

BMJ Open

BMJ Open is committed to open peer review. As part of this commitment we make the peer review history of every article we publish publicly available.

When an article is published we post the peer reviewers' comments and the authors' responses online. We also post the versions of the paper that were used during peer review. These are the versions that the peer review comments apply to.

The versions of the paper that follow are the versions that were submitted during the peer review process. They are not the versions of record or the final published versions. They should not be cited or distributed as the published version of this manuscript.

BMJ Open is an open access journal and the full, final, typeset and author-corrected version of record of the manuscript is available on our site with no access controls, subscription charges or pay-per-view fees (<http://bmjopen.bmj.com>).

If you have any questions on BMJ Open's open peer review process please email info.bmjopen@bmj.com

BMJ Open

A Survey on Physician Burnout During the COVID-19 Pandemic: The Role of Gender and Race

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-050380
Article Type:	Original research
Date Submitted by the Author:	21-Feb-2021
Complete List of Authors:	Khan, Nadia; The University of British Columbia Faculty of Medicine, Medicine; The University of British Columbia, Center for Health Evaluation and Outcomes Sciences Palepu , Anita; The University of British Columbia, Medicine Dodek, Peter; The University of British Columbia Faculty of Medicine, Medicine Salmon, Amy; The University of British Columbia, Center for Health Evaluation and Outcomes Sciences Leitch, Heather; The University of British Columbia Faculty of Medicine, Medicine Ruzycki, Shannon; University of Calgary Cumming School of Medicine, Department of Medicine, Community Health Sciences Townson, Andrea; The University of British Columbia Faculty of Medicine, Medicine Lacaille, Diane; The University of British Columbia Faculty of Medicine, Department of Medicine, Arthritis Research Canada
Keywords:	COVID-19, PUBLIC HEALTH, MENTAL HEALTH, Human resource management < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

A Survey on Physician Burnout During the COVID-19 Pandemic: The Role of Gender and Race

Short title: Physician Burnout during COVID-19

NA. Khan MD MSc (1), A Palepu MD MPH (1), P Dodek MD MHSc (2), A Salmon PhD (3), HA Leitch MD (4), S Ruzycki MD (5), A Townson MD (5), D Lacaille MD MHSc (6)

(1) Division of General Internal Medicine, Department of Medicine; Center for Health Evaluation and Outcomes Science, University of British Columbia, Vancouver, BC, Canada

(2) Division of Critical Care Medicine; Center for health evaluation and outcomes sciences, University of British Columbia, Vancouver, BC, Canada

(3) Center for health evaluation and outcomes sciences; School of Population and Public Health, University of British Columbia, Vancouver, BC, Canada

(4) Division of Hematology, University of British Columbia, Vancouver, BC, Canada

(5) Department of Medicine, Community Health Sciences, University of Calgary Cumming School of Medicine, Calgary, Alberta, Canada

(6) Division of Physical Medicine and Rehabilitation, Dept. of Medicine, University of British Columbia, Vancouver, BC, Canada

(7) Division of Rheumatology, Department of Medicine, University of British Columbia; Arthritis Research Canada.

Word Count: 2996

Abstract: 250

References: 34

Figures: 4

Tables: 1

Co-Author Email Addresses:

apalepu@hivnet.ubc.ca

peter.dodek@ubc.ca

asalmon@cheos.ubc.ca

drhleitch@providencehematology.com

sarro@ualberta.ca

Andrea.Townson@vch.ca

dlacaille@arthritisresearch.ca

Address for correspondence:

Nadia Khan MD MSc

540.70, 1081 Burrard Street,

Vancouver, BC, V6Z 1Y6

P:604 682-2344

F:604 806-8005

Email: nakhanubc@gmail.com

ABSTRACT

Objective: What is the prevalence of physician burnout during the pandemic and does this differ by gender, ethnicity, or sexual orientation?

Design, Setting and Participants: We conducted a cross-sectional survey (August-October, 2020) of internal medicine physicians at two academic hospitals in Vancouver, Canada.

Primary and Secondary Outcomes: Physician burnout and its components, emotional exhaustion, depersonalization, and personal accomplishment were measured using the Maslach Burnout Inventory.

Results: The response rate was 38% (302 responses, 49% women). The prevalence of burnout was 68% (emotional exhaustion 63%, depersonalization 39%, and feeling low personal accomplishment 22%). In addition, 20% reported that they were considering quitting the profession or had quit a position. Women were more likely to report emotional exhaustion (OR 2.00, 95%CI: 1.07 to 3.73, $p=0.03$) and feeling low personal accomplishment (OR 2.26, 95%CI: 1.09 -4.70, $p=0.03$) than men. Physicians of color were more likely to report feeling lower personal accomplishment than white physicians (OR 1.81, 95%CI: 1.28 to 2.55, $p=0.001$). There was no difference in emotional exhaustion or depersonalization by ethnicity or sexual orientation. Physicians who reported that COVID affected their burnout were more likely to report any burnout (OR: 3.74, 95%CI: 1.99 to 7.01, $p<0.001$) and consideration of quitting or quit (OR: 3.20, 1.34 to 7.66, $p=0.009$).

1
2
3
4
5 Conclusion: Burnout affects 2 out of 3 internal medicine physicians during the pandemic.
6
7
8 Women, physicians of color, and those who feel that COVID affects burnout were more
9
10 likely to report components of burnout. Further understanding of factors driving feelings
11
12 of low personal accomplishment in women and physicians of color is needed.
13
14
15

16
17 Key Words: physician burnout, gender, race, COVID-19, equity
18
19
20
21
22
23

24 ARTICLE SUMMARY:

25 26 STRENGTHS

- 27
28 • This survey used a validated burnout instrument, Maslach Burnout Inventory, to
29
30 measure internal medicine physician burnout during the pandemic.
- 31
32 • The study analyzed ethnicity, gender and sexual orientation of physicians on
33
34 burnout and personal accomplishment that is infrequently assessed.
- 35
36 • Evaluation of physician preference of interventions to reduce burnout and whether
37
38 these differed by ethnicity, gender and sexual orientation.
39
40
41

42 43 LIMITATIONS

- 44
45 • The response rate was somewhat low at 38% but the results did not differ among
46
47 divisions that had high response rates >50% compared with those that were lower.
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 Burnout is an occupational syndrome consisting of emotional exhaustion,
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Burnout is an occupational syndrome consisting of emotional exhaustion, depersonalization, and a diminished sense of personal accomplishment from work stress. Physician burnout is widely recognized and has an increasing global prevalence of 35-50% despite ongoing efforts to reduce burnout (1). The recent pandemic has placed further strain on physicians due to increased workload, anxiety related to supply of personal protective equipment, and uncertainty about patient care and health services (2). Burnout is a vital issue for physicians and health care systems as burnout is associated with worse job performance among physicians, job attrition, and is a stronger contributor to medical errors than fatigue (3). Burnout costs the Canadian health system \$213 million related to reduced work hours in physicians (4).

Physician burnout may disproportionately affect individuals based on their gender, ethnicity and sexual orientation, although study findings are sparse and inconsistent (5-7). Among women, unequal patient expectations, greater hours spent on child rearing, and gender discrimination may contribute to the increased emotional exhaustion experienced relative to men (5). Ethnic minority physicians experience more exclusion, and racial discrimination relative to white physicians (6) and sexual minority medical students experience more depression than heterosexual medical students (7). The pandemic may further amplify these structural inequities. The Public Health Agency of Canada reports that women, racialized Canadians, and essential workers are disproportionately affected by the COVID-19 pandemic (8). According to the American Medical Association, COVID-19 exacerbated inequities, not just for patients, but also for physicians (9). These issues may not only impact prevalence of burnout, but also influence the potential solutions for mitigating burnout.

1
2
3 Thus, we sought to evaluate the prevalence of burnout, determinants, work to life
4 conflict, considerations of quitting and views on potential interventions to reduce burnout
5 during the pandemic and to examine whether these measures differed by gender,
6 ethnicity, and sexual orientation among physicians who worked in the Department of
7 Medicine at two academic, tertiary care hospitals in Vancouver, Canada. We also
8 explored whether views on solutions to mitigate burnout differed in these subgroups.
9
10
11
12
13
14
15
16
17

18 **METHODS**

19
20
21 We conducted a cross-sectional online survey of physician members of the Department of
22 Medicine at the University of British Columbia at two tertiary care hospital sites. The
23 Providence Health Research Ethics board approved the study. The study reporting
24 followed the STROBE checklist.
25
26
27
28
29
30

31 **Participants and Setting**

32 All active members of the Department of Medicine working at two academic, tertiary
33 care hospitals in Vancouver were identified through division email lists. The Department
34 of Medicine is the largest department in the Faculty of Medicine at the University of
35 British Columbia (803 members with 37% women), and is a mix of academic (114 with
36 30% women) and clinical faculty. While all participants worked at either or both of the
37 two tertiary care centers, physicians also worked at community hospitals, private practice
38 or hospital ambulatory clinics, and rural or outreach sites. Participants provided informed
39 consent.
40
41
42
43
44
45
46
47
48
49
50
51

52 **Questionnaire**

1
2
3 Content experts in physician burnout from the research team developed the survey
4
5 questions based on the literature on burnout. The online questionnaire was administered
6
7 using the Qualtrics survey platform (Qualtrics, Provo, UT) for web and mobile-based
8
9 administration. The survey was pre-tested with a representative group of physicians
10
11 within the Department of Medicine to ensure that the questions and formatting were
12
13 clear. Any questions flagged were then modified accordingly.
14
15
16
17
18

19 **Demographic and Practice Characteristics**

20
21 We collected information on gender (man, woman, non-binary person, or prefer not to
22
23 say), number of children (of any age), age, ethnicity (white, South Asian, Asian or Pacific
24
25 Islander, or other) and sexual orientation (identify as lesbian, gay, bisexual, two-spirited,
26
27 or queer (LGBTQ), or identify as heterosexual). We collected years in practice, specialty
28
29 including if the specialty was directly responsible for caring for patients with COVID-19
30
31 (ICU or General Internal Medicine), hours per week spent on clinical, and academic
32
33 (teaching, research, administrative, medical education) activities, on call duties, number
34
35 of weekend days working, and use of electronic health systems.
36
37
38
39
40
41

42 **Burnout, Consideration of Quitting, and Work-to-life Conflict**

43
44 The Maslach Burnout Inventory© - Human Services Survey for Medical Personnel
45
46 (MBI) was used to assess burnout as this is the most widely used standard to measure
47
48 burnout for healthcare professionals (10). This validated instrument includes 22 items,
49
50 each scored from 0 to 6 based on self-reported frequency of the feeling addressed by each
51
52 item. In addition to providing an overall measure of burnout, the instrument enables the
53
54
55
56
57
58
59
60

1
2
3 measurement of the three distinct domains of burnout using summated ratings. The
4
5 emotional exhaustion domain consists of nine items (e.g. I feel emotionally drained from
6
7 my work) for a total score range of 0–54. The depersonalization domain consists of five
8
9 items (e.g. I don't really care what happens to some patients) for a total score range of 0–
10
11 30. The personal accomplishment domain consists of eight items (e.g. I have
12
13 accomplished many worthwhile things in this job) for a total score range of 0–48. The
14
15 presence of physician burnout was defined as emotional exhaustion scores ≥ 27 or
16
17 depersonalization scores ≥ 10 , consistent with criteria used in other studies (11). Feeling
18
19 low personal accomplishment (score ≤ 33) was evaluated separately from overall burnout
20
21 (11). Evidence linked 1-point changes in burnout scores with meaningful differences in
22
23 self-perceived major medical errors, reductions in work hours, and suicidal ideation (12).
24
25
26
27

28
29 Respondents were asked if they had ever left a position or considered quitting a
30
31 position now for any reason. We assessed work-to-life conflict using one item from a
32
33 national study on burnout among physicians, “my work schedule leaves me enough time
34
35 for my personal/family life” (strongly agree, agree, neutral, disagree, strongly disagree)
36
37 (13). The presence of work-to life conflict was considered if respondents disagreed with
38
39 that statement. Physicians were also asked if they felt that the COVID-19 pandemic
40
41 increased their feelings of burnout (agree, neither agree nor disagree or disagree).
42
43
44
45
46

47 **Ratings of Interventions to Reduce or Prevent Physician Burnout by Physicians**

48
49 Respondents were asked to rate on a scale of 1 to 10 the importance of various
50
51 interventions to reduce or prevent burnout. These potential interventions included person-
52
53
54
55
56
57
58
59
60

1
2
3 level and organization-level interventions that were derived from systematic reviews of
4 interventions that were considered to reduce burnout (14-16).
5
6
7
8
9

10 **Procedures**

11
12 Electronic links to the questionnaires were emailed from August to October 2020 using
13 updated email lists from the Divisions. We employed a modified Dilman approach (17)
14 to recruit participants including an initial email-out from the research team followed by 2
15 reminders via email. There were no limitations on time to respond. Survey responses
16 were anonymous and no incentives were provided.
17
18
19
20
21
22
23
24
25

26 **Patient and Public Involvement**

27
28 No patients were involved with this study as it pertained to physicians only. Physicians
29 were involved throughout the study process.
30
31
32
33
34
35
36
37

38 **STATISTICAL ANALYSIS**

39
40 Based on these data from a convenience sample, standard descriptive summary statistics
41 were used to characterize the physician respondents, survey scores, and ratings of
42 interventions. Separate multivariable logistic regression models were developed to assess
43 associations with overall burnout, burnout subscales (e.g. high emotional exhaustion vs.
44 not high emotional exhaustion), quitting, and work-life conflict. All models included the
45 following explanatory variables: age, gender, ethnicity (dichotomized to white or visible
46 minority physician due to sample size), sexual orientation, clinical hours, attribution of
47
48
49
50
51
52
53
54
55
56
57
58
59
60

COVID affecting burnout, division, weekend days worked, and on call duties. We tested for the presence of interactions between gender and ethnicity or sexual orientation in these models. As the interactions were negative, we present the models without the interaction terms. Missing values ranged from 14% to 17.5% across all survey questions (14% missing MBI). From available data, there were no statistically significant differences by division, age, gender, race or clinical hours worked among those with missing data and those without, Missing values were excluded from analyses (complete case analysis); therefore, our estimates are conservative. All tests were 2-sided and the level of significance was 0.05. All analyses were done using STATA 12.0 (Texas, USA).

RESULTS

Of the 803 (37% women) physicians invited to participate in the questionnaire, we received 302 responses (38% response rate with 31% with complete responses (49% women)). Response rates by division ranged from 13% to 96% (Figure 1, Table 1).

As seen in Table 1, most respondents were between ages 35 to 50 years and had children. Almost half were women, no persons identified as non-binary, and 2% preferred not to say their gender. One third of physician respondents identified as a visible minority. There were 6% of individuals who identified as lesbian, gay, bisexual, two-spirited, or queer. While almost all respondents worked clinically, 32% included research in their portfolio, 38% conducted medical education work and 24% also carried out administrative work.

Overall Burnout Prevalence

1
2
3 The prevalence of burnout was 68% among all respondents, 71% among women and 64%
4 among men ($p=0.25$). Burnout was reported by 60% of persons who identified as
5 LGBTQ. Seventy-one percent of white physicians, 68 % of South Asian physicians
6 reported burnout, and 78% of other ethnicities reported burnout while 54% of Asian and
7 Asian Pacific Islander physicians reported burnout ($p=0.88$). Burnout was highest in
8 those who were 36-50 years at 74% and lower with increasing ages; 51-65 years was
9 66% and 66 years and older had a prevalence of burnout of 33% ($p=0.03$). The
10 prevalence of burnout ranged from 46% to 100% across divisions (Figure 1). Divisions
11 with a response rate of $>55\%$ had a similar prevalence of burnout compared with
12 divisions with lower response rates (65% vs. 70%, $p=0.4$). Burnout was not significantly
13 different in those divisions primarily responsible for caring for patients with COVID-19
14 compared to other divisions (71% vs. 68%, $p=0.6$)
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29

30
31 As discerned in Table 1, from univariate analysis of demographic and work
32 characteristics and burnout, only age and clinical work hours were associated with
33 burnout. However, on multivariate analysis (Figure 2), there were no demographic or
34 work characteristics associated with overall burnout.
35
36
37
38
39
40
41

42 **Emotional Exhaustion, Depersonalization and Personal Accomplishment**

43
44 The overall prevalence of high emotional exhaustion was 63% and high
45 depersonalization was 39%. Feeling low personal accomplishment was present in 22%.
46
47 From Figure 3, women were more likely to report high emotional exhaustion (adjusted
48 Odds Ratio (OR) 2.00, 95% Confidence Interval (CI): 1.07 to 3.73, $p=0.03$) and feeling
49 low personal accomplishment (adjusted OR 2.26, 95%CI: 1.09 -4.70, $p=0.03$) than men.
50
51
52
53
54
55
56
57
58
59
60

1
2
3 There was no gender difference for depersonalization. Visible minority physicians were
4 more likely to report feeling low personal accomplishment compared with white
5 respondents (adjusted OR 1.81, 95%CI: 1.28 to 2.55, p=0.001). Younger respondents
6 were more likely to report depersonalization than older physicians (adjusted OR 0.60,
7 95%CI: 0.40 to 0.90, p=0.015). There was no association between ethnicity, sexual
8 orientation, or interaction terms of gender and ethnicity or of gender and sexual
9 orientation, with emotional exhaustion or depersonalization. There was no association
10 between sexual orientation or the interaction terms of gender and ethnicity or gender and
11 sexual orientation and feelings of low personal accomplishment.
12
13
14
15
16
17
18
19
20
21
22
23
24
25

26 **Having Quit or Consideration of Quitting, and Work-to life Conflict**

27
28 Twenty percent of respondents reported that they quit a position or are considering
29 quitting a work position (8% quit a position and 12% were considering quitting). There
30 were no associations between age, gender, ethnicity, or sexual orientation or work
31 characteristics and considering quitting or having quit (Figure 2). Forty-one percent of
32 respondents reported work to life conflict, not having enough time for personal or family
33 life because of work. There were no associations between gender, ethnicity, or sexual
34 orientation and reporting work to life conflict. However, increased clinical hours and
35 working more weekend days were associated with a greater likelihood of reporting work
36 to life conflict.
37
38
39
40
41
42
43
44
45
46
47
48
49
50

51 **Perceptions About COVID Affecting Burnout and Burnout**

1
2
3 Physicians who reported that COVID affected their burnout were also more likely to
4 report overall burnout (adjusted OR 3.74, 95%CI: 1.99 to 7.01, $p<0.001$), high emotional
5 exhaustion (adjusted OR 3.21, 1.73 to 5.95, $p<0.001$) and depersonalization (adjusted OR
6 2.47, 1.29 to 4.73, $p=0.006$), but not feelings of low personal accomplishment. Similarly,
7 those who reported that COVID affected burnout were more likely to have quit or be
8 considering quitting a work position (adjusted OR: 3.20, 1.34 to 7.66, $p=0.009$).
9
10
11
12
13
14
15
16
17
18

19 Views On Potential Interventions To Mitigate Burnout And Promote Wellness

20 Respondents rated interventions focusing on improving organizational factors to reduce
21 burnout and promote wellness as of high importance (Figure 4). Ratings of importance
22 did not significantly differ by gender, ethnicity or sexual orientation for each
23 intervention. The interventions with the highest ratings of importance were reducing
24 inefficient work processes and non-physician clerical work. The interventions with the
25 lowest ratings of importance were increasing social events and leadership skills and
26 career training.
27
28
29
30
31
32
33
34
35
36
37
38
39

40 DISCUSSION

41 During the COVID-19 pandemic, although most feel a sense of personal
42 accomplishment, burnout and emotional exhaustion are high. Physicians who report that
43 COVID affects their feelings of burnout are more likely to report burnout and to consider
44 quitting a work position or have quit a position. Women and visible minority physicians
45 are more likely to report components of burnout compared with their counterparts during
46 the pandemic.
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 The prevalence of burnout and its components in the current study are generally
4
5 higher than those reported before the pandemic. A systematic review of 176 studies from
6
7 2018 reported a prevalence of overall burnout of 48.7%, emotional exhaustion of 36.7%
8
9 and depersonalization of 32.1% among studies using similar burnout measures (18).
10
11 However, given significant heterogeneity in the physician subjects sampled, location and
12
13 study dates, it is challenging to directly compare prevalence before and after the
14
15 pandemic. Recent studies from China, Italy, and the US report similarly high rates of
16
17 burnout among health care workers but most do not use standardized, benchmarked
18
19 burnout questionnaires or examine personal accomplishment (19, 21-23). Our analysis
20
21 highlights that physicians perceived that COVID-19 increased their burnout. However,
22
23 burnout was high across all divisions studied regardless of whether they were responsible
24
25 for caring for COVID patients or not. This suggests a widespread impact of the
26
27 pandemic and the restrictions imposed including anxiety related to supply of personal
28
29 protective equipment, uncertainty and significant shift in clinical practice to virtual care
30
31 (20). Increased work hours, concerns over infecting family members, lack of support
32
33 from peers, limited resources and overwork were identified as drivers of burnout and
34
35 emotional exhaustion during the pandemic (21, 22).
36
37
38
39
40
41

42 Given recent social movements and that stressors from the pandemic can expose
43
44 and amplify the effects of social disparities (24), our finding that more women experience
45
46 emotional exhaustion and both women and visible minority physicians are more likely to
47
48 report feeling low personal accomplishment than their counterparts is important.
49
50 Although inconsistent, studies before the pandemic reported a higher risk of emotional
51
52 exhaustion in women than men (25, 26). There are few studies examining gender or
53
54
55
56
57
58
59
60

1
2
3 ethnicity on burnout during the pandemic. However, a recent analysis of medical trainees
4 demonstrated that women were more likely to report stress compared with men (20). The
5 reasons underlying the high prevalence of emotional exhaustion in women during the
6 pandemic may include more family stress, greater child-raising responsibility than men,
7 and less supportive work environments (5, 25, 26). Working parents spent an additional 6
8 hours caring for their children and women took more than two-thirds of that additional
9 time during the pandemic in Canada and elsewhere (27). Further, the increased hours
10 spent are thought to be at the expense of academic productivity in women (28) and may
11 contribute to feeling low personal accomplishment compared with men. The literature is
12 also inconsistent regarding the impact of race on burnout or its components (29-31). A
13 previous national US survey found that minority physicians were less likely to report
14 burnout including emotional exhaustion and depersonalization compared with white, non-
15 Hispanic physicians (31) whereas others demonstrated no difference in burnout.
16 However, with increased COVID-19 infections, incidents of racial discrimination
17 increased dramatically and this 'double pandemic' (29) may place greater strain on
18 visible minority physicians. Although our study also found no difference in emotional
19 exhaustion and depersonalization by ethnicity, we identified a greater likelihood of
20 feeling low personal accomplishment. The reasons underlying a feeling of low personal
21 accomplishment in these groups are unknown but may be related to higher prevalence of
22 imposter syndrome, a syndrome where an individual doubts their skills, or
23 accomplishments, increased discrimination or being less likely recognized for their
24 accomplishments than their counterparts (28, 30-33). Although our study did not find any
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 differences in burnout among sexual minority groups, a previous analysis of medical
4 students found greater rates of depression than heterosexual medical students (7).
5
6

7
8 Given the high prevalence of burnout, strategies to reduce burnout are needed
9 urgently. Ratings for the interventions that reduced work inefficiencies and non-physician
10 clerical work were rated similarly highly among gender, ethnicity, or sexual orientation
11 subgroups. This extends the findings from other observational studies that satisfaction
12 with workflow, relationship with colleagues, time and resources for continuing medical
13 education, opportunity to affect decision making, workload, and having a trusted advisor
14 were associated with lower likelihood of burnout (14).
15
16
17
18
19
20
21
22

23
24 This study systematically examined burnout using standard measures of burnout
25 during the pandemic. However, there are several limitations to note. First, response rates
26 were somewhat low which increases the risk of non-response bias. However, response
27 rates were comparable to other physician surveys despite the significant increase in
28 workload during the pandemic and burnout prevalence was nevertheless elevated in
29 divisions that had high response rates. Second, the number of physicians who identified
30 as LGBTQ or non-binary gender was low that may have underestimated any differences.
31
32 Third, we were not able to quantify any incremental effect of the pandemic on burnout, as
33 we did not have comparable data just prior to the pandemic. Perceptions of COVID-19
34 impacting feelings of burnout may be subject to confirmation bias. Finally, we sampled
35 physicians from the Department of Medicine and these results may not necessarily extend
36 to other physician groups such as emergency, primary care, or surgical specialties or
37 allied health care workers.
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

CONCLUSION

Burnout during the pandemic is affecting 2 out of every 3 physicians in this sample. Emotional exhaustion and feeling low personal accomplishment are higher in certain groups including women or physicians of color. Interventions reducing inefficient work practices and non-physician work is urgently needed and considered of highly important by all groups. Interventions for improving feelings of personal accomplishment that target gender and ethnic disparities among physicians must also be considered.

FUNDING: This study was funded through a Physicians Engagement grant (grant # NA) at Providence Health Care, Vancouver, BC but the funder had no role in the development, analysis, or reporting of the study. Dr. Diane Lacaille is supported by the Mary Pack Arthritis Chair in Rheumatology Research from the University of British Columbia and the Arthritis Society of Canada.

COMPETING INTERESTS: The authors declare that there are no competing interests with this manuscript.

AUTHOR STATEMENT: NAK, AP, PD, DL, SR, AS contributed to the design of the study. NAK, AP, AT and DL contributed to data collection and NK contributed towards analysis. All authors contributed to interpretation of the results, and meaningful contribution to writing and accepting the final manuscript. NAK had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

DATA STATEMENT: Statistical code and dataset available upon request of the corresponding author.

REFERENCES

1. 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 Clinic Proc.* 2015;90(12):1600-1613.
2. Sharifi M, Asadi-Pooya AA, Mousavi-Roknabadi RS. Burnout among Healthcare Providers of COVID-19; a Systematic Review of Epidemiology and Recommendations. *Arch Acad Emerg Med.* 2020;9(1):e7.
3. Daniel S. Tawfik, Jochen Profit, Timothy I. Morgenthaler, Daniel V. Satele, Christine A. Sinsky, Liselotte N. Dyrbye, Michael A. Tutty, Colin P. West, Tait D. Shanafelt. Physician Burnout, Well-being, and Work Unit Safety Grades in Relationship to Reported Medical Errors. *Mayo Clinic Proceedings*, 2018;93(11):1571-1580.
4. Dewa CS, Jacobs P, Thanh NX, Loong D. An estimate of the cost of burnout on early retirement and reduction in clinical hours of practicing physicians in Canada. *BMC Health Serv Res.* 2014;14:254.
5. Linzer M, Harwood E. Gendered expectations: do they contribute to high burnout among female physicians? *J Gen Intern Med.* 2018;33(6):963–5.
6. Garcia LC, Shanafelt TD, West CP, et al. Burnout, Depression, Career Satisfaction, and Work-Life Integration by Physician Race/Ethnicity. *JAMA Netw Open.* 2020;3(8):e2012762.
7. Przedworski JM, Dovidio JF, Hardeman RR, et al. A Comparison of the Mental Health and Well-Being of Sexual Minority and Heterosexual First-Year Medical Students: A Report From the Medical Student CHANGE Study. *Acad Med.* 2015;90(5):652-659.
8. Public Health Agency of Canada. <https://www.canada.ca/en/public-health/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/from-risk-resilience-equity-approach-covid-19.html#a2>. Accessed February 1, 2021
9. American Medical Association. <https://www.ama-assn.org/delivering-care/health-equity/covid-19-faqs-health-equity-pandemic>. Accessed February 1, 2021
10. C. Maslach, S.E. Jackson. The measurement of experienced burnout. *Journal of Occupational Behaviour*, 2 (1981), pp. 99-113. Copyright ©1981, 2016 by Christina Maslach & Susan E. Jackson. All rights reserved in all media. Published by Mind Garden, Inc., www.mindgarden.com
11. Rotenstein LS, Torre M, Ramos MA, et al. Prevalence of Burnout Among Physicians: A Systematic Review. *JAMA.* 2018;320(11):1131–1150.
12. Panagioti M, Geraghty K, Johnson J, Zhou A, Panagopoulou E, Chew-Graham C, Peters D, Hodkinson A, Riley R, Esmail A. Association Between Physician Burnout and Patient Safety, Professionalism, and Patient Satisfaction: A Systematic Review and Meta-analysis. *JAMA Intern Med.* 2018. doi: 10.1001/jamainternmed.2018.3713
13. West CP, Dyrbye LN, Rabatin JT, Call TG, Davidson JH, Multari A, Romanski SA, Hellyer JM, Sloan JA, Shanafelt TD. Intervention to promote physician well-

- being, job satisfaction, and professionalism: a randomized clinical trial. *JAMA Intern Med.* 2014;174(4):527-33.
14. 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.
 15. Clough BA, March S, Chan RJ, Casey LM, Phillips R, Ireland MJ. Psychosocial interventions for managing occupational stress and burnout among medical doctors: a systematic review. *Syst Rev.* 2017;6(1):144.
 16. Busireddy KR, Miller JA, Ellison K, Ren V, Qayyum R, Panda M. Efficacy of Interventions to Reduce Resident Physician Burnout: A Systematic Review. *J Grad Med Educ.* 2017;9(3):294-301.
 17. Dillman DA. *Mail and telephone surveys: the total design method.* 1978, New York: John Wiley & Sons.
 18. Rotenstein LS, Torre M, Ramos MA, et al. Prevalence of Burnout Among Physicians: A Systematic Review. *JAMA.* 2018;320(11):1131–1150.
 19. Amanullah S, Ramesh Shankar R. The Impact of COVID-19 on Physician Burnout Globally: A Review. *Healthcare (Basel).* 2020;8(4):421.
 20. Kannampallil T, Goss C, Evanoff B, Strickland J, McAlister R, Duncan J. Exposure To COVID-19 Patients Increases Physician Trainee Stress and Burnout. *PLoS ONE.* 2020;15:e0237301.
 21. Sasangohar F., Jones S., Masud F., Vahidy F., Kash B. Provider Burnout and Fatigue During The COVID-19 Pandemic: Lessons Learned from A High-Volume Intensive Care Unit. *Anesth. Analg.* 2020;131:106–111.
 22. Wu Y, Wang J, Luo C, Hu S, Lin X, Anderson A, Bruera E, Yang X, Wei S, Qian Y. A Comparison of Burnout Frequency Among Oncology Physicians and Nurses Working on The Frontline and Usual Wards During The COVID-19 Epidemic in Wuhan, China. *J. Pain Symptom Manag.* 2020;60:e60–e65.
 23. Di Monte C, Monaco S, Mariani R, Di Trani M. From Resilience to Burnout: Psychological Features of Italian General Practitioners During COVID-19 Emergency. *Front Psychol.* 2020;11:567201.
 24. Devakumar D, Shannon G, Bhopal SS, Abubakar I. Racism and discrimination in COVID-19 responses. *Lancet.* 2020;395(10231):1194.
 25. Elmore LC, Jeffe DB, Jin L, Awad MM, Turnbull IR. National Survey of Burnout among US General Surgery Residents. *J Am Coll Surg.* 2016;223(3):440-451.
 26. Linzer M, Smith CD, Hingle S, et al. Evaluation of Work Satisfaction, Stress, and Burnout Among US Internal Medicine Physicians and Trainees. *JAMA Network Open.* 2020;3(10):e2018758.
 27. Johnston R, Mohammed A, Van der Linden C. Evidence of Exacerbated Gender Inequality in Child Care Obligations in Canada and Australia during the COVID-19 Pandemic. *Politics & Gender.* 2020; 16(4): 1131-1141.
 28. Brubaker L. Women Physicians and the COVID-19 Pandemic. *JAMA.* 2020; 324(9): 835-836.
 29. Addo IY. Double pandemic: racial discrimination amid coronavirus disease 2019. *Social Sciences & Humanities Open.* 2020;2(1):100074.

- 1
- 2
- 3
- 4 30. Cantor JC, Mouzon DM. Are Hispanic, Black, and Asian Physicians Truly Less
- 5 Burned Out Than White Physicians? Individual and Institutional
- 6 Considerations. *JAMA Netw Open*. 2020;3(8):e2013099.
- 7 31. Garcia LC, Shanafelt TD, West CP, et al. Burnout, Depression, Career
- 8 Satisfaction, and Work-Life Integration by Physician Race/Ethnicity. *JAMA*
- 9 *Network Open*. 2020;3(8):e2012762.
- 10 32. Osseo-Asare A, Balasuriya L, Huot SJ, et al. Minority resident physicians'
- 11 views on the role of race/ethnicity in their training experiences in the
- 12 workplace. *JAMA Netw Open*. 2018;1(5):e182723.
- 13 33. Peterson NB, Friedman RH, Ash AS, Franco S, Carr PL. Faculty self-reported
- 14 experience with racial and ethnic discrimination in academic medicine. *J Gen*
- 15 *Intern Med*. 2004;19(3):259-265.
- 16 34. Cunningham CT, Quan H, Hemmelgarn B. et al. Exploring physician specialist
- 17 response rates to web-based surveys. *BMC Med Res Methodol*. 2015; 15, 32.
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25
- 26
- 27
- 28
- 29
- 30
- 31
- 32
- 33
- 34
- 35
- 36
- 37
- 38
- 39
- 40
- 41
- 42
- 43
- 44
- 45
- 46
- 47
- 48
- 49
- 50
- 51
- 52
- 53
- 54
- 55
- 56
- 57
- 58
- 59
- 60

FIGURE LEGEND:

Figure 1. Prevalence of Burnout by Division %

Figure 2. Multivariate Association of Burnout, Work-Life Conflict and Consideration of Quitting or Having Quit

Figure 3. Multivariate Association of Burnout Subscales, High Emotional Exhaustion (EE), High Depersonalization (DP) and Low Personal Accomplishment (PA)

Figure 4. Ratings on Strategies to Reduce Burnout and Promote Well-being*

For peer review only

Table 1. Baseline Characteristics According to Physician Burnout, %(n)*

Characteristics	No Burnout N=79	Burnout N=170	P-value
Demographics			
Age			
25-35 years	13.9 (11)	12.5 (21)	0.03
36-50 years	40.5 (32)	54.8 (92)	
51-65 years	29.1 (23)	29.2 (49)	
66 years or older	16.4 (13)	3.6 (6)	
Women	44.3 (35)	52.7 (87)	0.23
Ethnicity			
White	62.3 (48)	70.7 (118)	0.88
Asian or Pacific Islander	24.7 (19)	13.2 (22)	
South Asian	7.8 (6)	7.78 (13)	
Other	5.2 (4)	8.4 (14)	
LGBTQ	7.6 (6)	5.4 (9)	0.32

Children			
No children	23.1 (18)	31.1 (52)	0.52
1-2 children	50 (39)	47.9 (80)	
3 or more children	26.9 (21)	21 (35)	
Work Characteristics			
Medicine Specialty			
General Internal Medicine	12.8 (10)	13.5 (23)	0.54
Medical Oncology	6.4 (5)	16.4 (28)	
Neurology	11.5 (9)	14.0 (24)	
Rheumatology	18 (14)	8.8 (15)	
PMR	12.8 (10)	6.4 (11)	
ICU	5.1 (4)	7.0 (12)	
Cardiology	5.1 (4)	3.5 (6)	
Endocrinology	9 (7)	3.5 (6)	

Gastroenterology	5.1 (4)	3.5 (6)	
Infectious Diseases	<4	6.4 (11)	
Social Medicine	<4	2.9 (5)	
Other Divisions	10.1 (8)	13.5 (23)	
Divisions primarily responsible for COVID care	17.7 (14)	20.5 (35)	0.61
Appointment			
Clinical	92.4 (73)	90.6 (155)	0.86
Research	27.9 (22)	28.7 (49)	
Medical Education	31.7 (25)	39.2 (67)	
Administration	15.2 (12)	25.2 (43)	
Clinical Duty Hours			
>40 hours/week	52.1 (38)	46.5 (72)	0.04
>60 hours/week	8.2 (6)	21.9 (34)	
Weekend Days			

Working/ month			
None	25.3 (20)	17.8 (30)	0.27
1-2	44.3 (35)	52.1 (88)	
3-4	25.3 (20)	19.5 (33)	
5 or more	5.1 (4)	10.7 (18)	
Call Days/month			
None	20.5 (16)	15.8 (26)	0.90
1-3	47.4 (37)	55.8 (92)	
4 or more	32.1 (25)	28.5 (47)	
View COVID as affecting burnout	45.6 (36)	75.2 (127)	<0.0001

*14 to 17.5% missing data excluded. Abbreviations: LGBTQ: lesbian, gay, bisexual, transsexual, or queer; PMR: physical medicine and rehabilitation; ICU: intensive care unit

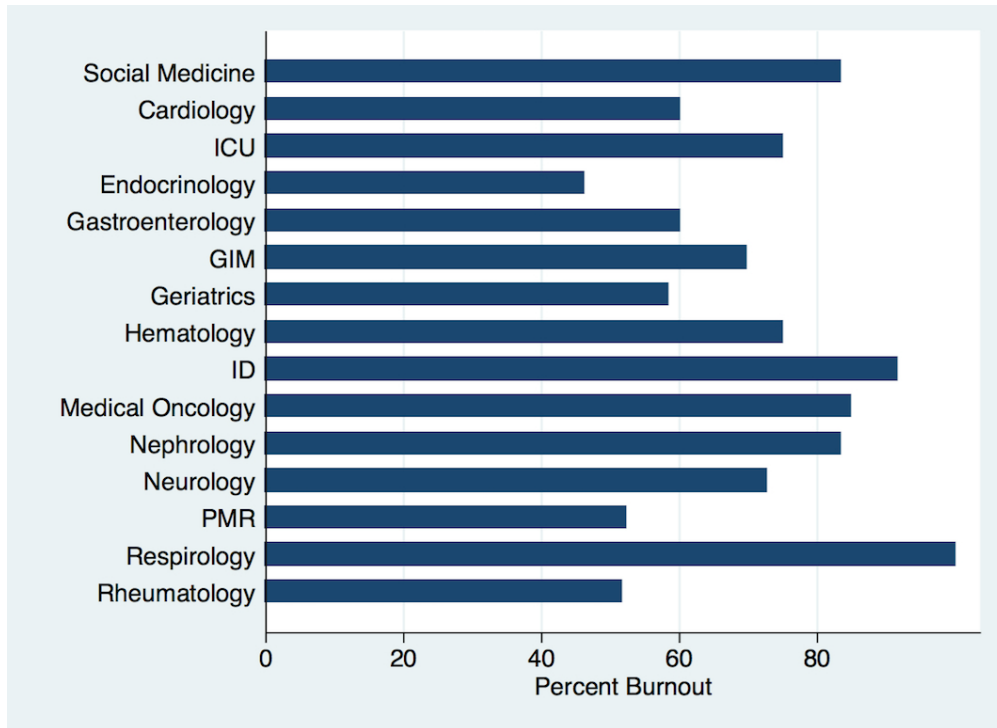


Figure 1. Prevalence of Burnout by Division %

Response rates: >55% in General Internal Medicine (GIM), Intensive Care (ICU), Social Medicine, and Rheumatology; 30-54% in Endocrinology, Infectious Disease (ID), Medical Oncology, Physical Medicine and Rehabilitation (PMR); <30% in Cardiology, Gastroenterology, Geriatrics, Hematology, Nephrology and Respirolgy.

90x65mm (300 x 300 DPI)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

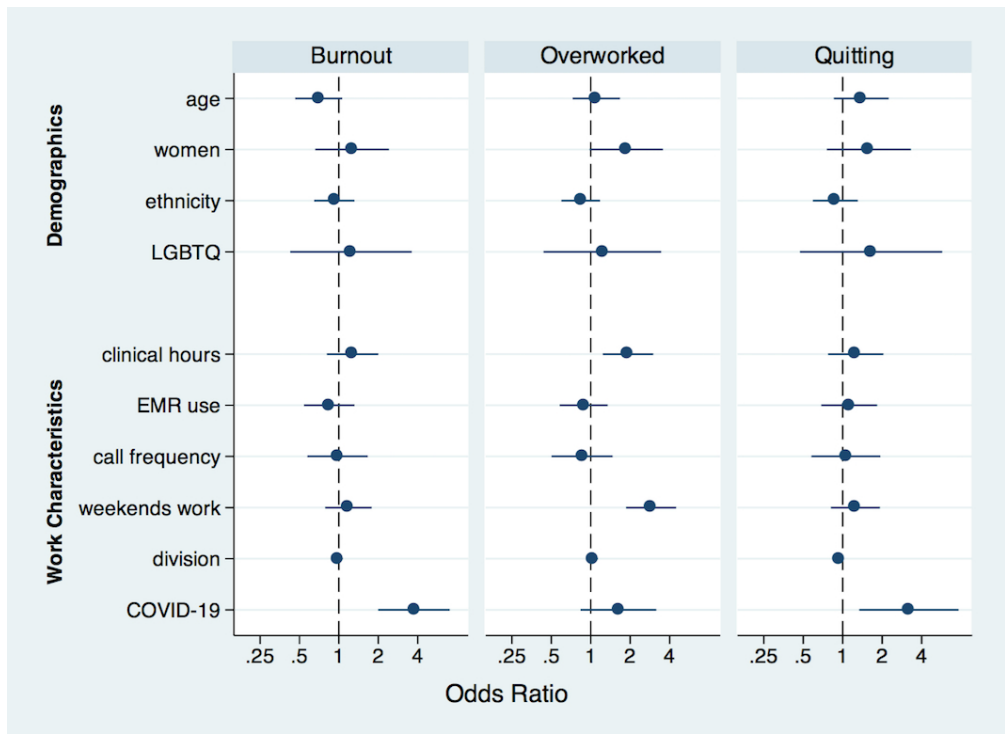


Figure 2. Multivariate Association of Burnout, Work-Life Conflict and Consideration of Quitting or Having Quit

Abbreviations: LGBTQ: lesbian, gay, bisexual, two-spirited, transsexual, or queer; EMR: electronic health record

90x65mm (300 x 300 DPI)

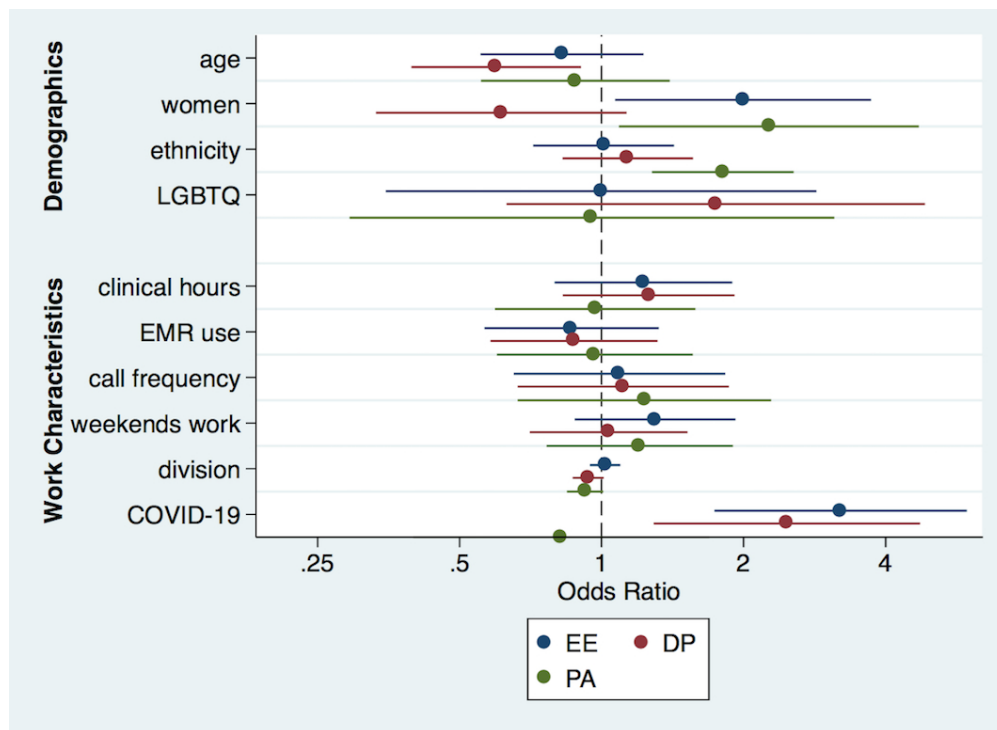


Figure 3. Multivariate Association of Burnout Subscales, High Emotional Exhaustion (EE), High Depersonalization (DP) and Low Personal Accomplishment (PA) Abbreviations: LGBTQ: lesbian, gay, bisexual, two-spirited, transsexual, or queer; EMR: electronic health record

90x65mm (300 x 300 DPI)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

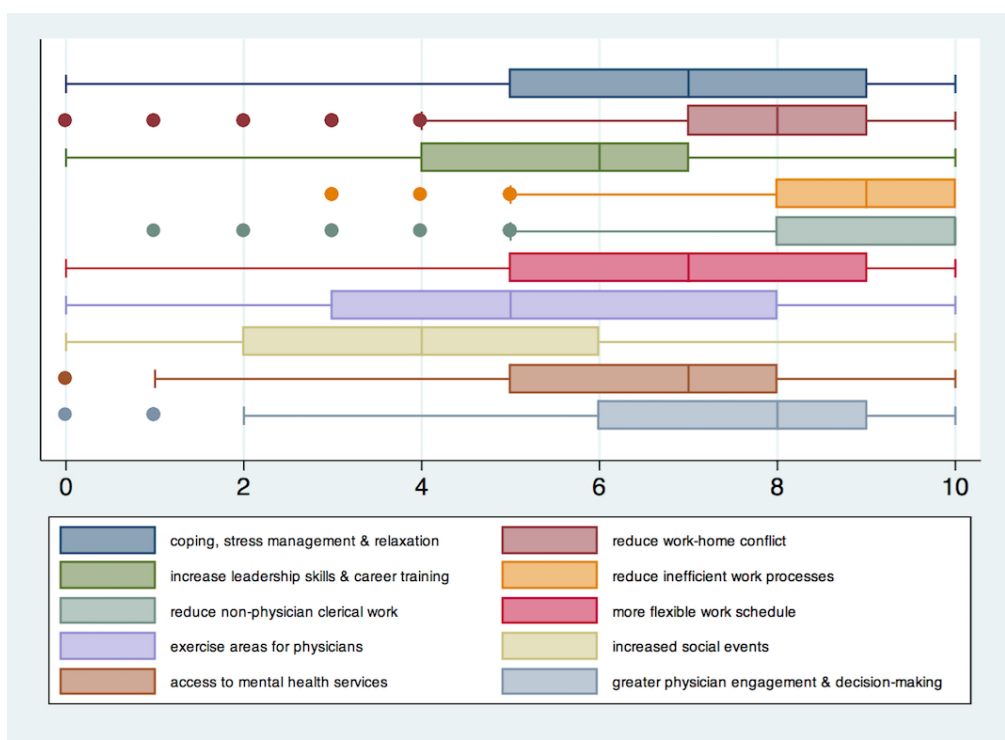


Figure 4. Ratings on Strategies to Reduce Burnout and Promote Well-being** Ratings based on a scale of 0 through 10 with 0 being the lowest level of importance and 10 the highest level of importance.

90x65mm (300 x 300 DPI)

Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the STROBE cross sectional reporting guidelines, and cite them as:

von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies.

	Reporting Item	Page Number
Title and abstract		
Title	#1a Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction		
Background / rationale	#2 Explain the scientific background and rationale for the investigation being reported	4
Objectives	#3 State specific objectives, including any prespecified hypotheses	5
Methods		
Study design	#4 Present key elements of study design early in the paper	5
Setting	#5 Describe the setting, locations, and relevant dates, including periods of	5

1		recruitment, exposure, follow-up, and data collection	
2	Eligibility criteria	#6a Give the eligibility criteria, and the sources and methods of selection of	5
3		participants.	
4			
5			
6		#7 Clearly define all outcomes, exposures, predictors, potential	6
7		confounders, and effect modifiers. Give diagnostic criteria, if applicable	
8			
9			
10	Data sources /	#8 For each variable of interest give sources of data and details of methods	6
11	measurement	of assessment (measurement). Describe comparability of assessment	
12		methods if there is more than one group. Give information separately	
13		for for exposed and unexposed groups if applicable.	
14			
15			
16			
17	Bias	#9 Describe any efforts to address potential sources of bias	8
18			
19	Study size	#10 Explain how the study size was arrived at	8
20			
21	Quantitative	#11 Explain how quantitative variables were handled in the analyses. If	8
22	variables	applicable, describe which groupings were chosen, and why	
23			
24			
25	Statistical	#12a Describe all statistical methods, including those used to control for	8
26	methods	confounding	
27			
28			
29	Statistical	#12b Describe any methods used to examine subgroups and interactions	8
30	methods		
31			
32			
33	Statistical	#12c Explain how missing data were addressed	8
34	methods		
35			
36			
37	Statistical	#12d If applicable, describe analytical methods taking account of sampling	na
38	methods	strategy	
39			
40			
41	Statistical	#12e Describe any sensitivity analyses	8
42	methods		
43			
44	Results		
45			
46	Participants	#13a Report numbers of individuals at each stage of study—eg numbers	9
47		potentially eligible, examined for eligibility, confirmed eligible,	
48		included in the study, completing follow-up, and analysed. Give	
49		information separately for for exposed and unexposed groups if	
50		applicable.	
51			
52			
53			
54			
55	Participants	#13b Give reasons for non-participation at each stage	na
56			
57	Participants	#13c Consider use of a flow diagram	na
58			
59			
60			

1	Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	9
2				
3				
4				
5				
6	Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	8,9
7				
8				
9				
10	Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	9
11				
12				
13				
14	Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	9
15				
16				
17				
18				
19	Main results	#16b	Report category boundaries when continuous variables were categorized	9
20				
21	Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	na
22				
23				
24				
25	Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	8
26				
27				
28				
29	Discussion			
30				
31	Key results	#18	Summarise key results with reference to study objectives	12
32				
33				
34	Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	15
35				
36				
37				
38				
39	Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	15
40				
41				
42				
43				
44	Generalisability	#21	Discuss the generalisability (external validity) of the study results	15
45				
46				
47	Other			
48	Information			
49				
50				
51	Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	16
52				
53				
54				
55				

The STROBE checklist is distributed under the terms of the Creative Commons Attribution License CC-BY.

This checklist was completed on 18. February 2021 using <https://www.goodreports.org/>, a tool made by the

[EQUATOR Network](#) in collaboration with [Penelope.ai](#)

For peer review only - <http://bmjopen.bmj.com/site/about/guidelines.xhtml>

BMJ Open

A Cross-sectional Survey on Physician Burnout During the COVID-19 Pandemic in Vancouver, Canada: The Role of Gender, Race and Sexual Orientation

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-050380.R1
Article Type:	Original research
Date Submitted by the Author:	10-Apr-2021
Complete List of Authors:	Khan, Nadia; The University of British Columbia Faculty of Medicine, Medicine; The University of British Columbia, Center for Health Evaluation and Outcomes Sciences Palepu , Anita; The University of British Columbia, Medicine Dodek, Peter; The University of British Columbia Faculty of Medicine, Medicine Salmon, Amy; The University of British Columbia, Center for Health Evaluation and Outcomes Sciences Leitch, Heather; The University of British Columbia Faculty of Medicine, Medicine Ruzycki, Shannon; University of Calgary Cumming School of Medicine, Department of Medicine, Community Health Sciences Townson, Andrea; The University of British Columbia Faculty of Medicine, Medicine Lacaille, Diane; The University of British Columbia Faculty of Medicine, Department of Medicine, Arthritis Research Canada
Primary Subject Heading:	Mental health
Secondary Subject Heading:	Occupational and environmental medicine
Keywords:	COVID-19, PUBLIC HEALTH, MENTAL HEALTH, Human resource management < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, GENERAL MEDICINE (see Internal Medicine)

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1
2
3 **A Cross-sectional Survey on Physician Burnout During the COVID-19 Pandemic in**
4
5 **Vancouver, Canada: The Role of Gender, Race and Sexual Orientation**
6
7

8 Short title: Physician Burnout during COVID-19
9

10 Nadia A. Khan MD MSc (1), Anita Palepu MD MPH (1), Peter Dodek MD MHSc (2),
11 Amy Salmon PhD (3), Heather A. Leitch MD (4), Shannon Ruzycki MD (5), Andrea
12 Townson MD (6), Diane Lacaille MD MHSc (7)
13

14
15 (1) Division of General Internal Medicine, Department of Medicine; Center for Health
16 Evaluation and Outcomes Science, University of British Columbia, Vancouver, BC,
17 Canada

18 (2) Division of Critical Care Medicine; Center for health evaluation and outcomes
19 sciences, University of British Columbia, Vancouver, BC, Canada

20 (3) Center for health evaluation and outcomes sciences; School of Population and Public
21 Health, University of British Columbia, Vancouver, BC, Canada

22 (4) Division of Hematology, University of British Columbia, Vancouver, BC, Canada

23 (5) Department of Medicine, Community Health Sciences, University of Calgary
24 Cumming School of Medicine, Calgary, Alberta, Canada

25 (6) Division of Physical Medicine and Rehabilitation, Dept. of Medicine, University of
26 British Columbia, Vancouver, BC, Canada

27 (7) Division of Rheumatology, Department of Medicine, University of British Columbia;
28 Arthritis Research Canada.
29
30

31
32 Word Count: 3263

33 Abstract: 262

34 References: 38

35 Figures: 4

36 Tables: 1
37

38 **Co-Author Email Addresses:**

39 apalepu@hivnet.ubc.ca

40 peter.dodek@ubc.ca

41 asalmon@cheos.ubc.ca

42 drhleitch@providencehematology.com

43 sarro@ualberta.ca

44 Andrea.Townson@vch.ca

45 dlacaille@arthritisresearch.ca
46
47

48 **Address for correspondence:**

49 Nadia Khan MD MSc

50 540.70, 1081 Burrard Street,

51 Vancouver, BC, V6Z 1Y6

52 P:604 682-2344

53 F:604 806-8005

54 Email: nakhanubc@gmail.com
55
56
57
58
59
60

ABSTRACT

Objective: To determine the prevalence of physician burnout during the pandemic and differences by gender, ethnicity, or sexual orientation.

Design, Setting and Participants: We conducted a cross-sectional survey (August-October, 2020) of internal medicine physicians at two academic hospitals in Vancouver, Canada.

Primary and Secondary Outcomes: Physician burnout and its components, emotional exhaustion, depersonalization, and personal accomplishment were measured using the Maslach Burnout Inventory.

Results: The response rate was 38% (n=302/803 respondents, 49% women,). The prevalence of burnout was 68% (emotional exhaustion 63%, depersonalization 39%, and feeling low personal accomplishment 22%). In addition, 20% reported that they were considering quitting the profession or had quit a position. Women were more likely to report emotional exhaustion (OR 2.00, 95% CI: 1.07 to 3.73, p=0.03) and feeling low personal accomplishment (OR 2.26, 95% CI: 1.09 -4.70, p=0.03) than men. Visible minority physicians were more likely to report feeling lower personal accomplishment than white physicians (OR 1.81, 95% CI: 1.28 to 2.55, p=0.001). There was no difference in emotional exhaustion or depersonalization by ethnicity or sexual orientation.

Physicians who reported that COVID affected their burnout were more likely to report any burnout (OR: 3.74, 95% CI: 1.99 to 7.01, p<0.001) and consideration of quitting or quit (OR: 3.20, 95% CI: 1.34 to 7.66, p=0.009).

1
2
3
4
5 Conclusion: Burnout affects 2 out of 3 internal medicine physicians during the pandemic.
6
7
8 Women, physicians of color, and those who feel that COVID affects burnout were more
9
10 likely to report components of burnout. Further understanding of factors driving feelings
11
12 of low personal accomplishment in women and visible minority physicians is needed.
13
14
15

16
17 Key Words: physician burnout, gender, race, COVID-19, equity
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

ARTICLE SUMMARY:

STRENGTHS

- This survey used a validated burnout instrument, Maslach Burnout Inventory, to measure internal medicine physician burnout during the pandemic.
- The study analyzed ethnicity, gender and sexual orientation of physicians on burnout and personal accomplishment that is infrequently assessed.
- As interventions for reducing burnout are not frequently informed by physician views, we determined which types of interventions to reduce burnout were considered important and explored any differences of these preferences by ethnicity, gender and sexual orientation.

LIMITATIONS

- The response rate was somewhat low at 38% but the results did not differ among divisions that had high response rates >50% compared with those that were lower.

INTRODUCTION

Burnout is an occupational syndrome consisting of emotional exhaustion, depersonalization, and a diminished sense of personal accomplishment from work stress. Physician burnout is increasing from a prevalence of 35-50% despite ongoing efforts to reduce burnout (1), with a recent meta-analysis indicating a 51% prevalence prior to the pandemic (2). The recent pandemic has placed further strain on physicians due to increased workload, anxiety related to supply of personal protective equipment, and uncertainty about patient care and health services (3). Burnout is a vital issue for physicians and health care systems as burnout is associated with worse job performance among physicians, job attrition, and is a stronger contributor to medical errors than fatigue (4). Burnout costs the Canadian health system \$213 million related to reduced physician work hours (5).

Physician burnout may disproportionately affect individuals based on their gender, ethnicity and sexual orientation, although study findings are sparse and inconsistent (6-8). Among women, unequal patient expectations, greater hours spent on child rearing, and gender discrimination may contribute to the increased emotional exhaustion experienced relative to men (6). Ethnic minority physicians experience more exclusion, and racial discrimination relative to white physicians (7) and sexual minority medical students experience more depression than heterosexual medical students (8). The pandemic may further amplify these structural inequities. The Public Health Agency of Canada reports that women, racialized Canadians, and essential workers are disproportionately affected by the COVID-19 pandemic (9). According to the American Medical Association, COVID-19 exacerbated inequities, not just for patients,

1
2
3 but also for physicians (10). These issues may not only impact prevalence of burnout, but
4
5 also influence the potential solutions for mitigating burnout.
6
7

8
9 Thus, we sought to evaluate the prevalence of burnout, determinants, work-to-life
10
11 conflict, considerations of quitting and views on potential interventions to reduce burnout
12
13 during the pandemic and to examine whether these measures differed by gender,
14
15 ethnicity, and sexual orientation among physicians who worked in the Department of
16
17 Medicine at two academic, tertiary care hospitals in Vancouver, Canada.
18
19

20 21 **METHODS**

22
23 We conducted a cross-sectional online survey of physician members of the Department of
24
25 Medicine at the University of British Columbia at two tertiary care hospital sites. The
26
27 Providence Health Research Ethics Board approved the study. The study reporting
28
29 followed the STROBE checklist.
30
31
32
33

34 35 **Participants and Setting**

36
37 All active members of the Department of Medicine working at two academic, tertiary
38
39 care hospitals in Vancouver were identified through division email lists. The Department
40
41 of Medicine is the largest department in the Faculty of Medicine at the University of
42
43 British Columbia (803 members with 37% women) and is a mix of academic (114 with
44
45 30% women) and clinical faculty. While all participants worked at either or both of the
46
47 two tertiary care centers, physicians also worked at community hospitals, private practice
48
49 or hospital ambulatory clinics, and rural or outreach sites. Participants provided informed
50
51 consent.
52
53
54
55
56
57
58
59
60

Survey

Content experts in physician burnout from the research team developed the survey questions based on the literature on burnout. The online questionnaire was administered using the Qualtrics survey platform (Qualtrics, Provo, UT) for web and mobile-based administration. The survey was pre-tested with a representative group of six physicians within the Department of Medicine to ensure that the questions and formatting were clear. Based on this, wording and the flow of demographic and intervention questions were then modified accordingly.

Demographic and Practice Characteristics

We collected information on gender (man, woman, non-binary person, or prefer not to say), number of children (of any age), age, ethnicity (white, South Asian, Asian or Pacific Islander, or other) and sexual orientation (identify as lesbian, gay, bisexual, two-spirited, or queer (LGBTQ), or identify as heterosexual). We collected years in practice, specialty including if the specialty was directly responsible for caring for patients with COVID-19 (ICU or General Internal Medicine), hours per week spent on clinical, and academic (teaching, research, administrative, medical education) activities, on call duties per month, number of weekend days working in a month, and use of electronic health systems.

Burnout, Consideration of Quitting, and Work-to-life Conflict

1
2
3 The Maslach Burnout Inventory© - Human Services Survey for Medical Personnel
4
5 (MBI) was used to assess burnout as this is the most widely used standard to measure
6
7 burnout for healthcare professionals (11). This validated instrument includes 22 items,
8
9 each scored from 0 to 6 based on self-reported frequency of the feeling addressed by each
10
11 item. In addition to providing an overall measure of burnout, the instrument enables the
12
13 measurement of the three distinct domains of burnout using summated ratings. The
14
15 emotional exhaustion domain consists of nine items (e.g. I feel emotionally drained from
16
17 my work) for a total score range of 0–54. The depersonalization domain consists of five
18
19 items (e.g. I don't really care what happens to some patients) for a total score range of 0–
20
21 30. The personal accomplishment domain consists of eight items (e.g. I have
22
23 accomplished many worthwhile things in this job) for a total score range of 0–48. The
24
25 presence of physician burnout was defined as an emotional exhaustion score ≥ 27 or
26
27 depersonalization score ≥ 10 , consistent with criteria used in other studies (12) and those
28
29 with scores less than this were considered as not experiencing burnout. We used the
30
31 same cut-points for defining the presence of emotional exhaustion or not and
32
33 depersonalization or not. Feeling low personal accomplishment (defined as a score ≤ 33)
34
35 was evaluated separately from overall burnout (12). Evidence linked 1-point changes in
36
37 burnout scores with meaningful differences in self-perceived major medical errors,
38
39 reductions in work hours, and suicidal ideation (13).
40
41
42
43
44
45

46
47 Respondents were asked if they had ever left a position or considered quitting a
48
49 position now for any reason. We assessed work-to-life conflict using one item from a
50
51 national study on burnout among physicians: “My work schedule leaves me enough time
52
53 for my personal/family life” (strongly agree, agree, neutral, disagree, strongly disagree)
54
55
56
57
58
59

1
2
3 (14). The presence of work-to life conflict was considered if respondents disagreed with
4 that statement. Physicians were also asked if they felt that the COVID-19 pandemic
5 increased their feelings of burnout (agree, neither agree nor disagree or disagree).
6
7
8
9

10 11 12 **Ratings of Interventions to Reduce or Prevent Physician Burnout by Physicians**

13
14 Respondents were asked to rate on a scale of 1 to 10 the importance of various
15 interventions to reduce or prevent burnout. These potential interventions included person-
16 level and organization-level interventions that were derived from systematic reviews of
17 interventions that were considered to reduce burnout (15-17).
18
19
20
21
22
23
24
25

26 **Procedures**

27
28 Electronic links to the questionnaires were emailed from August to October 2020 using
29 updated email lists from the Divisions. We employed a modified Dilman approach (18)
30 to recruit participants including an initial email-out from the research team followed by 2
31 reminders via email. There were no limitations on time to respond. Survey responses
32 were anonymous, and no incentives were provided.
33
34
35
36
37
38
39
40
41
42

43 **Patient and Public Involvement**

44 No patients were involved with this study as it pertained to physicians only. Physicians
45 were involved throughout the study process.
46
47
48
49
50

51 **STATISTICAL ANALYSIS**

1
2
3 Based on these data from a convenience sample, standard descriptive summary statistics
4 were used to characterize the physician respondents, survey scores, and ratings of
5 interventions. Separate multivariable logistic regression models were developed to assess
6 associations with overall burnout, burnout subscales (e.g. emotional exhaustion vs. not
7 and depersonalization vs. not), quitting, and work-life conflict. All models included the
8 following explanatory variables: age, gender, ethnicity (dichotomized to white or visible
9 minority physician due to sample size), sexual orientation, clinical hours, attribution of
10 COVID affecting burnout, division, weekend days worked, and on call duties. We tested
11 for the presence of interactions between gender and ethnicity as well as gender and sexual
12 orientation in these models. As these interaction were non-significant, we present the
13 models without the interaction terms. Missing values ranged from 14% to 17.5% across
14 all survey questions (14% missing MBI). From available data, there were no statistically
15 significant differences by division, age, gender, race/ethnicity or clinical hours worked
16 among those with missing data and those without. Missing values were excluded from
17 analyses (complete case analysis); therefore, our estimates are conservative. All tests
18 were 2-sided, and the level of significance was 0.05. All analyses were done using
19 STATA 12.0 (Texas, USA).
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43

44 RESULTS

45
46 Of the 803 (37% [297/803] women) physicians invited to participate in the questionnaire,
47 we received 302 responses (38% response rate with 31% with complete responses [49%
48 women]). Response rates by division ranged from 13% to 96% (Figure 1, Table 1).
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 As presented in Table 1, most respondents with complete data were between ages
4
5 35 to 50 years and had children. Almost half were women (122/249), no persons
6
7 identified as non-binary, and 2% (6/249) of respondents preferred not to provide their
8
9 gender. Almost one-third (78/249) of physician respondents identified as a visible
10
11 minority. There were 6% (15/249) of individuals who identified as lesbian, gay,
12
13 bisexual, two-spirited, or queer. While almost all respondents worked clinically, 28%
14
15 (70/249) included research in their portfolio, 37% (93/249) conducted medical education
16
17 work and 22% (55/249) also carried out administrative work.
18
19
20
21
22
23

24 **Overall Burnout Prevalence**

25
26 The prevalence of burnout was 68% among all respondents, 71% (86/121) among women
27
28 and 64% (75/117) among men ($p=0.25$). Burnout was reported by 60% (9/15) of persons
29
30 who identified as LGBTQ. The prevalence of burnout by race/ethnicity was: white
31
32 physicians 71% (117/165), South Asian physicians 68% (13/19), physicians identifying
33
34 as other ethnicities 78% (14/18), and Asian and Asian Pacific Islander physicians 54%
35
36 (22/41) ($p=0.88$). Burnout was highest in those who were 36-50 years at 74% (93/125)
37
38 and lower with increasing age categories; 51-65 years was 68% (48/71) and 66 years and
39
40 older had a prevalence of burnout of 32% (6/19) ($p=0.03$). The prevalence of burnout
41
42 ranged from 46% to 100% across divisions (Figure 1). Divisions with a response rate of
43
44 >55% had a similar prevalence of burnout compared with divisions with lower response
45
46 rates (65% vs. 70%, $p=0.40$). Burnout was not significantly different in those divisions
47
48 primarily responsible for caring for patients with COVID-19 compared to other divisions
49
50 (71% (35/49) vs. 68% (135/200), $p=0.60$)
51
52
53
54
55
56
57
58
59
60

1
2
3 As discerned in Table 1, from the bivariable analysis of demographic and work
4 characteristics with burnout, only age and clinical work hours were significantly
5 associated. However, there were no demographic or work characteristics associated with
6 overall burnout in the multivariable analyses (Figure 2).
7
8
9
10
11
12
13

14 **Emotional Exhaustion, Depersonalization and Personal Accomplishment**

15 The overall prevalence of emotional exhaustion was 63% (157/250) and
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
The overall prevalence of emotional exhaustion was 63% (157/250) and
depersonalization was 39% (99/251). Feeling low personal accomplishment was present
in 22% (55/249). From Figure 3, women were more likely to report emotional exhaustion
(adjusted Odds Ratio (AOR) 2.00, 95% Confidence Interval (CI): 1.07 to 3.73, p=0.03)
and feeling low personal accomplishment (AOR 2.26, 95% CI: 1.09 -4.70, p=0.03) than
men. There was no gender difference for depersonalization. Visible minority physicians
were more likely to report feeling low personal accomplishment compared with white
respondents (AOR 1.81, 95% CI: 1.28 to 2.55, p=0.001). Younger respondents were
more likely to report depersonalization than older physicians (AOR 0.60, 95% CI: 0.40 to
0.90, p=0.015). There was no association between ethnicity, sexual orientation, or
interaction terms of gender and ethnicity or of gender and sexual orientation, with
emotional exhaustion or depersonalization. There was no association between sexual
orientation or the interaction terms of gender and ethnicity or gender and sexual
orientation and feelings of low personal accomplishment.

51 **Having Quit or Consideration of Quitting, and Work-to life Conflict**

1
2
3 Twenty one percent of respondents reported that they quit a position or are considering
4 quitting a work position (12% [30/257] quit a position and 9% [22/257] were considering
5 quitting). There were no associations between age, gender, ethnicity, or sexual orientation
6 or work characteristics and considering quitting or having quit (Figure 2). Forty-one
7 percent (105/255) of respondents reported work-to-life conflict, not having enough time
8 for personal or family life because of work. There were no associations between gender,
9 ethnicity, or sexual orientation and reporting work-to-life conflict. However, increased
10 clinical hours and working more weekend days were associated with a greater likelihood
11 of reporting work to-life-conflict.
12
13
14
15
16
17
18
19
20
21
22
23
24
25

26 **Perceptions About COVID Affecting Burnout and Burnout**

27
28 Physicians who reported that COVID affected their burnout were also more likely to
29 report overall burnout (AOR 3.74, 95% CI: 1.99 to 7.01, $p<0.001$), emotional exhaustion
30 (AOR 3.21, 95% CI: 1.73 to 5.95, $p<0.001$) and depersonalization (AOR 2.47, 95%
31 CI:1.29 to 4.73, $p=0.006$), but not feelings of low personal accomplishment. Similarly,
32 those who reported that COVID affected burnout were more likely to have quit or
33 considering quitting a work position (AOR: 3.20, 95% CI: 1.34 to 7.66, $p=0.009$).
34
35
36
37
38
39
40
41
42
43
44

45 **Views on Potential Interventions to Mitigate Burnout and Promote Wellness**

46
47 Respondents rated interventions focusing on improving organizational factors to reduce
48 burnout and promote wellness as of high importance (Figure 4). Ratings of importance
49 did not significantly differ by gender, ethnicity or sexual orientation for each
50 intervention. The interventions with the highest importance ratings were reducing
51
52
53
54
55
56
57
58
59
60

1
2
3 inefficient work processes and non-physician clerical work. The interventions with the
4
5 lowest importance ratings were increasing social events, leadership skills and career
6
7 training.
8
9

12 **DISCUSSION**

14 During the COVID-19 pandemic, although most of our respondents feel a sense of
15
16 personal accomplishment, burnout and emotional exhaustion are high. Physicians who
17
18 endorse that COVID affects their feelings of burnout are more likely to report burnout
19
20 and to consider quitting a work position or have quit a position. Women and visible
21
22 minority physicians are more likely to report components of burnout compared with their
23
24 white counterparts during the pandemic.
25
26

28 The prevalence of burnout and its components in the current study are generally
29
30 higher than those reported prior to the pandemic. A systematic review of 176 studies
31
32 from 2018 reported a prevalence of overall burnout of 48.7%, emotional exhaustion of
33
34 36.7% and depersonalization of 32.1% among studies using similar burnout measures
35
36 (19). Also, a recent meta-analysis of 22, 778 medical and surgical residents identified a
37
38 51% aggregate prevalence prior to the pandemic (2). However, given significant
39
40 heterogeneity in the physician subjects sampled, location and study dates, it is
41
42 challenging to directly compare prevalence before and after the pandemic. Recent studies
43
44 from China, Italy, and the US report similarly high rates of burnout among health care
45
46 workers but most do not use standardized, benchmarked burnout questionnaires or
47
48 examine personal accomplishment (20-23). Our analysis highlights that physicians
49
50 perceived that COVID-19 increased their burnout. However, burnout was high across all
51
52
53
54
55
56
57
58
59
60

1
2
3 divisions studied regardless of whether they were responsible for caring for COVID
4 patients or not. This suggests a widespread impact of the pandemic and the restrictions
5 imposed including anxiety related to supply of personal protective equipment, uncertainty
6 and significant shift in clinical practice to virtual care (24). In a recent analysis of
7 surgeons, knowing a person who died from COVID-19 infection or someone who
8 acquired a COVID infection increased the risk of depression, anxiety, stress and post-
9 traumatic stress disorder, irrespective of being deployed for COVID-related work (25).
10 Increased work-hours, concerns over infecting family members, lack of support from
11 peers, limited resources and overwork were identified as drivers of burnout and
12 emotional exhaustion during the pandemic (22, 23).
13
14
15
16
17
18
19
20
21
22
23
24
25

26 Given recent social movements focused on racial inequity and the amplification
27 the effects of social disparities during the pandemic (26), our finding that more women
28 experience emotional exhaustion and both women and visible minority physicians are
29 more likely to report feeling low personal accomplishment than their counterparts is
30 important. Although inconsistent, studies of physicians before the pandemic reported a
31 higher risk of emotional exhaustion in women than men (27, 28). There are few studies
32 examining gender or ethnicity on burnout during the pandemic. However, a recent
33 analysis of medical trainees demonstrated that women were more likely to report stress
34 compared with men (21). The reasons underlying the high prevalence of emotional
35 exhaustion in women during the pandemic may include more family stress, greater child-
36 raising responsibility than men, increased risk of depression (29), and less supportive
37 work environments (6, 27, 28). Working parents spent an additional 6 hours caring for
38 their children and women took more than two-thirds of that additional time during the
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 pandemic in Canada and elsewhere (30). However, we did not find any gender
4
5 differences in our one item question on work-to-life conflict. Further, the increased
6
7 hours spent are thought to be at the expense of academic productivity in women (31) and
8
9 may contribute to feeling low personal accomplishment compared with men. The
10
11 literature is also inconsistent regarding the impact of race on burnout or its components
12
13 (32-34). A previous national US survey found that minority physicians were less likely
14
15 to report burnout including emotional exhaustion and depersonalization compared with
16
17 white, non-Hispanic physicians (35) whereas others demonstrated no difference in
18
19 burnout. However, with increased COVID-19 infections, incidents of racial
20
21 discrimination increased dramatically and this 'double pandemic' (32) may place greater
22
23 strain on visible minority physicians. Although our study also found no difference in
24
25 emotional exhaustion and depersonalization by ethnicity, we identified a greater
26
27 likelihood of feeling low personal accomplishment. The reasons underlying a feeling of
28
29 low personal accomplishment in these groups are unknown but may be related to higher
30
31 prevalence of imposter syndrome, a syndrome where an individual doubts their skills, or
32
33 accomplishments, increased discrimination or being less likely recognized for their
34
35 accomplishments than their counterparts (31, 33-35). Although our study did not find any
36
37 differences in burnout among sexual minority groups, a previous analysis of medical
38
39 students found greater rates of depression than heterosexual medical students (8).

40
41
42 Given the high prevalence of burnout, strategies to reduce burnout are needed
43
44 urgently. Most interventions studied thus far include person level interventions to
45
46 improve resilience and coping with effective tools such as online cognitive behavioral
47
48 therapy. (36) There are fewer studies evaluating additional components that address
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 system-level issues including optimizing work quality or quantity. Further, there are few
4
5 studies evaluating physician preferences for person level, work quality or quantity
6
7 interventions. In this study, ratings for the interventions that reduced work inefficiencies
8
9 and non-physician clerical work were rated similarly highly among gender, ethnicity, or
10
11 sexual orientation subgroups. This extends the findings from other observational studies
12
13 that satisfaction with workflow, relationship with colleagues, time and resources for
14
15 continuing medical education, opportunity to affect decision making, workload, and
16
17 having a trusted advisor were associated with lower likelihood of burnout (15). These
18
19 interventions that addressed work quality were highly rated, whereas person-level
20
21 interventions were less highly rated. New interventions should focus on combining
22
23 person-level interventions, with system-level approaches that address work quantity and
24
25 quality interventions.
26
27
28
29

30
31 This study systematically examined burnout using standard measures of burnout
32
33 during the pandemic. However, there are several limitations to note. First, response rates
34
35 were somewhat low which increases the risk of non-response bias. However, response
36
37 rates were comparable to other physician surveys (37, 38) despite the significant increase
38
39 in workload during the pandemic and burnout prevalence was nevertheless elevated in
40
41 divisions that had high response rates. Second, the number of physicians who identified
42
43 as LGBTQ or non-binary gender was low that may have underestimated any differences.
44
45 Third, we were not able to quantify any incremental effect of the pandemic on burnout, as
46
47 we did not have comparable data just prior to the pandemic. Perceptions of COVID-19
48
49 impacting feelings of burnout may be subject to confirmation bias. Finally, we sampled
50
51 physicians from the Department of Medicine and these results may not necessarily extend
52
53
54
55
56
57
58
59
60

1
2
3 to other physician groups such as emergency, primary care, or surgical specialties or
4
5 allied health care workers.
6
7
8
9

10 **CONCLUSION**

11
12 Burnout during the pandemic is affecting 2 out of every 3 physicians in this sample.

13
14 Emotional exhaustion and feeling low personal accomplishment are more prevalent in
15
16 certain groups including women or visible minority physicians. Interventions reducing
17
18 inefficient work practices and non-physician work is urgently needed and considered of
19
20 highly important by all groups. Interventions for improving feelings of personal
21
22 accomplishment that target gender and ethnic disparities among physicians must also be
23
24 considered.
25
26
27
28
29
30

31 **ETHICS STATEMENT:** This study was approved by the Providence Health Research
32 Ethics boards H018-02999
33
34

35 **FUNDING:** This project was unfunded. Dr. Diane Lacaille is supported by the Mary
36 Pack Arthritis Chair in Rheumatology Research from the University of British Columbia
37 and the Arthritis Society of Canada.
38
39

40 **COMPETING INTERESTS:** The authors declare that there are no competing interests
41 with this manuscript.
42

43 **AUTHOR STATEMENT:** NAK, AP, PD, HL, DL, SR, AS contributed to the design of
44 the study. NAK, AP, AT and DL contributed to data collection and NAK contributed
45 towards analysis. All authors contributed to interpretation of the results, and meaningful
46 contribution to writing and accepting the final manuscript. NAK had full access to all the
47 data in the study and take responsibility for the integrity of the data and the accuracy of
48 the data analysis.
49
50

51 **DATA STATEMENT:** Statistical code and dataset available upon request of the
52 corresponding author.
53

54 **REFERENCES**

55
56
57
58
59
60

1. 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 Clinic Proc.* 2015;90(12):1600-1613.
2. Low ZX, Yeo KA, Sharma VK, Leung GK, McIntyre RS, Guerrero A, Lu B, Sin Fai Lam CC, Tran BX, Nguyen LH, Ho CS, Tam WW, Ho RC. Prevalence of Burnout in Medical and Surgical Residents: A Meta-Analysis. *Int J Environ Res Public Health.* 2019;16(9):1479.
3. Sharifi M, Asadi-Pooya AA, Mousavi-Roknabadi RS. Burnout among Healthcare Providers of COVID-19; a Systematic Review of Epidemiology and Recommendations. *Arch Acad Emerg Med.* 2020;9(1):e7.
4. Daniel S. Tawfik, Jochen Profit, Timothy I. Morgenthaler, Daniel V. Satele, Christine A. Sinsky, Liselotte N. Dyrbye, Michael A. Tutty, Colin P. West, Tait D. Shanafelt. Physician Burnout, Well-being, and Work Unit Safety Grades in Relationship to Reported Medical Errors. *Mayo Clinic Proceedings,* 2018;93(11):1571-1580.
5. Dewa CS, Jacobs P, Thanh NX, Loong D. An estimate of the cost of burnout on early retirement and reduction in clinical hours of practicing physicians in Canada. *BMC Health Serv Res.* 2014;14:254.
6. Linzer M, Harwood E. Gendered expectations: do they contribute to high burnout among female physicians? *J Gen Intern Med.* 2018;33(6):963–5.
7. Garcia LC, Shanafelt TD, West CP, et al. Burnout, Depression, Career Satisfaction, and Work-Life Integration by Physician Race/Ethnicity. *JAMA Netw Open.* 2020;3(8):e2012762.
8. Przedworski JM, Dovidio JF, Hardeman RR, et al. A Comparison of the Mental Health and Well-Being of Sexual Minority and Heterosexual First-Year Medical Students: A Report From the Medical Student CHANGE Study. *Acad Med.* 2015;90(5):652-659.
9. Public Health Agency of Canada. <https://www.canada.ca/en/public-health/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/from-risk-resilience-equity-approach-covid-19.html#a2>. Accessed February 1, 2021
10. American Medical Association. <https://www.ama-assn.org/delivering-care/health-equity/covid-19-faqs-health-equity-pandemic>. Accessed February 1, 2021
11. C. Maslach, S.E. Jackson. The measurement of experienced burnout. *Journal of Occupational Behaviour*, 2 (1981), pp. 99-113. Copyright ©1981, 2016 by Christina Maslach & Susan E. Jackson. All rights reserved in all media. Published by Mind Garden, Inc., www.mindgarden.com
12. Rotenstein LS, Torre M, Ramos MA, et al. Prevalence of Burnout Among Physicians: A Systematic Review. *JAMA.* 2018;320(11):1131–1150.
13. Panagioti M, Geraghty K, Johnson J, Zhou A, Panagopoulou E, Chew-Graham C, Peters D, Hodkinson A, Riley R, Esmail A. Association Between Physician Burnout and Patient Safety, Professionalism, and Patient Satisfaction: A Systematic Review and Meta-analysis. *JAMA Intern Med.* 2018. doi: 10.1001/jamainternmed.2018.3713
14. West CP, Dyrbye LN, Rabatin JT, Call TG, Davidson JH, Multari A, Romanski SA, Hellyer JM, Sloan JA, Shanafelt TD. Intervention to promote physician well-

- being, job satisfaction, and professionalism: a randomized clinical trial. *JAMA Intern Med.* 2014;174(4):527-33.
15. 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.
 16. Clough BA, March S, Chan RJ, Casey LM, Phillips R, Ireland MJ. Psychosocial interventions for managing occupational stress and burnout among medical doctors: a systematic review. *Syst Rev.* 2017;6(1):144.
 17. Busireddy KR, Miller JA, Ellison K, Ren V, Qayyum R, Panda M. Efficacy of Interventions to Reduce Resident Physician Burnout: A Systematic Review. *J Grad Med Educ.* 2017;9(3):294-301.
 18. Dillman DA. *Mail and telephone surveys: the total design method.* 1978, New York: John Wiley & Sons.
 19. Rotenstein LS, Torre M, Ramos MA, et al. Prevalence of Burnout Among Physicians: A Systematic Review. *JAMA.* 2018;320(11):1131–1150.
 20. Amanullah S, Ramesh Shankar R. The Impact of COVID-19 on Physician Burnout Globally: A Review. *Healthcare (Basel).* 2020;8(4):421.
 21. Sasangohar F., Jones S., Masud F., Vahidy F., Kash B. Provider Burnout and Fatigue During The COVID-19 Pandemic: Lessons Learned from A High-Volume Intensive Care Unit. *Anesth. Analg.* 2020;131:106–111.
 22. Wu Y, Wang J, Luo C, Hu S, Lin X, Anderson A, Bruera E, Yang X, Wei S, Qian Y. A Comparison of Burnout Frequency Among Oncology Physicians and Nurses Working on The Frontline and Usual Wards During The COVID-19 Epidemic in Wuhan, China. *J. Pain Symptom Manag.* 2020;60:e60–e65.
 23. Di Monte C, Monaco S, Mariani R, Di Trani M. From Resilience to Burnout: Psychological Features of Italian General Practitioners During COVID-19 Emergency. *Front Psychol.* 2020;11:567201.
 24. Kannampallil T, Goss C, Evanoff B, Strickland J, McAlister R, Duncan J. Exposure To COVID-19 Patients Increases Physician Trainee Stress and Burnout. *PLoS ONE.* 2020;15:e0237301.
 25. Tan YQ, Wang Z, Yap QV, Chan YH, Ho RC, Hamid ARAH, Landaluce-Olavarria A, Pellino G, Gauhar V, Chand M, Wroclawski ML, Hameed BMZ, Ling SK, Sengupta S, Gallo G, Chiu PK, Tanidir Y, Tallada MPV, Garcia BN, Colleoni R, Abiddin ZAZ, Campi R, Esperto F, Carrion D, Elterman D, Chung ASJ, Ng ACF, Moschini M, Rivas JG, Mayol J, Teoh JY, Chiong E. Psychological Health of Surgeons in a Time of COVID-19: A Global Survey. *Ann Surg.* 2021 Jan 22. doi: 10.1097/SLA.0000000000004775. Epub ahead of print. PMID: 33491983
 26. Devakumar D, Shannon G, Bhopal SS, Abubakar I. Racism and discrimination in COVID-19 responses. *Lancet.* 2020;395(10231):1194.
 27. Elmore LC, Jeffe DB, Jin L, Awad MM, Turnbull IR. National Survey of Burnout among US General Surgery Residents. *J Am Coll Surg.* 2016;223(3):440-451.
 28. Linzer M, Smith CD, Hingle S, et al. Evaluation of Work Satisfaction, Stress, and Burnout Among US Internal Medicine Physicians and Trainees. *JAMA Network Open.* 2020;3(10):e2018758.

- 1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
29. Lim GY, Tam WW, Lu Y, Ho CS, Zhang MW, Ho RC. Prevalence of Depression in the Community from 30 Countries between 1994 and 2014. *Sci Rep*. 2018 Feb 12;8(1):2861.
 30. Johnston R, Mohammed A, Van der Linden C. Evidence of Exacerbated Gender Inequality in Child Care Obligations in Canada and Australia during the COVID-19 Pandemic. *Politics & Gender*. 2020; 16(4): 1131-1141.
 31. Brubaker L. Women Physicians and the COVID-19 Pandemic. *JAMA*. 2020; 324(9): 835-836.
 32. Addo IY. Double pandemic: racial discrimination amid coronavirus disease 2019. *Social Sciences & Humanities Open*. 2020;2(1):100074.
 33. Cantor JC, Mouzon DM. Are Hispanic, Black, and Asian Physicians Truly Less Burned Out Than White Physicians? Individual and Institutional Considerations. *JAMA Netw Open*. 2020;3(8):e2013099.
 34. Garcia LC, Shanafelt TD, West CP, et al. Burnout, Depression, Career Satisfaction, and Work-Life Integration by Physician Race/Ethnicity. *JAMA Network Open*. 2020;3(8):e2012762.
 35. Osseo-Asare A, Balasuriya L, Huot SJ, et al. Minority resident physicians' views on the role of race/ethnicity in their training experiences in the workplace. *JAMA Netw Open*. 2018;1(5):e182723.
 36. Ho CS, Chee CY, Ho RC. Mental Health Strategies to Combat the Psychological Impact of COVID-19 Beyond Paranoia and Panic. *Ann Acad Med Singap*. 2020 Mar 16;49(3):155-160.
 37. Peterson NB, Friedman RH, Ash AS, Franco S, Carr PL. Faculty self-reported experience with racial and ethnic discrimination in academic medicine. *J Gen Intern Med*. 2004;19(3):259-265.
 38. Cunningham CT, Quan H, Hemmelgarn B. et al. Exploring physician specialist response rates to web-based surveys. *BMC Med Res Methodol*. 2015; 15, 32.

FIGURE LEGEND:

Figure 1. Prevalence of Burnout by Division %

Figure 2. Multivariate Association of Burnout, Work-Life Conflict and Consideration of Quitting or Having Quit

Figure 3. Multivariate Association of Burnout Subscales, High Emotional Exhaustion (EE), High Depersonalization (DP) and Low Personal Accomplishment (PA)

Figure 4. Ratings on Strategies to Reduce Burnout and Promote Well-being*

Table 1. Baseline Characteristics According to Physician Burnout, %(n)*

Characteristics	No Burnout N=79	Burnout N=170	P-value
Demographics			
Age			
25-35 years	13.9 (11)	12.5 (21)	0.03
36-50 years	40.5 (32)	54.8 (92)	
51-65 years	29.1 (23)	29.2 (49)	
66 years or older	16.4 (13)	3.6 (6)	
Women	44.3 (35)	52.7 (87)	0.23
Ethnicity			
White	62.3 (48)	70.7 (118)	0.88
Asian or Pacific Islander	24.7 (19)	13.2 (22)	
South Asian	7.8 (6)	7.78 (13)	
Other	5.2 (4)	8.4 (14)	
LGBTQ	7.6 (6)	5.4 (9)	0.32

Children			
No children	23.1 (18)	31.1 (52)	0.52
1-2 children	50 (39)	47.9 (80)	
3 or more children	26.9 (21)	21 (35)	
Work Characteristics			
Medicine Specialty			
General Internal Medicine	12.8 (10)	13.5 (23)	0.54
Medical Oncology	6.4 (5)	16.4 (28)	
Neurology	11.5 (9)	14.0 (24)	
Rheumatology	18 (14)	8.8 (15)	
PMR	12.8 (10)	6.4 (11)	
ICU	5.1 (4)	7.0 (12)	
Cardiology	5.1 (4)	3.5 (6)	
Endocrinology	9 (7)	3.5 (6)	

Gastroenterology	5.1 (4)	3.5 (6)	
Infectious Diseases	<4	6.4 (11)	
Social Medicine**	<4	2.9 (5)	
Other Divisions	10.1 (8)	13.5 (23)	
Divisions primarily responsible for COVID care	17.7 (14)	20.5 (35)	0.61
Appointment			
Clinical	92.4 (73)	90.6 (155)	0.86
Research	27.9 (22)	28.7 (49)	
Medical Education	31.7 (25)	39.2 (67)	
Administration	15.2 (12)	25.2 (43)	
Clinical Duty Hours			
>40 hours/week	52.1 (38)	46.5 (72)	0.04
>60 hours/week	8.2 (6)	21.9 (34)	
Weekend Days			

Working/ month			
None	25.3 (20)	17.8 (30)	0.27
1-2	44.3 (35)	52.1 (88)	
3-4	25.3 (20)	19.5 (33)	
5 or more	5.1 (4)	10.7 (18)	
Call Days/month			
None	20.5 (16)	15.8 (26)	0.90
1-3	47.4 (37)	55.8 (92)	
4 or more	32.1 (25)	28.5 (47)	
View COVID as affecting burnout	45.6 (36)	75.2 (127)	<0.0001

*14 to 17.5% missing data excluded.

**Social Medicine is a new Division that includes a focus on addictions and social determinants of health.

Abbreviations: LGBTQ: lesbian, gay, bisexual, transsexual, or queer; PMR: physical medicine and rehabilitation; ICU: intensive care unit

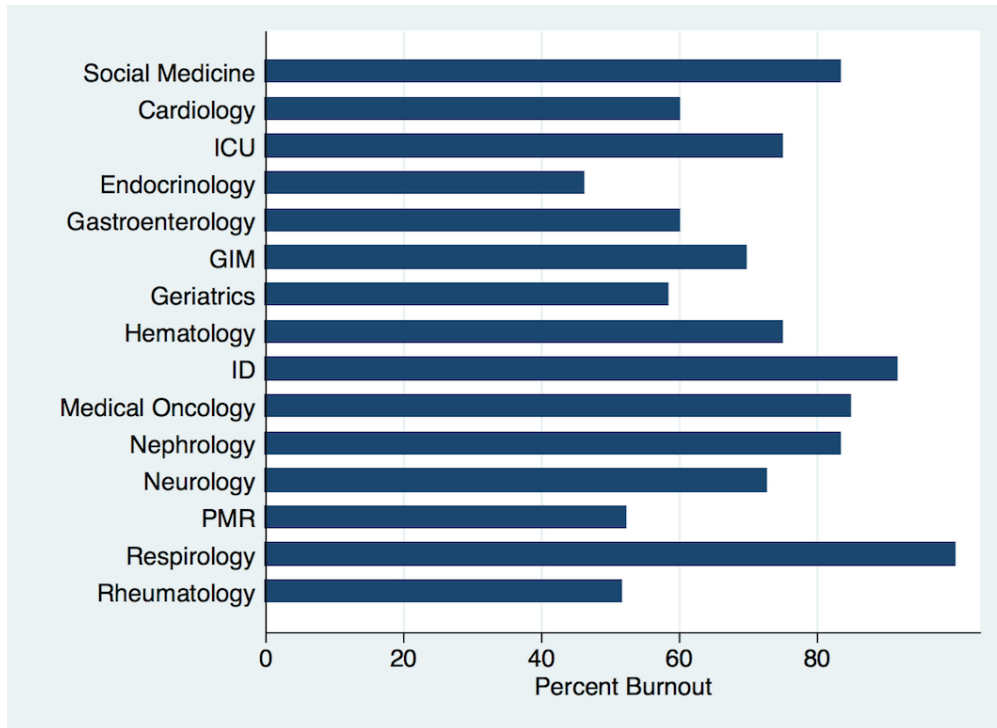


Figure 1. Prevalence of Burnout by Division %

Response rates: >55% in General Internal Medicine (GIM), Intensive Care (ICU), Social Medicine, and Rheumatology; 30-54% in Endocrinology, Infectious Disease (ID), Medical Oncology, Physical Medicine and Rehabilitation (PMR); <30% in Cardiology, Gastroenterology, Geriatrics, Hematology, Nephrology and Respirology.

90x65mm (300 x 300 DPI)

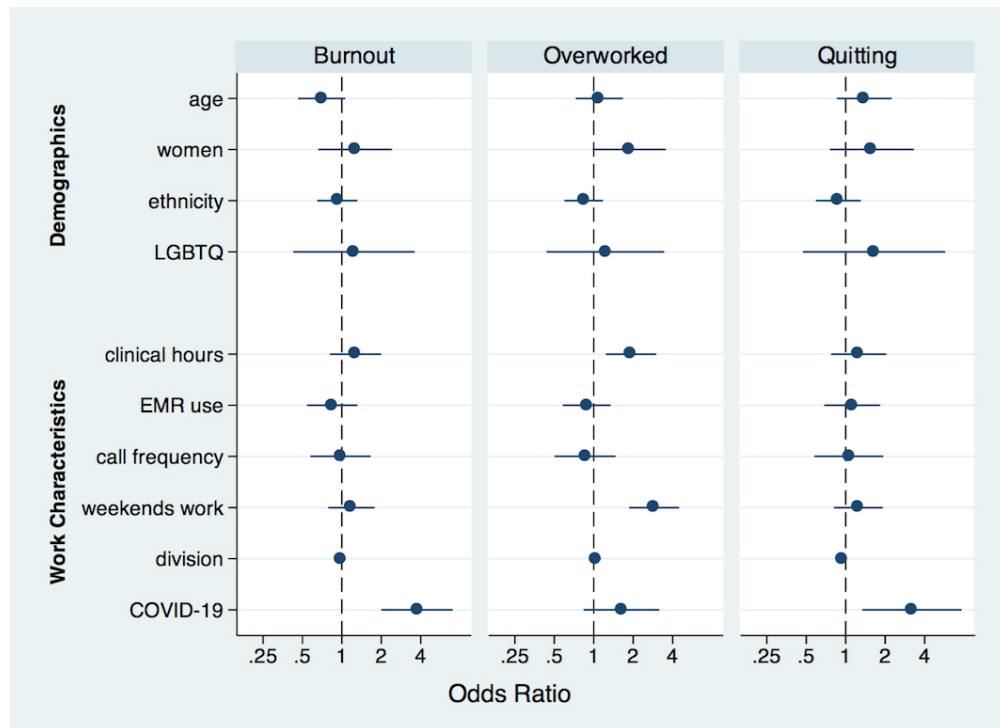


Figure 2. Multivariate Association of Burnout, Work-Life Conflict and Consideration of Quitting or Having Quit

Abbreviations: LGBTQ: lesbian, gay, bisexual, two-spirited, transsexual, or queer; EMR: electronic health record

90x65mm (300 x 300 DPI)

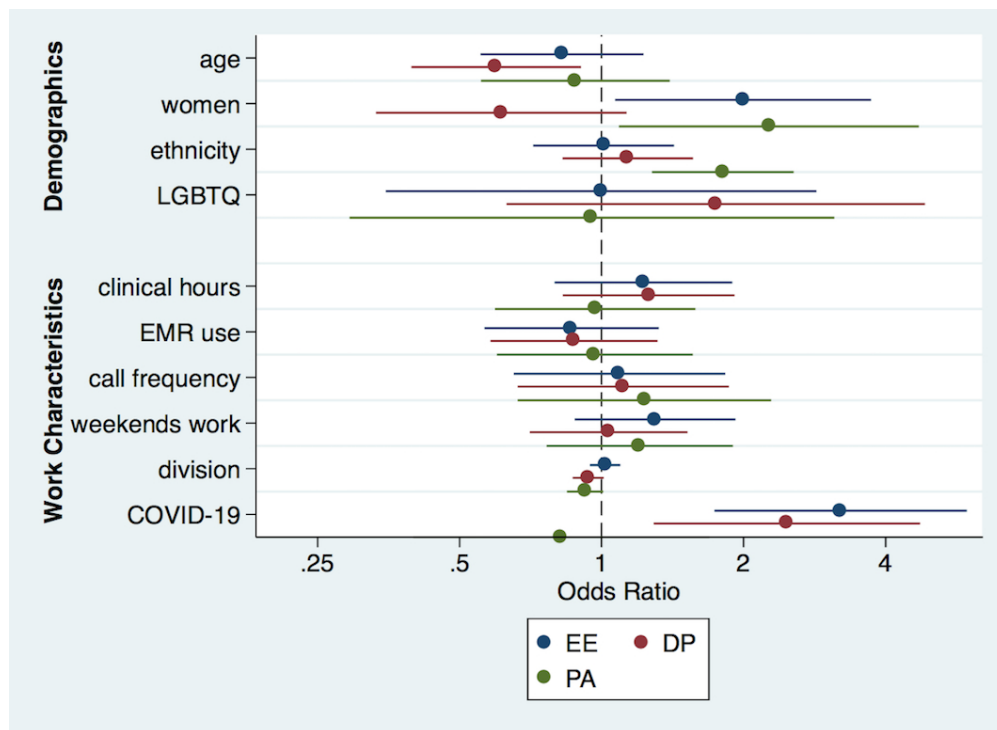


Figure 3. Multivariate Association of Burnout Subscales, High Emotional Exhaustion (EE), High Depersonalization (DP) and Low Personal Accomplishment (PA) Abbreviations: LGBTQ: lesbian, gay, bisexual, two-spirited, transsexual, or queer; EMR: electronic health record

90x65mm (300 x 300 DPI)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

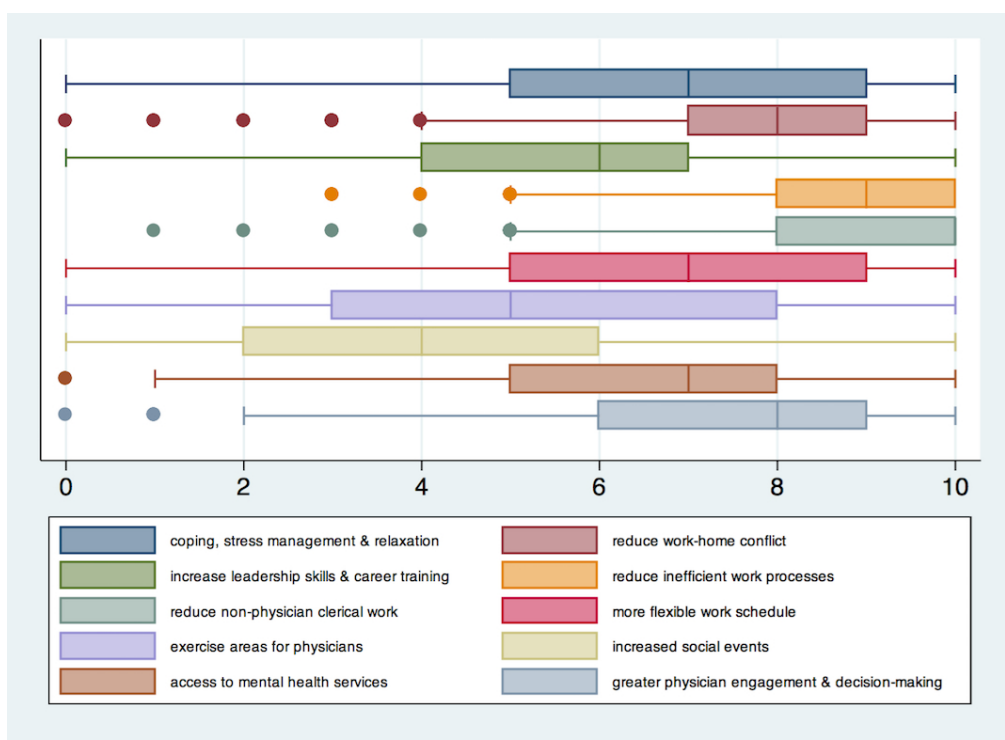


Figure 4. Ratings on Strategies to Reduce Burnout and Promote Well-being** Ratings based on a scale of 0 through 10 with 0 being the lowest level of importance and 10 the highest level of importance.

90x65mm (300 x 300 DPI)

Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the STROBE cross sectional reporting guidelines, and cite them as:

von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies.

		Reporting Item	Page Number
Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	#3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	#4	Present key elements of study design early in the paper	5
Setting	#5	Describe the setting, locations, and relevant dates, including periods of	5

1		recruitment, exposure, follow-up, and data collection	
2	Eligibility criteria	#6a Give the eligibility criteria, and the sources and methods of selection of	5
3		participants.	
4			
5			
6		#7 Clearly define all outcomes, exposures, predictors, potential	6
7		confounders, and effect modifiers. Give diagnostic criteria, if applicable	
8			
9			
10	Data sources /	#8 For each variable of interest give sources of data and details of methods	6
11	measurement	of assessment (measurement). Describe comparability of assessment	
12		methods if there is more than one group. Give information separately	
13		for for exposed and unexposed groups if applicable.	
14			
15			
16			
17	Bias	#9 Describe any efforts to address potential sources of bias	8
18			
19	Study size	#10 Explain how the study size was arrived at	8
20			
21	Quantitative	#11 Explain how quantitative variables were handled in the analyses. If	8
22	variables	applicable, describe which groupings were chosen, and why	
23			
24			
25	Statistical	#12a Describe all statistical methods, including those used to control for	8
26	methods	confounding	
27			
28			
29	Statistical	#12b Describe any methods used to examine subgroups and interactions	8
30	methods		
31			
32			
33	Statistical	#12c Explain how missing data were addressed	8
34	methods		
35			
36			
37	Statistical	#12d If applicable, describe analytical methods taking account of sampling	na
38	methods	strategy	
39			
40			
41	Statistical	#12e Describe any sensitivity analyses	8
42	methods		
43			
44	Results		
45			
46	Participants	#13a Report numbers of individuals at each stage of study—eg numbers	9
47		potentially eligible, examined for eligibility, confirmed eligible,	
48		included in the study, completing follow-up, and analysed. Give	
49		information separately for for exposed and unexposed groups if	
50		applicable.	
51			
52			
53			
54			
55	Participants	#13b Give reasons for non-participation at each stage	na
56			
57	Participants	#13c Consider use of a flow diagram	na
58			
59			
60			

1	Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	9
2				
3				
4				
5				
6	Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	8,9
7				
8				
9				
10	Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	9
11				
12				
13				
14	Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	9
15				
16				
17				
18				
19	Main results	#16b	Report category boundaries when continuous variables were categorized	9
20				
21	Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	na
22				
23				
24				
25	Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	8
26				
27				
28				
29	Discussion			
30				
31	Key results	#18	Summarise key results with reference to study objectives	12
32				
33				
34	Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	15
35				
36				
37				
38				
39	Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	15
40				
41				
42				
43				
44	Generalisability	#21	Discuss the generalisability (external validity) of the study results	15
45				
46				
47	Other			
48	Information			
49				
50				
51	Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	16
52				
53				
54				
55				

The STROBE checklist is distributed under the terms of the Creative Commons Attribution License CC-BY.

This checklist was completed on 18. February 2021 using <https://www.goodreports.org/>, a tool made by the

[EQUATOR Network](#) in collaboration with [Penelope.ai](#)

For peer review only - <http://bmjopen.bmj.com/site/about/guidelines.xhtml>