burnout against normative physician samples [125–127]. These tools have been shown to prompt reflection and possible action steps to address burnout in large groups of physicians [127]. At the organizational level, burnout assessment should be considered part of the "dashboard" of tracked institutional performance measures, quality indicators and leadership performance [49, 91, 107]. The abbreviated burnout items described previously are well suited to this purpose, but alternative measures may also be useful if applied consistently to inform changes over time. Such organizational assessments can be aggregated by work unit to afford actionable insights into local issues with burnout whilst maintaining physician confidentiality [91, 128].

Finally, solutions to physician burnout will require coordinated efforts at national and potentially international levels [91]. Regulatory and documentation requirements, although well-intended, often overburden physicians and distract them from direct patient care activities [93–95]. Maintaining the critical importance of patient safety and optimizing patient outcomes, whilst protecting the most meaningful work roles for physicians, must

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Table 3 *Selected key publications on contributors, consequences and solutions for physician burnout*

Publication	Overview
Schaufeli WB, Leiter MP, Maslach C. Burnout: 35 years of research and practice. *Career Dev Int* 2009; **14**: 204–20. [3]	This review summarizes the development and background of the burnout concept. Burnout is noted to be a global phenomenon generally driven by imbalances between demands and resources at work, along with values conflicts.
Leiter MP, Maslach C. Latent burnout profiles: a new approach to understanding the burnout experience. *Burn Res* 2016; **3**: 89–100. [11]	This study described patterns of burnout symptoms across the three dimensions of the Maslach Burnout Inventory. These patterns correlate differentially with contributors to workload, resources, social context and satisfaction at work.
Waddimba AC, Scribani M, Nieves MA, Krupa N, May JJ, Jenkins P. Validation of single-item screening measures for provider burnout in a rural health care network. *Eval Health Prof* 2016; **39**: 215–25. [23]	This study evaluated the performance of several abbreviated burnout assessment approaches relative to the full Maslach Burnout Inventory. A more general burnout item correlated with emotional exhaustion but not depersonalization, suggesting that specific depersonalization assessment is necessary.
Shanafelt TD, Hasan O, Dyrbye LN *et al.* Changes in burnout and satisfaction with work-life balance in physicians and the general US working population between 2011 and 2014. *Mayo Clin Proc* 2015; **90**: 1600–13. [37]	This study provided national burnout data for United States physicians in 2014. Rates of clinically significant burnout symptoms exceeded 50% and had increased since 2011. Both burnout and satisfaction with work–life balance were worse amongst physicians than amongst the general working population.
Prins JT, Gazendam-Donofrio SM, Tubben BJ, van der Heijden FM, van de Wiel HB, Hoekstra-Weebers JE. Burnout in medical residents: a review. *Med Educ* 2007; **41**: 788–800. [44]	This systematic review evaluated the global burnout literature involving medical residents through 2005. Results indicated that research at that time was limited, spurring more rigorous future investigations.
Hall LH, Johnson J, Watt I, Tsipa A, O'Connor DB. Healthcare staff wellbeing, burnout, and patient safety: a systematic review. *PLoS ONE* 2016; **11**: e0159015. [62]	This systematic review evaluated the relationship between patient safety outcomes and healthcare professional and physician well-being, including burnout. Burnout was associated with poor patient safety outcomes, but additional prospective studies are needed to better assess causality.
Shanafelt T, Goh J, Sinsky C. The business case for investing in physician well-being. *JAMA Intern Med* 2017; **177**: 1826–32. [85]	This synthesis of evidence on costs associated with physician burnout provides conservative formulas to estimate the expected financial impact of physician burnout on a healthcare organization, along with the financial return on investments to reduce burnout.

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Table 3 (*Continued*)

Publication	Overview
Linzer M, Visser MR, Oort FJ *et al.* Predicting and preventing physician burnout: results from the United States and the Netherlands. *Am J Med* 2001; **111**: 170–5. [34]	This joint study of physicians in the United States and the Netherlands compared and contrasted burnout symptoms and their relationship with work characteristics. In both settings, work control, work–home interference and home support were amongst the important predictors of burnout symptoms.
Shanafelt TD, Noseworthy JH. Executive leadership and physician well-being: nine organizational strategies to promote engagement and reduce burnout. *Mayo Clin Proc* 2016; **92**: 129–46. [91]	This paper outlines key evidence-based strategies organizations can implement to reduce burnout and promote engagement at work.
West CP, Dyrbye LN, Erwin PJ, Shanafelt TD. Interventions to prevent and reduce physician burnout: a systematic review and meta-analysis. *Lancet* 2016; **388**: 2272–81. [120]	This paper summarizes the global literature on interventions targeting physician burnout, identifying both individual-focused and structural or organizational strategies with demonstrated effectiveness.
Panagioti M, Panagopoulou E, Bower P *et al.* Controlled interventions to reduce burnout in physicians: a systematic review and meta-analysis. *JAMA Intern Med* 2017; **177**: 195–205. [121]	This paper focuses on intervention results for the emotional exhaustion domain of burnout, further emphasizing the importance of organization-level strategies rather than purely individual-focused efforts.

become complementary goals. This has been characterized as a necessary expansion of the Triple Aim approach to improving health system performance (improving the health of populations, improving the experience of care and reducing per capita costs of health care) [129] to a Quadruple Aim, adding the aim of improving the work lives of healthcare professionals and their experience of providing care [130, 131]. Because physician burnout directly hinders health system performance, efforts to address burnout should be considered fundamental elements of national and global strategies to improve health care.

Gaps in the physician burnout literature

Although studies on physician burnout have greatly advanced knowledge of its epidemiology and interventions to address this problem, many gaps remain [120, 132, 133]. These have been well delineated in recent papers [132, 133], so we will not repeat a complete listing of research needs here. However, there are several common broad themes.

First, much of the physician burnout literature has involved cross-sectional studies, and longitudinal studies of the causes and consequences of physician burnout are needed. Regardless of study design, consideration of the myriad of potential contributing factors has generally been incomplete. Results on the impact of demographic factors, including sex, age, minority status, financial status and family roles, have been inconsistent, and clarification of the roles these variables play in physician burnout and response to interventions is needed. Investigations of and reasons for differences in burnout across practice environments, including differing practice locations, healthcare systems, countries, specialties and team structures, have also been limited. At a more fundamental level, application of poorly validated instruments and varying definitions for burnout assessment remain common. Novel burnout measures and definitions may be useful, but as noted previously their development must adhere to established rigorous scientific procedures for instrument development and validation.

Second, the effect of individual-focused and structural/organizational approaches in combination has not been studied, although it is generally accepted that solutions in both areas are needed. The optimal approaches to development and implementation of burnout interventions also remain unclear. In addition, relatively few studies have assessed long-term or postintervention effects, and it remains unknown whether re-exposure to potentially beneficial interventions is necessary to maintain their effects.

Third, additional research is needed to better understand the consequences of physician burnout on patient outcomes and safety, physician practice behaviours, healthcare costs and the ability of healthcare systems to care for populations. This includes further examination of the impact of burnout on career plans throughout the medical training process into practice. Studies incorporating physician burnout assessment into quality improvement and economic analysis frameworks may be particularly informative.

Conclusions

Physician burnout is prevalent internationally and adversely affects individual physicians, patients and healthcare organizations and systems. Drivers of this epidemic are largely rooted within healthcare organizations and systems, although physician-level factors also play a role. Effective solutions should align with these drivers and require that the problem of physician burnout be viewed as a shared responsibility of both healthcare systems and individual physicians. Although our understanding of physician burnout has advanced considerably in recent years, many gaps in our knowledge remain. For medicine to fulfil its mission for patients and for public health, all stakeholders in healthcare delivery must work together to develop and implement effective remedies.

Conflict of interest statement

Dr. West declares no conflict of interests related to this article. Drs. Dyrbye and Shanafelt are co-inventors of the Physician Well-Being Index, Medical Student Well-Being Index and Well-Being Index. Mayo Clinic holds the copyright for these instruments and has licensed them for use outside of Mayo Clinic. Drs. Dyrbye and Shanafelt receive a portion of any royalties paid to Mayo Clinic from use of these instruments.

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