




BMJ Open Prevalence and drivers of nurse and physician distress in cardiovascular and oncology programmes at a Canadian quaternary hospital network during the COVID-19 pandemic: a quality improvement initiative

Ahlexxi Jelen ¹, Gary Rodin ², Leanna Graham,³ Rebecca Goldfarb,⁴ Kenneth Mah,² Daniel V Satele,⁵ Mary Elliot,² Monika K Krzyzanowska,⁶ Barry B Rubin ⁷

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For numbered affiliations see end of article.

Correspondence to
Ahlexxi Jelen;
ahlexxi.jelen@uhn.ca

ABSTRACT

Objectives To assess the prevalence and drivers of distress, a composite of burnout, decreased meaning in work, severe fatigue, poor work–life integration and quality of life, and suicidal ideation, among nurses and physicians during the COVID-19 pandemic.

Design Cross-sectional design to evaluate distress levels of nurses and physicians during the COVID-19 pandemic between June and August 2021.

Setting Cardiovascular and oncology care settings at a Canadian quaternary hospital network.

Participants 261 nurses and 167 physicians working in cardiovascular or oncology care. Response rate was 29% (428 of 1480).

Outcome measures Survey tool to measure clinician distress using the Well-Being Index (WBI) and additional questions about workplace-related and COVID-19 pandemic-related factors.

Results Among 428 respondents, nurses (82%, 214 of 261) and physicians (62%, 104 of 167) reported high distress on the WBI survey. Higher WBI scores (≥ 2) in nurses were associated with perceived inadequate staffing (174 (86%) vs 28 (64%), $p=0.003$), unfair treatment, (105 (52%) vs 11 (25%), $p=0.005$), and pandemic-related impact at work (162 (80%) vs 22 (50%), $p<0.001$) and in their personal life (135 (67%) vs 11 (25%), $p<0.001$), interfering with job performance. Higher WBI scores (≥ 3) in physicians were associated with perceived inadequate staffing (81 (79%) vs 32 (52%), $p=0.001$), unfair treatment (44 (43%) vs 13 (21%), $p=0.02$), professional dissatisfaction (29 (28%) vs 5 (8%), $p=0.008$), and pandemic-related impact at work (84 (82%) vs 35 (56%), $p=0.001$) and in their personal life (56 (54%) vs 24 (39%), $p=0.014$), interfering with job performance.

Conclusion High distress was common among nurses and physicians working in cardiovascular and oncology care settings during the pandemic and linked to factors within and beyond the workplace. These results underscore the complex and contextual aspects of clinician distress, and the need to develop targeted approaches to effectively address this problem.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This project highlights the importance of assessing clinician well-being and identifying contextual factors that contribute to high distress among diverse healthcare workers and care settings that can be used to develop targeted intervention strategies to address this problem.
- ⇒ The project used the validated Well-Being Index with additional measures of workplace and COVID-19-related pressures to document the prevalence and potential drivers of distress among cardiovascular and oncology clinicians.
- ⇒ Survey questions related to the workplace and COVID-19 were not validated but were contextually relevant in assessing their potential contribution to high distress among clinicians.
- ⇒ The survey was conducted during the COVID-19 pandemic, and response rates may have been affected by survey fatigue, workload burden and staffing shortages.
- ⇒ This cross-sectional project does not allow for conclusions about causality, and the generalisability of the population under investigation to other settings and clinical groups is not established.

INTRODUCTION

Clinicians are exposed to multiple stressors within their work environment and are at increased risk of poor mental and physical health outcomes. Work-related pressures are associated with psychological distress and other adverse mental health outcomes, including burnout, depression, anxiety, sleep disturbances, substance use, suicidal ideation and completed suicide.^{1–5} Nurses and physicians are particularly vulnerable to experiencing burnout, a work-related syndrome

characterised by emotional exhaustion, depersonalisation and a feeling of low personal accomplishment^{6 7} due to chronic and prolonged work-related stress.^{2 8} In addition to burnout, the clinically relevant dimensions of distress include decreased meaning in work, severe fatigue, poor work–life integration and quality of life, and suicidal ideation.^{9–11} Distress among healthcare workers can have adverse effects on patient safety and quality of care, leading to increased medical errors, worse patient outcomes and reduced patient satisfaction.^{1 12–14} The negative effects of clinician distress and burnout further translate into economic losses for healthcare systems through increased absenteeism, high job turnover, medicolegal expenses and decreased productivity.^{14 15}

The severity of distress in healthcare workers can vary depending on clinician characteristics, healthcare settings and the broader environment. It has been found that being a nurse or a physician, having less work experience, identifying as female, working in a high-stress specialty such as critical care or treating patients with advanced or chronic illnesses, like cancer and cardiovascular diseases, and working in academic healthcare settings are significant drivers of clinician distress.^{1 2 8 16–18} High levels of distress and burnout have also been attributed to workplace-related factors, including excessive workloads, administrative burden, lack of control over work and work–life imbalances.^{1 19} Our previous research found that inadequate staffing levels and unfair treatment in the workplace were associated with greater distress among cardiovascular nurses, physicians and allied health professionals.^{20–22}

The unprecedented pressure and rapid changes in hospital work environments during the COVID-19 pandemic seemed to exacerbate clinician distress. In that regard, frontline healthcare workers experienced significant distress due to increased workloads, high patient-to-nurse ratios, redeployment, risk of infection and viral spread while caring for COVID-19 patients or vulnerable populations, and the lack of personal protective equipment.^{23–26} Distress experienced by clinicians may have also been amplified by their responsibility to carry out emergency public health measures to control the virus, including social distancing, self-isolation or quarantine.^{27 28} While deemed necessary during that period, these pandemic response measures may have intensified distress due to decreased social interactions, greater work–life imbalance and uncertainty about their effectiveness.^{23 25}

Distress experienced by clinicians had been rising, even prior to the COVID-19 pandemic, reaching a crisis level, as alarmingly high rates of burnout, depression, and suicide threatened their well-being and patient safety.^{6 29} Understanding the prevalence of distress and relevant contextual factors among healthcare workers in different care settings is essential for developing intervention strategies that reduce distress and improve well-being, even as the pandemic wanes. Initial research by our team examined the prevalence and drivers of burnout and distress among

clinicians in a cardiovascular programme.^{20–22} As a next step, this quality improvement initiative aimed to identify the prevalence of clinician distress during the COVID-19 pandemic along with workplace-related and pandemic-related factors contributing to it in cardiovascular and oncology care settings, the two largest programmes within a Canadian quaternary hospital network.

METHODS

Participants, materials and procedure

We surveyed nurses and physicians practising cardiovascular and oncology care in the Peter Munk Cardiac Centre (PMCC) and Princess Margaret Cancer Centre (PMCP) at the University Health Network (UHN), a large academic quaternary care institution in Toronto, Canada. These settings were chosen as they are comparably sized large programmes within our hospital network. The survey tool was administered during the second year of the COVID-19 pandemic. All nurses and physicians in the PMCC and PMCP were eligible and invited to respond between 14 June 2021 and 20 August 2021. Initial survey invitations and subsequent reminders were sent via email by Canadian Viewpoint (<https://canview.com/>), an independent, third-party quantitative data collection company. Additional recruitment strategies were used to create awareness of the survey, including recruitment posters, visits to clinical units and virtual staff meetings. Each strategy described the initiative and potential benefit to clinicians, including immediate confidential survey results and information on local, provincial and Canadian resources to support well-being. Participant consent was obtained by clinicians if they signed the user licence agreement upon completing the survey. Clinicians were not compensated for participation in this project. Survey participation was voluntary, and all demographics and responses remained anonymous.

Measures

The survey tool included questions that were developed by the project team about participants' demographics and practice characteristics.

Well-Being Index

To assess overall distress, we used the Well-Being Index (WBI), a brief, nine-item, validated self-assessment tool that assesses symptoms of stress, burnout, fatigue, depression, quality of life, satisfaction with work–life balance and meaning in work.^{9–11} Seven of the nine WBI items are answered as 'yes/no', with 1 point assigned to the total WBI score for each 'yes' response. The item that evaluates meaning in work uses a 7-point Likert scale (1=very strongly disagree and 7=very strongly agree), with 1 point added to the total score for those who indicate higher disagreement (strongly disagree or very strongly disagree), or 1 point subtracted to the total score for those who indicate higher agreement (strongly agree or very strongly agree). The item that evaluates satisfaction with

Table 1 Workplace and COVID-19-related statements

Statement	Likert scale
Please rate how satisfied you are with your electronic medical record.	Very unsatisfied=1, very satisfied=5
Staffing levels in this work setting are sufficient to handle the number of patients.	Disagree strongly=1, agree strongly=5
I am treated fairly in the workplace.	Disagree strongly=1, agree strongly=5
The COVID-19 pandemic has interfered with my ability to do my job because of its impact on my work environment.	Disagree strongly=1, agree strongly=5
The COVID-19 pandemic has interfered with my ability to do my job because of its impact on my personal life.	Disagree strongly=1, agree strongly=5
I feel happy at work.	Disagree strongly=1, agree strongly=5
I am contributing professionally (eg, patient care, teaching, research and leadership) in the ways I value most.	Disagree strongly=1, agree strongly=5

work–life balance uses a 5-point Likert scale (1=strongly disagree and 5=strongly agree), with 1 point added to the total score for those who indicate lower satisfaction (disagree or strongly disagree), and 1 point subtracted from the total score for those who indicate higher satisfaction (agree or strongly agree). WBI total scores range from -2 to 9 , with a higher score indicating increased distress levels. WBI scores of 2 or higher in nurses and 3 or higher in physicians indicate high levels of overall distress, while WBI scores of 4 or higher in nurses and 5 or higher in physicians indicate severe distress.^{9–11}

Workplace- and COVID-19 pandemic-related factors

We developed seven additional workplace-related and COVID-19-related statements to assess perceptions of the work environment (eg, ‘staffing levels in this work setting are sufficient to handle the number of patients’) and impact of the COVID-19 pandemic (eg, ‘the COVID-19 pandemic has interfered with my ability to do my job because of its impact on my work environment’). Items are listed in [table 1](#). For each statement, a 5-point Likert scale was used to measure respondents’ level of satisfaction (1=very unsatisfied and 5=very satisfied) or level of agreement (1=strongly disagree and 5=strongly agree).

Statistical analysis

Univariable analyses were performed to determine relationships between workplace-related and COVID-19 pandemic-related factors and the categorical outcome of high distress (WBI scores of ≥ 2 in nurses and ≥ 3 in physicians) in all nurses and all physicians and then separately in nurses and physicians working in cardiovascular or oncology care settings.

A WBI score of 2 or higher indicates high distress among nurses. Such a score among nurses in US academic health sciences centres was associated with a 4.4-fold higher likelihood of burnout, 2.4-fold higher likelihood of poor quality of life and intent to leave their current position (for reasons other than retirement) in the next 24 months, 2.3-fold higher likelihood of severe fatigue and 2.0-fold higher likelihood of reporting a recent patient care error.¹¹ Nurses having a WBI score of 4 or higher indicates severe distress and has been associated with a

higher likelihood of burnout (8.1-fold), low quality of life and intent to leave their job (4.6-fold), suicidal ideation (3.6-fold), extreme fatigue (3.5-fold) and reporting patient care errors (2.7-fold).¹¹ These patterns also apply to physicians. A WBI score of 3 or higher indicates high distress. Among 6880 US physicians, distress was associated with a higher likelihood of burnout (1.9-fold) and severe fatigue or poor overall quality of life (1.4-fold).¹⁰ Physicians having a WBI score of 5 or higher indicates severe distress and has been associated with a higher likelihood of burnout (6.6-fold), low quality of life (3.6-fold), severe fatigue (2.9-fold) and suicidal ideation (2.8-fold).¹⁰

All tests were two sided with an alpha of 0.05 . We used X^2 tests to identify associations involving the categorical WBI outcomes and Kruskal-Wallis tests for comparisons involving continuous WBI scores, as appropriate. Univariate analysis was used to evaluate respondent demographics (gender, race, years since graduation, time working at UHN, clinical specialty of physicians and nurses’ clinical work setting) and factors related to the workplace and COVID-19 (perceptions of adequate staffing levels, fair workplace treatment and professionally meaningful contributions, as well as interference of job performance due to COVID-19 impact on work or personal life).

We used logistic multivariable regression to identify demographic and workplace-related and COVID-19-related predictors of high distress (WBI scores of ≥ 2 in nurses and ≥ 3 in physicians) in the overall nurse and physician respondents; due to sample size limitations, corresponding logistic regression analyses were not conducted separately for each clinician group within each care setting. Multivariable models were constructed by selecting demographic and workplace-related predictors that: (a) achieved a significance level of at least 0.20 in univariate analysis and (b) passed standard collinearity diagnostic testing. ORs with 95% CIs were calculated for the associations of identified predictors with high WBI scores. Among all physician respondents, the multivariable logistic regression included site, gender, ethnicity, staffing levels, fair workplace treatment, professional contributions and impact of COVID-19 at work and on

personal life. In all nurse respondents, multivariable logistic regression included ethnicity, time since graduation, time worked at UHN, clinical setting worked, electronic medical record satisfaction, staffing levels, fair workplace treatment, professional contributions, and the impact of COVID-19 at work and on personal life. We conducted all analyses using SAS V.9 (SAS Institute).

Patient and public involvement

None.

RESULTS

Participants

Of the 1480 cardiovascular and oncology clinicians invited to participate in the survey, a total of 428 (29%) responded. Among the respondents were 261 nurses (61%) and 167 physicians (39%). The 261 nurse respondents accounted for 24% of the 1079 cardiovascular and oncology nurses invited to participate, while the 167 physician respondents made up 42% of the 401 cardiovascular and oncology physicians invited to participate. Of the 261 nurse respondents, 148 (57%) were cardiovascular nurses and 113 (43%) were oncology nurses. Of the physician respondents, 63 (38%) were cardiovascular physicians and 104 (62%) were oncology physicians. The response rate of cardiovascular nurses was 28% (148 of 532 invited) and of oncology nurses was 21% (113 of 547 invited). Response rates of physicians in the cardiovascular and oncology programmes were 41% (63 of 154 invited) and 42% (104 of 247 invited), respectively.

While there were no significant race differences, significant gender disparities were found, with high WBI scores present in 73% of female physicians, compared with 54% of their male counterparts ($p=0.01$). Ninety-one per cent (63 of 69) of cardiovascular nurses working in critical care settings had high WBI scores, compared with 77% (61 of 79) of those who did not ($p=0.02$). Among surgical oncology physicians, 89% (16 of 18) had high WBI scores, compared with 62% (53 of 86) of those in non-surgical specialties ($p=0.03$). Demographics including site, gender, race, years since graduation, time working at UHN, clinical specialty of physicians and nurses' clinical area worked are reported in [table 2](#).

WBI scores

Among all 428 nurse and physician respondents, 318 (74%) reported WBI scores ranging from high to severe distress. The mean WBI score of all nurse respondents was 4.1 (SD=2.50), indicating severe distress. The mean WBI score of all physician respondents was 3.3 (SD 2.71), indicating high distress. The mean WBI score of cardiovascular nurses was 4.4 (SD 2.59), indicating severe distress, and the mean WBI score of oncology nurses was 3.7 (SD 2.32), indicating high distress. High distress was found in both cardiovascular and oncology physicians, with a mean WBI score of 3.0 (SD 2.84) and 3.5 (SD 2.63), respectively. [Figure 1](#) shows the distribution of WBI scores of all nurse

and physician respondents. Responses to additional WBI items are described in [table 3](#).

Associations with high distress among nurses

Of the 261 nurse respondents, 214 (82%) had a WBI score of ≥ 2 , indicating high distress.¹¹ Nurses with high distress were more likely than those with low distress to be neutral or to somewhat or strongly disagree that staffing levels were adequate (174 (86%) vs 28 (64%), $p=0.003$), to be neutral or somewhat or strongly disagree that they were treated fairly at work (105 (52%) vs 11 (25%), $p=0.005$), or to be neutral or somewhat or strongly disagree that they were professionally satisfied (69 (34%) vs 6 (14%), $p=0.008$). Moreover, nurses with high distress were more likely than those with low distress to somewhat or strongly agree with the view that the COVID-19 pandemic interfered with job performance due to its impact on their work environment (162 (80%) vs 22 (50%), $p<0.001$) or on their personal life (135 (67%) vs 11 (25%), $p<0.001$).

In the cardiovascular programme, 84% (124 of 148) of nurses had a WBI score of ≥ 2 . Cardiovascular nurses with high distress were more likely than those with low distress to somewhat or strongly agree that the COVID-19 pandemic interfered with job performance due to its impact on their work environment (106 (89%) vs 13 (57%), $p<0.001$) or on their personal life (90 (76%) vs 8 (35%), $p<0.001$). Eighty per cent (90 of 113) of nurses in the oncology programme reported a WBI score of ≥ 2 . Oncology nurses with high distress were more likely than those with low distress to be neutral or to somewhat or strongly disagree that staffing levels were adequate (70 (83%) vs 10 (48%), $p=0.003$), or to be neutral or somewhat or strongly disagree that they were treated fairly at work (41 (49%) vs 3 (14%), $p=0.02$). Additionally, oncology nurses with high distress were more likely to somewhat or strongly agree that the pandemic interfered with job performance due to its impact on their personal life (45 (54%) vs 3 (14%), $p=0.006$). Logistic multivariable regression showed that high distress among all nurses was associated with job interference from impact of the COVID-19 pandemic on personal life (OR 4.4 (1.8 to 10.6), $p=0.001$).

Associations with high distress among physicians

Sixty-two per cent (104 of 167) of physicians had a WBI score of ≥ 3 , indicating high levels of distress.^{9,10} Physicians with high distress, compared to those with low distress, were more likely to be neutral or to somewhat or strongly disagree that staffing levels were adequate (81 (79%) vs 32 (52%), $p=0.001$), that they were treated fairly at work (44 (43%) vs 13 (21%), $p=0.02$), or were professionally dissatisfied or neutral (29 (28%) vs 5 (8%), $p=0.008$). Physicians with high distress were more likely than those with low distress to somewhat or strongly agree that the pandemic interfered with job performance due to its impact on their work environment (84 (82%) vs 35 (56%), $p=0.001$) or on their personal life (56 (54%) vs 24 (39%), $p=0.014$). In the cardiovascular programme, 56% (35 of 63) of physicians

Table 2 Demographics of nurses and physicians at the Peter Munk Cardiac Centre and Princess Margaret Cancer Centre, University Health Network

	Nurse (N=261)	Physician (N=167)	Total (N=428)
UHN site, n (%)			
Peter Munk Cardiac Centre	148 (57)	63 (38)	211 (49)
Princess Margaret Cancer Centre	113 (43)	104 (62)	217 (51)
Gender, n (%)			
Male	27 (10)	95 (58)	122 (29)
Female	231 (90)	69 (42)	300 (71)
Gender diverse	0 (0)	0 (0)	0 (0)
Missing	3	3	6
White, n (%)			
Yes	118 (45)	95 (58)	213 (50)
No	142 (55)	70 (42)	212 (50)
Missing	1	2	3
When did you graduate?, n (%)			
<5 years ago	55 (21)	0 (0)	55 (13)
5–15 years ago	93 (36)	51 (31)	144 (34)
16–25 years ago	53 (20)	58 (35)	111 (26)
26+ years ago	59 (23)	56 (34)	115 (27)
Missing	1	2	3
When did you begin working at UHN?, n (%)			
<5 years ago	74 (28)	44 (27)	118 (29)
5–15 years ago	101 (39)	67 (40)	168 (39)
16–25 years ago	54 (21)	28 (17)	82 (19)
26+ years ago	31 (12)	26 (16)	57 (13)
Missing	1	2	3
Clinical areas, n (%)			
Peter Munk Cardiac Centre			
Cardiac cath lab or interventional radiology			
Yes	15 (6)		
No	246 (94)		
Cardiovascular critical care			
Yes	69 (26)		
No	192 (74)		
Inpatient wards, n (%)			
Yes	46 (18)		
No	215 (82)		
Outpatient clinics, n (%)			
Yes	11 (4)		
No	250 (96)		
Other department, n (%)			
Yes	14 (5)		
No	247 (95)		
Princess Margaret Cancer Centre			
Ambulatory haematology			
Yes	18 (7)		

Continued



Table 2 Continued

	Nurse (N=261)	Physician (N=167)	Total (N=428)
No	243 (93)		
Ambulatory solid tumour			
Yes	25 (10)		
No	236 (90)		
Cancer clinical research unit			
Yes	7 (3)		
No	254 (97)		
Clinical specialty, n (%)			
Peter Munk Cardiac Centre			
Cardiac surgery		10 (6)	
Vascular surgery		7 (4)	
Cardiology		23 (14)	
Cardiac rehabilitation		3 (2)	
Anaesthesia		16 (10)	
Medical imaging		3 (2)	
Other		1 (1)	
Princess Margaret Cancer Centre			
Medical oncology and haematology		47 (8)	
Radiation medicine programme		23 (4)	
Surgical oncology		18 (3)	
Supportive care		15 (3)	
Other		1 (0)	
UHN, University Health Network.			

had a WBI score of ≥ 3 . Cardiovascular physicians with high distress were more likely than those with low distress to be neutral or to somewhat or strongly disagree that they were treated fairly at work (15 (43%) vs 3 (11%), $p=0.02$) or to somewhat or strongly agree that the pandemic interfered with job performance due to its impact on their work environment (31 (89%) vs 16 (59%), $p=0.03$). In the oncology programme, 66% (69 of 104) of physicians had a WBI score of ≥ 3 . Oncology physicians reporting high distress were more likely than those with low distress to be neutral or to somewhat or strongly disagree that staffing levels were adequate (60 (88%) vs 18 (51%), $p<0.001$) or to somewhat or strongly agree that the pandemic interfered with job performance due to its impact on their work environment (53 (78%) vs 19 (54%), $p=0.03$).

Logistic multivariable regression of data from all physician respondents showed that high distress was associated with perceived impact of the COVID-19 pandemic on job performance, (OR=3.5 (1.4 to 8.5), $p=0.007$), inadequate staffing (OR=3.4 (1.5 to 7.7), $p=0.003$) and professional dissatisfaction (OR=3.4 (1.1 to 10.6), $p=0.032$).

DISCUSSION

The current project investigated the prevalence and factors associated with high distress among nurses and

physicians in cardiovascular and oncology care settings during the COVID-19 pandemic at a large academic quaternary healthcare network. Our findings revealed that 74% of clinicians experienced high distress as measured by the WBI. The COVID-19 pandemic further contributed to this distress by exacerbating workplace stressors and introducing unique challenges to an already strained healthcare system.^{24 25}

In our project, high levels of distress in physicians and nurses were associated with professional dissatisfaction, perceptions of insufficient staffing levels and unfair workplace treatment. Additionally, high distress in these clinicians was associated with the perception that the COVID-19 pandemic had adversely affected their work and personal lives, and thus interfered with their job performance. These findings and their potential impact on retention and recruitment of qualified healthcare providers may partially explain why healthcare systems in Canada and internationally are facing unprecedented workforce shortages, most notably of nurses and physicians.³⁰ Such workforce shortages can have further adverse effects on staff by increasing their workload and working hours, patient-to-nurse ratios, risk of medical errors, and exacerbating job dissatisfaction and moral distress.^{1 26 31}

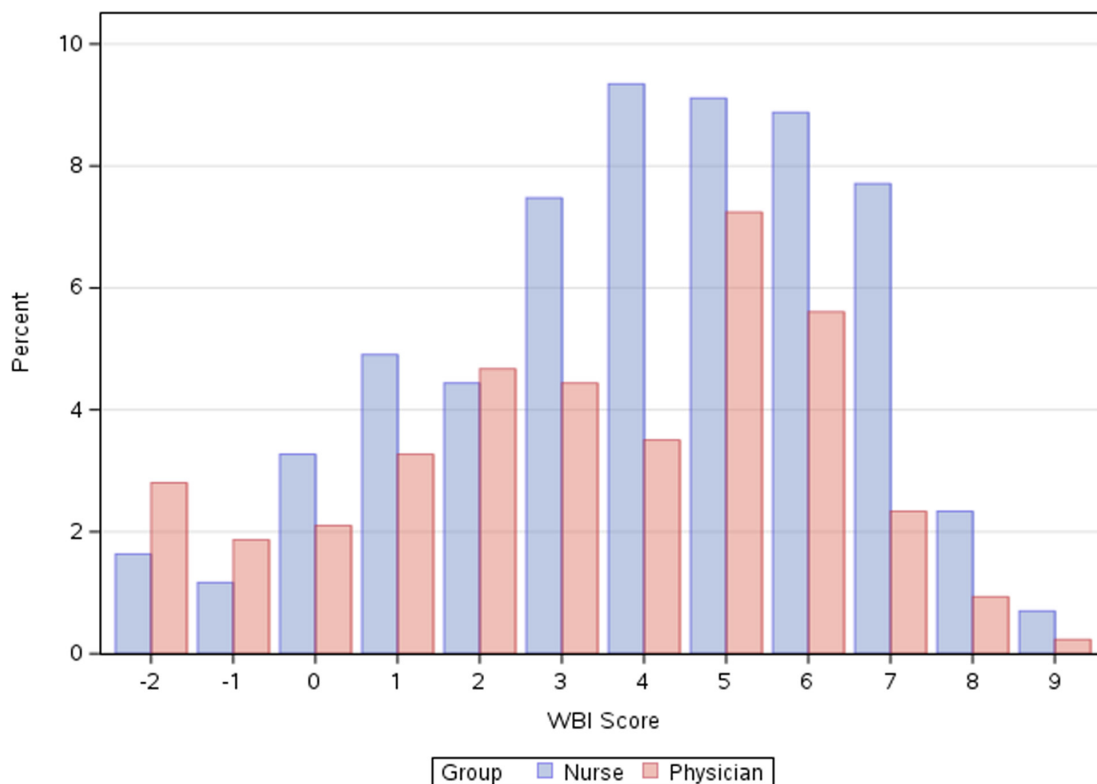


Figure 1 WBI scores of all nurse and physician respondents. WBI, Well-Being Index.

The perception of inadequate staffing in the present project was associated with high distress only among oncology nurses and physicians, although we found comparable results with cardiovascular clinicians in our previous research.^{21 22} Since hospital staffing levels were in a constant state of flux during the pandemic, it is possible that the oncology programme had more staffing shortages than the cardiovascular programme during the survey period. Significant numbers of cardiovascular nurses were redeployed to support other clinical units in response to workforce shortages and increasing demands for critical patient care during the pandemic. These transferred nurses may not have perceived or experienced inadequate staffing levels in the cardiovascular programme.

During the pandemic, physicians experienced increased clinical demands, reduction of surgical cases, perceived staffing shortages and unfair workplace treatment, which may all have contributed to their high distress levels and reduced professional satisfaction during the survey period. In this project, we found that high distress among cardiovascular physicians was associated with the perception of unfair workplace treatment, which is consistent with our previous research²² and that of others.³² Within the oncology programme, physicians practising in surgical specialties experienced higher levels of distress compared with non-surgical physicians, which may be related to the reduction of surgical volumes during the pandemic. The medical and radiation oncology services maintained their case volumes during this period, partly because a greater proportion of their work could be shifted to virtual care.

Medical and radiation oncology physicians also became the primary point of contact for an increased number of patients as many other care practices became inaccessible to them during the pandemic. It is possible that the reduction in surgical volumes, with its impact on professional satisfaction, contributed to the higher prevalence of distress among surgical compared with non-surgical oncology physicians during the pandemic.

The COVID-19 pandemic was a significant source of distress among nurses and physicians in both programmes. Clinicians with high distress, as measured by the WBI, were more likely to report that the COVID-19 pandemic affected their personal and professional lives, which they reported interfering with their ability to perform their jobs. Nurses and physicians in the cardiovascular programme and physicians in the oncology programme who reported high levels of distress tended to report greater pandemic-related impact on their work environments affecting their ability to perform their jobs. In both programmes, clinicians experienced significant disruptions and delays in providing standard care due to the additional demands and emergency response restrictions mandated by the provincial government and put in place by the hospital. These factors likely contributed to the high prevalence of clinician distress observed in these clinical programmes.

High distress among cardiovascular clinicians may be explained by the disruptive changes to their clinical environments during the COVID-19 pandemic. Intensive care units in the cardiovascular programme were converted into COVID-19 response centres to manage

Table 3 Nurse and physician responses on the Well-Being Index (WBI)

WBI item	Nurses		P value*	Physicians		P value*
	Cardiovascular nurses (N=148)	Oncology nurses (N=113)		Cardiovascular physicians (N=63)	Oncology physicians (N=104)	
Have you felt burned out from work?			0.79			0.11
Yes	130 (88%)	98 (87%)		42 (67%)	81 (78%)	
No	18 (12%)	15 (13%)		21 (33%)	23 (22%)	
Have you worried that your work is hardening you?			0.14			0.13
Yes	119 (80%)	82 (73%)		30 (48%)	62 (60%)	
No	29 (20%)	31 (27%)		33 (52%)	42 (40%)	
Have you often been bothered by feeling down, depressed or hopeless?			0.006			0.18
Yes	103 (70%)	60 (53%)		29 (46%)	59 (57%)	
No	45 (30%)	53 (47%)		34 (54%)	45 (43%)	
Have you fallen asleep while sitting inactive in a public place?			0.09			0.09
Yes	41 (28%)	21 (19%)		18 (29%)	18 (17%)	
No	107 (72%)	92 (81%)		45 (71%)	86 (83%)	
Have you felt that all things you had to do were piling up so high that you could not overcome them?			0.02			0.96
Yes	100 (68%)	60 (53%)		39 (62%)	64 (62%)	
No	48 (32%)	53 (47%)		24 (38%)	40 (38%)	
Have you been bothered by emotional problems?			0.64			0.56
Yes	125 (84%)	93 (82%)		39 (62%)	69 (66%)	
No	23 (16%)	20 (18%)		24 (38%)	35 (34%)	
Has your physical health interfered with your ability to do your daily work at home and/or away from home?			<0.001			0.21
Yes	91 (61%)	40 (35%)		10 (16%)	25 (24%)	
No	57 (39%)	73 (65%)		53 (84%)	79 (76%)	
The work I do is meaningful to me			0.57			0.84
1–2	6 (4%)	6 (5%)		1 (2%)	1 (1%)	
3–5	45 (30%)	40 (35%)		16 (25%)	30 (29%)	
6–7	97 (66%)	67 (59%)		46 (73%)	73 (70%)	
My work schedule leaves enough time for my personal/family life			0.57			0.46
1–2	65 (44%)	53 (47%)		38 (60%)	72 (69%)	
3	44 (30%)	27 (24%)		13 (21%)	15 (14%)	
4–5	39 (26%)	33 (29%)		12 (19%)	17 (16%)	

*X² p value.

high volumes of patients with COVID-19, and nurses were redeployed to these high-risk exposure areas to deliver care, spending extended hours in cumbersome personal protective equipment. The resultant decrease in clinical resources for patients with cardiovascular disease was a significant contributor of distress for cardiovascular

physicians. These changes may also have lowered staff confidence in the competencies and workflow of their teams and may have increased exhaustion among health-care workers. Cardiovascular nurses may have experienced increased distress due to the fear of contracting and transmitting COVID-19. This may explain why a high

percentage of cardiovascular nurses reported feeling that their physical health interfered with their ability to perform daily work, both at home and away from home. Additionally, COVID-19 protection measures required the programme to ramp down regular clinical activities, drastically reducing cardiac and vascular surgery procedural volumes, in-person clinic visits and impeding progress on research-related activities. These changes could have had a negative impact on physicians' professional satisfaction and income. Non-surgical physicians in the oncology programme continued to see high volumes of patients by shifting from in-person patient visits to virtual care and from surgical interventions to non-surgical therapies for cancer treatment in response to the evolving pandemic.³³

Importantly, only nurses attributed their high levels of distress to the negative impact of COVID-19 on their personal life, regardless of the care setting in which they worked. Unlike some of their physician colleagues, shifting to a virtual method of care delivery was not an option for frontline nurses who provided in-person care. In both the oncology and cardiovascular programmes, nurses encountered numerous workplace challenges including increased workloads, overtime, high patient-to-nurse ratios and inadequate staffing. Continuous changes in outbreak locations and the designation of COVID-19 units within the cardiovascular programme heightened infection prevention and control risks. As frontline healthcare workers, nurses' perception of their risk of contracting COVID-19 and increased job demands may have had a direct negative impact on their personal lives.^{25 34} For example, some nurses were required to self-isolate from family members following potential COVID-19 exposure at work, leading to heightened feelings of loneliness and social disconnection. Others may have experienced an increase in their caregiving responsibilities for family members, such as children or elderly parents, or have been required to take on additional responsibilities to care for family and friends. The predominantly female distribution of staff may have amplified this caregiving burden because of the typical gender imbalance in family caregiving responsibilities.³⁵ Routines and activities outside of work were further disrupted by pandemic-related restrictions, and extra demands were placed on nurses to respond to the evolving healthcare crisis. These included requests to pause vacations during the pandemic to mitigate staffing shortages and manage high patient volumes, including patients with COVID-19. Taken together, the work environment made it challenging for nurses to engage in self-care or other personal activities necessary to maintain their well-being. For nurses, the inability to balance work, family and personal life may have increased their level of distress and contributed to feelings of depression or demoralisation.

Despite many differences in the underlying factors contributing to high distress across diverse clinicians and care settings, high levels of distress were common among

nurses and physicians participating in this project, all of whom faced imminent exposure to an unknown virus with potentially serious consequences for both them and others under their care. This project highlights how the COVID-19 pandemic has impacted the well-being of these healthcare workers, and the drivers of distress among these clinicians.

Implications

The hospital work environment can be a significant source of distress, as suggested by this cross-sectional examination of distress in nurses and physicians working in quaternary cardiovascular and oncology specialties. Loss of collegiality and social connection, increased work demands, fear of infection, moral distress and greater work-life imbalance during the pandemic may have amplified distress in these healthcare workers during this period. While the number of patients being admitted to hospital with COVID-19 has decreased significantly, measures are still needed to minimise clinician distress during the post-pandemic phase and to prevent it in future health crises. Measures taken by healthcare organisations to decrease clinician distress include initiatives to improve staff well-being, manage workloads, create supportive and fair work environments, and implement transparent decision-making and staffing policies.^{1 19 36}

Limitations

This project took place in a hospital system during the COVID-19 pandemic, when healthcare workers were operating in crisis mode, experiencing survey and email fatigue, and engaged in competing hospital priorities. These factors may have contributed to the relatively low survey response rates and reduced power to detect significant effects in the subgroup comparisons. Moreover, conclusions about causality cannot be made because of the cross-sectional project design. Further research in other settings and with other groups of clinicians in the post-pandemic period is needed to determine the generalisability of these findings. While the seven workplace-related and COVID-19-related questions that we designed have not been validated, they are contextually relevant to our hospital setting and provide valuable insight into the drivers of clinician distress.

CONCLUSION

This project highlights the importance of assessing clinician well-being and identifying the contextual factors that are associated with high distress among different clinician groups and the care settings in which they work. Our findings can guide healthcare organisations in the assessment of clinician well-being and the development of targeted interventions.^{5 36} As hospitals gradually recover from the pandemic, future studies should explore the underlying drivers of clinician distress that are independent of pandemic influences. This will enable the development

of targeted, locally tailored interventions to reduce clinician distress and improve well-being.

Author affiliations

¹Peter Munk Cardiac Centre, University Health Network, Toronto, Ontario, Canada

²Department of Supportive Care, Princess Margaret Cancer Centre, University Health Network, Toronto, Ontario, Canada

³Office of Professional Practice & Policy, Toronto General Hospital, University Health Network, Toronto, Ontario, Canada

⁴Goldfarb Intelligence Marketing, Toronto, Ontario, Canada

⁵Quantitative Health Sciences, Mayo Clinic, Rochester, New York, USA

⁶Division of Medical Oncology & Hematology, Princess Margaret Cancer Centre, University Health Network, Toronto, Ontario, Canada

⁷Division of Vascular Surgery, Peter Munk Cardiac Centre, University Health Network, Toronto, Ontario, Canada

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ORCID iDs

Ahlexi Jelen <http://orcid.org/0009-0007-6185-8261>

Gary Rodin <http://orcid.org/0000-0002-6626-6974>

Barry B Rubin <http://orcid.org/0000-0002-5397-9574>

REFERENCES

- West CP, Dyrbye LN, Shanafelt TD. Physician burnout: contributors, consequences and solutions. *J Intern Med* 2018;283:516–29.
- Aiken LH, Clarke SP, Sloane DM, *et al.* Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA* 2002;288:1987–93.
- Chen C, Meier ST. Burnout and depression in nurses: a systematic review and meta-analysis. *Int J Nurs Stud* 2021;124:104099.
- Dutheil F, Aubert C, Pereira B, *et al.* Suicide among physicians and health-care workers: a systematic review and meta-analysis. *PLoS One* 2019;14:e0226361.
- National Academies of Sciences Engineering and Medicine, National Academy of Medicine, Committee on Systems Approaches to Improve Patient Care by Supporting Clinician Well-Being. Taking action against clinician burnout: a systems approach to professional well-being. Washington, D.C National Academies Press; 2019.
- Dzau VJ, Kirch DG, Nasca TJ. To care is human — Collectively confronting the clinician-burnout crisis. *N Engl J Med* 2018;378:312–4.
- Maslach C, Jackson S, Leiter M. *Maslach burnout inventory manual, 3rd ed.* Palo Alto, CA: Consulting Psychologists Press, 1996.
- Shanafelt TD, Hasan O, Dyrbye LN, *et al.* Changes in burnout and satisfaction with work-life balance in physicians and the general US working population between 2011 and 2014. *Mayo Clin Proc* 2015;90:1600–13.
- Dyrbye LN, Satele D, Shanafelt T. Ability of a 9-item well-being index to identify distress and stratify quality of life in US workers. *J Occup Environ Med* 2016;58:810–7.
- Dyrbye LN, Satele D, Sloan J, *et al.* Utility of a brief screening tool to identify physicians in distress. *J Gen Intern Med* 2013;28:421–7.
- Dyrbye LN, Johnson PO, Johnson LM, *et al.* Efficacy of the well-being index to identify distress and well-being in U.S. nurses. *Nurs Res* 2018;67:447–55.
- Salyers MP, Bonfils KA, Luther L, *et al.* The relationship between professional burnout and quality and safety in healthcare: a meta-analysis. *J Gen Intern Med* 2017;32:475–82.
- Tawfik DS, Profit J, Morgenthaler TI, *et al.* Physician burnout, well-being, and work unit safety grades in relationship to reported medical errors. *Mayo Clin Proc* 2018;93:1571–80.
- Dyrbye LN, Shanafelt TD, Sinsky CA, *et al.* Burnout among health care professionals: a call to explore and address this underrecognized threat to safe, high-quality care. *NAM Perspectives* 2017;7.
- Han S, Shanafelt TD, Sinsky CA, *et al.* Estimating the attributable cost of physician burnout in the United States. *Ann Intern Med* 2019;170:784–90.
- West CP, Tan AD, Habermann TM, *et al.* Association of resident fatigue and distress with perceived medical errors. *JAMA* 2009;302:1294–300.
- Nassar AK, Reid S, Kahnemouli K, *et al.* Burnout among academic clinicians as it correlates with workload and demographic variables. *Behav Sci (Basel)* 2020;10:94.
- Hlubocky FJ, Back AL, Shanafelt TD. Addressing burnout in oncology: why cancer care clinicians are at risk, what individuals can do, and how organizations can respond. *Am Soc Clin Oncol Educ Book* 2016;35:271–9.
- Shanafelt TD, Noseworthy JH. Executive leadership and physician well-being: nine organizational strategies to promote engagement and reduce burnout. *Mayo Clin Proc* 2017;92:129–46.
- Rubin B, Goldfarb R, Satele D, *et al.* Burnout and distress among allied health care professionals in a cardiovascular centre of a quaternary hospital network: a cross-sectional survey. *CMAJ Open* 2021;9:E29–37.
- Rubin B, Goldfarb R, Satele D, *et al.* Burnout and distress among nurses in a cardiovascular centre of a quaternary hospital network: a cross-sectional survey. *CMAJ Open* 2021;9:E19–28.
- Rubin B, Goldfarb R, Satele D, *et al.* Burnout and distress among physicians in a cardiovascular centre of a quaternary hospital network: a cross-sectional survey. *CMAJ Open* 2021;9:E10–8.
- Fiorillo A, Gorwood P. The consequences of the COVID-19 pandemic on mental health and implications for clinical practice. *Eur Psychiatry* 2020;63:e32.
- De Kock JH, Latham HA, Leslie SJ, *et al.* A rapid review of the impact of COVID-19 on the mental health of healthcare workers: implications for supporting psychological well-being. *BMC Public Health* 2021;21:104.
- Shanafelt T, Ripp J, Trockel M. Understanding and addressing sources of anxiety among health care professionals during the COVID-19 pandemic. *JAMA* 2020;323:2133–4.
- Registered Nurses' Association of Ontario. Nursing through crisis: a comparative perspective; 2022.
- Lowe C, Rafiq M, MacKay LJ, *et al.* Impact of the COVID-19 pandemic on Canadian social connections: a thematic analysis. *J Soc Pers Relat* 2023;40:76–101.
- Southwick SM, Southwick FS. The loss of social connectedness as a major contributor to physician burnout: applying organizational and teamwork principles for prevention and recovery. *JAMA Psychiatry* 2020;77:449–50.
- Jha A, Liff A, Chaoui A. A crisis in health care: a call to action on physician burnout. Waltham, MA Massachusetts Medical Society, Massachusetts Health and Hospital Association, Harvard T.H. Chan School of Public Health, and Harvard Global Health Institute; 2019.

- 30 Scheffler RM, Arnold DR. Projecting shortages and surpluses of doctors and nurses in the OECD: what looms ahead. *Health Econ Policy Law* 2019;14:274–90.
- 31 Jameton A. *Nursing Practice: The Ethical Issues*. Englewood Cliffs, NJ: Prentice-Hall, 1984: 331.
- 32 Sutinen R, Kivimäki M, Elovainio M, *et al*. Organizational fairness and psychological distress in hospital physicians. *Scand J Public Health* 2002;30:209–15.
- 33 Fu R, Sutradhar R, Li Q, *et al*. Timeliness and modality of treatment for new cancer diagnoses during the COVID-19 pandemic in Canada. *JAMA Netw Open* 2023;6:e2250394.
- 34 Lake ET, Narva AM, Holland S, *et al*. Hospital nurses' moral distress and mental health during COVID-19. *J Adv Nurs* 2022;78:799–809.
- 35 Stefanova V, Farrell L, Latu I. Gender and the pandemic: associations between caregiving, working from home, personal and career outcomes for women and men. *Curr Psychol* 2021:1–17.
- 36 National Academy of Medicine. *National Plan for Health Workforce Well-Being*. National Academy of Medicine, 2022.