

JAMA | Original Investigation

# Prevalence of Burnout Among Physicians

## A Systematic Review

Lisa S. Rotenstein, MD, MBA; Matthew Torre, MD; Marco A. Ramos, MD, PhD; Rachael C. Rosales, MD; Constance Guille, MD, MSCR; Srijan Sen, MD, PhD; Douglas A. Mata, MD, MPH

**IMPORTANCE** Burnout is a self-reported job-related syndrome increasingly recognized as a critical factor affecting physicians and their patients. An accurate estimate of burnout prevalence among physicians would have important health policy implications, but the overall prevalence is unknown.

**OBJECTIVE** To characterize the methods used to assess burnout and provide an estimate of the prevalence of physician burnout.

**DATA SOURCES AND STUDY SELECTION** Systematic search of EMBASE, ERIC, MEDLINE/PubMed, psycARTICLES, and psycINFO for studies on the prevalence of burnout in practicing physicians (ie, excluding physicians in training) published before June 1, 2018.

**DATA EXTRACTION AND SYNTHESIS** Burnout prevalence and study characteristics were extracted independently by 3 investigators. Although meta-analytic pooling was planned, variation in study designs and burnout ascertainment methods, as well as statistical heterogeneity, made quantitative pooling inappropriate. Therefore, studies were summarized descriptively and assessed qualitatively.

**MAIN OUTCOMES AND MEASURES** Point or period prevalence of burnout assessed by questionnaire.

**RESULTS** Burnout prevalence data were extracted from 182 studies involving 109 628 individuals in 45 countries published between 1991 and 2018. In all, 85.7% (156/182) of studies used a version of the Maslach Burnout Inventory (MBI) to assess burnout. Studies variably reported prevalence estimates of overall burnout or burnout subcomponents: 67.0% (122/182) on overall burnout, 72.0% (131/182) on emotional exhaustion, 68.1% (124/182) on depersonalization, and 63.2% (115/182) on low personal accomplishment. Studies used at least 142 unique definitions for meeting overall burnout or burnout subscale criteria, indicating substantial disagreement in the literature on what constituted burnout. Studies variably defined burnout based on predefined cutoff scores or sample quantiles and used markedly different cutoff definitions. Among studies using instruments based on the MBI, there were at least 47 distinct definitions of overall burnout prevalence and 29, 26, and 26 definitions of emotional exhaustion, depersonalization, and low personal accomplishment prevalence, respectively. Overall burnout prevalence ranged from 0% to 80.5%. Emotional exhaustion, depersonalization, and low personal accomplishment prevalence ranged from 0% to 86.2%, 0% to 89.9%, and 0% to 87.1%, respectively. Because of inconsistencies in definitions of and assessment methods for burnout across studies, associations between burnout and sex, age, geography, time, specialty, and depressive symptoms could not be reliably determined.

**CONCLUSIONS AND RELEVANCE** In this systematic review, there was substantial variability in prevalence estimates of burnout among practicing physicians and marked variation in burnout definitions, assessment methods, and study quality. These findings preclude definitive conclusions about the prevalence of burnout and highlight the importance of developing a consensus definition of burnout and of standardizing measurement tools to assess the effects of chronic occupational stress on physicians.

JAMA. 2018;320(11):1131-1150. doi:10.1001/jama.2018.12777

- [← Editorial page 1109](#)
- [← Related article page 1114](#)
- [+ Supplemental content](#)

**Author Affiliations:** Author affiliations are listed at the end of this article.

**Corresponding Author:** Douglas A. Mata, MD, MPH, Program in Molecular Pathological Epidemiology, Department of Pathology, Brigham and Women's Hospital, Brigham Education Institute, Harvard Medical School, 75 Francis St, Boston, MA 02115-6106 (dmata@bwh.harvard.edu)

The concept of burnout in health care emerged in the late 1960s as a way to colloquially describe the emotional and psychological stress experienced by clinic staff caring for structurally vulnerable patients in free clinics.<sup>1</sup> Since then, the term *burnout* has been used to characterize job-related stress in any health practice environment, from hospitals in urban communities to global health settings.<sup>2,3</sup> This expansion of the scope of burnout has made it useful for describing the shared experience and stress of medical practice, particularly in conjunction with research demonstrating elevated levels of depressive symptoms among physicians.<sup>4,5</sup> Building on foundational work by Maslach et al<sup>6</sup> in the 1980s, researchers have described burnout as a combination of emotional exhaustion, depersonalization, and low personal accomplishment caused by the chronic stress of medical practice. In the research literature, “overall” or “aggregate” burnout is typically measured by assessing some combination of these 3 subcomponents. Some studies have found that physician burnout is associated with increased medical errors, lower patient satisfaction, longer postdischarge recovery times, and decreased professional work effort.<sup>7-9</sup> Consequently, there is interest among researchers, clinicians, and health policy leaders in ascertaining the prevalence and drivers of burnout in physicians.

The objective of this systematic review was to assess how burnout among practicing physicians has been defined in the literature and to identify the prevalence of burnout in this population.

## Methods

### Search Strategy and Study Eligibility

Three authors (L.S.R., M.T., and R.C.R.) independently identified cross-sectional and longitudinal studies published before June 1, 2018, that reported on the prevalence of burnout among practicing physicians (ie, excluding medical students and resident physicians) by systematically searching EMBASE, ERIC, MEDLINE/PubMed, psycARTICLES, and psycINFO. In addition, the authors screened the reference lists of articles identified and corresponded with study investigators using approaches consistent with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) and Meta-analysis of Observational Studies in Epidemiology (MOOSE) reporting guidelines.<sup>10,11</sup> For the database searches, terms related to physicians and study design were combined with those related to burnout without language restriction (full details of the search strategy are provided in eAppendix 1 in Supplement 1). Studies that reported data on practicing physicians, were published in peer-reviewed journals, and used a well-described method to assess for burnout were included. A fourth author (D.A.M.) resolved discrepancies by discussion and adjudication.

### Data Extraction and Quality Assessment

Three authors (L.S.R., M.T., and R.C.R.) independently extracted the following data from each article using a standardized form: study design; geographic location;

## Key Points

**Question** How is burnout assessed among physicians and what is the prevalence of burnout among physicians?

**Findings** In this systematic review, there was substantial variability in prevalence estimates of burnout among physicians, ranging from 0% to 80.5%, and marked variation in burnout definitions, assessment methods, and study quality. Associations between burnout and sex, age, geography, time, specialty, and depressive symptoms could not be reliably determined.

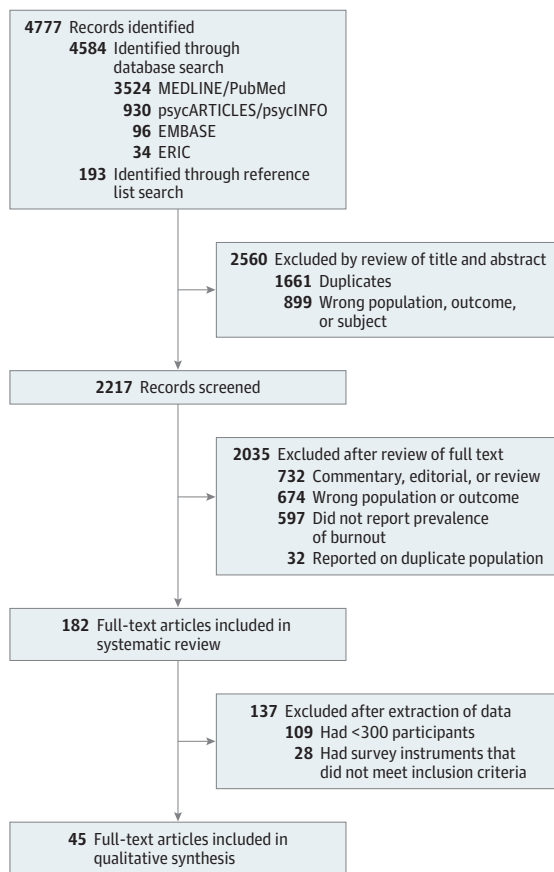
**Meaning** These findings preclude definitive conclusions about the prevalence of burnout among physicians and highlight the importance of developing a consensus definition of burnout and of standardizing measurement tools to assess the effects of chronic occupational stress on physicians.

year(s) of survey; sample size; specialty; average age of participants; number and percentage of male participants; diagnostic or screening method used; outcome definition (ie, specific diagnostic criteria or screening instrument cutoff); and reported prevalence estimates of overall burnout, its subcomponents of emotional exhaustion, depersonalization, and a diminished sense of personal accomplishment, or both. Whether studies reported prevalence estimates of comorbid depression or depressive symptoms was also noted. When studies involved the same population of physicians, only the most comprehensive or recent publication was included, with the former taking precedence. The 3 authors independently assessed the risk of bias of these predominantly nonrandomized studies using a modified version of the Newcastle-Ottawa Scale, which assessed sample representativeness and size, comparability between respondents and nonrespondents, ascertainment of burnout, and thoroughness of descriptive statistics reporting (full details regarding scoring are provided in eAppendix 2 in Supplement 1).<sup>12</sup> A fourth author (D.A.M.) resolved discrepancies by discussion and adjudication.

### Data Synthesis and Analysis

As described in the prespecified study protocol (eAppendixes 3-4 in Supplement 1), the study was originally designed to perform a meta-analysis, including an assessment of heterogeneity in burnout ascertainment methods, definitions, and outcomes, as well as statistical heterogeneity and bias from small study effects. However, as described below in the Results section, the pooled quantitative summary estimates were judged to not be reliable. Therefore, the entire body of studies was summarized descriptively and a qualitative synthesis of a subset of larger studies was also performed. Studies were included in the qualitative synthesis if they had at least 300 participants, used a full-length instrument to assess burnout, and clearly indicated the criteria used to label individuals as experiencing burnout. Studies using short-form survey instruments (eg, single question) or ill-defined survey instruments (eg, instrument was not described or no cutoff score was reported or referenced) to assess burnout were excluded from

Figure 1. Study Identification and Selection



the qualitative synthesis regardless of the number of participants on which they reported.

## Results

### Study Characteristics

One hundred seventy-six cross-sectional studies and 6 longitudinal studies involving 109 628 individuals in 45 countries published between 1991 and 2018 reporting on burnout in practicing physicians were identified (Figure 1).<sup>13-194</sup> The number of participants per study ranged from 4 to 7830 (median, 200; interquartile range, 93-512; mean, 602). The characteristics of the full set of individual studies, the geographic regions in which they were conducted, and their Newcastle-Ottawa risk-of-bias scores appear in eTables 1 through 4 in Supplement 1. In all, 18.1% (33/182) of the studies also reported on the prevalence of screening positive for depression as assessed by various self-report questionnaires (eTable 5 in Supplement 1). A subset of 45 larger studies involving 65 327 individuals in 20 countries published between 1991 and 2018 met the inclusion criteria for the qualitative synthesis (Table 1).<sup>13-57</sup>

### Instruments Used to Assess Burnout

Among the full set of 182 studies, 67.0% (122/182) reported prevalence estimates of overall burnout, 72.0% (131/182)

reported prevalence estimates of emotional exhaustion, 68.1% (124/182) reported prevalence estimates of depersonalization, and 63.2% (115/182) reported prevalence estimates of a diminished sense of personal accomplishment. In all, 85.7% (156/182) used a version of the proprietary Maslach Burnout Inventory (MBI)<sup>6</sup> to generate these prevalence estimates, while 14.3% (26/182) used other methods. The burnout assessment instruments used by the 182 studies are summarized in Table 2.

Most studies (57.8% [108/182]) used a full-length implementation of the original version of the MBI, the 22-item MBI-Human Services Survey (MBI-HSS), designed to measure feelings of burnout among individuals working in human services jobs, like physicians. Fewer studies (4.8% [9/182]) used a full-length implementation of the 16-item MBI-General Survey (MBI-GS), designed to measure feelings of burnout among individuals in non-human services occupations. The MBI-GS focuses on burnout related to the general performance of work rather than on relationships at work (eg, with patients). Both MBI versions ask survey takers to rate how often they experience specific feelings of burnout at work on a 7-point Likert scale, with 0 representing “never” and 6 “every day” (examples of included items are provided in eAppendix 5 in Supplement 1). The MBI-HSS produces scores on 3 subscales: emotional exhaustion (scores range from 0-54), depersonalization (scores range from 0-30), and low personal accomplishment (scores range from 0-48). Because the MBI-GS deemphasizes human relationships, it renames the subscales as exhaustion, cynicism, and professional efficacy, although the concepts measured by both versions of the inventory are similar. In contrast to the MBI-HSS, subscale scores for the MBI-GS are usually determined by calculating mean ratings across relevant questions, with mean scores ranging from 0 to 6 for all 3 subscales. Several (16.5% [30/182]) studies used assessment instruments based on one of these full-length MBI surveys but modified in some manner, as by altering the text of the presented statements related to burnout or shortening the number of items or subscales on the inventory. For example, 4.4% (8/182) of studies used single-item burnout assessment tools for emotional exhaustion or depersonalization that were adapted from the MBI-HSS and validated by West et al.<sup>195</sup> Some studies (4.9% [9/182]) did not specify what version of the MBI they used. For all versions of the MBI, higher scores on the emotional exhaustion and depersonalization subscales and lower scores on the personal accomplishment subscale (or their MBI-GS equivalents) correspond to higher levels of burnout.

Several public domain methods were used by the 14.3% (26/182) of studies that did not use the MBI to assess burnout. These instruments included the 16-item Astudillo and Mendinueta Burnout Questionnaire,<sup>196</sup> the 54-item Modified Compassion Satisfaction and Fatigue Test,<sup>182</sup> the 19-item Copenhagen Burnout Inventory,<sup>197</sup> the 40-item Hamburg Burnout Inventory,<sup>198</sup> the Pines and Aronson Burnout Measure,<sup>199</sup> the 20-item Spanish-language Questionnaire for the Evaluation of Work-Related Burnout Syndrome (CESQT),<sup>200</sup> the 10-item Zero Burnout Program Survey,<sup>201</sup> and various single-item measures of self-perceived burnout, including the measure of Rohland et al.<sup>152</sup> Some studies used abbreviated or

Table 1. Selected Characteristics of the 45 Studies Included in the Qualitative Synthesis<sup>a</sup>

Source	Continent/ Region	Country	Survey Years	Specialty	No. of Participants <sup>b</sup>	Age, y <sup>c</sup> Mean, SD, (8.8)	Men, No. (%) <sup>c</sup> 555 (46.2)	Burnout Assessment Instrument <sup>d</sup>	Emotional Exhaustion Definition <sup>e,f</sup>	Depersonali- zation Definition <sup>e,f</sup>	Low Personal Accom- plishment Definition <sup>e,f</sup>	Overall Burnout Definition <sup>e,f</sup>	Depression Screening Instrument and Definition <sup>e</sup>
Wu et al, <sup>55</sup> 2013	Asia	China	2010	Multiple	1202	Mean, 38.7 (SD, 8.8)	555 (46.2)	16-Item MBI-GS	NR	NR	NR	EX ≥14, CY ≥10, and PE ≤17	NR
Wang et al, <sup>54</sup> 2014	Asia	China	2008	Multiple	457	Mean, 39.1 (SD, 9.6)	185 (40.5)	19-Item revised Chinese MBI-HSS	NR	NR	NR	Score ≥4.5	NR
Li et al, <sup>36</sup> 2018	Asia	China	2015	Anesthesia	1696	NR	NR	22-Item MBI-HSS	NR	NR	NR	EE ≥27 and/or DP ≥13	NR
Nishimura et al, <sup>38</sup> 2014	Asia	Japan	2011	Multiple	2635	Mean, 47.2	2422 (91.9)	16-Item MBI-GS	NR	NR	NR	EX >4.0 and (CY >2.6 and/or PE <4.17)	NR
Saijo et al, <sup>46</sup> 2014	Asia	Japan	2009	Multiple	488	NR	391 (80.1)	16-Item MBI-GS	NR	NR	NR	EX >4.2 and (CY >2.4 and/or PE <2.5)	PHQ-9 ≥5
Asai et al, <sup>23</sup> 2007	Asia	Japan	2000	Multiple	697	Mean, 45 (SD, 8.2)	639 (93.7)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤33	NR	GHQ-1 ≥4
Chen et al, <sup>27</sup> 2013	Asia	Taiwan	2012	Multiple	531	NR	NR	16-Item MBI-GS	EX ≥3.2	CY >2.2	PE ≤4.0	NR	NR
Wurm et al, <sup>36</sup> 2016	Europe	Austria	2010-2011	Multiple	5897	Mean, 44.4 (SD, 10.5)	3273 (55.5)	40-Item HBI	NR	NR	NR	Score ≥145	MDI ≥20
Vanden- broeck et al, <sup>53</sup> 2017	Europe	Belgium	2012	Multiple	1169	Mean, 43.5 (SD, 10.9)	617 (52.7)	20-Item UBOS	EE ≥2.5	Women: DP ≥1.6; men: DP ≥1.8	PA ≤3.7	EE ≥2.5, DP ≥1.6 (women) /DP ≥1.8 (men), and PA ≤3.7	NR
Pedersen et al, <sup>41</sup> 2013	Europe	Denmark	2004, 2012	General Practice	381	NR	232 (60.9)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤33	EE ≥27, DP ≥10, and PA ≤33	NR
Pedersen et al, <sup>43</sup> 2016	Europe	Denmark	2014	Multiple	1186	NR	690 (54.6)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤33	EE ≥27, DP ≥10, and PA ≤33	NR
Pedersen et al, <sup>42</sup> 2018	Europe	Denmark	2012	General practice	588	NR	306 (52.4)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤33	EE ≥27 and/or DP ≥10	NR
Brøndt et al, <sup>24</sup> 2008	Europe	Denmark	2004	General practice	379	Mean, 51.8 (SD, 6.7)	229 (60.7)	22-Item MBI-HSS	NR	NR	NR	EE ≥27, DP ≥10, and PA ≤33	NR
Lesage et al, <sup>35</sup> 2013	Europe	France	2011	Occupational medicine	1440	Mean, 52.6	418 (29.0)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤31	EE ≥27, DP ≥10, and PA ≤33	NR
Dréano- Hartz et al, <sup>29</sup> 2016	Europe	France	2012-2013	Palliative care	309	Mean, 47.2 (SD, 9.2)	101 (32.7)	22-Item MBI-HSS	EE ≥30	DP ≥12	PA ≤38	NR	NR

(continued)

Table 1. Selected Characteristics of the 45 Studies Included in the Qualitative Synthesis<sup>a</sup> (continued)

Source	Continent/ Region	Country	Survey Years	Specialty	No. of Participants <sup>b</sup>	Age, y <sup>c</sup>	Men, No. (%) <sup>c</sup>	Burnout Assessment Instrument <sup>d</sup>	Emotional Exhaustion Definition <sup>e,f</sup>	Depersonali- zation Definition <sup>e,f</sup>	Low Personal Accom- plishment Definition <sup>e,f</sup>	Overall Burnout Definition <sup>e,f</sup>	Depression Screening Instrument and Definition <sup>e</sup>
Pantenburg et al, <sup>40</sup> 2016	Europe	Germany	2012-2013	Multiple	1784	Mean, 32.8 (SD, 4)	698 (39.1)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤33	EE ≥27, DP ≥10, and PA ≤33	NR
O'Kelly et al, <sup>39</sup> 2016	Europe	Ireland, United Kingdom	2014	Urology	575	NR	503 (87.5)	22-Item MBI-HSS	EE ≥27	DP ≥13	PA ≤31	EE ≥27 and (DP ≥13 and/or PA ≤31)	NR
Grassi and Magnani, <sup>13</sup> 2000	Europe	Italy	NR	Internal medicine	328	Mean, 39.9	228 (69.5)	22-Item MBI-HSS	EE >top tertile	DP >top tertile	PA <lowest tertile	NR	GHQ-12 ≥4
van der Wal et al, <sup>19</sup> 2016	Europe	The Netherlands	2012	Anesthesia	514	Mean, 47.2 (range, 30-67)	335 (62.5)	20-Item UBOS	NR	NR	NR	EE >top quartile and (DP >top quartile and/or PA <lowest quartile)	GHQ-12 ≥2
Twellaar et al, <sup>17</sup> 2008	Europe	The Netherlands	2002	General practice	349	Mean, 45.9 (SD, 7)	180 (51.6)	20-Item UBOS	NR	NR	NR	EE >top quartile and (DP >top quartile and/or PA <lowest quartile)	NR
Marôco et al, <sup>14</sup> 2016	Europe	Portugal	2011-2013	Multiple	466	Mean, 38.7 (SD, 11)	196 (42)	15-Item modified MBI-HSS	NR	NR	NR	Mean subscale score ≥3	NR
Chivato Pérez et al, <sup>28</sup> 2011	Europe	Spain	2008	Allergy and immunology	404	Mean, 43.9 (SD, 8.8)	183 (45.2)	22-Item MBI-HSS	EE ≥25	DP ≥10	PA ≤32	NR	NR
Riquelme et al, <sup>16</sup> 2018	Europe	Spain	2015	Multiple	301	NR	196 (65.1)	22-Item MBI-HSS	EE >top quartile	DP >top quartile	PA <lowest quartile	EE >top quartile, DP >top quartile, and PA <lowest quartile	NR
Escribá- Agüir and Pérez-Hoyos, <sup>30</sup> 2007	Europe	Spain	2000-2001	Emergency medicine	353	NR	233 (65.4)	9-Item MBI-HSS for EE only	EE ≥27	NR	NR	NR	NR
Arigoni et al, <sup>22</sup> 2009	Europe	Switzerland	NR	Multiple	371	NR	241 (65.5)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤33	EE ≥27, DP ≥10, and PA ≤33	GHQ-12 ≥4
Goehring et al, <sup>31</sup> 2005	Europe	Switzerland	2002	Primary care	1755	Mean, 50.8	1468 (83.6)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤33	EE ≥27, DP ≥10, and PA ≤33	NR
Upton et al, <sup>18</sup> 2012	Europe	United Kingdom	NR	Surgery	313	NR	282 (92.2)	16-Item MBI-GS	EX >top tertile	CY >top tertile	NR	EX >top tertile and CY >top tertile	NR
Taylor et al, <sup>52</sup> 2005	Europe	United Kingdom	2002	Multiple	1294	NR	1059 (81)	22-Item MBI-HSS	EE ≥27	NR	NR	NR	GHQ-12 ≥4

(continued)

Table 1. Selected Characteristics of the 45 Studies Included in the Qualitative Synthesis<sup>a</sup> (continued)

Source	Continent/ Region	Country	Survey Years	Specialty	No. of Participants <sup>b</sup>	Age, y <sup>c</sup>	Men, No. (%) <sup>c</sup>	Burnout Assessment Instrument <sup>d</sup>	Emotional Exhaustion Definition <sup>e,f</sup>	Depersonali- zation Definition <sup>e,f</sup>	Low Personal Accom- plishment Definition <sup>e,f</sup>	Overall Burnout Definition <sup>e,f</sup>	Depression Screening Instrument and Definition <sup>e</sup>
Al-Dubai and Rampal, <sup>21</sup> 2010	Middle East	Yemen	2006-2007	Multiple	563	Mean, 33.3 (SD, 5.7)	335 (59.5)	22-Item MBI-HSS	EE ≥27	DP ≥13	PA ≤31	EE ≥27, DP ≥13, and PA ≤31	NR
Puffer et al, <sup>15</sup> 2017	North America	United States	NR	Primary care	2099	NR	NR	10-Item Mini-Z	NR	NR	NR	Score ≥3	NR
Rao et al, <sup>45</sup> 2017	North America	United States	2014	Multiple	1774	NR	1027 (57.9)	16-Item MBI-GS	NR	NR	NR	EX ≥3.2, CY ≥2.6, and PE ≤3.8	NR
Shanafelt et al, <sup>49</sup> 2014	North America	United States	2012-2013	Oncology	1083	Median, 52	554 (50.4)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤32	EE ≥27 and/or DP ≥10	NR
Golub et al, <sup>32</sup> 2008	North America	United States	2005	Otolaryngology	351	Mean, 52 (range, 33-87)	306 (87.2)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤33	EE ≥27, DP ≥10, and PA ≤33	NR
Shanafelt et al, <sup>47</sup> 2012	North America	United States	2011	Multiple	7288	Median, 55	5241 (71.9)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤33	EE ≥27 and/or DP ≥10	PRIME-MD ≥1
Shanafelt et al, <sup>50</sup> 2015	North America	United States	2014	Multiple	6822	Median, 56	4497 (67.5)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤33	EE ≥27 and/or DP ≥10	PRIME-MD ≥1
Shanafelt et al, <sup>51</sup> 2009	North America	United States	2007	Internal medicine	459	NR	345 (77.2)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤33	EE ≥27 and/or DP ≥10	NR
Buis et al, <sup>25</sup> 2017	North America	United States	2016	Neurology	1616	Mean, 51 (SD, 12)	1091 (65.3)	22-Item MBI-HSS	EE ≥27	DP ≥10	PA ≤33	EE ≥27 and/or DP ≥10	NR
Campbell et al, <sup>26</sup> 2001	North America	United States	NR	Surgery	577	Mean, 50	492 (94.4)	22-Item MBI-HSS	EE ≥27	DP ≥13	PA ≤31	NR	NR
Kamal et al, <sup>33</sup> 2016	North America	United States	2013	Palliative care	691	NR	NR	22-Item MBI-HSS	EE ≥27	DP ≥13	NR	EE ≥27 and/or DP ≥13	NR
Shanafelt et al, <sup>48</sup> 2009	North America	United States	2008	Surgery	7830	Median, 51 (IQR, 43-59)	6815 (86.7)	22-Item MBI-HSS	EE ≥28	DP ≥11	PA ≤32	EE ≥28	PRIME-MD ≥1
Qureshi et al, <sup>44</sup> 2015	North America	United States	2010	Surgery	1605	Mean, 50.8 (range, 33-74)	1243 (73.5)	22-Item MBI-HSS	EE ≥28	DP ≥11	PA ≤32	EE ≥28 and/or DP ≥11	NR
Yoon et al, <sup>37</sup> 2010	North America	United States	2008-2009	Obstetrics and gynecology	1128	Mean, 47.8 (SD, 9.2)	617 (53.5)	5-Item MBI-GS for EX only	EX ≥3.2	NR	NR	NR	NR
Kluger et al, <sup>34</sup> 2003	Oceania	Australia	NR	Anesthesia	422	NR	350 (83)	22-Item MBI-HSS	EE ≥28	DP ≥11	PA ≤39	NR	NR

(continued)

Table 1. Selected Characteristics of the 45 Studies Included in the Qualitative Synthesis<sup>a</sup> (continued)

Source	Continent/ Region	Country	Survey Years	Specialty	No. of Participants <sup>b</sup>	Age, y <sup>c</sup>	Men, No. (%) <sup>c</sup>	Burnout Assessment Instrument <sup>d</sup>	Emotional Exhaustion Definition <sup>e,f</sup>	Depersonali- zation Definition <sup>e,f</sup>	Low Personal Accom- plishment Definition <sup>e,f</sup>	Overall Burnout Definition <sup>e,f</sup>	Depression Screening Instrument and Definition <sup>e</sup>
Winefield and Amstey, <sup>20</sup> 1991	Oceania	Australia	1987	General practice	929	Mean, 42.8	748 (79.7)	22-Item MBI-HSS	Mean EE > 3	Mean DP > 3	Mean PA < 3	NR	NR
Maticorena- Quevedo et al, <sup>37</sup> 2016	South America	Peru	2014	Multiple	2228	NR	1697 (76.2)	22-Item MBI-HSS	EE ≥ 27	DP ≥ 10	PA ≤ 33	EE ≥ 27, DP ≥ 10, and PA ≤ 33	NR

Abbreviations: BDI, Beck Depression Inventory; CY, cynicism; DP, depersonalization; EE, emotional exhaustion; EX, exhaustion; GHQ-12, 12-item General Health Questionnaire; HBI, Hamburg Burnout Inventory; IQR, interquartile range; MBI, Maslach Burnout Inventory; MBI-GS, MBI-General Survey; MBI-HSS, MBI-Human Services Survey; UBOS, Utrechtse Burnout Schaal (Dutch adaptation of the MBI); MDI, Major Depression Inventory; Mini Z, Zero Burnout Program Survey; NR, not reported; PA, personal accomplishment; PE, professional efficacy; PHQ-9, 9-item Patient Health Questionnaire; PRIME-MD, Primary Care Evaluation of Mental Disorders.

<sup>a</sup> Studies are ordered alphabetically by continent and then by country and medical specialty.

<sup>b</sup> Number of participants who were practicing physicians (ie, not medical students or resident physicians) for whom burnout data were available.

<sup>c</sup> If age and sex data for the entire population of included practicing physicians were not explicitly reported by the study, they were back-calculated or inferred when possible.

<sup>d</sup> If the burnout assessment method was not explicitly reported by the study, it was inferred when possible based on the articles or manuals the study cited.

<sup>e</sup> If the cutoff was not explicitly reported by the study, it was inferred when possible based on the articles or manuals the study cited.

<sup>f</sup> Note that the MBI-GS uses the terms *exhaustion*, *cynicism*, and *professional efficacy* rather than *emotional exhaustion*, *depersonalization*, and *personal accomplishment*.

modified surveys based on these instruments, with some conceptualizing burnout differently than the traditional definition in the MBI. For example, as described by Kristensen et al,<sup>197</sup> the Copenhagen Burnout Inventory was developed in response to perceived limitations of the MBI and conceptualizes burnout as consisting of domains referred to as personal, work-related, and client-related burnout, considering the core of burnout as symptoms of fatigue and exhaustion.

**Prevalence of Overall Burnout Among Physicians**

The prevalence estimates of overall burnout reported by the 67.0% (122/182) of studies that provided data on overall burnout ranged from 0% to 80.5%. Meta-analytic pooling of the prevalence estimates is shown in eTable 6 in Supplement 1 but is not considered reliable because of heterogeneity in burnout ascertainment methods, definitions, and outcomes, as well as statistical heterogeneity. This heterogeneity persisted after stratifying the analyses by screening instrument and cutoff score, in part because of the considerable variability in how studies defined overall burnout (eTable 7 in Supplement 1). Considering all combinations of subscale cutoff scores used, there were at least 58 unique ways of labeling individuals as experiencing burnout (eTable 8 in Supplement 1). Even among the 80.3% (98/122) of studies using an inventory based on the MBI, there were at least 47 unique implementations of MBI versions, cutoff combinations, or both. For example, the most frequent definition of overall burnout, used by 17.2% (21/122) of studies, required individuals to score all of at least 27, at least 10, and no more than 33 on the MBI exhaustion, depersonalization, and personal accomplishment subscales, respectively. The second most frequent definition, used by 9.0% (11/122) of studies, was more lenient in that it considered individuals to have burnout if they scored either at least 27 on the exhaustion or at least 10 on the depersonalization subscales or both. There were at least 11 different methods for measuring burnout represented among the 19.7% (24/122) of studies that did not use the MBI. Among this group, the most frequently used techniques (12.3% [15/122]) were various single-item screens of self-perceived burnout, most notably a Rohland score of at least 3, used by 4.9% (6/122) of studies. This heterogeneity is illustrated by visual inspection of the prevalence estimates from the subset of larger studies included in the qualitative synthesis, 75.6% (34/45) of which reported on overall burnout using 18 unique screening instruments, cutoff combinations, or both (Figure 2).

**Prevalence of Burnout Subcomponents Among Physicians**

There was also important heterogeneity in assessment methods and definitions for burnout subcomponents, precluding reliable meta-analysis (eTables 9-14 in Supplement 1). The prevalence estimates of emotional exhaustion reported by the 72.0% (131/182) of studies that provided data ranged from 0% to 86.2%. For MBI-derived emotional exhaustion, 43.5% (57/131) of studies used a cutoff score of at least 27, 16.8% (22/131) used a cutoff of “high” without explicitly stating a cutoff score, 29.8% (39/131) used a different cutoff score, and 9.2% (12/131) used a nonstandard or shortened version of the MBI (eg, a single-question screening tool). A single study used a

**Table 2. Burnout Assessment Instruments Used by the 182 Studies Included in the Systematic Review**

Burnout Assessment Instrument <sup>a</sup>	No. (%) of Studies
22-Item MBI-HSS	108 (59.3)
16-Item MBI-GS	9 (4.9)
MBI (version not specified)	9 (4.9)
Single-item measure of self-perceived burnout	9 (4.9)
2-Item modified MBI-HSS for EE and DP only	6 (3.3)
Rohland et al <sup>152</sup> single-item measure of self-perceived burnout	6 (3.3)
20-Item UBOS	5 (2.7)
12-Item abbreviated MBI-HSS	4 (2.2)
9-Item abbreviated MBI-HSS	2 (1.1)
9-Item MBI-HSS for EE only	2 (1.1)
19-Item CBI	2 (1.1)
54-Item modified CFST	2 (1.1)
Golembiewski et al <sup>220</sup> modified MBI	2 (1.1)
5-Item MBI-GS for EX only	1 (0.5)
7-Item modified MBI-HSS	1 (0.5)
8-Item modified CBI	1 (0.5)
10-Item Mini Z	1 (0.5)
13-Item UBOS for EE and DP only	1 (0.5)
14-Item MBI-HSS for EE and DP only	1 (0.5)
15-Item Chinese MBI-GS	1 (0.5)
15-Item UBOS	1 (0.5)
15-Item modified MBI-HSS	1 (0.5)
16-Item AMBQ	1 (0.5)
16-Item Chinese CBI	1 (0.5)
19-Item revised Chinese MBI-HSS	1 (0.5)
20-Item CESQT	1 (0.5)
40-Item HBI	1 (0.5)
Pines and Aronson Burnout Measure	1 (0.5)
Single-item modified MBI-HSS	1 (0.5)

Abbreviations: AMBQ, Astudillo and Mendinueta Burnout Questionnaire; CBI, Copenhagen Burnout Inventory; CESQT, Questionnaire for the Evaluation of Work-Related Burnout Syndrome; CFST, Compassion Satisfaction and Fatigue Test; DP, depersonalization; EE, emotional exhaustion; EX, exhaustion; HBI, Hamburg Burnout Inventory; MBI, Maslach Burnout Inventory; MBI-GS, MBI-General Survey; MBI-HSS, MBI-Human Services Survey; UBOS, Utrechtse Burnout Schaal (Dutch adaptation of the MBI); Mini Z, Zero Burnout Program Survey.

<sup>a</sup> Instruments are ordered by decreasing frequency of use and then alphabetically.

non-MBI-based assessment method, a tertile-based split of CESQT scores, to identify individuals with emotional exhaustion. This heterogeneity is illustrated by visual inspection of the prevalence estimates from the studies included in the qualitative synthesis, 73.3% (33/45) of which reported on emotional exhaustion (Figure 3).

The prevalence estimates of depersonalization reported by the 68.1% (124/182) of studies that provided data ranged from 0% to 89.9%. For MBI-derived depersonalization, 33.1% (41/124) of studies used a cutoff score of at least 10, 13.7% (17/124) used a cutoff score of at least 13, 16.9% (21/124) used a cutoff of “high” without explicitly stating a cutoff score, 26.6% (33/124) used a different cutoff score, and 8.9% (11/124) used a

nonstandard or shortened version of the MBI. A single study used a tertile-based split of CESQT scores to identify individuals experiencing depersonalization. This heterogeneity is illustrated by visual inspection of the prevalence estimates from the studies included in the qualitative synthesis, 66.7% (30/45) of which reported on depersonalization (Figure 4).

The prevalence estimates of a diminished sense of personal accomplishment reported by the 63.2% (115/182) of studies that provided data ranged from 0% to 87.1%. For MBI-derived low personal accomplishment, 34.8% (40/115) of studies used a cutoff of no more than 33, 12.2% (14/115) used a cutoff of no more than 31, 17.4% (20/115) used a cutoff of “low” without explicitly stating a cutoff score, 28.7% (33/115) used a different cutoff score, and 6.1% (7/115) used a nonstandard or shortened version of the MBI. A single study used a tertile-based split of CESQT scores to identify individuals experiencing a diminished sense of personal accomplishment. This heterogeneity is illustrated by visual inspection of the prevalence estimates from the studies included in the qualitative synthesis, 62.2% (28/45) of which reported on personal accomplishment (Figure 5).

### Prevalence of Burnout and Its Subcomponents Among Physicians by Study-Level Characteristics

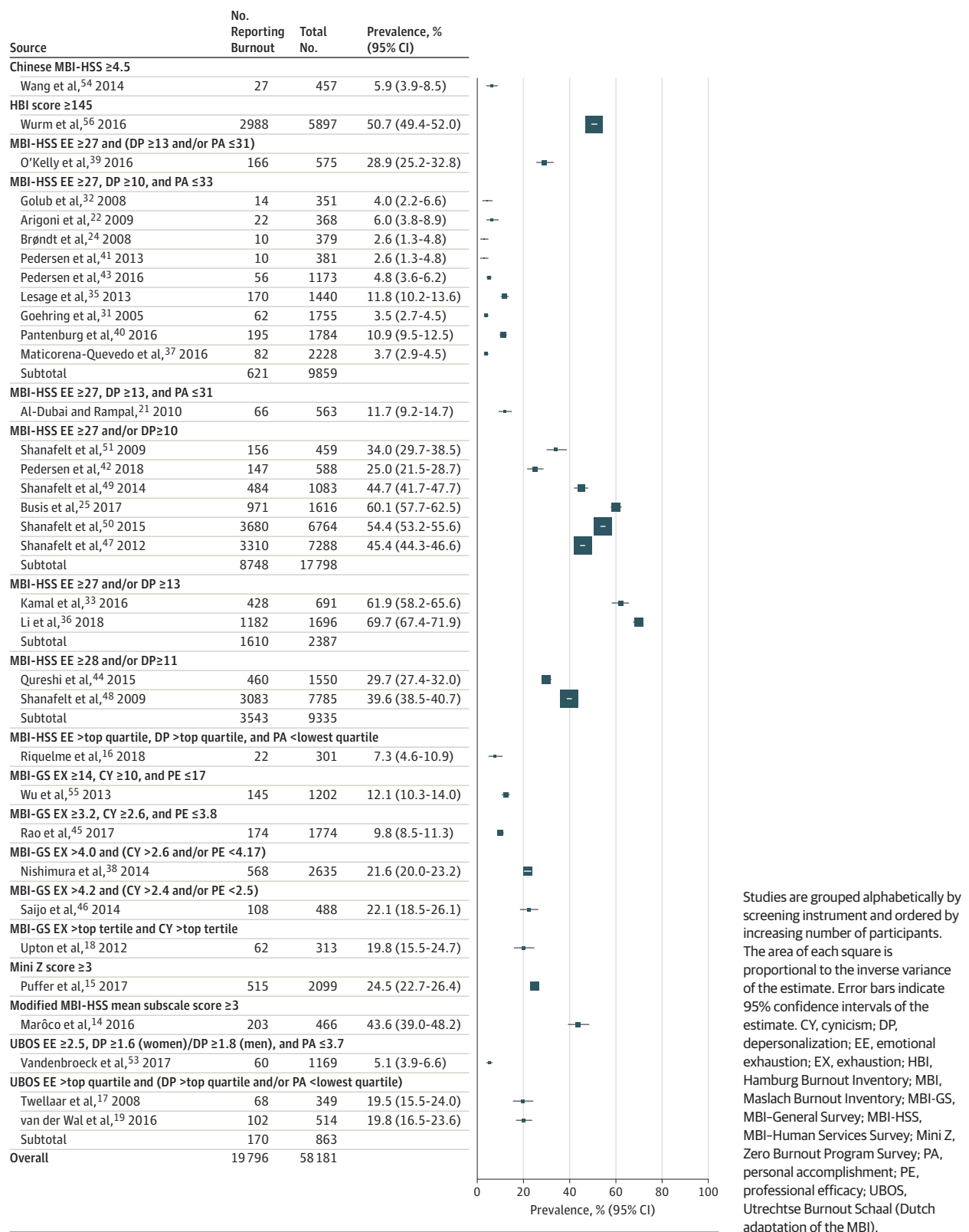
The observed heterogeneity precluded reliable investigation of the associations of overall burnout or burnout subcomponent prevalence with the geographic region in which studies were conducted, the subspecialties of the study participants, the baseline survey year, the mean or median age of the study participants, the percentage of male study participants, or the presence or absence of comorbid depressive symptoms, the latter of which were also examined independently of burnout (eTables 15-26 in Supplement 1). To identify potential sources of heterogeneity independent of assessment method, heterogeneity was also examined within subgroups of studies using common instruments when at least 15 studies were available. However, heterogeneity within all subgroups remained too high for meaningful meta-analyses (eTable 27 in Supplement 1).

### Risk-of-Bias Assessment

Based on the modified Newcastle-Ottawa risk-of-bias scores assigned to the studies, most had limitations in study quality (eTable 4 in Supplement 1). For example, only 32.4% (59/182) of studies fulfilled the criterion for sample representativeness by surveying physicians of multiple specialties at multiple institutions. Only 40.1% (73/182) met the size criterion by surveying at least 300 participants. Only 6.6% (12/182) established the comparability between respondents and nonrespondents and only 33.5% (61/182) reported descriptive statistics for participants who did respond. Although 87.9% (160/182) met the ascertainment criteria by using a well-described or validated tool to measure burnout, the value of this finding is unclear given that the validity of the burnout construct (particularly as measured by the MBI) is uncertain. Visual inspection of funnel plots for all outcomes yielded minimal evidence of small study effects, with statistically significant asymmetry only for overall burnout (eFigure in Supplement 1).



Figure 2. Prevalence of Overall Burnout Reported by 34 Studies Stratified by Assessment Method

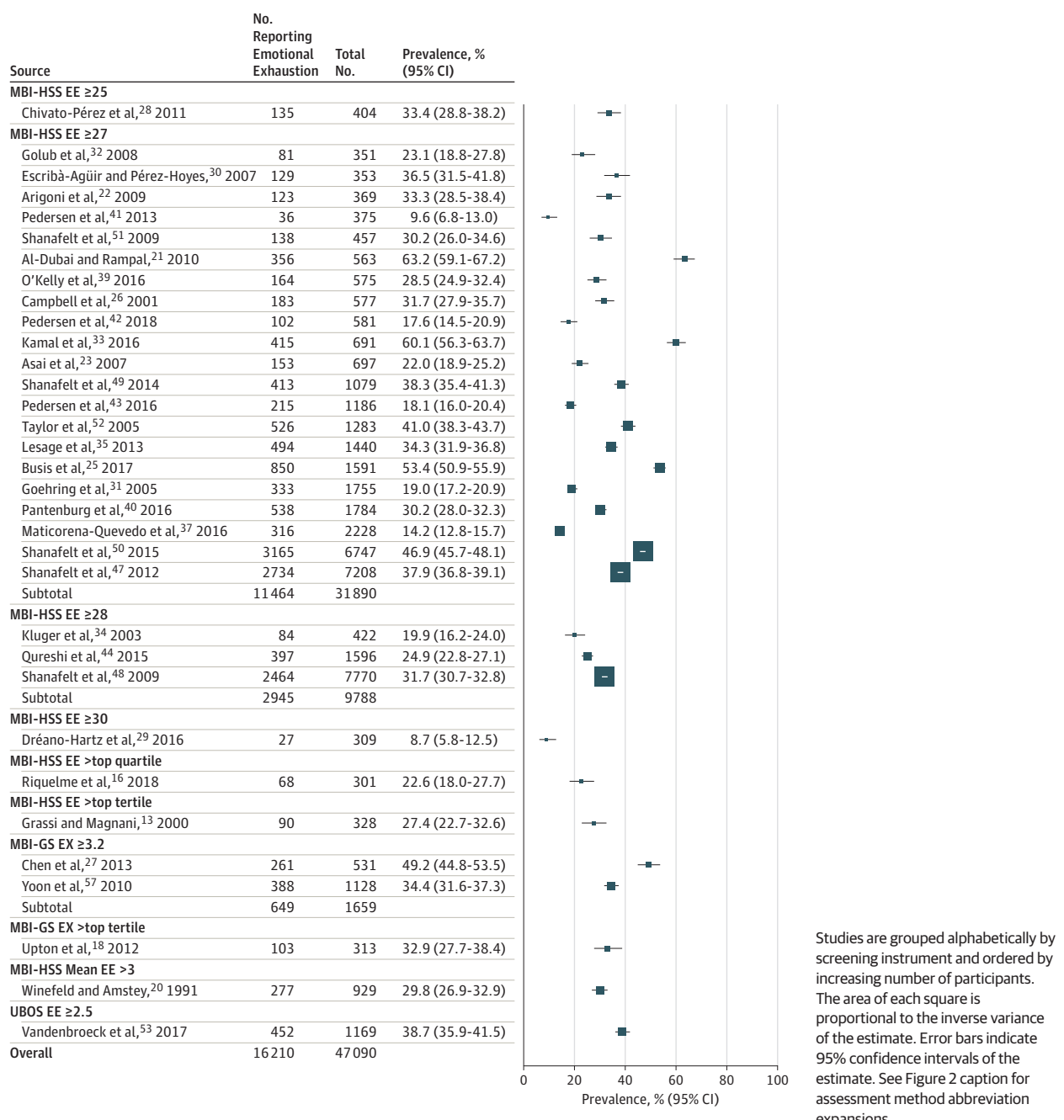


**Qualitative Synthesis**

Table 1 details the subset of 45 larger studies selected for more in-depth qualitative consideration. Most of these studies used

either the 22-item MBI-HSS (66.7% [30/45]) or the 16-item MBI-GS (13.3% [6/45]). The Dutch adaptation of the MBI-HSS, the 20-item Utrechtse Burnout Schaal, was used by 6.7%

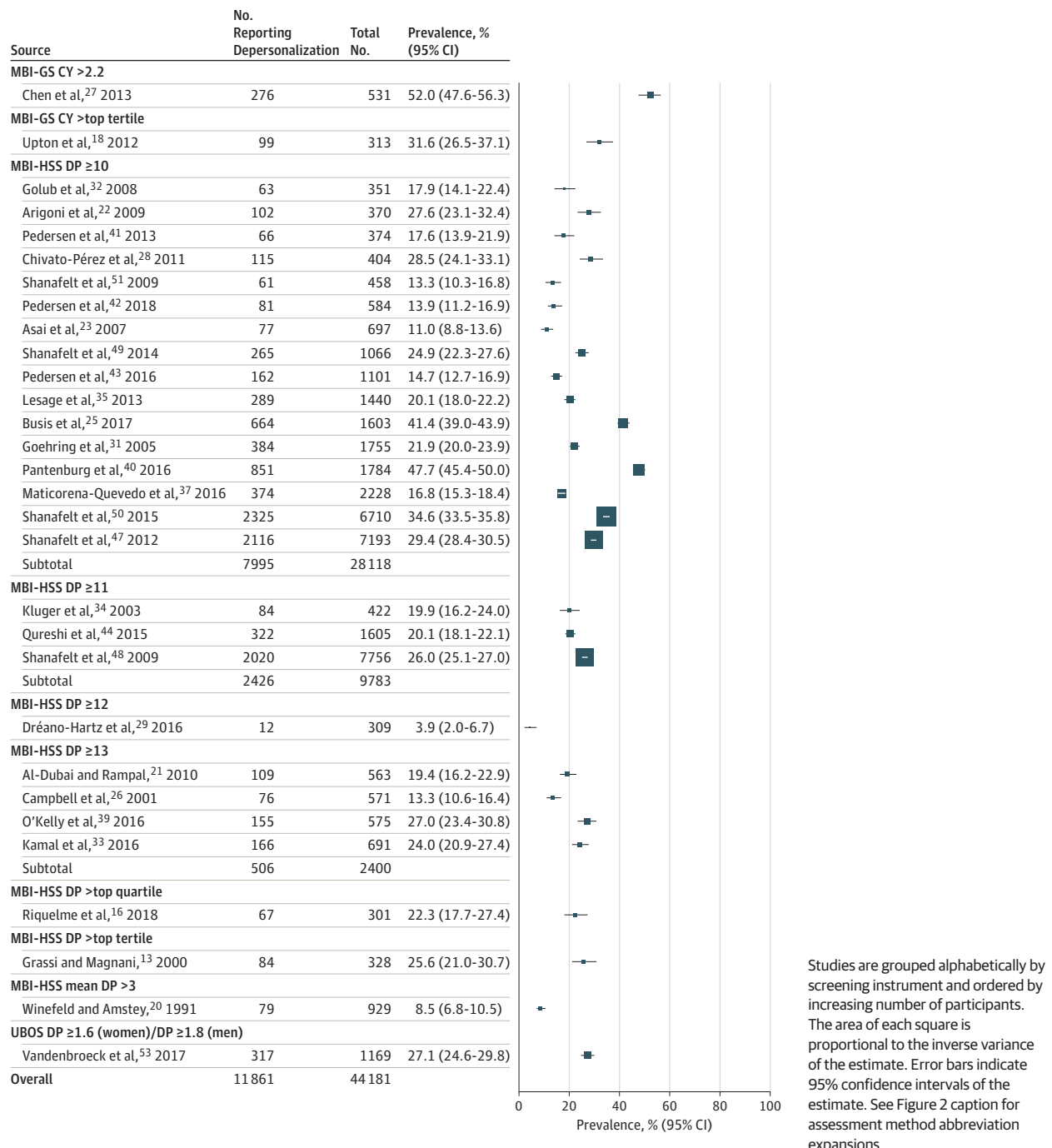
Figure 3. Prevalence of Emotional Exhaustion Reported by 33 Studies Stratified by Assessment Method



(3/45) of studies. A 19-item version of the MBI-HSS adapted to a Chinese context, a 15-item shortened version of the MBI-HSS, and versions of the MBI-HSS and MBI-GS focused on emotional exhaustion alone were also used by individual studies. The Zero Burnout Program Survey and the Hamburg Burnout Inventory were also used by individual studies. Among these 45 studies, 75.6% (34/45) generated prevalence estimates of overall burnout. The criteria used to label individuals as experiencing burnout varied widely, including the number of subscales on which participants needed to screen positive to constitute experiencing burnout (Table 1 and Figure 2).

Ten studies provided overall burnout prevalence estimates using relatively permissive MBI-HSS criteria, classifying individuals as having symptoms of burnout if they exceeded either a specific cutoff for elevated emotional exhaustion or depersonalization. Six studies defined burnout as either an emotional exhaustion score of at least 27 or a depersonalization score of at least 10.<sup>25,42,47,49-51</sup> This definition of burnout led to prevalence estimates ranging from 25.0% to 60.1%. For example, Pedersen et al<sup>42</sup> examined burnout among Danish general practitioners and found a 25.0% prevalence, and Busis et al<sup>25</sup> examined burnout among US

Figure 4. Prevalence of Depersonalization Reported by 30 Studies Stratified by Assessment Method

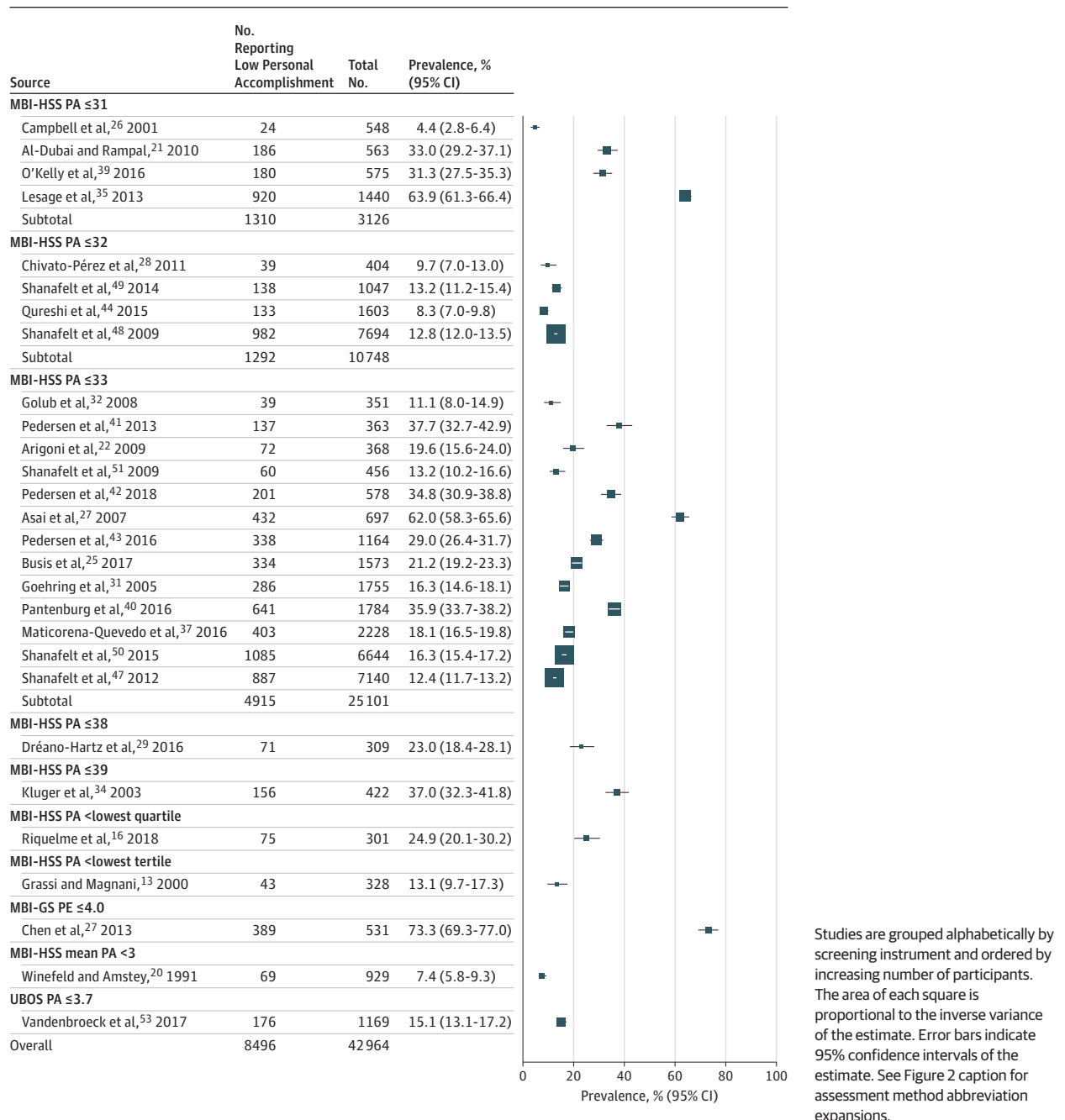


neurologists and found a 60.1% prevalence. Four studies by Shanafelt et al<sup>47,49-51</sup> examined burnout among US physicians of all specialties using these cutoff score combinations. In a 2015 longitudinal study, Shanafelt et al<sup>50</sup> found that the prevalence of physicians reporting burnout symptoms had increased from 45.5% to 54.4% between 2011 and 2014. Two studies of surgeons defined burnout as either an emotional exhaustion score of at least 28 or a depersonalization score of at least 11. In a 2008 study, Shanafelt et al<sup>48</sup> surveyed surgeons of multiple subspecialties, identifying a burnout symptom

prevalence of 39.6%. In a study limited to plastic surgeons, Qureshi et al<sup>44</sup> found a prevalence of 30.0% using these criteria. Two studies used cutoffs of at least 27 or at least 13 for emotional exhaustion or depersonalization, respectively. Kamal et al<sup>33</sup> reported a prevalence of 61.9% among US palliative care physicians and Li et al<sup>36</sup> reported a prevalence of 69.6% among Chinese anesthesiologists using these criteria.

Six studies took a more stringent approach by requiring that at least 2 of 3 MBI subscales be positive to constitute burnout. In their study of urologists in Ireland and the United Kingdom,

Figure 5. Prevalence of Low Personal Accomplishment Reported by 28 Studies Stratified by Assessment Method



O’Kelly et al<sup>39</sup> defined burnout as an MBI-HSS cutoff of at least 27 for emotional exhaustion combined with either a cutoff of at least 13 for depersonalization or no more than 31 for personal accomplishment, generating a burnout prevalence of 28.9%. Twellaar et al<sup>17</sup> and Van der Wal et al<sup>19</sup> took a similar approach using the Utrechtse Burnout Schaal inventory. They required that participants have an exhaustion score above the top quartile combined with either a depersonalization score above the top quartile or a personal accomplishment score below the bottom quartile. Using these criteria, they calculated prevalence estimates of 19.5% and 19.8% among Dutch

general practitioners and anesthesiologists, respectively. Two studies took a similar approach using the MBI-GS. Saijo et al<sup>46</sup> defined burnout as a mean exhaustion score greater than 4.2 combined with either a cynicism score greater than 2.4 or a professional efficacy score of no more than 2.5, finding a 22.1% prevalence among Japanese physicians of multiple specialties. Nishimura et al<sup>38</sup> defined burnout as a mean exhaustion score greater than 4.0 combined with either a cynicism score greater than 2.6 or a professional efficacy score less than 4.17, finding a 21.6% prevalence among Japanese neurologists and neurosurgeons. In their study of surgeons in the

United Kingdom, Upton et al<sup>18</sup> defined burnout as both an exhaustion score and a cynicism score above the top tertile, regardless of the professional efficacy score, generating a prevalence of 19.8%.

Several studies used even stricter definitions of overall burnout, requiring all 3 MBI subscales to be positive to constitute a case. Nine studies<sup>22,24,31,32,35,37,40,41,43</sup> each used the MBI-HSS to survey physicians in a variety of specialties, specifying that individuals have an emotional exhaustion score of at least 27, a depersonalization score of at least 10, and a personal accomplishment score of no greater than 33 to be considered as having symptoms of burnout. This approach to defining burnout generated lower prevalence estimates, ranging from 2.6% to 11.8% across studies. For example, in a longitudinal study of Danish general practitioners, Pedersen et al<sup>41</sup> showed that burnout prevalence had increased from 2.6% to 3.7% between 2004 and 2012 and calculated a 7-year burnout incidence of 13.0%. A separate study of Danish general practitioners by Brøndt et al<sup>24</sup> demonstrated the effect that strict diagnostic criteria may have on burnout prevalence. In their study, only 2.6% of physicians met the strict criteria mentioned above, but a separate analysis defining burnout as either an emotional exhaustion score of at least 27 or a depersonalization score of at least 10 resulted in a higher prevalence of 24.1%.

Five other studies also used strict definitions of overall burnout, each using slightly different criteria. For example, Al-Dubai et al<sup>21</sup> required all 3 subscales of the MBI-HSS to be positive. Using an emotional exhaustion score of at least 27, a depersonalization score of at least 13, and a personal accomplishment score of no more than 31, they demonstrated a burnout symptom prevalence of 11.7% among Yemeni physicians across multiple specialties. Riquelme et al<sup>16</sup> took a similar approach using the MBI-HSS but defined subscale positivity by quartile-based cutoffs, demonstrating a burnout prevalence of 7.3% among Spanish pain medicine physicians. In their study of Belgian physicians in multiple specialties, Vandebroek et al<sup>53</sup> similarly required that all 3 MBI subscales be positive. Using the Utrechtse Burnout Schaal, they required a mean emotional exhaustion score of at least 2.5, a mean depersonalization score of at least 1.6 (for women) or at least 1.8 (for men), and a mean personal accomplishment score of no more than 3.7 to constitute burnout, demonstrating a prevalence of 5.1%. Rao et al<sup>186</sup> and Wu et al<sup>55</sup> both used the MBI-GS to assess burnout using relatively strict criteria. In their study of administrative burden among US physicians in multiple specialties, Rao et al<sup>186</sup> used mean MBI-GS subscale cutoffs of at least 3.2, at least 2.6, and no more than 3.8, for exhaustion, cynicism, and professional efficacy, respectively, demonstrating a burnout prevalence of 9.8%. Wu et al<sup>55</sup> surveyed Chinese physicians of various specialties, using cutoffs of at least 14, at least 10, and no more than 17, respectively, demonstrating a burnout prevalence of 12.1%.

Four studies defined burnout using either modified versions of the MBI or other inventories. Wang et al<sup>54</sup> used a revised 19-item Chinese version of the MBI-HSS and assessed overall burnout via a weighted equation, with a score of at least 4.5 indicating severe burnout ( $0.4 \times \text{exhaustion} + 0.3 \times \text{depersonalization} + 0.3 \times \text{reduced personal accomplishment}$ ). Using this criterion,

5.9% of physicians across multiple specialties from Shanghai hospitals were considered to have symptoms of burnout. In their study of Portuguese physicians in multiple specialties, Marôco et al<sup>14</sup> used a 15-item modified version of the MBI-HSS, considering a mean subscale score of at least 3 as the cutoff for burnout, generating a prevalence of 43.6%. Puffer et al<sup>15</sup> demonstrated a burnout prevalence of 24.5% among US physicians using the Zero Burnout Program Survey with a cutoff score of at least 3. For their study of Austrian physicians, Wurm et al<sup>56</sup> used the Hamburg Burnout Inventory, in part because of its validation in the German language. A score of at least 145 was considered the cutoff for at least mild burnout, resulting in an overall prevalence of 50.7%. They further classified 28.0% of participants as having mild, 13.1% as having moderate, and 9.6% as having severe burnout symptoms. Theirs was one of the few studies to also assess participants with a high-specificity screening tool for major depression, the 12-item World Health Organization Major Depression Inventory. Using these data, Wurm et al<sup>56</sup> concluded that the Hamburg Burnout Inventory subscales for emotional exhaustion, detachment (ie, depersonalization), and personal accomplishment correlated more highly with the cardinal symptoms of depression (ie, sadness, lack of interest, and diminished energy) than with each other, demonstrating overlap of the concepts of burnout and depression in physicians.

Among the 45 studies, 73.3% (33/45) generated prevalence estimates of emotional exhaustion, depersonalization, or low personal accomplishment, including 11 studies<sup>13,20,23,26-30,34,52,57</sup> that did not provide estimates of overall burnout. A wide range of cutoff scores was used (Table 1). The most common criterion for defining emotional exhaustion was an MBI-HSS cutoff of at least 27, corresponding to symptoms experienced a few times per month, used by 63.6% (21/33) of studies reporting on this outcome. The most common criterion for defining depersonalization was an MBI-HSS cutoff of at least 10, corresponding to symptoms experienced once per month or less, used by 53.3% (16/30) of studies. The most common criterion for defining low personal accomplishment was an MBI-HSS cutoff of at least 33, corresponding to symptoms experienced approximately once per week, used by 46.4% (13/28) of studies. Overall, across the 33 studies that presented subscale prevalence data, 10, 10, and 10 unique instrument-cutoff score combinations were used to define emotional exhaustion, depersonalization, or low personal accomplishment (or their MBI-GS equivalents), respectively. With this diversity of cutoffs, emotional exhaustion prevalence ranged from 8.7% to 63.2%, depersonalization prevalence ranged from 3.9% to 52.0%, and low personal accomplishment prevalence ranged from 4.4% to 73.3% (Figure 3, Figure 4, and Figure 5).

## Discussion

This systematic review of 182 studies involving 109 628 physicians in 45 countries demonstrated remarkable variability in published prevalence estimates of burnout, with estimates of overall burnout ranging from 0% to 80.5%. This wide range reflected the marked heterogeneity in the criteria used

to define and measure burnout in the literature, with at least 142 unique definitions for meeting overall burnout or burnout subscale criteria identified. This review identified a lack of consensus on how the burnout construct is used to measure physicians' exposure and response to occupational stress. Although a prevalence of 50% for physician burnout has been cited in the popular press<sup>202</sup> and academic literature,<sup>203</sup> the heterogeneity between the assessed studies calls into question whether any prevalence estimate cited for burnout can be meaningfully interpreted.

Research on burnout among physicians has increased awareness of physician mental health and well-being as an important issue,<sup>204</sup> and US national organizations have recently called for all health care systems to assess their physicians on measures of well-being, often with a focus on burnout.<sup>205</sup> This review indicates that a more consistent definition of burnout and improved assessment tools may be necessary if these policy measures are to successfully improve the physician work environment.

The methodological heterogeneity among the studies included in this systematic review may have been driven in part by shifting definitions of burnout and by questions around the conceptual framework of the burnout construct. The majority of the studies used an inventory based on the MBI, which considers burnout to consist of 3 domains: emotional exhaustion, depersonalization, and low personal accomplishment.<sup>6</sup> The older third edition of the MBI manual provided cutoff scores to define burnout according to tertile-based splits of convenience samples of healthy workers, although the manual cautioned against using such coding for diagnostic purposes.<sup>206</sup> Separately, Maslach supported defining overall burnout as high emotional exhaustion along with high depersonalization or low personal accomplishment.<sup>207</sup> Others have asserted that high emotional exhaustion or high depersonalization but not low personal accomplishment can differentiate individuals with burnout from those who are not experiencing burnout<sup>208</sup>; some have suggested that personal accomplishment may not be a part of the total concept of burnout.<sup>209</sup>

The clinical validity of these definitions is not certain. The most commonly used MBI cutoff score for high emotional exhaustion ( $\geq 27$ , used by 43.5% of studies) corresponds to symptoms experienced only a few times per month on average. The most commonly used cutoff score for high depersonalization ( $\geq 10$ , used by 33.1% of studies) corresponds to symptoms experienced once per month or less on average. And the most commonly used cutoff score for low personal accomplishment ( $\leq 33$ , used by 34.8% of studies) corresponds to symptoms experienced only once per week on average. Symptoms experienced this infrequently are unlikely to reflect clinically meaningful levels of burnout.<sup>210</sup> The prevalence estimates summarized in this systematic review therefore primarily reflect symptoms of burnout rather than a clinical burnout syndrome. With these and other concerns,<sup>207</sup> researchers have used alternate subscale and overall burnout cutoffs, adding to the proliferation of definitions. The current fourth edition of the MBI manual more strongly advocates that researchers treat burnout as continuous data for each domain and argues against dichotomizing or combining the subscales to label individu-

als as having burnout.<sup>6</sup> However, dichotomous burnout definitions may be more practical to guide institutional policy and identify physicians with burnout.

In addition to the different definitions of burnout, the heterogeneity among the published studies may be due to fundamental problems with the conceptualization and measurement of burnout through the MBI. This inventory was originally developed not on the basis of clinical observation but rather by inductive factor analysis of what has been described as a "rather arbitrary" set of items,<sup>211</sup> leading to questions about the validity of MBI-measured burnout.<sup>197</sup> Although the MBI conceptualizes burnout as a job-related phenomenon, evidence suggests that it does not effectively distinguish between symptoms that arise from work stress, from nonwork stress, or from a combination of the two.<sup>212</sup> The original and still most commonly used version of the MBI, the MBI-HSS, conceptualizes burnout specifically as a downstream consequence of human relations-induced stress.<sup>6</sup> However, a possible increase in the prevalence of burnout among physicians has corresponded with an increasing volume of non-patient-focused work such as with the electronic medical record,<sup>213</sup> whereas increased time with patients has instead been positively associated with physician mental well-being.<sup>214</sup> In addition, the MBI combines the experience of burnout (emotional exhaustion) with coping strategies (depersonalization), creating a unitary measure that may not represent any singular clinical phenomenon.<sup>197</sup> It has therefore been suggested that rigorous clinical observation may be needed to determine what constitutes a case of burnout.<sup>215</sup>

With these conceptual concerns, there is an argument for grounding burnout in a well-established illness category with known diagnostic criteria, such as major depressive disorder, and considering burnout a form of depression instead of a distinct entity.<sup>216</sup> However, there may be advantages to considering burnout as a distinct entity.<sup>217</sup> In contrast to depression, the concept of burnout avoids pathologizing workers' emotional responses to their jobs. Understanding health practitioners as workers with burnout instead of as patients with depression may help underscore the environmental and cultural factors that can negatively affect their well-being and encourage implementation of structural reforms that can complement clinical care in the form of psychotherapy and medication.<sup>218</sup>

### Future Directions

Given the lack of a clear consensus among the 182 studies included in this review, researchers studying burnout should consider limitations associated with the concept and its measurement. First, use of arbitrary and varying definitions of dichotomized burnout likely contributed to the heterogeneity. In the absence of agreed-on diagnostic criteria for a clinical burnout syndrome, future studies may consider analyzing burnout exclusively as a continuous measure. Second, researchers who nonetheless wish to generate dichotomous burnout outcomes should consider reporting multiple prevalence estimates using a range of cutoff scores. Third, given limitations in the MBI, the most common measurement tool for burnout, researchers should consider using other tools,

such as the Copenhagen Burnout Inventory, that explicitly avoid these conceptual problems and are freely available in the public domain.<sup>197</sup>

Fourth, to better capture the broader adverse effects of physician stress, researchers should consider using validated instruments to longitudinally assess for concurrent depression, anxiety, substance abuse, and medical illness along with consistent measures of the subjective and workplace factors that shape the physician experience (eg, hours worked and compensation). Fifth, researchers should also more strictly adhere to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

### Limitations

This study has several limitations. First, because the aim of the review was to estimate burnout prevalence, it excluded studies of burnout that did not report prevalence estimates. Second, the data were derived from studies with assorted designs, assessment instruments, and physician demographics, and the analyses were inherently limited by the

ongoing nosological debate in the literature over what constitutes a case of burnout. Third, the studies included in the analysis focused disproportionately on the measurement of burnout among physicians in the United States and Europe. Fourth, the analysis relied on aggregated published data from the peer-reviewed literature and did not consider non-peer-reviewed data sources, such as informal annual surveys by Medscape.<sup>219</sup>

### Conclusions

In this systematic review, there was substantial variability in prevalence estimates of burnout among physicians and marked variation in burnout definitions, assessment methods, and study quality. These findings preclude definitive conclusions about the prevalence of burnout and highlight the importance of developing a consensus definition of burnout and of standardizing measurement tools to assess the effects of chronic occupational stress on physicians.

#### ARTICLE INFORMATION

**Accepted for Publication:** August 9, 2018.

**Author Affiliations:** Harvard Medical School, Boston, Massachusetts (Rotenstein, Torre, Rosales, Mata); Department of Medicine, Brigham and Women's Hospital, Boston, Massachusetts (Rotenstein); Brigham Education Institute, Boston, Massachusetts (Rotenstein, Mata); Department of Pathology, Brigham and Women's Hospital, Boston, Massachusetts (Torre); Department of Psychiatry, Yale School of Medicine, New Haven, Connecticut (Ramos); Department of Psychiatry, Brigham and Women's Hospital, Boston, Massachusetts (Rosales); Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina, Charleston (Guille); Molecular and Behavioral Neuroscience Institute and Department of Psychiatry, University of Michigan, Ann Arbor (Sen); Program in Molecular Pathological Epidemiology, Department of Pathology, Brigham and Women's Hospital, Boston, Massachusetts (Mata).

**Author Contributions:** Dr Mata had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Concept and design:** Rotenstein, Mata.

**Acquisition, analysis, or interpretation of data:** All authors.

**Drafting of the manuscript:** Rotenstein, Ramos, Mata.

**Critical revision of the manuscript for important intellectual content:** All authors.

**Statistical analysis:** Mata.

**Obtained funding:** Guille, Sen, Mata.

**Administrative, technical, or material support:** Guille, Sen, Mata.

**Supervision:** Guille, Sen, Mata.

**Conflict of Interest Disclosures:** All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

**Funding/Support:** This study received funding from the National Institutes of Health (grant RO1MH101459 to Dr Sen).

**Role of the Funder/Sponsor:** The study funder had no role in the design and conduct of the study; collection, management, analysis, or interpretation of the data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication.

**Disclaimer:** The opinions, results, and conclusions reported in this article are those of the authors and are independent from the funding sources.

**Data Sharing Statement:** See [Supplement 2](#).

#### REFERENCES

- Freudenberger HJ. Staff burn-out. *J Soc Issues*. 1974;30(1):159-165. doi:10.1111/j.1540-4560.1974.tb00706.x
- Kim MH, Mazenga AC, Simon K, et al. Burnout and self-reported suboptimal patient care amongst health care workers providing HIV care in Malawi. *PLoS One*. 2018;13(2):e0192983. doi:10.1371/journal.pone.0192983
- Saijo Y, Chiba S, Yoshioka E, et al. Job stress and burnout among urban and rural hospital physicians in Japan. *Aust J Rural Health*. 2013;21(4):225-231. doi:10.1111/ajr.12040
- Rotenstein LS, Ramos MA, Torre M, et al. Prevalence of depression, depressive symptoms, and suicidal ideation among medical students: a systematic review and meta-analysis. *JAMA*. 2016;316(21):2214-2236. doi:10.1001/jama.2016.17324
- Mata DA, Ramos MA, Bansal N, et al. Prevalence of depression and depressive symptoms among resident physicians: a systematic review and meta-analysis. *JAMA*. 2015;314(22):2373-2383. doi:10.1001/jama.2015.15845
- Maslach C, Jackson SE, Leiter MP. *Maslach Burnout Inventory Manual*. 4th ed. Menlo Park, CA: Mind Garden Inc; 2016.
- West CP, Tan AD, Habermann TM, Sloan JA, Shanafelt TD. Association of resident fatigue and distress with perceived medical errors. *JAMA*. 2009;302(12):1294-1300. doi:10.1001/jama.2009.1389
- Halbesleben JRB, Rathert C. Linking physician burnout and patient outcomes: exploring the dyadic relationship between physicians and patients. *Health Care Manage Rev*. 2008;33(1):29-39. doi:10.1097/01.HMR.0000304493.87898.72
- Shanafelt TD, Mungo M, Schmitgen J, et al. Longitudinal study evaluating the association between physician burnout and changes in professional work effort. *Mayo Clin Proc*. 2016;91(4):422-431. doi:10.1016/j.mayocp.2016.02.001
- Moher D, Liberati A, Tetzlaff J, Altman DG; PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Open Med*. 2009;3(3):e123-e130.
- Stroup DF, Berlin JA, Morton SC, et al; Meta-analysis of Observational Studies in Epidemiology (MOOSE) Group. Meta-analysis of observational studies in epidemiology: a proposal for reporting. *JAMA*. 2000;283(15):2008-2012. doi:10.1001/jama.283.15.2008
- Stang A. Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of nonrandomized studies in meta-analyses. *Eur J Epidemiol*. 2010;25(9):603-605. doi:10.1007/s10654-010-9491-z
- Grassi L, Magnani K. Psychiatric morbidity and burnout in the medical profession: an Italian study of general practitioners and hospital physicians. *Psychother Psychosom*. 2000;69(6):329-334. doi:10.1159/000012416
- Marôco J, Marôco AL, Leite E, Bastos C, Vazão MJ, Campos J. Burnout in Portuguese healthcare professionals: an analysis at the national level [in Portuguese]. *Acta Med Port*. 2016;29(1):24-30.
- Puffer JC, Knight HC, O'Neill TR, et al. Prevalence of burnout in board certified family physicians. *J Am Board Fam Med*. 2017;30(2):125-126. doi:10.3122/jabfm.2017.02.160295
- Riquelme I, Chacón J-I, Gándara A-V, et al; PAINBO Study Group. Prevalence of burnout among pain medicine physicians and its potential effect upon clinical outcomes in patients with

- oncologic pain or chronic pain of nononcologic origin. *Pain Med*. 2018. doi:10.1093/pm/pnx335
17. Twellaar M, Winants Y, Houkes I. How healthy are Dutch general practitioners? self-reported (mental) health among Dutch general practitioners. *Eur J Gen Pract*. 2008;14(1):4-9. doi:10.1080/13814780701814911
  18. Upton D, Mason V, Doran B, Solowiej K, Shiralkar U, Shiralkar S. The experience of burnout across different surgical specialties in the United Kingdom: a cross-sectional survey. *Surgery*. 2012;151(4):493-501. doi:10.1016/j.surg.2011.09.035
  19. van der Wal RAB, Bucx MJL, Hendriks JCM, Scheffer G-J, Prins JB. Psychological distress, burnout and personality traits in Dutch anaesthesiologists: a survey. *Eur J Anaesthesiol*. 2016;33(3):179-186. doi:10.1097/EJA.0000000000000375
  20. Winefield HR, Anstey TJ. Job stress in general practice: practitioner age, sex and attitudes as predictors. *Fam Pract*. 1991;8(2):140-144. doi:10.1093/fampra/8.2.140
  21. Al-Dubai SAR, Rampal KG. Prevalence and associated factors of burnout among doctors in Yemen. *J Occup Health*. 2010;52(1):58-65. doi:10.1539/joh.08030
  22. Arigoni F, Bovier PA, Mermillod B, Waltz P, Sappino A-P. Prevalence of burnout among Swiss cancer clinicians, paediatricians and general practitioners: who are most at risk? *Support Care Cancer*. 2009;17(1):75-81. doi:10.1007/s00520-008-0465-6
  23. Asai M, Morita T, Akechi T, et al. Burnout and psychiatric morbidity among physicians engaged in end-of-life care for cancer patients: a cross-sectional nationwide survey in Japan. *Psychooncology*. 2007;16(5):421-428. doi:10.1002/pon.1066
  24. Brøndt A, Sokolowski I, Olesen F, Vedsted P. Continuing medical education and burnout among Danish GPs. *Br J Gen Pract*. 2008;58(546):15-19. doi:10.3399/bjgp08X263767
  25. Busis NA, Shanafelt TD, Keran CM, et al. Burnout, career satisfaction, and well-being among US neurologists in 2016. *Neurology*. 2017;88(8):797-808. doi:10.1212/WNL.0000000000003640
  26. Campbell DA Jr, Sonnand SS, Eckhauser FE, Campbell KK, Greenfield LJ. Burnout among American surgeons. *Surgery*. 2001;130(4):696-702. doi:10.1067/msy.2001.116676
  27. Chen K-Y, Yang C-M, Lien C-H, et al. Burnout, job satisfaction, and medical malpractice among physicians. *Int J Med Sci*. 2013;10(11):1471-1478. doi:10.7150/ijms.6743
  28. Chivato Pérez T, Campos Andreu A, Negro Alvarez JM, Caballero Martínez F. Professional burnout and work satisfaction in Spanish allergists: analysis of working conditions in the specialty. *J Investig Allergol Clin Immunol*. 2011;21(1):13-21.
  29. Dréano-Hartz S, Rhondali W, Ledoux M, et al. Burnout among physicians in palliative care: impact of clinical settings. *Palliat Support Care*. 2016;14(4):402-410. doi:10.1017/S1478951515000991
  30. Escribà-Agüir V, Pérez-Hoyos S. Psychological well-being and psychosocial work environment characteristics among emergency medical and nursing staff. *Stress Health*. 2007;23(3):153-160. doi:10.1002/smi.1131
  31. Goehring C, Bouvier Gallacchi M, Küenzi B, Bovier P. Psychosocial and professional characteristics of burnout in Swiss primary care practitioners: a cross-sectional survey. *Swiss Med Wkly*. 2005;135(7-8):101-108.
  32. Golub JS, Johns MM III, Weiss PS, Ramesh AK, Ossoff RH. Burnout in academic faculty of otolaryngology-head and neck surgery. *Laryngoscope*. 2008;118(11):1951-1956. doi:10.1097/MLG.0b013e31818226e9
  33. Kamal AH, Bull JH, Wolf SP, et al. Prevalence and predictors of burnout among hospice and palliative care clinicians in the US. *J Pain Symptom Manage*. 2016;51(4):690-696. doi:10.1016/j.jpainsymman.2015.10.020
  34. Kluger MT, Townend K, Laidlaw T. Job satisfaction, stress and burnout in Australian specialist anaesthetists. *Anaesthesia*. 2003;58(4):339-345. doi:10.1046/j.1365-2044.2003.03085.x
  35. Lesage F-X, Berjot S, Altintas E, Paty B. Burnout among occupational physicians: a threat to occupational health systems? a nationwide cross-sectional survey. *Ann Occup Hyg*. 2013;57(7):913-919. doi:10.1093/annhyg/met013
  36. Li H, Zuo M, Gelb AW, et al. Chinese anesthesiologists have high burnout and low job satisfaction: a cross-sectional survey. *Anesth Analg*. 2018;126(3):1004-1012. doi:10.1213/ANE.0000000000002776
  37. Maticorena-Quevedo J, Beas R, Anduaga-Beramendi A, Mayta-Tristán P. Prevalence of burnout syndrome in Peruvian physicians and nurses, ENSUSALUD 2014 [in Spanish]. *Rev Peru Med Exp Salud Publica*. 2016;33(2):241-247. doi:10.17843/rpmesp.2016.332.2170
  38. Nishimura K, Nakamura F, Takegami M, et al; J-ASPECT Study Group. Cross-sectional survey of workload and burnout among Japanese physicians working in stroke care: the nationwide survey of acute stroke care capacity for proper designation of comprehensive stroke center in Japan (J-ASPECT) study. *Circ Cardiovasc Qual Outcomes*. 2014;7(3):414-422. doi:10.1161/CIRCOUTCOMES.113.000159
  39. O'Kelly F, Manecksha RP, Quinlan DM, et al. Rates of self-reported "burnout" and causative factors amongst urologists in Ireland and the UK: a comparative cross-sectional study. *BJU Int*. 2016;117(2):363-372. doi:10.1111/bju.13218
  40. Pantenburg B, Luppia M, König H-H, Riedel-Heller SG. Burnout among young physicians and its association with physicians' wishes to leave: results of a survey in Saxony, Germany. *J Occup Med Toxicol*. 2016;11:2. doi:10.1186/s12995-016-0091-z
  41. Pedersen AF, Andersen CM, Olesen F, Vedsted P. Risk of burnout in Danish GPs and exploration of factors associated with development of burnout: a two-wave panel study. *Int J Family Med*. 2013;2013:603713. doi:10.1155/2013/603713
  42. Pedersen AF, Ingeman ML, Vedsted P. Empathy, burn-out and the use of gut feeling: a cross-sectional survey of Danish general practitioners. *BMJ Open*. 2018;8(2):e020007. doi:10.1136/bmjopen-2017-020007
  43. Pedersen AF, Sørensen JK, Bruun NH, Christensen B, Vedsted P. Risky alcohol use in Danish physicians: associated with alexithymia and burnout? *Drug Alcohol Depend*. 2016;160:119-126. doi:10.1016/j.drugaldep.2015.12.038
  44. Qureshi HA, Rawlani R, Mioton LM, Dumanian GA, Kim JYS, Rawlani V. Burnout phenomenon in US plastic surgeons: risk factors and impact on quality of life. *Plast Reconstr Surg*. 2015;135(2):619-626. doi:10.1097/PRS.0000000000000855
  45. Rao SK, Kimball AB, Lehrhoff SR, et al. The impact of administrative burden on academic physicians: results of a hospital-wide physician survey. *Acad Med*. 2017;92(2):237-243. doi:10.1097/ACM.0000000000001461
  46. Saijo Y, Chiba S, Yoshioka E, et al. Effects of work burden, job strain and support on depressive symptoms and burnout among Japanese physicians. *Int J Occup Med Environ Health*. 2014;27(6):980-992. doi:10.2478/s13382-014-0324-2
  47. Shanafelt TD, Boone S, Tan L, et al. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. *Arch Intern Med*. 2012;172(18):1377-1385. doi:10.1001/archinternmed.2012.3199
  48. Shanafelt TD, Balch CM, Bechamps GJ, et al. Burnout and career satisfaction among American surgeons. *Ann Surg*. 2009;250(3):463-471. doi:10.1097/SLA.0b013e3181ac4df4
  49. Shanafelt TD, Gradishar WJ, Kosty M, et al. Burnout and career satisfaction among US oncologists. *J Clin Oncol*. 2014;32(7):678-686. doi:10.1200/JCO.2013.51.8480
  50. 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(12):1600-1613. doi:10.1016/j.mayocp.2015.08.023
  51. Shanafelt TD, West CP, Sloan JA, et al. Career fit and burnout among academic faculty. *Arch Intern Med*. 2009;169(10):990-995. doi:10.1001/archinternmed.2009.70
  52. Taylor C, Graham J, Potts HWW, Richards MA, Ramirez AJ. Changes in mental health of UK hospital consultants since the mid-1990s. *Lancet*. 2005;366(9487):742-744. doi:10.1016/S0140-6736(05)67178-4
  53. Vandebroek S, Van Gerven E, De Witte H, Vanhaecht K, Godderis L. Burnout in Belgian physicians and nurses. *Occup Med (Lond)*. 2017;67(7):546-554. doi:10.1093/occmed/kqx126
  54. Wang Z, Xie Z, Dai J, Zhang L, Huang Y, Chen B. Physician burnout and its associated factors: a cross-sectional study in Shanghai. *J Occup Health*. 2014;56(1):73-83. doi:10.1539/joh.13-0108-OA
  55. Wu H, Liu L, Wang Y, Gao F, Zhao X, Wang L. Factors associated with burnout among Chinese hospital doctors: a cross-sectional study. *BMC Public Health*. 2013;13:786. doi:10.1186/1471-2458-13-786
  56. Wurm W, Vogel K, Holl A, et al. Depression-burnout overlap in physicians. *PLoS One*. 2016;11(3):e0149913. doi:10.1371/journal.pone.0149913
  57. Yoon JD, Rasinski KA, Curlin FA. Conflict and emotional exhaustion in obstetrician-gynaecologists: a national survey. *J Med Ethics*. 2010;36(12):731-735. doi:10.1136/jme.2010.037762
  58. Abdulla L, Al-Qahtani DM, Al-Kuwari MG. Prevalence and determinants of burnout syndrome among primary healthcare physicians in Qatar. *S Afr Fam Pract (2004)*. 2011;53(4):380-383. doi:10.1080/20786204.2011.10874118



59. Aggarwal S, Kusano AS, Carter JN, Gable L, Thomas CR Jr, Chang DT. Stress and burnout among residency program directors in United States radiation oncology programs. *Int J Radiat Oncol Biol Phys*. 2015;93(4):746-753. doi:10.1016/j.ijrobp.2015.08.019
60. Aguirre Roldán AM, Quijano Barriga AM. Burnout syndrome, family and work related variables on general practitioners in Bogota: a strategy of work quality [in Spanish]. *Rev Colomb Psiquiatr*. 2015;44(4):198-205. doi:10.1016/j.rcp.2015.05.017
61. Ahmadpanah M, Torabian S, Dastore K, Jahangard L, Haghighi M. Association of occupational burnout and type of personality in Iranian general practitioners. *Work*. 2015;51(2):315-319. doi:10.3233/WOR-141903
62. Al-Shoraian GMJ, Hussain N, Alajmi MF, Kamel MI, El-Shazly MK. Burnout among family and general practitioners. *Alexandria J Med*. 2011;47(4):359-364. doi:10.1016/j.ajme.2011.10.005
63. Allegra CJ, Hall R, Yothers G. Prevalence of burnout in the US oncology community: results of a 2003 survey. *J Oncol Pract*. 2005;1(4):140-147. doi:10.1200/jop.2005.1.4.140
64. Amanullah S, McNally K, Zelin J, Cole J, Cernovsky Z. Are burnout prevention programs for hospital physicians needed? *Asian J Psychiatry*. 2017;26:66-69. doi:10.1016/j.ajp.2017.01.009
65. Arayago R, Gonzalez A, Limongi M, Guevara H. Síndrome de burnout en residentes y especialistas de anestesiología. *Salus*. 2016;20(1):13-21.
66. Atalaya F, María I, Díez D, Luis J. Burnout syndrome among gynecologists in the Virgen Macarena University Hospital in Seville [in Spanish]. *Prog Obstet Ginecol*. 2008;531-540. doi:10.1016/S0304-5013(08)72327-6.
67. Balch CM, Oreskovich MR, Dyrbye LN, et al. Personal consequences of malpractice lawsuits on American surgeons. *J Am Coll Surg*. 2011;213(5):657-667. doi:10.1016/j.jamcollsurg.2011.08.005
68. Barbosa FT, Elói RJ, Santos LM, Leão BA, Lima FJ, Sousa-Rodrigues CF. Correlation between weekly working time and burnout syndrome among anesthesiologists of Maceió-AL. *Braz J Anesthesiol*. 2017;67(2):115-121. doi:10.1016/j.bjan.2015.06.001
69. Barbosa FT, Leão BA, Tavares GMS, Santos JG. Burnout syndrome and weekly workload of on-call physicians: cross-sectional study. *Sao Paulo Med J*. 2012;130(5):282-288. doi:10.1590/S1516-31802012000500003
70. Barros D de S, Tironi MOS, Nascimento Sobrinho CL, et al. Intensive care unit physicians: socio-demographic profile, working conditions and factors associated with burnout syndrome [in Portuguese]. *Rev Bras Ter Intensiva*. 2008;20(3):235-240.
71. Bertges Yost W, Eshelman A, Raoufi M, Abouljoud MS. A national study of burnout among American transplant surgeons. *Transplant Proc*. 2005;37(2):1399-1401. doi:10.1016/j.transproceed.2005.01.055
72. Böhle A, Baumgärtel M, Götz ML, Müller EH, Jocham D. Burn-out of urologists in the county of Schleswig-Holstein, Germany: a comparison of hospital and private practice urologists. *J Urol*. 2001;165(4):1158-1161. doi:10.1016/S0022-5347(05)66454-3
73. Bressi C, Manenti S, Porcellana M, et al. Haemato-oncology and burnout: an Italian survey. *Br J Cancer*. 2008;98(6):1046-1052. doi:10.1038/sj.bjc.6604270
74. Bressi C, Porcellana M, Gambini O, et al. Burnout among psychiatrists in Milan: a multicenter survey. *Psychiatr Serv*. 2009;60(7):985-988. doi:10.1176/ps.2009.60.7.985
75. Bruce SM, Conaglen HM, Conaglen JV. Burnout in physicians: a case for peer-support. *Intern Med J*. 2005;35(5):272-278. doi:10.1111/j.1445-5994.2005.00782.x
76. Burghi G, Lambert J, Chaize M, et al. Prevalence, risk factors and consequences of severe burnout syndrome in ICU. *Intensive Care Med*. 2014;40(11):1785-1786. doi:10.1007/s00134-014-3454-x
77. Chew FS, Mulcahy MJ, Porrino JA, Mulcahy H, Relyea-Chew A. Prevalence of burnout among musculoskeletal radiologists. *Skeletal Radiol*. 2017;46(4):497-506. doi:10.1007/s00256-017-2578-9
78. Chou L-P, Li C-Y, Hu SC. Job stress and burnout in hospital employees: comparisons of different medical professions in a regional hospital in Taiwan. *BMJ Open*. 2014;4(2):e004185. doi:10.1136/bmjopen-2013-004185
79. Coleman M, Dexter D, Nankivil N. Factors affecting physician satisfaction and Wisconsin Medical Society strategies to drive change. *WMMJ*. 2015;114(4):135-142.
80. Colville GA, Smith JG, Brierley J, et al. Coping with staff burnout and work-related posttraumatic stress in intensive care. *Pediatr Crit Care Med*. 2017;18(7):e267-e273. doi:10.1097/PCC.0000000000001179
81. Contag SP, Golub JS, Teknos TN, et al. Professional burnout among microvascular and reconstructive free-flap head and neck surgeons in the United States. *Arch Otolaryngol Head Neck Surg*. 2010;136(10):950-956. doi:10.1001/archoto.2010.154
82. Cruz OA, Pole CJ, Thomas SM. Burnout in chairs of academic departments of ophthalmology. *Ophthalmology*. 2007;114(12):2350-2355. doi:10.1016/j.ophtha.2007.04.058
83. Das S, Barman S, Datta S, et al. Degree of burnout among emergency healthcare workers and factors influencing level of burnout: a pilot study. *Delhi Psychiatry J*. 2016;19(1):36-47.
84. De Oliveira GS Jr, Almeida MD, Ahmad S, Fitzgerald PC, McCarthy RJ. Anesthesiology residency program director burnout. *J Clin Anesth*. 2011;23(3):176-182. doi:10.1016/j.jclane.2011.02.001
85. De Stefano C, Philippon A-L, Krastinova E, et al. Effect of emergency physician burnout on patient waiting times. *Intern Emerg Med*. 2018;13(3):421-428. doi:10.1007/s11739-017-1706-9
86. Deckard GJ, Hicks LL, Hamory BH. The occurrence and distribution of burnout among infectious diseases physicians. *J Infect Dis*. 1992;165(2):224-228. doi:10.1093/infdis/165.2.224
87. Deckard G, Meterko M, Field D. Physician burnout: an examination of personal, professional, and organizational relationships. *Med Care*. 1994;32(7):745-754. doi:10.1097/00005650-199407000-00007
88. Doan-Wiggins L, Zun L, Cooper MA, Meyers DL, Chen EH; Wellness Task Force, Illinois College of Emergency Physicians. Practice satisfaction, occupational stress, and attrition of emergency physicians. *Acad Emerg Med*. 1995;2(6):556-563. doi:10.1111/j.1553-2712.1995.tb03261.x
89. Dolan ED, Mohr D, Lempa M, et al. Using a single item to measure burnout in primary care staff: a psychometric evaluation. *J Gen Intern Med*. 2015;30(5):582-587. doi:10.1007/s11606-014-3112-6
90. Dunwoodie DA, Auret K. Psychological morbidity and burnout in palliative care doctors in Western Australia. *Intern Med J*. 2007;37(10):693-698. doi:10.1111/j.1445-5994.2007.01384.x
91. Dyrbye LN, Shanafelt TD, Thomas MR, Durning SJ. Brief observation: a national study of burnout among internal medicine clerkship directors. *Am J Med*. 2009;122(3):310-312. doi:10.1016/j.amjmed.2008.11.008
92. Eelen S, Bauwens S, Baillon C, Distelmans W, Jacobs E, Verzelen A. The prevalence of burnout among oncology professionals: oncologists are at risk of developing burnout. *Psychooncology*. 2014;23(12):1415-1422. doi:10.1002/pon.3579
93. Elit L, Trim K, Mand-Bains IH, Sussman J, Grunfeld E; Society of Gynecologic Oncology Canada. Job satisfaction, stress, and burnout among Canadian gynecologic oncologists. *Gynecol Oncol*. 2004;94(1):134-139. doi:10.1016/j.ygyno.2004.04.014
94. Embriaco N, Azoulay E, Barrau K, et al. High level of burnout in intensivists: prevalence and associated factors. *Am J Respir Crit Care Med*. 2007;175(7):686-692. doi:10.1164/rccm.200608-1184OC
95. Evans RW, Ghosh K. A survey of headache medicine specialists on career satisfaction and burnout. *Headache*. 2015;55(10):1448-1457. doi:10.1111/head.12708
96. Fields AI, Cuerdon TT, Brasseur CO, et al. Physician burnout in pediatric critical care medicine. *Crit Care Med*. 1995;23(8):1425-1429. doi:10.1097/00003246-199508000-00018
97. Fletcher AM, Pagedar N, Smith RJH. Factors correlating with burnout in practicing otolaryngologists. *Otolaryngol Head Neck Surg*. 2012;146(2):234-239. doi:10.1177/0194599811428585
98. Frutos-Llanes R, Jiménez-Blanco S, Blanco-Montagut LE. Burnout syndrome in general practitioners of Avila [in Spanish]. *Semergen*. 2014;40(7):357-365. doi:10.1016/j.semerg.2014.02.008
99. Gabbe SG, Melville J, Mandel L, Walker E. Burnout in chairs of obstetrics and gynecology: diagnosis, treatment, and prevention. *Am J Obstet Gynecol*. 2002;186(4):601-612. doi:10.1067/mob.2002.122391
100. Garcia HA, McGeary CA, Finley EP, Ketchum NS, McGeary DD, Peterson AL. Burnout among psychiatrists in the Veterans Health Administration. *Burn Res*. 2015;2(4):108-114. doi:10.1016/j.burn.2015.10.001
101. Garcia TT, Garcia PCR, Molon ME, et al. Prevalence of burnout in pediatric intensivists: an observational comparison with general pediatricians. *Pediatr Crit Care Med*. 2014;15(8):e347-e353. doi:10.1097/PCC.0000000000000218
102. Gil-Monte PR, Marucco MA. Burnout prevalence in pediatricians of general hospitals [in Spanish]. *Rev Saude Publica*. 2008;42(3):450-456. doi:10.1590/S0034-89102008000300009

103. Glasheen JJ, Misky GJ, Reid MB, Harrison RA, Sharpe B, Auerbach A. Career satisfaction and burnout in academic hospital medicine. *Arch Intern Med*. 2011;171(8):782-785. doi:10.1001/archinternmed.2011.153
104. Głębocka A. The relationship between burnout syndrome among the medical staff and work conditions in the Polish healthcare system. *Adv Exp Med Biol*. 2017;968:61-70. doi:10.1007/5584\_2016\_179
105. Gorelick MH, Schremmer R, Ruch-Ross H, Radabaugh C, Selbst S. Current workforce characteristics and burnout in pediatric emergency medicine. *Acad Emerg Med*. 2016;23(1):48-54. doi:10.1111/acem.12845
106. Govêia CS, Cruz TTMD, Miranda DB, et al. Association between burnout syndrome and anxiety in residents and anesthesiologists of the Federal District [in Portuguese]. *Rev Bras Anestesiol*. 2018;68(5):442-446. doi:10.1016/j.bjan.2018.02.007
107. Guest RS, Baser R, Li Y, Scardino PT, Brown AE, Kissane DW. Cancer surgeons' distress and well-being, I: the tension between a culture of productivity and the need for self-care. *Ann Surg Oncol*. 2011;18(5):1229-1235. doi:10.1245/s10434-011-1622-6
108. Guntupalli KK, Fromm RE Jr. Burnout in the internist-intensivist. *Intensive Care Med*. 1996;22(7):625-630. doi:10.1007/BF01709737
109. Hagau N, Pop RS. Prevalence of burnout in Romanian anaesthesia and intensive care physicians and associated factors. *J Rom Anest Ter Intensiva*. 2012;19:117-124.
110. Hamdan M, Hamra AA. Burnout among workers in emergency Departments in Palestinian hospitals: prevalence and associated factors. *BMC Health Serv Res*. 2017;17(1):407. doi:10.1186/s12913-017-2356-3
111. Hämmig O, Brauchli R, Bauer GF. Effort-reward and work-life imbalance, general stress and burnout among employees of a large public hospital in Switzerland. *Swiss Med Wkly*. 2012;142:w13577. doi:10.4414/smw.2012.13577
112. Helewa RM, Kholdebarin R, Hochman DJ. Attending surgeon burnout and satisfaction with the establishment of a regional acute care surgical service. *Can J Surg*. 2012;55(5):312-316. doi:10.1503/cjs.000611
113. Helfrich CD, Dolan ED, Simonetti J, et al. Elements of team-based care in a patient-centered medical home are associated with lower burnout among VA primary care employees. *J Gen Intern Med*. 2014;29(suppl 2):S659-S666. doi:10.1007/s11606-013-2702-z
114. Hinami K, Whelan CT, Miller JA, Wolosin RJ, Wetterneck TB; Society of Hospital Medicine Career Satisfaction Task Force. Job characteristics, satisfaction, and burnout across hospitalist practice models. *J Hosp Med*. 2012;7(5):402-410. doi:10.1002/jhm.1907
115. Ifediora CO. Burnout among after-hours home visit doctors in Australia. *BMC Fam Pract*. 2016;17:2. doi:10.1186/s12875-016-0400-8
116. Jager AJ, Tutty MA, Kao AC. Association between physician burnout and identification with medicine as a calling. *Mayo Clin Proc*. 2017;92(3):415-422. doi:10.1016/j.mayocp.2016.11.012
117. Jesse MT, Abouljoud M, Eshelman A. Determinants of burnout among transplant surgeons: a national survey in the United States. *Am J Transplant*. 2015;15(3):772-778. doi:10.1111/ajt.13056
118. Johns MM III, Ossoff RH. Burnout in academic chairs of otolaryngology: head and neck surgery. *Laryngoscope*. 2005;115(11):2056-2061. doi:10.1097/01.MLG.00000181492.36179.8B
119. Johnson JT, Wagner RL, Rueger RM, Goepfert H. Professional burnout among head and neck surgeons: results of a survey. *Head Neck*. 1993;15(6):557-560. doi:10.1002/hed.2880150614
120. Kase SM, Waldman ED, Weintraub AS. A cross-sectional pilot study of compassion fatigue, burnout, and compassion satisfaction in pediatric palliative care providers in the United States [published online February 5, 2018]. *Palliat Support Care*. doi:10.1017/S1478951517001237
121. Klimo P Jr, DeCuyper M, Ragel BT, McCartney S, Couldwell WT, Boop FA. Career satisfaction and burnout among U.S. neurosurgeons: a feasibility and pilot study. *World Neurosurg*. 2013;80(5):e59-e68. doi:10.1016/j.wneu.2012.09.009
122. Kroll HR, Macaulay T, Jesse M. A preliminary survey examining predictors of burnout in pain medicine physicians in the United States. *Pain Physician*. 2016;19(5):E689-E696.
123. Kumar S, Fischer J, Robinson E, Hatcher S, Bhagat RN. Burnout and job satisfaction in New Zealand psychiatrists: a national study. *Int J Soc Psychiatry*. 2007;53(4):306-316. doi:10.1177/0020764006074534
124. Kushnir T, Greenberg D, Madjar N, Hadari I, Yermiahu Y, Bachner YG. Is burnout associated with referral rates among primary care physicians in community clinics? *Fam Pract*. 2014;31(1):44-50. doi:10.1093/fampra/cmt060
125. Lamothe M, Boujut E, Zenasni F, Sultan S. To be or not to be empathic: the combined role of empathic concern and perspective taking in understanding burnout in general practice. *BMC Fam Pract*. 2014;15:15. doi:10.1186/1471-2296-15-15
126. Langade D, Modi PD, Sidhwa YF, et al. Burnout syndrome among medical practitioners across India: a questionnaire-based survey. *Cureus*. 2016;8(9):e771. doi:10.7759/cureus.771
127. Lee FJ, Stewart M, Brown JB. Stress, burnout, and strategies for reducing them: what's the situation among Canadian family physicians? *Can Fam Physician*. 2008;54(2):234-235.
128. Leung J, Rioseco P, Munro P. Stress, satisfaction and burnout amongst Australian and New Zealand radiation oncologists. *J Med Imaging Radiat Oncol*. 2015;59(1):115-124. doi:10.1111/1754-9485.12217
129. Lloyd S, Streiner D, Shannon S. Burnout, depression, life and job satisfaction among Canadian emergency physicians. *J Emerg Med*. 1994;12(4):559-565. doi:10.1016/0736-4679(94)90360-3
130. Lu DW, Dresden S, McCloskey C, Branzetti J, Gisondi MA. Impact of burnout on self-reported patient care among emergency physicians. *West J Emerg Med*. 2015;16(7):996-1001. doi:10.5811/westjem.2015.9.27945
131. Marcelino G, Cerveira JM, Carvalho I, et al. Burnout levels among Portuguese family doctors: a nationwide survey. *BMJ Open*. 2012;2(3):e001050. doi:10.1136/bmjopen-2012-001050
132. Margaryan AG. Burnout in primary health care physicians: a pilot study. *New Armen Med J*. 2010;4(2):76-79.
133. Martínez de la Casa Muñoz A, del Castillo Comas C, Magaña Loarte E, Bru Espino I, Franco Moreno A, Segura Frago A. Study of the prevalence of burnout in doctors in the health area of Talavera de la Reina [in Spanish]. *Aten Primaria*. 2003;32(6):343-348.
134. Massou S, Doghmi N, Belhaj A, et al. Enquête sur le syndrome d'épuisement professionnel chez les personnels d'anesthésie réanimation de quatre hôpitaux universitaires marocains. *Ann Medicopsychol Rev Psychiatr*. 2013;171(8):538-542. doi:10.1016/j.amp.2012.02.024
135. Mattei A, Fiasca F, Mazzei M, Necozone S, Bianchini V. Stress and burnout in health-care workers after the 2009 L'Aquila earthquake: a cross-sectional observational study. *Front Psychiatry*. 2017;8:98. doi:10.3389/fpsy.2017.00098
136. McPhillips HA, Stanton B, Zuckerman B, Stapleton FB. Role of a pediatric department chair: factors leading to satisfaction and burnout. *J Pediatr*. 2007;151(4):425-430. doi:10.1016/j.jpeds.2007.03.016
137. Merlani P, Verdon M, Businger A, Domenighetti G, Pargger H, Ricou B; STRESI+ Group. Burnout in ICU caregivers: a multicenter study of factors associated to centers. *Am J Respir Crit Care Med*. 2011;184(10):1140-1146. doi:10.1164/rccm.201101-00680C
138. Meynaar IA, van Saase J, Feberwee T, Aerts TM, Bakker J, Thijssse W. Burnout among Dutch intensivists—a nationwide survey. *Neth J Crit Care*. 2016;24(1):12-17.
139. Mikalaukas A, Benetis R, Širvinskis E, et al. Burnout among anesthetists and intensive care physicians. *Open Med (Wars)*. 2018;13:105-112. doi:10.1515/med-2018-0017
140. Mikalaukas A, Širvinskis E, Marchertienė I, et al. Burnout among Lithuanian cardiac surgeons and cardiac anesthesiologists. *Medicina (Kaunas)*. 2012;48(9):478-484.
141. Milenović M, Matejić B, Vasić V, Frost E, Petrović N, Simić D. High rate of burnout among anaesthesiologists in Belgrade teaching hospitals: results of a cross-sectional survey. *Eur J Anaesthesiol*. 2016;33(3):187-194. doi:10.1097/EJA.0000000000000383
142. Orton P, Orton C, Pereira Gray D. Depersonalised doctors: a cross-sectional study of 564 doctors, 760 consultations and 1876 patient reports in UK general practice. *BMJ Open*. 2012;2:e000274. doi:10.1136/bmjopen-2011-000274
143. Ožvačić Adžić Z, Katić M, Kern J, Soler JK, Cerovečki V, Polašek O. Is burnout in family physicians in Croatia related to interpersonal quality of care? *Arh Hig Rada Toksikol*. 2013;64(2):69-78. doi:10.2478/10004-1254-64-2013-2307
144. Panagopoulou E, Montgomery A, Benos A. Burnout in internal medicine physicians: differences between residents and specialists. *Eur J Intern Med*. 2006;17(3):195-200. doi:10.1016/j.ejim.2005.11.013
145. Pit SW, Hansen V. Factors influencing early retirement intentions in Australian rural general practitioners. *Occup Med (Lond)*. 2014;64(4):297-304. doi:10.1093/occmed/kqu028

146. Pozdnyakova A, Laiteerapong N, Volerman A, et al. Impact of medical scribes on physician and patient satisfaction in primary care. *J Gen Intern Med*. 2018;33(7):1109-1115. doi:10.1007/s11606-018-4434-6
147. Pranckeviciene A, Tamasauskas A, Deltuva VP, Bunevicius A. Professional burnout and its correlates in Lithuanian neurosurgeons. *Acta Neurochir (Wien)*. 2016;158(8):1437-1445. doi:10.1007/s00701-016-2869-2
148. Putnik K, Houkes I. Work related characteristics, work-home and home-work interference and burnout among primary healthcare physicians: a gender perspective in a Serbian context. *BMC Public Health*. 2011;11:716. doi:10.1186/1471-2458-11-716
149. Raggio B, Malacarne P. Burnout in intensive care unit. *Minerva Anestesiol*. 2007;73(4):195-200.
150. Rath KS, Huffman LB, Phillips GS, Carpenter KM, Fowler JM. Burnout and associated factors among members of the Society of Gynecologic Oncology. *Am J Obstet Gynecol*. 2015;213(6):824.e1-824.e9. doi:10.1016/j.ajog.2015.07.036
151. Richter A, Kostova P, Harth V, Wegner R. Children, care, career—a cross-sectional study on the risk of burnout among German hospital physicians at different career stages. *J Occup Med Toxicol*. 2014;9(1):41. doi:10.1186/s12995-014-0041-6
152. Rohland BM, Kruse GR, Rohrer JE. Validation of a single-item measure of burnout against the Maslach Burnout Inventory among physicians. *Stress Health*. 2004;20(2):75-79. doi:10.1002/smi.1002
153. Ruitenburg MM, Frings-Dresen MHW, Sluiter JK. The prevalence of common mental disorders among hospital physicians and their association with self-reported work ability: a cross-sectional study. *BMC Health Serv Res*. 2012;12:292-298. doi:10.1186/1472-6963-12-292
154. Sadat-Ali M, Al-Habdan IM, Al-Dakheel DA, Shriyan D. Are orthopedic surgeons prone to burnout? *Saudi Med J*. 2005;26(8):1180-1182.
155. Saleh KJ, Quick JC, Conaway M, et al. The prevalence and severity of burnout among academic orthopaedic departmental leaders. *J Bone Joint Surg Am*. 2007;89(4):896-903. doi:10.2106/JBJS.F.00987
156. Saleh KJ, Quick JC, Sime WE, Novicoff WM, Einhorn TA. Recognizing and preventing burnout among orthopaedic leaders. *Clin Orthop Relat Res*. 2009;467(2):558-565. doi:10.1007/s11999-008-0622-8
157. Salmoirago-Blotcher E, Fitchett G, Leung K, et al. An exploration of the role of religion/spirituality in the promotion of physicians' wellbeing in emergency medicine. *Prev Med Rep*. 2016;3:189-195. doi:10.1016/j.pmedr.2016.01.009
158. Schooley B, Hikmet N, Tarcan M, Yorgancioglu G. Comparing burnout across emergency physicians, nurses, technicians, and health information technicians working for the same organization. *Medicine (Baltimore)*. 2016;95(10):e2856. doi:10.1097/MD.00000000000002856
159. See KC, Lim TK, Kua EH, Phua J, Chua GS, Ho KY. Stress and burnout among physicians: prevalence and risk factors in a Singaporean internal medicine programme. *Ann Acad Med Singapore*. 2016;45(10):471-474.
160. Selmanovic S, Ramic E, Pranjic N, Brekalo-Lazarevic S, Pasic Z, Alic A. Stress at work and burnout syndrome in hospital doctors. *Med Arh*. 2011;65(4):221-224. doi:10.5455/medarh.2011.65.221-224
161. Sharma A, Sharp DM, Walker LG, Monson JRT. Stress and burnout in colorectal and vascular surgical consultants working in the UK National Health Service. *Psychooncology*. 2008;17(6):570-576. doi:10.1002/pon.1269
162. Sheno AN, Kalyanaraman M, Pillai A, Raghava PS, Day S. Burnout and psychological distress among pediatric critical care physicians in the United States. *Crit Care Med*. 2018;46(1):116-122. doi:10.1097/CCM.0000000000002751
163. Silver JK, Bhatnagar S. Physician burnout in physical medicine and rehabilitation (PM&R): should we focus more on physiatrists' mission? *Am J Phys Med Rehabil*. 2017;96(8):e159-e161. doi:10.1097/PHM.0000000000000674
164. Simons BS, Foltz PA, Chalupa RL, Hylden CM, Dowd TC, Johnson AE. Burnout in US military orthopaedic residents and staff physicians. *Mil Med*. 2016;181(8):835-839. doi:10.7202/MILMED-D-15-00325
165. Siu C, Yuen SK, Cheung A. Burnout among public doctors in Hong Kong: cross-sectional survey. *Hong Kong Med J*. 2012;18(3):186-192.
166. Soltanifar A, Pishbin E, Attaran Mashhadi N, Najaf Najafi M, Siahtir M. Burnout among female emergency medicine physicians: a nationwide study. *Emerg Med Australas*. 2018. doi:10.1111/1742-6723.12941
167. Stafford L, Judd F. Mental health and occupational wellbeing of Australian gynaecologic oncologists. *Gynecol Oncol*. 2010;116(3):526-532. doi:10.1016/j.ygyno.2009.10.080
168. Stanetić K, Tesanović G. Influence of age and length of service on the level of stress and burnout syndrome. *Med Pregl*. 2013;66(3-4):153-162. doi:10.2298/MPNS1304153S
169. Starmer AJ, Frintner MP, Freed GL. Work-life balance, burnout, and satisfaction of early career pediatricians. *Pediatrics*. 2016;137(4):e20153183. doi:10.1542/peds.2015-3183
170. Stojanovic-Tasic M, Latas M, Milosevic N, et al. Is Balint training associated with the reduced burnout among primary health care doctors? *Libyan J Med*. 2018;13(1):1440123. doi:10.1080/19932820.2018.1440123
171. Streu R, Hansen J, Abrahamse P, Alderman AK. Professional burnout among US plastic surgeons: results of a national survey. *Ann Plast Surg*. 2014;72(3):346-350. doi:10.1097/SAP.0000000000000056
172. Surgenor LJ, Spearing RL, Horn J, Beutrais AL, Mulder RT, Chen P. Burnout in hospital-based medical consultants in the New Zealand public health system. *N Z Med J*. 2009;122(1300):11-18.
173. Tak HJ, Curlin FA, Yoon JD. Association of intrinsic motivating factors and markers of physician well-being: a national physician survey. *J Gen Intern Med*. 2017;32(7):739-746. doi:10.1007/s11606-017-3997-y
174. Teixeira C, Ribeiro O, Fonseca AM, Carvalho AS. Burnout in intensive care units—a consideration of the possible prevalence and frequency of new risk factors: a descriptive correlational multicentre study. *BMC Anesthesiol*. 2013;13(1):38. doi:10.1186/1471-2253-13-38
175. Tironi MOS, Nascimento Sobrinho CL, Barros D de S, et al. Professional burnout syndrome of intensive care physicians from Salvador, Bahia, Brazil [in Portuguese]. *Rev Assoc Med Bras (1992)*. 2009;55(6):656-662. doi:10.1590/S0104-42302009000600009
176. Travado L, Grassi L, Gil F, Ventura C, Martins C; Southern European Psycho-Oncology Study Group. Physician-patient communication among Southern European cancer physicians: the influence of psychosocial orientation and burnout. *Psychooncology*. 2005;14(8):661-670. doi:10.1002/pon.890
177. van der Ploeg E, Dorresteijn SM, Kleber RJ. Critical incidents and chronic stressors at work: their impact on forensic doctors. *J Occup Health Psychol*. 2003;8(2):157-166. doi:10.1037/1076-8998.8.2.157
178. Vicentic S, Gasic MJ, Milovanovic A, et al. Burnout, quality of life and emotional profile in general practitioners and psychiatrists. *Work*. 2013;45(1):129-138. doi:10.3233/WOR-121484
179. Vilà Falgueras M, Cruzate Muñoz C, Orfila Pernas F, Creixell Sureda J, González López MP, Davins Miralles J. Burnout and teamwork in primary care teams [in Spanish]. *Aten Primaria*. 2015;47(1):25-31. doi:10.1016/j.aprim.2014.01.008
180. Viviers S, Lachance L, Maranda M-F, Ménard C. Burnout, psychological distress, and overwork: the case of Quebec's ophthalmologists. *Can J Ophthalmol*. 2008;43(5):535-546. doi:10.3129/i08-132
181. Volpe U, Luciano M, Palumbo C, Sampogna G, Del Vecchio V, Fiorillo A. Risk of burnout among early career mental health professionals. *J Psychiatr Ment Health Nurs*. 2014;21(9):774-781. doi:10.1111/jpm.12137
182. Weintraub AS, Geithner EM, Stroustrup A, Waldman ED. Compassion fatigue, burnout and compassion satisfaction in neonatologists in the US. *J Perinatol*. 2016;36(11):1021-1026. doi:10.1038/jp.2016.121
183. West CP, Dyrbye LN, Rabatin JT, et al. Intervention to promote physician well-being, job satisfaction, and professionalism: a randomized clinical trial. *JAMA Intern Med*. 2014;174(4):527-533. doi:10.1001/jamainternmed.2013.14387
184. West CP, Halvorsen AJ, Swenson SL, McDonald FS. Burnout and distress among internal medicine program directors: results of a national survey. *J Gen Intern Med*. 2013;28(8):1056-1063. doi:10.1007/s11606-013-2349-9
185. Whippen DA, Canellos GP. Burnout syndrome in the practice of oncology: results of a random survey of 1000 oncologists. *J Clin Oncol*. 1991;9(10):1916-1920. doi:10.1200/JCO.1991.9.10.1916
186. Wright JG, Khetani N, Stephens D. Burnout among faculty physicians in an academic health science centre. *Paediatr Child Health*. 2011;16(7):409-413. doi:10.1093/pch/16.7.409
187. Xiao Y, Wang J, Chen S, et al. Psychological distress, burnout level and job satisfaction in emergency medicine: a cross-sectional study of physicians in China. *Emerg Med Australas*. 2014;26(6):538-542. doi:10.1111/1742-6723.12315
188. Yoon JD, Daley BM, Curlin FA. The association between a sense of calling and physician

- well-being: a national study of primary care physicians and psychiatrists. *Acad Psychiatry*. 2017; 41(2):167-173. doi:10.1007/s40596-016-0487-1
189. Yoon JD, Hunt NB, Ravella KC, Jun CS, Curlin FA. Physician burnout and the calling to care for the dying: a national survey. *Am J Hosp Palliat Care*. 2017;34(10):931-937. doi:10.1177/1049909116661817
190. Yuguero O, Forné C, Esquerda M, Pifarré J, Abadías MJ, Viñas J. Empathy and burnout of emergency professionals of a health region: a cross-sectional study. *Medicine (Baltimore)*. 2017; 96(37):e8030. doi:10.1097/MD.0000000000008030
191. Yuguero O, Ramon Marsal J, Esquerda M, Vivanco L, Soler-González J. Association between low empathy and high burnout among primary care physicians and nurses in Lleida, Spain. *Eur J Gen Pract*. 2017;23(1):4-10. doi:10.1080/13814788.2016.1233173
192. Yuguero Torres O, Esquerda Aresté M, Marsal Mora JR, Soler-González J. Association between sick leave prescribing practices and physician burnout and empathy. *PLoS One*. 2015;10(7): e0133379. doi:10.1371/journal.pone.0133379
193. Zafar W, Khan UR, Siddiqui SA, Jamali S, Razzak JA. Workplace violence and self-reported psychological health: coping with post-traumatic stress, mental distress, and burnout among physicians working in the emergency departments compared to other in Pakistan. *J Emerg Med*. 2016;50(1):167-77.e1. doi:10.1016/j.jemermed.2015.02.049
194. Zanatta AB, Lucca SR. Prevalence of burnout syndrome in health professionals of an onco-hematological pediatric hospital [in Portuguese]. *Rev Esc Enferm USP*. 2015;49(2): 253-260. doi:10.1590/S0080-62342015000200010
195. West CP, Dyrbye LN, Satele DV, Sloan JA, Shanafelt TD. Concurrent validity of single-item measures of emotional exhaustion and depersonalization in burnout assessment. *J Gen Intern Med*. 2012;27(11):1445-1452. doi:10.1007/s11606-012-2015-7
196. Astudillo W, Mendinueta C. Exhaustion syndrome in palliative care. *Support Care Cancer*. 1996;4(6):408-415. doi:10.1007/BF01880637
197. Kristensen TS, Borritz M, Villadsen E, Christensen KB. The Copenhagen Burnout Inventory: a new tool for the assessment of burnout. *Work Stress*. 2005;19(3):192-207. doi:10.1080/02678370500297720
198. Burisch M. Approaches to personality inventory construction: a comparison of merits. *Am Psychol*. 1984;39(3):214-227. doi:10.1037/0003-066X.39.3.214
199. Malakh-Pines A, Aronson E, Kafry D. *Burnout: From Tedium to Personal Growth*. New York, NY: Free Press; 1981.
200. Gil-Monte P. *CESQT: Cuestionario Para La Evaluación Del Síndrome de Quemarse Por El Trabajo: Manual*. Madrid, Spain: TEA; 2011. [https://www.academia.edu/30051507/CESQT\\_-\\_Cuestionario\\_para\\_la\\_Evaluaci%C3%B3n\\_del\\_S%C3%ADndrome\\_de\\_Quemarse\\_por\\_el\\_Trabajo\\_Manual](https://www.academia.edu/30051507/CESQT_-_Cuestionario_para_la_Evaluaci%C3%B3n_del_S%C3%ADndrome_de_Quemarse_por_el_Trabajo_Manual). Accessed August 6, 2018.
201. Shimotsu S, Poplau S, Linzer M. Validation of a brief clinician survey to reduce clinician burnout. In: Abstracts from the 38th Annual Meeting of the Society of General Internal Medicine. *J Gen Intern Med*. 2015;30(suppl 2):S79-S80. doi:10.1007/s11606-015-3271-0
202. Larkin M. Physician burnout takes a toll on US patients. *Reuters*. January 17, 2018. <https://www.reuters.com/article/us-health-physicians-burnout/physician-burnout-takes-a-toll-on-u-s-patients-idUSKBN1F621U>. Accessed July 7, 2018.
203. West CP, Dyrbye LN, Erwin PJ, Shanafelt TD. Interventions to prevent and reduce physician burnout: a systematic review and meta-analysis. *Lancet*. 2016;388(10057):2272-2281. doi:10.1016/S0140-6736(16)31279-X
204. Shanafelt TD. Enhancing meaning in work: a prescription for preventing physician burnout and promoting patient-centered care. *JAMA*. 2009; 302(12):1338-1340. doi:10.1001/jama.2009.1385
205. Thomas LR, Ripp JA, West CP. Charter on physician well-being. *JAMA*. 2018;319(15):1541-1542. doi:10.1001/jama.2018.1331
206. Maslach C, Jackson SE, Leiter MP. *Maslach Burnout Inventory Manual*. 3rd ed. Menlo Park, CA: Mind Garden Inc; 1996.
207. Dyrbye LN, West CP, Shanafelt TD. Defining burnout as a dichotomous variable. *J Gen Intern Med*. 2009;24(3):440. doi:10.1007/s11606-008-0876-6
208. Schaufeli WB, Bakker AB, Hoogduin K, Schaap C, Kladler A. On the clinical validity of the Maslach Burnout Inventory and the burnout measure. *Psychol Health*. 2001;16(5):565-582. doi:10.1080/08870440108405527
209. Schutte N, Toppinen S, Kalimo R, Schaufeli W. The factorial validity of the Maslach Burnout Inventory-General Survey (MBI-GS) across occupational groups and nations. *J Occup Organ Psychol*. 2000;73(1):53-66. doi:10.1348/O96317900166877
210. Bianchi R, Schonfeld IS, Laurent E. The dead end of current research on burnout prevalence. *J Am Coll Surg*. 2016;223(2):424-425. doi:10.1016/j.jamcollsurg.2016.05.012
211. Schaufeli WB. Past performance and future perspectives of burnout research. *S Afr J Ind Psychol*. 2003;29(4). doi:10.4102/sajip.v29i4.127
212. Bianchi R, Truchot D, Laurent E, Brisson R, Schonfeld IS. Is burnout solely job-related? a critical comment. *Scand J Psychol*. 2014;55(4):357-361. doi:10.1111/sjop.12119
213. Wenger N, Méan M, Castioni J, Marques-Vidal P, Waeber G, Garnier A. Allocation of internal medicine resident time in a Swiss hospital: a time and motion study of day and evening shifts. *Ann Intern Med*. 2017;166(8):579-586. doi:10.7326/M16-2238
214. Mata DA, Ramos MA, Kim MM, Guille C, Sen S. In their own words: an analysis of the experiences of medical interns participating in a prospective cohort study of depression. *Acad Med*. 2016;91(9): 1244-1250. doi:10.1097/ACM.0000000000001227
215. Bianchi R, Schonfeld IS, Laurent E. Is burnout separable from depression in cluster analysis? a longitudinal study. *Soc Psychiatry Psychiatr Epidemiol*. 2015;50(6):1005-1011. doi:10.1007/s00127-014-0996-8
216. Hallsten L. Burning out: a framework. In: *Professional Burnout: Recent Developments in Theory and Research*. Philadelphia, PA: Taylor & Francis; 1993. Series in Applied Psychology: Social Issues and Questions.
217. Melnick ER, Powsner SM, Shanafelt TD. Defining physician burnout, and differentiating between burnout and depression [letter reply]. *Mayo Clin Proc*. 2017;92(9):1456-1458. doi:10.1016/j.mayocp.2017.07.005
218. Messias E, Flynn V. The tired, retired, and recovered physician: professional burnout versus major depressive disorder. *Am J Psychiatry*. 2018; 175(8):716-719. doi:10.1176/appi.ajp.2018.17121325
219. Medscape National Physician Burnout & Depression Report 2018. <https://www.medscape.com/slideshow/2018-lifestyle-burnout-depression-6009235>. Accessed March 10, 2018.
220. Golembiewski R, Munzenrider R, Stevenson J. Physical symptoms and burn-out phases. In: Moise LR, ed. *Organizational Policy and Development*. Louisville, KY: Center for Continuing Education Studies, University of Louisville; 1984:71-86.