

Supplemental data

Supplemental table 1: Literature search with keywords and Boolean operators.	1
Supplemental table 2: Maslach Burnout Inventory	2
Supplemental table 3: Main burnout measuring instruments.	3
Supplemental table 4: List of studies included in analysis.....	4

Supplemental table 1: Literature search with keywords and Boolean operators.

Database	Search query	Results
Embase	(exhaustion:ab,ti OR burnout:ab,ti OR stress:ab,ti) AND ('covid 19':ab,ti OR coronavirus:ab,ti OR 'sars cov 2':ab,ti) AND (healthcare:ab,ti OR physician:ab,ti OR nurse:ab,ti) AND [1-1-2020]/sd NOT [11-10-2020]/sd	242
Google scholar	(exhaustion[title,abstract] OR burnout[title,abstract] OR stress[title,abstract]) AND (Covid[title,abstract] OR coronavirus[title,abstract] OR sars-cov-2[title,abstract]) AND (healthcare[title,abstract] OR physician[title,abstract] OR nurse[title,abstract]), With custom date range 2020-2020 (search performed on 20.10.2020).	100
Pubmed	(exhaustion[Title/Abstract] OR burnout[Title/Abstract] OR stress[Title/Abstract]) AND (Covid-19[Title/Abstract] OR coronavirus[Title/Abstract] OR sars-cov-2[Title/Abstract]) AND (healthcare[Title/Abstract] OR physician[Title/Abstract] OR nurse[Title/Abstract]) AND ("2020/01/01"[Date - Publication] : "2020/10/10"[Date - Publication])	351

Supplemental table 2: Maslach Burnout Inventory (Maslach et al. 1996).

The inventory consists of 22 questions which have five graded Likert-type answers. To determine the risk of burnout, the MBI explores three subscales: emotional exhaustion, depersonalization, and personal accomplishment. A high score in the first and third sections and a low score in the second section may indicate burnout.

Questions	Never	Rarely	Sometimes	Frequently	Always
Section I: Emotional exhaustion (EE)					
(1) Feel emotionally drained from work	0	1	2	3	4
(2) Feel used up at the end of the workday	0	1	2	3	4
(3) Feel fatigued when getting up in the morning	0	1	2	3	4
(6) Working with people puts too much stress	0	1	2	3	4
(8) Feel burned out from work	0	1	2	3	4
(13) Feel frustrated by job	0	1	2	3	4
(14) Feel working too hard on the job	0	1	2	3	4
(16) Working with patients is a strain	0	1	2	3	4
(20) Feel like at the end of the rope	0	1	2	3	4
Section II: Personal accomplishment (PA)					
(4) Can easily understand patients' feelings	0	1	2	3	4
(7) Deal effectively with the patients' problems	0	1	2	3	4
(9) Feel positively influencing people's lives	0	1	2	3	4
(12) Feel very energetic	0	1	2	3	4
(17) Can easily create a relaxed atmosphere	0	1	2	3	4
(18) Feel exhilarated after working with patients	0	1	2	3	4
(19) Have accomplished worthwhile things in job	0	1	2	3	4
(21) Deal with emotional problems calmly	0	1	2	3	4
Section III: Depersonalization (DP)					
(5) Treat patients as impersonal "objects"	0	1	2	3	4
(10) Become more callous toward people	0	1	2	3	4
(11) Worry that job is hardening emotionally	0	1	2	3	4
(15) Don't really care what happens to patients	0	1	2	3	4
(22) Feel patients blame me for their problems	0	1	2	3	4

Supplemental table 3: Main burnout measuring instruments (adapted from nam.edu) (National Academy of Medicine 2020).

Copenhagen Burnout Inventory

Purpose	To measure burnout in any occupational group.
Data Source	A 19-item survey with positively and negatively framed items that covers 3 areas: personal, work, and client-related burnout. There are multiple questions for each of these subscales and responses are in the form of either always, often, sometimes, seldom, and never/almost never, or to a very high degree, to a high degree, somewhat, to a low degree, and to a very low degree.
Data analysis	Each dimension is separately treated as a continuous variable. Items within the subscales are averaged. Possible score ranges for all scales is 0-100. In one study investigators chose a score of 50 or higher to indicate burnout as a dichotomous variable (Henriksen and Lukasse 2016). These cut-off scores were not established based on validity evidence.
Development	Developed with a framework that characterizes the core of burnout as fatigue and exhaustion, which are attributed to specific domains in a person's life (personal, work-related, and client-related). In a sample of 1914 individuals from seven different workplaces CBI scales had high internal reliability and scores predicted future sickness absence, intention to quit, and sleep problems (Kristensen et al. 2005).

Maslach Burnout Inventory – Human Services Survey

Purpose	To measure burnout in individuals who work with people (human services and medical professionals).
Data Source	A 22-item survey that covers 3 areas: Emotional Exhaustion (EE), Depersonalization (DP), and low sense of Personal Accomplishment (PA). Each subscale includes multiple questions with frequency rating choices of Never, A few times a year or less, Once a month or less, A few times a month, Once a week, A few times a week, or Every day.
Data analysis	It is preferred to examine relationships with subscale scores as continuous variables and outcomes. Investigators often dichotomize results into burnout – non-burnout but there is no accepted standard definition (Dyrbye, West, and Shanafelt 2009). A common approach considers individuals as presenting at least one symptom of burnout if they have high scores on either the EE (score of 27 or higher) or DP (score of 10 or higher) subscales. Evidence indicates that high scores on these subscales can distinguish clinical burnout from the non-burned out (Schaufeli et al. 2001).
Development	The instrument was developed following exploratory research with interview and questionnaire data, testing in a variety of health and service occupations, and factor and confirmatory data analysis.

Oldenburg Burnout Inventory

Purpose	To measure burnout in any occupational group.
Data Source	A 16-item survey with positively and negatively framed items that covers 2 areas: exhaustion (physical, cognitive, and affective aspects) and disengagement from work (negative attitudes toward work objects, work content, or work in general) (Demerouti and Bakker 2008). There are multiple questions for each subscale and responses are in the form of a 4-point Likert scale from strongly agree (1) to strongly disagree (4).
Data analysis	Each burnout dimension is treated separately as a continuous variable.
Development	Developed in response to the MBI not having negatively worded items, and based on job demands-resources model where job demands are primarily related to exhaustion and job resources are primarily related to disengagement (Demerouti et al. 2000; Demerouti et al. 2001).

Single Item Burnout Measure (embedded in Mini-Z)

Purpose	To measure burnout in any occupational group.
Data Source	Single item. Options go from (1) "I enjoy my work, I have no symptoms of burnout," to (5) "I feel completely burned out and often wonder if I can go on. I am at a point where I may need some changes or may need to seek some sort of help."
Data analysis	Often dichotomized as no symptoms of burnout (score of 2 or less) vs. 1 or more symptoms (score of 3 or more). These cut-off scores were not established based on validity evidence.
Development	In a sample of 5400, employees correlation between responses to the single-item with single-item for MBI-EE score was $r = 0.79$ (Dolan et al. 2015). In a sample of 307 physicians single-item correlated modestly with MBI-EE (Rohland, Kruse, and Rohrer 2004). In a third study, single-item responses in a sample of 308 rural physicians and advance practice providers correlated with full MBI EE and DP domain scores. The summary from that study was that the single item predicts high levels of EE but not low EE or DP (Waddimba et al. 2016).

Supplemental table 4: List of studies included in analysis.

Authors	Country	Region	Start	End	Type	N	BO	Stress	Main conclusions
Abdessater, M. et al.	France	Europe	27-Mar	30-Mar	CSS	275	-	Custom	COVID-19 pandemic has negative impact on young French urologists in training and on their work and training quality.
Abdulah, DM. et al.	Iraq	Middle east	9-Apr	14-Apr	CSS	209	-	PSS-10	Medical doctors have moderate level of perceived stress during the COVID-19 outbreak in Iraqi Kurdistan.
Alshekaili, M. et al.	Oman	Middle east	8-Apr	17-Apr	CSS	1139	-	DASS-21	FL workers are 1.5 times more likely to have stress and sleeping problems than UW.
Arafa, A. et al.	Multi-country	Middle east	14-Apr	24-Apr	CSS	426	-	DASS-21	Female sex, age ≤ 30 years, night shifts, and watching/reading COVID-19 news is associated with worse psychological symptoms.
Azoulay, E. et al.	Multi-country	Global	30-Jan	25-Jan	CSS	1001	MBI	-	Age and female gender are associated with severe BO; number of COVID-19 patients managed is not. Clinicians with symptoms of severe BO are more frequently smoking or taking sleeping pills.
Babore, A. et al.	Italy	Europe	11-Apr	16-Apr	CSS	595	-	PSS-10	A positive attitude towards stressful situations is protective factor. Female gender, seeking social support, avoidance strategies and working with COVID-19 patients are risk factors.
Barello, S. et al.	Italy	Europe	-	-	CSS	376	MBI	-	Levels of EE are higher than normative values and %-age of HCWs with high levels of Exhaustion is higher than other Italian samples before COVID-19.
Bhargava, S. et al.	Multi-country	Global	1-Apr	20-Apr	CSS	733	-	Custom	Considerable percentages of dermatologists report distress, with teledermatology being the most powerful factor increasing the OR.
Buselli, R. et al.	Italy	Europe	1-Apr	1-May	CSS	265	ProQOL-5	-	FL and healthcare assistants report higher CS than UW and physicians, respectively. BO is associated with depressive or anxiety scores.
Çalik, M. et al.	Turkey	Europe			CSS	90	-	Salivary cortisol	HCWs working in usually busy departments gained previous experience towards stress and were much more prepared than those working at other departments to deal with stress during the COVID-19 outbreak.
Chew, NWS. et al. (1)	Multi-country	Asia & Pacific	29-Apr	4-Jun	CSS	1146	-	DASS-21	Prevalence of psychological adversity among HCWs is independent of the burden of COVID-19 cases within each country. Non-medically trained HCWs were at higher risk of adverse psychological outcomes.
Chew, NWS. et al. (2)	Multi-country	Asia & Pacific	19-Feb	17-Apr	CSS	906	-	DASS-21	Commonly reported symptoms are headache, throat pain and lethargy. Those with physical symptoms had higher rates of stress. This association may be bidirectional.
Chew, QH. et al.	Singapore	Asia & Pacific	5-Mar	2-Jun	LS	221	-	PSS-10, IES-R	Perceived stress is positively predicted by avoidance as coping strategy and level of perceived stigma, and negatively predicted by positive thinking.
Civantos, AM. et al. (1)	Brazil	South America	14-May	31-May	CSS	163	Mini-Z	IES-R	Surgeons reported symptoms of BO, anxiety, distress and depression. Females were more likely to report BO. Physicians with prior psychiatric conditions were more likely to have symptoms of distress.

Authors	Country	Region	Start	End	Type	N	BO	Stress	Main conclusions
Civantos, AM. et al. (2)	Brazil	South America	14-Apr	25-Apr	CSS	349	Mini-Z	IES-R	Residents reported increased BO compared to attendings. Females reported higher levels of BO, anxiety, and distress.
Degraeve, A. et al.	Belgium	Europe	29-Apr	3-May	CSS	62	CBI	-	Despite a decrease in surgical training, residents made use of the time to deepen theoretical knowledge and do scientific work. A decrease in activity had a favorable effect on BO and on quality of life.
Dimitriu, MCT. et al.	Romania	Europe	27-Apr	8-May	CSS	100	Custom	-	BO was more frequent in UW compared to FL HCWs.
Dinibutun, SR.	Turkey	Europe	1-Apr	30-Apr	CSS	200	Custom (MBI)	-	BO level was lower and feeling of personal accomplishment higher in physicians who actively fought the virus.
Elbay, RY. et al.	Turkey	Europe	10-Mar	15-Mar	CSS	442	-	DASS-21	Women, young and less experienced HCWs are in the high-risk group for worse mental health scores. Excessive workload and inadequate logistic support may cause more emotional impact in FL physicians.
Giusti, EM. et al.	Italy	Europe	16-Apr	11-May	LCS	330	MBI	DASS-21, IES-6	Workload, constant contact with COVID-19 patients are related to BO. Other associated factors are presence of previous psychological comorbidities, fear of infection and feelings of isolation.
Guixia, L. & Zhang, H.	China	Asia & Pacific	2-Feb	3-Feb	CSS	92	MBI	-	Anxiety and working years together accounted for 26.8% of the variation in BO, but nevertheless nurses had high morale and work enthusiasm, full of empathy.
Holton, S. et al.	Australia	Asia & Pacific	15-May	10-Jun	CSS	668	-	DASS-21	More experience and better health scores are associated with lower stress, being a nurse or midwife is associated with higher stress. Direct contact with Covid patients is not associated with stress.
Hong, S. et al.	China	Asia & Pacific	8-Feb	14-Feb	CSS	4692	-	Custom	Female gender, lower educational level, poor perceived support from family and hospital management, as well as occupational stressors are associated with somatic symptoms and poor mental health outcomes.
Huffman, EM. et al.	United States	North America	21-Apr	12-May	CSS	662	-	Custom	HCWs are experiencing higher levels of stress during COVID-19 pandemic. HCPs have high grit and resilience, and resilience is protective against stress and other negative psychological factors.
Khalafallah, AM. et al.	United States	North America	1-May	14-May	CSS	111	aMBI	-	Earlier post-graduate year and being redeployed to other wards are associated with increased BO.
Khasne, RW. et al.	India	Asia & Pacific			CSS	2026	CBI	-	Female respondents had higher scores of BO. Common concerns amongst HCWs seemed to be fear of catching infection and infecting family members.
Kramer, V. et al.	Germany	Europe	15-Apr	1-May	CSS	3669	-	Custom	Nurses report higher levels of stress and subjective burden and lower levels of work satisfaction and experienced support compared to physicians.
Kuo, F-L. et al.	Taiwan	Asia & Pacific	31-Mar	5-Apr	CSS	752	-	Custom	Total stress was moderate, and discomfort caused by protective equipment was the major stressor. Nurses and those with minor children generally perceived higher stress.
Labrague, LJ. Et al.	Philippines	Asia & Pacific	25-Apr	25-May	CSS	325	-	BRCS	Increased levels of personal resilience, social support and organizational support were associated with decreased levels of anxiety.

Authors	Country	Region	Start	End	Type	N	BO	Stress	Main conclusions
Lai, J. et al.	China	Asia & Pacific	29-Jan	3-Feb	CSS	1257	-	IES-R	A considerable proportion of HCWs reported symptoms of depression, anxiety, insomnia, and distress. Associated risk factors were female gender, being a nurse, those in Wuhan, and front-line wards.
Luceño-Moreno, L. et al.	Spain	Europe	1-Apr	30-Apr	CSS	1422	MBI	IES-R	Resilience is associated in a negative and significant way with all symptoms of depression, anxiety and post-traumatic stress.
Man, MA. et al.	Romania	Europe	15-Mar	15-Apr	CSS	115	-	PSS-10	There is no significant difference between COVID-19 staff and non-COVID-19 staff in terms of illness perception, stress perception, and emotional distress.
Martínez-López, JÁ. et al.	Spain	Europe	6-Apr	19-Apr	CSS	157	MBI	-	Physicians and nurses have a higher risk of suffering from EE than other professions. The lack of resources such as PPE are associated with high levels of DP.
Matsuo, T. et al.	Japan	Asia & Pacific	6-Apr	19-Apr	CSS	312	MBI	-	BO is higher among nurses and in HCWs with fewer years of experience because of unfamiliarity with PPE, with decreased sleep, with the desire for reduced workloads, and with the desire of appreciation or respect.
Prasad, A. et al.	United States	North America	14-Apr	25-Apr	CSS	347	Mini-Z	IES-15	Respondents in outpatient settings experience lower BO than those in an inpatient service or OR. Individuals aged 31 to 40 years were more likely to experience BO than younger respondents.
Ramaci, T. et al.	Italy	Europe	17-Mar	26-Mar	CSS	273	ProQOL	-	Working with highly infectious patients generates stigmatization, which is an important predictor of compassion satisfaction, BO, and CS among HCWs.
Rodriguez, RM. et al.	United States	North America	23-Feb	10-Apr	CSS	426	-	Custom	HCWs suffer from decreased signs of affection and worry about exposing family and friends. Enhanced availability of PPE, rapid turnaround testing and better communication could mitigate physician stress.
Ruiz-Fernández, MD. et al.	Spain	Europe	30-Mar	16-Apr	CSS	506	ProQoL	PSS-14	Physicians have higher CF and BO, while nurses show higher CS. Perceived stress scores are similar in both occupations. HCWs working in COVID-19 units, ERs and ICUs have higher CF and BO.
Sampaio, F. et al.	Portugal	Europe	31-Mar	7-Apr	CSS	767	-	DASS-21	Nurses who had sufficient and adequate PPE in the workplace had lower stress levels. Being assigned to a different ward had no significant impact on perceived stress.
Wu, Y. et al.	China	Asia & Pacific	13-Mar	17-Mar	CSS	190	MBI	-	Well-being of HCWs in UW may be negatively impacted by higher frequency of BO and anxiety about being infected.
Zerbini, G. et al.	Germany	Europe	23-Feb	24-Apr	CSS	110	MBI	-	Nurses FL reported higher levels of stress, exhaustion, and depressive mood and lower levels of work-related fulfilment compared to UW. Physicians reported similar scores independent of their ward.

Studies in bold are part of the meta-analytic assessment. Abbreviations - **BO**: Burnout; **CF**: Compassion fatigue; **CS**: Compassion satisfaction; **CSS**: Cross-sectional study; **DP**: Depersonalization; **EE**: Emotional exhaustion; **FL**: Front line (workers); **LCS**: Longitudinal cohort study; **LS**: Longitudinal study; **PA**: Personal accomplishment; **UW**: Usual ward (workers). Measuring instruments - **BRCS**: Brief Resilient Coping Scale; **CBI**: Copenhagen Burnout Inventory; **DASS-21**: Depression Anxiety Stress Scale-21; **IES-R**: Impact of Events Scale-Revised; **MBI**: Maslach Burnout Inventory; **Mini-Z**: Mini-Z Burnout Index; **OLBI**: Oldenburg Burnout Inventory; **ProQOL-5**: Professional Quality Of Life Scale version 5; **PSS-(10-14)**: Perceived Stress Scale-10-14 items.

