

ORIGINAL RESEARCH

Wellness of hospitalists and hospital medicine advanced practice providers during the COVID-19 pandemic, 2020–2021

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Abstract

Background: The early phase of the coronavirus disease 2019 (COVID-19) pandemic had a negative impact on the wellness of hospitalists and hospital medicine advanced practice providers (APPs). However, the burden of the pandemic has evolved and the change in hospitalist and hospital medicine APP wellness is unknown.

Objective: To evaluate the longitudinal trend in wellness of hospitalists and hospital medicine APPs during the COVID-19 pandemic and guide wellness interventions.

Design, Setting and Participants: Between May 4, 2020, and June 6, 2021, we administered three surveys to Internal Medicine hospitalists (physicians) and hospital medicine APPs (nurse practitioners and physician assistants) at 16 Mayo Clinic hospitals in four U.S. states.

Measurements: We evaluated the association of hospitalist and hospital medicine APP characteristics with PROMIS® measures of global wellbeing-mental health, global wellbeing-social activities and relationships, anxiety, social isolation, and emotional support, using logistic and linear regression models.

Results: The response rates were 52.2% (n=154/295; May 2020), 37.1% (n=111/299; October 2020) and 35.5% (n=114/321; May 2021). In mixed models that included hospitalist and hospital medicine APP characteristics and survey period, APPs, compared with physicians, had lower odds of top global wellbeing-social activities and relationships (adjusted odds ratio 0.42 [0.22–0.82]; p = .01), whereas survey period showed no association. The survey period showed an independent association with higher anxiety (May 2020 vs. others) and higher social isolation (October 2020 vs. others), whereas profession showed no association. Concern about contracting COVID-19 at work was significantly associated with lower odds of top global wellbeing-mental health and global wellbeing-social activities and relationships, and with higher anxiety and social isolation. Hospitalist and hospital medicine APP characteristics showed no association with levels of emotional support.

Conclusions: In this longitudinal assessment of hospitalists and hospital medicine APPs, concern about contracting COVID-19 at work remained a determinant of wellness. The trend for global wellbeing, anxiety, and social isolation may guide wellness interventions.

INTRODUCTION

Hospitalists and hospital medicine advanced practice providers (APPs) are integral to the management of adults hospitalized with coronavirus disease 2019 (COVID-19). Compared to the prepandemic period, hospitalists and hospital medicine APPs early in the pandemic (May 2020) reported lower global well-being, higher anxiety, and higher social isolation.¹ The COVID-19 pandemic has since progressed with improved prevention, diagnostics, and therapeutics. However, it is unknown if the wellness of hospitalists and hospital medicine APPs has concomitantly changed, which could inform wellness efforts.

Early in the pandemic, limited knowledge on COVID-19 led to substantial stress among healthcare providers. A survey of 20,947 workers at 42 organizations, from May to October 2020, revealed a fear of exposure or transmission to COVID-19 (61%), anxiety/depression (38%), and burnout (49%).² Similarly, surveys of physician assistants and nurse practitioners highlighted their level of stress, suboptimal access to personal protective equipment, and concern about contracting COVID-19 infection.^{3,4} Since then, the COVID-19 burden has changed, notably, from the increased availability of COVID-19 vaccines.^{5,6} However, the varied public uptake of COVID-19 vaccines and the emergence of COVID-19 variants have led to increased hospitalizations and stress on healthcare providers.⁷⁻⁹ Given these changes, it is unclear if the wellness of hospitalists and hospital medicine APPs has changed, which has implications for burnout and attrition, and for the care of hospitalized patients.

To address these knowledge gaps, we surveyed hospitalists and hospital medicine APPs at an academic institution's 16 hospitals in four US states during three periods in the COVID-19 pandemic. We evaluated trends in wellness to identify areas for improvement and intervention.

METHODS

The study was conducted by the Hospital Experiences to Advance Goals and Outcomes Network (HEXAGON) group.¹⁰ HEXAGON is a research network for hospitalists and hospital medicine APPs across all Mayo Clinic sites in Arizona, Florida, Minnesota, and Wisconsin. HEXAGON focuses on generating knowledge, improving efficiency, and fostering innovation in hospital care through internal and external partnerships.¹⁰

The study was deemed Exempt by the Mayo Clinic Institutional Review Board.

Survey timeline, sites, and participants

We conducted three surveys. The first survey (May 4–25, 2020) pertained to two periods: before March 15, 2020 (prior to pandemic) and March 15–April 30, 2020 (during pandemic). The second survey (October 26–November 9, 2020; during pandemic) pertained to the September 1–October 15, 2020 period. The third survey (May 10–June 6, 2021; during pandemic) pertained to the March 15–April 30, 2021 period.

We surveyed hospitalists and hospital medicine APPs from 16 hospitals at four Mayo Clinic sites in Rochester (Minnesota), Jacksonville (Florida), Phoenix/Scottsdale (Arizona), and Mayo Clinic Health System (MCHS; Minnesota and Wisconsin) across four US states, as previously reported.¹ The sites were randomly labeled A–D. Rochester, Jacksonville, and Phoenix/Scottsdale sites have one hospital each; MCHS is a network that includes 13 community hospitals in Minnesota (Albert Lea/Austin, Cannon Falls, Fairmont, Lake City, Mankato, Owatonna, and Red Wing) and Wisconsin (Barron, Bloomer, Eau Claire, La Crosse, Menomonie, and Osseo).

Survey development and administration

Hospitalists and hospital medicine APPs were surveyed on demographics, work hours, and living situation using Research Electronic Data Capture (REDCap[®]), as described in Supporting Information Appendix 1.^{11,12} Wellness was assessed using Patient-Reported Outcomes Measurement Information System (PROMIS[®]) surveys (Supporting Information Appendix 1).^{1,13} We used PROMIS[®] surveys because they are publicly available and validated. Further, PROMIS[®] surveys cover ~70 domains, including pain and anxiety, and are suitable to evaluate a broad range of experiences. Global well-being (PROMIS Scale v1.2–Global Mental 2a) was rated on a 5-point Likert scale (excellent, very good, good, fair, poor).¹⁴ Anxiety (Neuro-QoL Short Form v1.0–Anxiety)¹⁵⁻¹⁷ and social isolation (PROMIS Short Form v2.0–Social Isolation 8a)^{18,19} were assessed using eight questions each (score range: 8–40).

For May 2020, emotional support (score range: 13–65) was assessed using 13 questions, of which, 12 were from the PROMIS Item Bank v2.0–Emotional Support computerized adaptive test. One question was developed by the authors (“I got emotional support from my colleagues”). For subsequent surveys (October 2020, May 2021), we used PROMIS Item Bank v2.0–Emotional Support–Short Form 8a.²⁰ Anxiety, social isolation, and emotional support were

rated on a 5-point Likert scale (never, rarely, sometimes, usually, always). Each hospitalist and hospital medicine APP received a unique email survey link, with up to two weekly reminders. Survey participation was voluntary.

Data analysis

Deidentified responses were exported from REDCap[®]. Participant characteristics were analyzed by survey period and using descriptive statistics. Scores for anxiety, social isolation, and emotional support were calculated as described.^{10,11,13} To compare emotional support across surveys, we used multiple imputations for two questions in the May 2020 survey.

For each survey period, we used separate logistic regression models for global well-being. We used a binary dependent variable for "top" category on the Likert scale and reported results of "top category" (excellent or very good) versus "lower category" (good, fair, poor) as odds ratio (95% confidence interval). For each survey period, we used linear regression models for anxiety, social isolation, and emotional support, and reported results as an estimate (standard error). The models included age (<40 years; ≥40 years), gender (women/other; men), profession (hospital medicine APPs; hospitalists), concern about contracting COVID-19 at work (strongly agree or agree; other [neutral, disagree, or strongly disagree]), and survey site (A–D).

The longitudinal trend in global well-being—mental health and in global well-being—social health and relationships was evaluated using mixed-effects (glimmix) logistic regression models with variance component covariance structures. The longitudinal trend in anxiety, social isolation, and emotional support was evaluated using linear mixed models with unstructured covariance structures. Repeat measures were accounted for using the individual respondent as a random effect. Both models included survey period (May 2020; October 2020; May 2021), age (<40 years; ≥40 years), gender (women/other; men), profession (hospital medicine APPs; hospitalists), concern about contracting COVID-19 at work (strongly agree or agree; other [neutral, disagree, or strongly disagree]), and survey site (A–D). A subgroup analysis was conducted on respondents that completed all three surveys. The models included survey period (March 2020; May 2020; October 2020; May 2021), age (<40 years; ≥40 years), gender (women/other; men), profession (hospital medicine APPs; hospitalists), and survey site (A–D).

Data were analyzed using SAS[®] 9.4 (SAS Institute Inc.) with statistical significance at two-tailed $p < .05$.

RESULTS

The survey response rates were 52.2% ($n = 154/295$; May 2020), 37.1% ($n = 111/299$; October 2020), and 35.5% ($n = 114/321$; May 2021), with 56 hospitalists and hospital medicine APPs responding to all surveys. Despite different response rates, respondents across

surveys had similar demographic characteristics (Table 1). The proportion of respondents concerned about contracting COVID-19 decreased over time ($p < .001$). The proportion of top global well-being—mental health ($p = .02$) and top global well-being—social activities ($p = .003$) improved with time, but remained below the prepandemic proportions of 89.6%¹ and 87.7%,¹ respectively.

Anxiety, social isolation, and emotional support

We used PROMIS surveys for anxiety, social isolation, and emotional support (Supporting Information Appendix 1). In linear mixed models that included all surveys, survey period and concern about contracting COVID-19 at work were associated with a higher level of anxiety (Table 2). When analyzed by individual survey period, in May 2020, women, compared to men, had a higher level of anxiety ($p = .01$) (Figure 1 and Table S1). In all survey periods, concern about contracting COVID-19 at work was associated with a higher level of anxiety.

In linear mixed models that included all surveys, concern about contracting COVID-19 at work was associated with a higher level of social isolation (Table 2). Generally similar results were obtained when analyzed by individual survey periods (Figure 1 and Table S1).

In all survey periods, we did not observe an association between characteristics and levels of emotional support (Table 2, Figure 1, and Table S1).

Global well-being: Mental health

PROMIS has one question on global well-being—mental health. In mixed logistic regression models that included all surveys, concern about contracting COVID-19 at work was associated with lower odds of top global well-being—mental health (odds ratio [OR]: 0.41 [0.23–0.75]; $p = .004$) (Figure 2).

Analysis by individual survey period revealed generally consistent results (Figure S1). In October 2020, respondents <40 years, compared with age ≥40 years, had 72% lower odds of top global well-being—mental health, which was similar to the 77% lower odds associated with concern about contracting COVID-19 at work (both, $p < .01$).

Global well-being: Social activities and relationships

PROMIS has one question on global well-being—social activities and relationships. In mixed logistic regression models that included all surveys, lower odds of top global well-being—social activities and relationships were observed for hospital medicine APPs compared with hospitalists (OR: 0.41 [0.21–0.79]) and for respondents concerned about contracting COVID-19 at work (OR: 0.48 [0.27–0.86]) (both, $p = .01$) (Figure 2). The results were generally similar to those for individual survey periods (Figure S2).

TABLE 1 Characteristics of responding hospitalists, categorized by survey period

	May 2020 (n = 154), no. (%)	October 2020 (n = 111), no. (%)	May 2021 (n = 114), no. (%)	p Value
Age <40 years	87 (56.9)	59 (53.2)	57 (50.0)	.53
Gender				.72
Women	85 (55.9)	64 (58.2)	60 (52.6)	
Men	66 (43.4)	44 (40.0)	53 (46.5)	
Other ^a	1 (0.7)	2 (1.8)	1 (0.9)	
Profession				.79
Hospital medicine APP ^b	70 (45.5)	48 (43.2)	47 (41.2)	
Hospitalist	84 (54.5)	63 (56.8)	67 (58.8)	
Living situation during pandemic				.56
Lived alone	17 (11.2)	18 (16.4)	14 (12.3)	
Lived with 1–4 members	121 (79.6)	86 (78.2)	93 (81.6)	
Lived with 5–10 members	14 (9.2)	6 (5.5)	7 (6.1)	
People living with you during pandemic ^c				
Children	92 (59.7)	65 (58.6)	66 (57.9)	.95
Parents	16 (10.4)	7 (6.3)	13 (11.4)	.38
Spouse, partner, or significant other	122 (79.2)	87 (78.4)	92 (80.7)	.91
Primary source for COVID-19 information				
News websites	29 (18.8)	21 (19.3)	25 (21.9)	
Social medial platforms	2 (1.3)	0	1 (0.9)	
Institutional resources	112 (72.7)	78 (71.6)	81 (71.1)	
Discussion with family and friends	1 (0.6)	0	0	
Other	10 (6.5)	10 (9.2)	7 (6.1)	
Worked <4 weeks	73 (47.4)	31 (27.9)	39 (34.2)	.004
Concerned about contracting COVID-19 at work ^d				<.001
Agree	115 (74.7)	62 (55.9)	31 (27.2)	
Other	39 (25.3)	49 (44.1)	83 (72.8)	
Cared for patients with known or suspected COVID-19	129 (84.3)	93 (85.3)	90 (80.4)	.57
Changed where you lived due to fear of transmitting COVID-19 to family members	8 (5.2)	2 (1.8)	2 (1.8)	.18
Top global well-being—mental health ^e	81 (52.9)	59 (53.2)	78 (68.4)	.02
Top global well-being—social activities and relationships ^f	37 (24.0)	35 (32.1)	49 (43.8)	.003

Note: For each survey period, “during pandemic” and questions referred to the preceding 6-week period: May 2020 (March 15, 2020–April 30, 2020); October 2020 (September 1, 2020–October 15, 2020); and May 2021 (March 15, 2021–April 30, 2021). Percentages may not add to 100 due to rounding. Data for May 2020 from Dugani et al., with permission.¹

Abbreviations: APP, advanced practice provider; COVID-19, coronavirus disease 2019 due to severe acute respiratory syndrome coronavirus 2.

^aOther indicates “prefer not to respond.”

^bAPP refers to nurse practitioners and physician assistants.

^cRespondents could select more than one option.

^dAgree included strongly agree and agree; other included neutral, disagree, and strongly disagree.

^eOptions were excellent, very good, good, fair, and poor. Top global well-being included excellent and very good. The prepandemic proportion, assessed during the May 2020 survey, was 89.6% (n = 138/154) for global well-being—mental health and 87.7% (n = 135/154) for global well-being—social activities and relationships, as previously reported.¹ Data missing for age (n = 1), gender (n = 3), primary source for COVID-19 information (n = 2), cared for patients with known or suspected COVID-19 (n = 5), changed where you lived due to fear of transmitting COVID-19 to family members (n = 2), global well-being—mental health (n = 1), and global well-being—social activities and relationships (n = 4). P value from χ^2 test.

TABLE 2 Anxiety, social isolation, and emotional isolation across three survey periods during the COVID-19 pandemic, from 2020 to 2021

	Anxiety (higher value indicates higher anxiety)		Social isolation (higher value indicates higher isolation)		Emotional support (higher value indicates higher support)	
	Estimate (standard error) ^a	p Value	Estimate (standard error) ^a	p Value	Estimate (standard error) ^a	p Value
Intercept	13.0		13.2		35.2	
Survey period during pandemic		.001		.02		.23
May 2020	1.7 (0.5)		0.6 (0.7)		0.8 (0.6)	
October 2020	-0.008 (0.5)		1.8 (0.7)		0.04 (0.7)	
May 2021	Ref.		Ref.		Ref.	
Age <40 years versus ≥40 years	1.6 (0.7)	.03	0.7 (0.8)	.42	-0.4 (0.8)	.65
Women/other versus men	1.2 (0.8)	.18	-0.5 (0.9)	.54	-0.4 (0.8)	.65
Hospital medicine APP ^b versus hospitalist	0.8 (0.8)	.35	1.3 (0.9)	.14	-0.2 (0.9)	.78
Concerned about contracting COVID-19 at work		<.001		.01		.87
Strongly agree or agree versus other ^c	2.5 (0.5)		1.7 (0.7)		-0.1 (0.6)	
Survey site		.11		.09		.19
A	0.8 (1.0)		0.1 (1.1)		-0.8 (1.1)	
B	2.5 (1.1)		2.8 (1.2)		-2.2 (1.2)	
C	0.2 (0.9)		-0.2 (1.0)		-1.7 (1.0)	
D	Ref.		Ref.		Ref.	

Note: Separate linear mixed models were used for anxiety, social isolation, and emotional support, including other listed covariates and individual respondents (random effect). Prior to pandemic (before March 15, 2020) data were not included. Data for May 2020 are available from Dugani et al., with permission.¹ Survey sites were Mayo Clinic hospitals in Rochester (Minnesota), Jacksonville (Florida), Phoenix/Scottsdale (Arizona), and Mayo Clinic Health System (MCHS), randomly labeled A–D. MCHS is a network that includes 13 community hospitals in Minnesota and Wisconsin.

Abbreviations: APP, advanced practice provider; COVID-19, coronavirus disease 2019 due to severe acute respiratory syndrome coronavirus 2.

^aCompared with the reference group (ref.; estimate = 0).

^bAPP refers to nurse practitioners and physician assistants.

^cOther included neutral, disagree, or strongly disagree.

Exploratory analysis

The characteristics of respondents to all and individual surveys were generally similar (compare Table 1 and Table S2).

In linear mixed models, survey period was associated with higher anxiety (May 2020) and higher social isolation (May 2020 and October 2020) (Table S3).

In mixed logistic regression models that included all surveys, the survey period was associated with odds of top well-being—mental health and odds of top well-being—social activities and relationships (Table S4). Compared to May 2021, prepandemic March 2020 had similar odds of top well-being—mental health, but May 2020 was associated with lower odds (overall $p = .0003$) (Table S4). Compared to May 2021, prepandemic March 2020 was associated with higher odds of top well-being—social activities and relationships, whereas May 2020 was associated with lower odds (overall $p < .001$).

DISCUSSION

In this longitudinal assessment of hospitalists and hospital medicine APPs from 16 hospitals at all Mayo Clinic sites across four US states, concern about contracting COVID-19 at work was associated with lower odds of top global well-being—mental health, lower odds of top global well-being—social activities and relationships, and higher anxiety and social isolation. Compared with hospitalists, hospital medicine APPs had 59% lower odds of top global well-being—social activities and relationships. The trend for anxiety, social isolation, and emotional support differed by survey period. To our knowledge, this is the first longitudinal assessment of wellness of hospitalists and hospital medicine APPs during the COVID-19 pandemic, which may inform wellness interventions.

Previously, we reported the decline in wellness of hospitalists and hospital medicine APPs from the prepandemic period (March

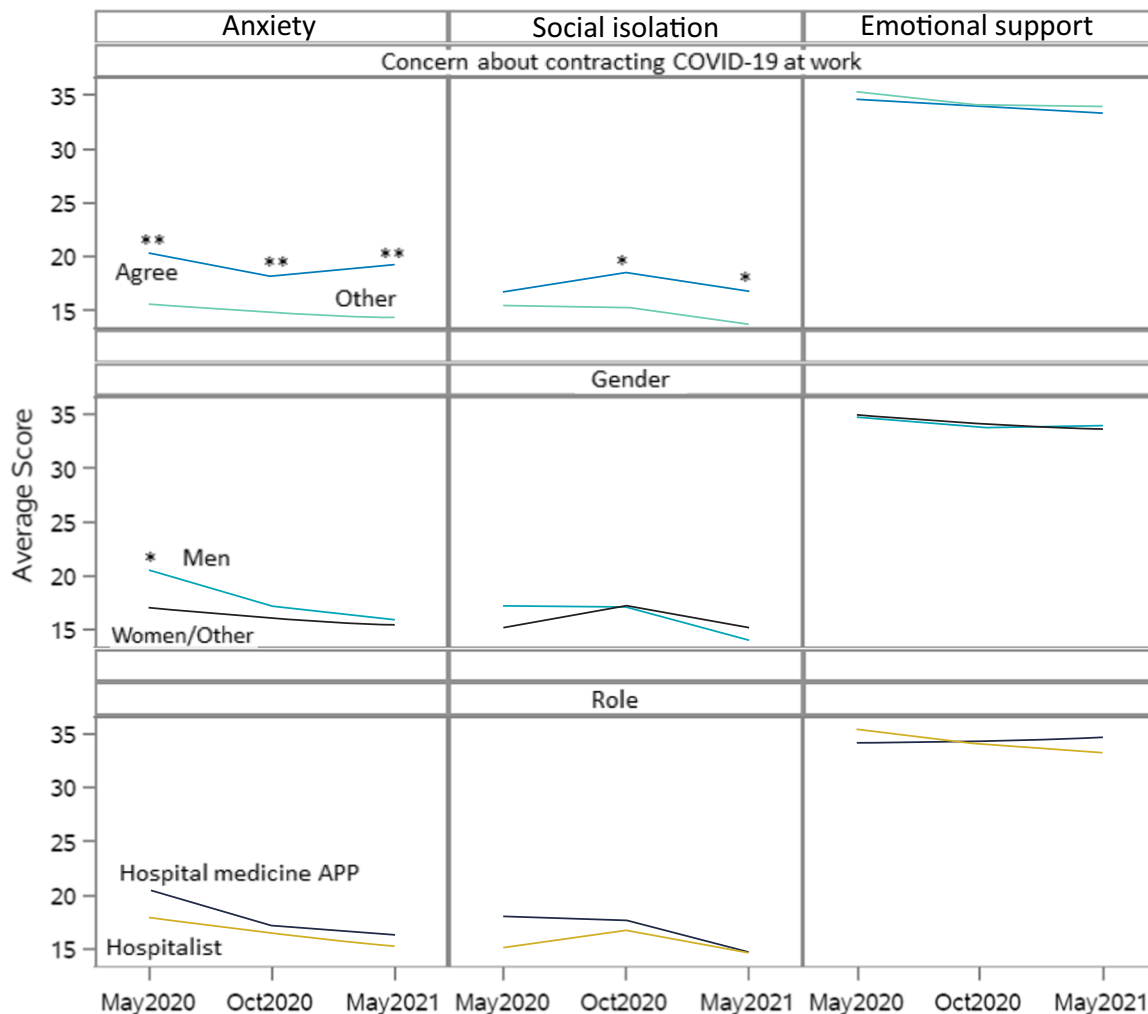


FIGURE 1 Anxiety, social isolation, and emotional support across survey periods during the COVID-19 pandemic. Separate linear regression models for anxiety (left column), social isolation (central column), and emotional support (right column) for select covariates in each survey period. Each model included other listed covariates, age group, and survey sites (A–D). Survey sites were Mayo Clinic hospitals in Rochester (Minnesota), Jacksonville (Florida), Phoenix/Scottsdale (Arizona), and Mayo Clinic Health System (MCHS), randomly labeled A–D. MCHS is a network that includes 13 community hospitals in Minnesota and Wisconsin. Prior to pandemic (before March 15, 2020) data were not included. Data for May 2020 are available from Dugani et al., with permission.¹ Higher score indicates higher anxiety and higher social isolation, but higher emotional support. APP refers to nurse practitioners and physician assistants. For “concern about contracting COVID-19 at work,” other refers to neutral, disagree, or strongly disagree. * $p < .05$; ** $p < .01$. Abbreviations: APP, advanced practice provider; COVID-19, coronavirus disease 2019 due to severe acute respiratory syndrome coronavirus 2

2020) to early in the pandemic (May 2020).¹ Other cross-sectional studies during the pandemic also reported a decline in the psychological wellness of nurses, physician assistants, nurse practitioners, and physicians, attributed to personal, professional, and systemic factors.^{21–25} Compared to cross-sectional studies, there is sparse information on the longitudinal assessment of provider wellness. A three-wave study in Germany, from April–June 2020, examined the psychological well-being of 789 employees in various sectors including health and social services (20.5% of participants).²⁶ In that study, the psychological well-being of women, compared to men, was more affected by the pandemic, and partially mitigated by job autonomy and partner support.²⁶ Across seven hospitals in the University of Pennsylvania Health System, intensive care staff were

surveyed in July–August 2020, October–November 2020, and January–February 2021. The respondents had a high prevalence of burnout (67%) and depressive symptoms (46%).²⁷ Our findings build on these observations by reporting longitudinal trends from May 2020–May 2021, during which period, there was a substantial change in the COVID-19 burden, access to personal protective equipment, and availability of medications and vaccinations for COVID-19.

Our findings show nuanced associations of wellness with the survey period: although the proportion of hospitalists and hospital medicine APPs concerned about contracting COVID-19 at work decreased from 75% (May 2020) to 27% (May 2021), it remained associated with lower global well-being, higher anxiety, and higher

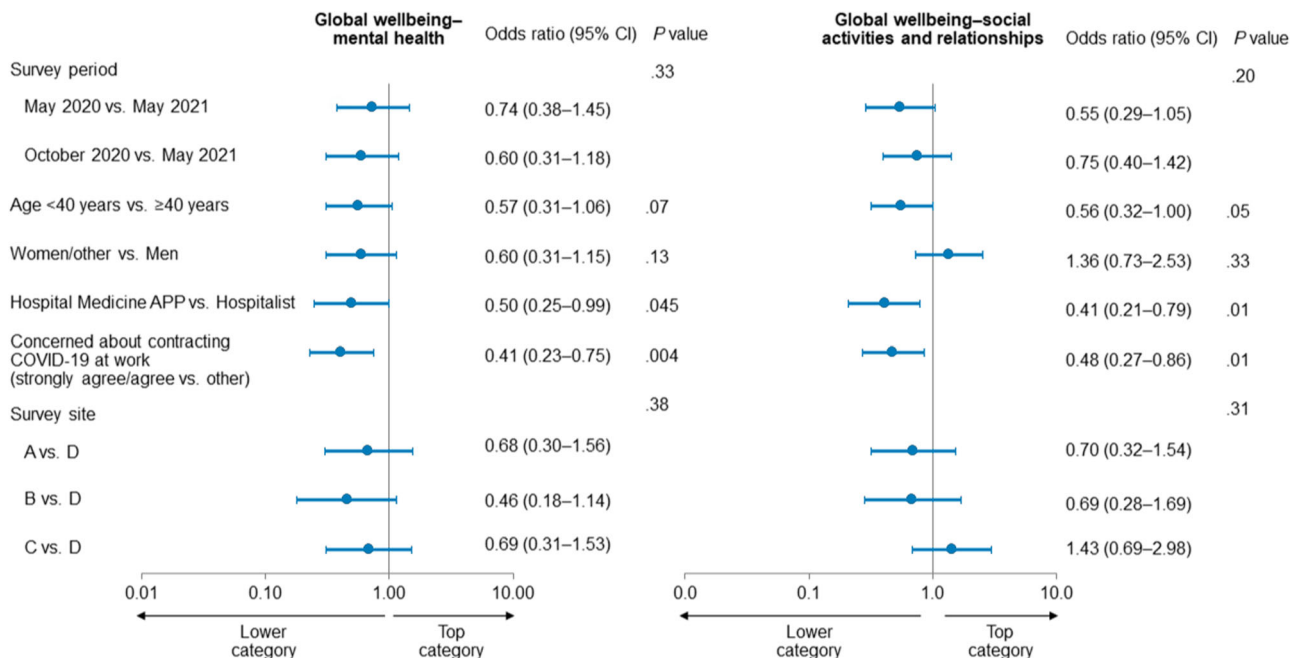


FIGURE 2 Global well-being across survey periods during the COVID-19 pandemic. Separate mixed logistic regression models for odds of top versus lower category of well-being for global well-being—mental health (left panel) and global well-being—social activities and relationships (right panel). The models included other listed covariates and individual respondents (random effect). Top category included excellent or very good; lower category included good, fair, or poor. APP refers to nurse practitioners and physician assistants. Other refers to neutral, disagree, or strongly disagree. Survey sites were Mayo Clinic hospitals in Rochester (Minnesota), Jacksonville (Florida), Phoenix/Scottsdale (Arizona), and Mayo Clinic Health System (MCHS), randomly labeled A–D. MCHS is a network that includes 13 community hospitals in Minnesota and Wisconsin. Abbreviations: APP, advanced practice provider; CI, confidence interval; COVID-19, coronavirus disease 2019 due to severe acute respiratory syndrome coronavirus 2. Used with permission of Mayo Foundation for Medical Education and Research, all rights reserved

social isolation. Although not evaluated in the study, the availability of medications, vaccines, and other protective measures for COVID-19 may have alleviated, but did not abrogate, concern about contracting COVID-19 infection. Hospitalists and hospital medicine APPs are likely experiencing common stressors/barriers from the impact of the COVID-19 pandemic on their children/families and on their ability to connect with friends and family members. Many hospitalists and hospital medicine APPs have young families, and the COVID-19 pandemic has introduced additional stress from distance learning, abrupt change in school schedules, and COVID-19 illness in family members. In addition to personal factors, common professional factors may include stress and exhaustion from caring for medically complex patients with an uncertain end to the COVID-19 pandemic. Our study also identified that hospital medicine APPs, compared to hospitalists, had lower odds for top global well-being-social activities and relationships. Given that institutional access to personal protective equipment, COVID-19 vaccines, COVID-19 education and support resources did not differ by profession, further qualitative studies (e.g., focus groups) are required to uncover contributory factors. The emergence of the COVID-19 Omicron variant in November/December 2021, after the completion of our most recent survey, has introduced new stressors on individuals and communities, and the impact on wellness needs evaluation.

Sustained suboptimal wellness can have negative consequences for physicians, APPs, and their families and patients. In June 2020, a

mixed quantitative-qualitative analysis of physicians in England showed that physicians' physical and mental health had declined since the start of the pandemic, with potential for burnout.²⁸ Another study evaluated the impact of redeployment on physician well-being and reported concerns about training opportunities, personal protective equipment, and family safety.²⁹ Similarly, a cross-sectional survey of 2707 healthcare professionals (including physicians, nurse practitioners, physician assistants) in 60 countries reported burnout attributed to professional factors and organizational support.³⁰ In the present study, we did not evaluate burnout or plans to quit hospital medicine. Future studies are required to evaluate strategies to support hospitalists and hospital medicine APPs at risk of burnout or declining health.

Findings from the present study provide impetus to develop wellness interventions. A meta-analysis of articles through May 2020 focused on interventions for "frontline health and social care professionals during and after a disease outbreak, epidemic or pandemic."³¹ The meta-analysis revealed a lack of evidence to guide the selection of beneficial interventions.³¹ Since then, other studies have reported strategies to improve the mental health and wellness of healthcare workers.^{32–37} While our study was ongoing, our institution developed strategies to support staff during the COVID-19 pandemic. For instance, the Healing the Emotional Lives of Peers (HELP) program and Office of Staff Services provide confidential support; institution leadership

provides regular, reliable information on COVID-19 disease burden and available supports; and department/division leadership has increased communication to identify concerns and tailor interventions to the site milieu. In addition, to reduce the risk of contracting COVID-19 at work, sites have increased the use of telemedicine/virtual care. This has allowed for frequent, virtual communication with patients, and allows hospitalists and hospital medicine APPs to socially distance and work in office areas or from home. The institution requires staff to be vaccinated against COVID-19 or have a valid exemption, provides designated areas for meals and refreshment, and implemented strategies (e.g., provide work laptops) to maximize remote work and minimize in-person meetings. Site-specific changes included providing free safety goggles and face shields (in addition to standard personal protective equipment) and purchasing an ultraviolet sterilization machine to sterilize items at the end of the day. To promote wellness and express gratitude, some sites provide daily lunch to staff, joy snacks, and massage therapy. These and other strategies may be considered at other institutions to promote staff wellness.

This study has potential limitations. The survey response rate was 35%–52%. However, the characteristics of respondents across surveys were comparable, suggesting that other factors, including survey fatigue,³⁸ may have contributed to the lower response rate. Although we examined several personal and professional characteristics, the contribution of unmeasured factors (e.g., work experience) to wellness is unknown. The study has several strengths. It surveyed hospitalists and hospital medicine APPs in four US states at distinct periods in the pandemic (early, mid, and late). Although the survey sites were within the same institution, the heterogeneity in providers, patients, state-level burden of COVID-19 and healthcare policies, increases generalizability to other institutions.^{1,39} The study provides a foundation to characterize system- and profession-specific factors that influence wellness.

In summary, this longitudinal study of wellness of hospitalists and hospital medicine APPs revealed that concern for contracting COVID-19 at work was an independent determinant of global well-being, anxiety, and social isolation. In addition, compared to hospitalists, hospital medicine APPs had lower top global well-being—social activities and relationships. These findings do not establish causality but provide a strong foundation for ongoing wellness efforts. This is particularly relevant because hospital medicine is the predominant service line to manage COVID-19 patients on general medical wards.

CONCLUSION

In this longitudinal assessment of hospitalists and hospital medicine APPs in an academic institution's 16 hospitals across four US states, concern about contracting COVID-19 at work was an independent determinant of global well-being, anxiety, and social isolation. The long-term effects of chronically unwell hospitalists and hospital medicine APPs are unknown but may weaken institutions' ability to

care for hospitalized patients. There is an urgent need for ongoing wellness efforts to support hospitalists and hospital medicine APPs and build a stronger workforce.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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