

A. COVER PAGE

Project Title: Physicians' Occupational Health During Covid-19: A Qualitative Analysis of Systems Factors	
Grant Number: 5R21OH012175-02	Project/Grant Period: 09/01/2021 - 08/31/2023
Reporting Period: 09/01/2022 - 08/31/2023	Requested Budget Period: 09/01/2022 - 08/31/2023
Report Term Frequency: Final	Date Submitted: 01/25/2024
Program Director/Principal Investigator Information: MARA HELENE BUCHBINDER , MA PHD AB Phone Number: 919-843-6881 Email: mara_buchbinder@med.unc.edu	Recipient Organization: UNIV OF NORTH CAROLINA CHAPEL HILL UNIVERSITY OF NORTH CAROLINA CHAPEL HILL Office of Sponsored Research CHAPEL HILL, NC 275995023 DUNS: 608195277 UEI: D3LHU66KBLD5 EIN: 1566001393A1 RECIPIENT ID: 5122525
Change of Contact PD/PI: NA	
Administrative Official: R DAVID PAUL 104 Airport Dr. Suite 2200 Chapel Hill, NC 275991350 Phone number: 919-966-3411 Email: sponsoredprograms@unc.edu	Signing Official: ADELA RADOSOVA 130 Mason Farm Road Chapel Hill, NC 27599 Phone number: 919-962-3950 Email: grants@unc.edu
Human Subjects: NA	Vertebrate Animals: NA
hESC: No	Inventions/Patents: No

B. ACCOMPLISHMENTS

B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?

Physicians are at risk for high rates of depression, substance abuse, suicide, and burnout, an occupational phenomenon resulting from chronic workplace stress. Burnout is characterized by 1) fatigue or exhaustion, 2) feelings of negativity toward one's job, and 3) reduced professional efficacy. A recent National Academies of Science, Engineering, and Medicine (NASEM) consensus study estimates that 40-54% of physicians are burnt out, making burnout more prevalent in physicians than among workers with similar education levels.

New working conditions imposed by the COVID-19 pandemic have exacerbated these occupational health burdens for physicians at a time when baseline levels of stress, burnout, and poor mental health were already overwhelmingly high. Physicians must now confront new sources of occupational stress, such as shortages of personal protective equipment (PPE), scarcity of critical care resources, understaffing, redeployment to new clinical settings, personal and household health risks due to potential viral exposure, unprecedented clinical uncertainty, and caring for an increased number of patients dying alone, without usual family support.

This onslaught of new (and potentially recurrent) acute stressors on top of chronic stress presents an occupational health crisis for physicians. There is an important need to (1) characterize the relationship between pandemic workplace conditions and adverse health outcomes (e.g. fatigue, stress, burnout, mental illness) and (2) identify work practices and organizational characteristics that promote occupational health and well-being and reduce the risk of such outcomes. While studies of burnout and physician mental health have expanded recently, most focus on prevalence of psychiatric morbidity across specialties and career stages, and highlight specific individual-level predictors and interventions. Relatively little is known about the systems, professional, and institutional-level factors that contribute to physicians' poor occupational health outcomes.

To respond to these urgent and ongoing needs, we propose a novel exploratory study of the occupational health and wellbeing of physicians working on the front line of COVID-19 care in two American cities. Our socio-ecological framework acknowledges that systems-level factors (e.g. state/local public health policies), professional-level factors (e.g. a professional community's norms, beliefs, and practices), and institutional-level factors (e.g. surge conditions, institutional policies, team culture) affect occupational health in consequential and intersecting ways. We will conduct qualitative interviews with physicians in Los Angeles, CA (n=40) and Miami, FL (n=40). Sampling physicians from diverse hospitals will enable us to assess how differences in state and local public health responses and institutional factors mediate the way physicians respond to the crisis. Our specific aims are to:

Aim 1: Describe the relationships among the systems-, professional-, and institutional-level factors shaping workplace conditions during the COVID-19 pandemic and physicians' perceptions of occupational health and well-being.

Aim 2: Identify systems-, professional-, institutional-, and individual-level characteristics that protect physicians' occupational health and well-being during the COVID-19 pandemic.

Aim 3. Develop and disseminate evidence-based recommendations to protect physicians' occupational health and well-being during normal and crisis conditions, with expert panel input.

This study addresses a well-documented occupational health problem that has taken on new urgency due to the pandemic, and does so through novel attention to structural factors that shape occupational health and well-being. Our interdisciplinary team's expertise in qualitative methods, occupational safety and health, and bioethics policymaking, and our relevant preliminary data ensure our future success. Outcomes will inform evidence-based interventions to improve physicians' occupational health and well-being during crisis and normal conditions. The study's short-term and long-term impacts thus align with NIOSH's Total Worker Health™ Initiative, which addresses worker well-being by integrating occupational safety and health protections with workplace policies and programs that promote health and wellbeing.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File Uploaded : B2.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

For this reporting period, is there one or more Revision/Supplement associated with this award for which reporting is required?

No

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File Uploaded : B4.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

Our primary mode of dissemination has been through academic publications and presentations. In addition to our main overview article reporting Aim 1 and Aim 2 findings in the American Journal of Industrial Medicine, we published articles in the Journal of Hospital Medicine, Annals of the American Thoracic Society, the American Journal of Bioethics, and Perspectives in Biology and Medicine. Publishing in journals from a variety of disciplines has expanded our audience to ensure maximal uptake of our findings. We also presented our findings in multiple national conferences—including the American Public Health Association Annual Meeting, the American Physicians' Health Conference, and the Total Worker Health Symposium—and in webinars to the American College of Occupational and Environmental Medicine and the UNC Occupational Safety and Health Education and Research Center. Finally, Dr. Berlinger presented findings in a keynote presentation at Duquesne University's Carfang Conference on Nursing and Healthcare Ethics and Dr. Buchbinder presented at Grand Rounds in the Division of Occupational and Environmental Medicine at the Icahn School of Medicine at Mount Sinai.

Our Aim 3 recommendations were disseminated through a KevinMD blog post and podcast appearance by Dr. Buchbinder. KevinMD is a leading platform on which physicians and other clinicians share insights. It receives over 3 million page views per month, with over 250,000 followers on Facebook and Twitter. We publicized the blog post and podcast appearance using the following strategies: (1) circulating announcements to our professional networks (e.g., LinkedIn) and project mailing list, (2) a press release from the Hastings Center, our dissemination partner, and (3) relying on our expert advisory board to help amplify our messaging and increase our reach.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

Not Applicable

B2.**1. Major Activities and Specific Objectives**

In Year 2 of the award, our major focus was on data analysis, manuscript preparation, presenting preliminary findings, and translation and dissemination of findings. For Aims 1 and 2, we interviewed a total of 35 physician in Los Angeles and 31 in Miami. Although we initially planned to enroll 40 participants in each city, we closed enrollment in October 2022 after attaining thematic saturation. We had experienced some delays due to recruitment challenges and did not want to further delay data analysis, given the time and budgetary constraints of this short, two-year study.

To achieve robust and unbiased results, we followed a set of coding procedures used in our previous studies to ensure qualitative rigor. During an initial training period, at least two coders coded the same transcript independently, and discrepancies were discussed to ensure that understanding of concepts and codes remained in agreement. Code applications and definitions were revised as these understandings evolved. After the first 10% of transcripts were coded, we determined that a sufficient level of agreement had been attained, and we divided the remaining transcripts. Any remaining uncertainty was discussed with the entire coding team and resolved collaboratively.

For Aim 3, led by Dr. Berlinger through a subcontract to the Hastings Center, we convened our expert advisory panel twice—in March 2023 and in May 2023—to get their input on the translation of study findings. Due to scheduling constraints, we decided to hold the second meeting as a series of small groups, rather than a single meeting with the entire advisory board. This was very effective because the smaller group meetings facilitated more active participation. In the first set of meetings, we focused on soliciting the advisory board's feedback on interpretation of emergent findings and our draft conceptual model, as well as getting their ideas about specific audiences to which to target our Aim 3 recommendations. In the second set of meetings, we solicited the advisory board's feedback on our draft recommendations and gathered suggestions for dissemination. We also consulted individual board members on an ad hoc basis throughout the project.

2. Significant Results

The main results from Aims 1 and 2 were published in the American Journal of Industrial Medicine. The final sample of 66 physicians worked in 20 hospitals. We developed a conceptual model for occupational stressors and protective factors adapted from Sorensen and colleagues' model for research on work, safety, health, and well-being. The Sorensen et al. model highlights the importance of factors beyond the immediate workplace environment that shape worker stress, health, and well-being. We adapted Sorensen et al.'s model to include attention to organizational culture, which we conceptualized as overlaying an organization's policies, programs, and practices, as well as conditions of work. Our conceptual model thus permits us to consider stressors and protective factors for physicians' work-related well-being at multiple levels (social/political/economic environment, employment, and labor patterns, organization, individual worker) that align with the fundamental elements of Total Worker Health.®

Stressors in the social, political, and economic environment included dealing with the politicization of COVID-19, including vaccine hesitancy; state and federal governmental COVID-19 policies and messaging; and shifting CDC guidance. Employment and labor pattern stressors

included the national nursing shortage, different policies for paid time off, furloughs, reduced pay, and layoffs. Organizational-level stressors included institutional policies, staffing constraints and high patient volume (i.e., increased number of cases and longer lengths of stay), and perceived poor leadership. At the individual worker level, stressors included concerns about viral transmission to family, strained personal relationships, and work-life fit, particularly for those with young children. Respondents identified promising protective factors at multiple levels, including responsive state leadership, job security, concrete opportunities to provide input into institutional policy, strong leadership and communication, and feeling cared for by one's institution. These findings support a multi-level strategy that acknowledges internal organizational and external factors shaping clinicians' work-related well-being, consistent with the Total Worker Health® approach.

Importantly, our findings suggest that incorporating organizational culture into a Total Worker Health® conceptual model for work-related well-being is essential because the majority of protective factors we identified were attributed to organizational culture. Organizational culture is an actionable site of intervention for health systems and institutions. Organizations may improve clinicians' work-related well-being by targeting elements of organizational culture such as communication, leadership, and expressions of appreciation for employees. Future research could utilize validated instruments like the NIOSH Worker Well-Being Questionnaire (NIOSH WellBQ) to measure organizational culture and its relationship to work-related well-being. Results can be used to identify and set organization-specific benchmarks, as well as to inform evidence-based interventions for improving clinician well-being.

For our translational aim (Aim 3), our core message in our KevinMD blog post focused on how an occupational health lens can help to reframe dominant approaches to clinician burnout, which have largely failed to produce tangible change. We urged a shift in focus from distressed workers to hazardous work environments. Our specific recommendations for doing this included: (1) flipping the conceptual framing of burnout to begin with hazardous work environments, so that the change we seek is environmental rather than individual; (2) embracing a workplace health and safety framework for clinician well-being, using NIOSH's Hierarchy of Controls framework; (3) prioritizing analysis of and response to the structural conditions that lead to distressed work environments, by leaning on social scientists and historians; and (4) adopting measurement strategies that incorporate organizational-level metrics for understanding clinician burnout and well-being, to complement individual-level measures.

3. Key Outcomes or Other Achievements

Key outcomes of this proposal include peer-reviewed publications in five journals: the American Journal of Industrial Medicine, the Journal of Hospital Medicine, the American Journal of Bioethics, Perspectives in Biology and Medicine, and Annals of the American Thoracic Society. (See section C of this report). We also published a blog post with key study findings and recommendations in KevinMD, a popular website for commentary on the medical profession. We presented findings in three academic conferences (the American Public Health Association annual meeting, the American Physicians' Health Conference, the Total Worker Health Symposium), in three grand rounds and keynote lectures, and on the KevinMD podcast. Dr. Buchbinder was invited to moderate a plenary session at the 2022 American Society for Bioethics and Humanities on The Great Migration in Healthcare, on the basis of this work.

Finally, this project led to successful grant collaborations between Dr. Buchbinder and advisory board member Dr. Erika Sabbath, and between Dr. Buchbinder and Dr. Deena Costa, a mentee of advisory board member Dr. Jack Iwashyna. Dr. Buchbinder and Dr. Sabbath competed successfully for a Greenwall Foundation grant to study professional well-being and moral distress among OB-GYNs in states with abortion bans; they have two additional grant proposals currently under review, including one at NIOSH (impact score: 18 percentile: 6.0). Findings from the current study served as preliminary data for an R01 proposal that was funded by the National Heart, Lung, and Blood Institute last May (MPIs: Dr. Buchbinder and Dr. Costa). The study proposes to investigate organizational resilience in intensive care units using a mixed methods approach and a sample from a large national health system.

This research has contributed to the training of Lily Goldberg, an MPH student in the Gillings School of Public Health. Goldberg's primary role on the study was to: (1) contribute to qualitative data analysis; (2) perform literature review in preparation for manuscript authoring; (3) assist with preparation of manuscripts; and (4) organize meetings of our expert advisory board. Dr. Buchbinder (PI) is a PhD-level social scientist with extensive training and expertise in qualitative research methods, including qualitative analysis. Dr. Buchbinder trained Goldberg in qualitative analytic methods and literature review methods. Goldberg used data from the study to complete a qualitative data analysis assignment as part of her coursework. Goldberg also had an opportunity to be a co-author of the main study publication in the American Journal of Industrial Medicine.

C. PRODUCTS

C.1 PUBLICATIONS

Are there publications or manuscripts accepted for publication in a journal or other publication (e.g., book, one-time publication, monograph) during the reporting period resulting directly from this award?

Yes

Publications Reported for this Reporting Period

Public Access Compliance	Citation
N/A: Not NIH Funded	Buchbinder M, Berlinger N, Jenkins TM. Protecting Practitioners in Stressed Systems: Translational Bioethics and the COVID-19 Pandemic. Perspectives in biology and medicine. 2022;65(4):637-645. PubMed PMID: 36468392; PubMed Central PMCID: PMC10765946; DOI: 10.1353/pbm.2022.0055.
N/A: Not NIH Funded	Buchbinder M, Jenkins T. Burnout in Critical Care: Time for Moving Upstream. Annals of the American Thoracic Society. 2022 September;19(9):1443-1445. PubMed PMID: 35482779; PubMed Central PMCID: PMC10765947; DOI: 10.1513/AnnalsATS.202202-111IP.
N/A: Not NIH Funded	Buchbinder M, Browne A, Berlinger N, Jenkins T, Buchbinder L. Moral Stress and Moral Distress: Confronting Challenges in Healthcare Systems under Pressure. The American journal of bioethics : AJOB. 2023 June 22;1-15. PubMed PMID: 37347222; PubMed Central PMCID: PMC10758677; DOI: 10.1080/15265161.2023.2224270.
N/A: Not NIH Funded	Browne A, Jenkins T, Berlinger N, Buchbinder L, Buchbinder M. The impact of health inequities on physicians' occupational well-being during COVID-19: A qualitative analysis from four US cities. Journal of hospital medicine. 2023 July;18(7):595-602. PubMed PMID: 37070735; PubMed Central PMCID: PMC10783652; DOI: 10.1002/jhm.13107.
N/A: Not NIH Funded	Buchbinder M, Jenkins T, Staley J, Berlinger N, Buchbinder L, Goldberg L. Multidimensional stressors and protective factors shaping physicians' work environments and work-related well-being in two large US cities during COVID-19. American journal of industrial medicine. 2023 October;66(10):854-865. PubMed PMID: 37488786; DOI: 10.1002/ajim.23520.

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Category	Explanation
Other	https://www.stepsmed.com/

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Have inventions, patent applications and/or licenses resulted from the award during the reporting period? No

If yes, has this information been previously provided to the PHS or to the official responsible for patent matters at the grantee organization? No

C.5 OTHER PRODUCTS AND RESOURCE SHARING

NOTHING TO REPORT

D. PARTICIPANTS

D.1 WHAT INDIVIDUALS HAVE WORKED ON THE PROJECT?

Commons ID	S/K	Name	Degree(s)	Role	Cal	Aca	Sum	Foreign Org	Country	SS
MARA_BUCHBINDER	Y	Buchbinder, Mara Helene	AB,MA,PHD	PD/PI	2.6	0.0	0.0			NA
NANCYTHC	N	Berlinger, Nancy	BA,PHD,MOTH	Co-Investigator	1.8	0.0	0.0			NA
TANIA.JENKINS	Y	Jenkins, Tania M		Co-Investigator	0.0	0.0	1.0			NA
LILYGOLD	N	Goldberg, Lily I	BS,MPH	Graduate Student (research assistant)	2.4	0.0	0.0			NA

Glossary of acronyms:

S/K - Senior/Key

Cal - Person Months (Calendar)

Aca - Person Months (Academic)

Sum - Person Months (Summer)

Foreign Org - Foreign Organization Affiliation

SS - Supplement Support

RS - Reentry Supplement

DS - Diversity Supplement

OT - Other

NA - Not Applicable

D.2 PERSONNEL UPDATES

D.2.a Level of Effort

Not Applicable

D.2.b New Senior/Key Personnel

Not Applicable

D.2.c Changes in Other Support

Not Applicable

D.2.d New Other Significant Contributors

Not Applicable

D.2.e Multi-PI (MPI) Leadership Plan

Not Applicable

E. IMPACT**E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?**

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

NOTHING TO REPORT

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

Not Applicable

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

NOTHING TO REPORT

G. SPECIAL REPORTING REQUIREMENTS SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS

NOTHING TO REPORT

G.2 RESPONSIBLE CONDUCT OF RESEARCH

Not Applicable

G.3 MENTOR'S REPORT OR SPONSOR COMMENTS

Not Applicable

G.4 HUMAN SUBJECTS

G.4.a Does the project involve human subjects?

Not Applicable

G.4.b Inclusion Enrollment Data

File(s) uploaded:

CumulativeInclusionEnrollmentReport.pdf

G.4.c ClinicalTrials.gov

Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

NOT APPLICABLE

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

G.7 VERTEBRATE ANIMALS

Not Applicable

G.8 PROJECT/PERFORMANCE SITES

Not Applicable

G.9 FOREIGN COMPONENT No foreign component
G.10 ESTIMATED UNOBLIGATED BALANCE Not Applicable
G.11 PROGRAM INCOME Not Applicable
G.12 F&A COSTS Not Applicable

Cumulative Inclusion Enrollment Report

This report format should NOT be used for collecting data from study participants.

Study Title:

Comments:

Racial Categories	Ethnic Categories									Total
	Not Hispanic or Latino			Hispanic or Latino			Unknown/Not Reported Ethnicity			
	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	
American Indian/ Alaska Native										
Asian										
Native Hawaiian or Other Pacific Islander										
Black or African American										
White										
More Than One Race										
Unknown or Not Reported										
Total										

I. OUTCOMES

I.1 What were the outcomes of the award?

Physicians are at risk for high rates of depression, substance abuse, suicide, and burnout, an occupational phenomenon resulting from chronic workplace stress. Burnout is characterized by 1) fatigue or exhaustion, 2) feelings of negativity toward one's job, and 3) reduced professional efficacy. The COVID-19 pandemic exacerbated this occupational burden at a time when baseline levels of stress, burnout, and poor mental health were already overwhelmingly high. This study sought to (1) understand the relationship between pandemic workplace conditions and adverse health outcomes (e.g. fatigue, stress, burnout, mental illness) and (2) identify work practices and organizational characteristics that promote physicians' health and well-being and reduce the risk of such outcomes. We conducted interviews with physicians in Los Angeles (n=35) and Miami (n=31) who worked on the front lines of COVID-19 care (i.e. from emergency medicine, hospital medicine, pulmonary critical care, and palliative care).

Our findings highlight the importance of factors beyond the immediate workplace environment shaping physicians' stress, health, and well-being. Stressors in the social, political, and economic environment included dealing with the politicization of COVID-19, including vaccine hesitancy; state and federal governmental COVID-19 policies and messaging; and shifting CDC guidance. Employment and labor pattern stressors included the national nursing shortage, different policies for paid time off, furloughs, reduced pay, and layoffs. Organizational-level stressors included institutional policies, staffing constraints and high patient volume (i.e., increased number of cases and longer lengths of stay), and perceived poor leadership. At the individual level, stressors included concerns about viral transmission to family, strained personal relationships, and work-life fit, particularly for those with young children. Respondents identified protective factors at multiple levels, including responsive state leadership, job security, concrete opportunities to provide input into institutional policy, strong leadership and communication, and feeling cared for by one's institution. Taken together, these findings support a multi-level strategy that acknowledges internal organizational and external factors shaping physicians' occupational well-being. Hospitals and health systems may improve clinicians' work-related well-being by targeting elements of organizational culture such as communication, leadership, and expressions of appreciation for employees.