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HEMAPHERESIS

TRANSFUSION

Apheresis physician well-being during the COVID-19 pandemic: Results of a survey

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Abstract

Background: The COVID-19 pandemic has placed additional stressors on physician lives. In this study, we report findings from a survey conducted among attending physician (AP) members of the American Society for Apheresis (ASFA) to elucidate the status of their well-being during the COVID-19 pandemic as well as resources provided or actions taken by their institutions and themselves personally to maintain or improve their well-being.

Study Design and Methods: A 17-question, voluntary, IRB-approved survey regarding well-being was distributed to the ASFA AP members between August 26, 2020 and September 16, 2020. The descriptive analyses were reported as number and frequency of respondents for each question. Non-parametric chi-square tests, ANOVA, and paired t-tests were performed to determine differences in categorical variables, changes in well-being scores, and compare time points, respectively.

Results: Based on the responses of 70 attending level physicians representing the United States (U.S., 53, 75.7%) and outside the U.S. (17, 24.3%), the following were observed: (1) COVID-19 negatively affects the well-being of a subpopulation of APs, (2) neither institutional nor individual measures to improve

well-being completely resolved the problem of decreased AP well-being during the pandemic, and (3) personal actions may be superior to institutional resources.

Conclusion: There is a widespread decline in AP well-being during the COVID-19 pandemic that was not adequately improved by institutional or personal resources/actions taken. Institutions and physicians must work together to implement strategies including resources and actions that could further improve AP physician well-being during a public health crisis.

KEYWORDS

SARS-CoV-2, attending physicians, enzymatic nanomotors, burnout, personal protective equipment

1 | INTRODUCTION

The COVID-19 pandemic, caused by the SARS-CoV2 virus, is one of the worst public health crises in the last century and has affected all aspects of our lives including healthcare delivery. Well-being is a key component of one's quality of life, especially for healthcare workers such as physicians, because their well-being not only affects themselves but also their patients.[1–5] Literature surrounding the prevalence, challenges, and mitigation efforts of physician well-being and burnout is robust.[2,6–20]

The added stress caused by the COVID-19 pandemic has negatively impacted the well-being of healthcare workers in the U.S.[21–23] Therefore, the need for mental health support and wellness programs has increased, and organizations have responded with guidance to support physicians during this critical time.[24–26]

In order to better understand the impact of the COVID-19 pandemic on attending level physician (AP) members of the American Society for Apheresis' Attending Physicians Subcommittee (ASFA-APS), ASFA-APS designed and implemented a survey for ASFA's AP members to gather information on their self-reported well-being. The goals of this survey were threefold: (1) determine the impact that the COVID-19 pandemic has had on AP well-being relative to pre-pandemic times, (2) identify both institutional and individual actions that have been taken to improve well-being, and (3) determine the success of these interventions to better improve well-being in the future. This survey led to many hypotheses in light of the breadth and depth of impact the COVID-19 pandemic has had on both personal and professional lives. These hypotheses include: (1) personal actions would have greater impact on well-being than institutional resources, (2) despite the latter two, well-being would not fully improve well-being to pre-COVID levels, (3) different geographic areas would reflect different well-being scores due to the difference in severity of COVID-19 across regions, and (4) the type of work site would influence well-being. We report the results of this survey here.

2 | MATERIALS AND METHODS

2.1 | Survey development

The ASFA-APS developed a survey to gather information regarding well-being during the 2020 COVID-19 pandemic among AP. The 17-question survey (Appendix 1) included four demographic questions and 13 well-being questions (of which five were open-ended questions) with an estimated total time to complete the survey of under 10 minutes. Questions were included to evaluate the geographic location of respondents, type of facility, organization implemented resources to support physician well-being, and personal practices implemented for well-being. Furthermore, if respondents reported organization or personal implemented actions, then they were asked to describe the actions and why these were or were not impactful. Self-reported well-being questions were quantified by a 0–10 scale (rating scale from 0 as bad as it can be to 10 as good as it can be or not applicable). The questions were designed to evaluate well-being at four time points: (1) Before COVID-19 (Pre-COVID), (2) During COVID-19 related "shelter in place" (During COVID), (3) During re-opening of the respondent's community (Re-opening), and (4) on the current day when completing the survey (Current).

Survey logic was used to direct respondents through the questions based on their responses. ASFA-

APS members beta tested the survey for user time requirement, individual question clarity, and software functionality. The term, "Well-being," for this survey was defined as encompassing the respondent's overall physical, emotional, spiritual, and intellectual well-being.

2.2 | Subjects and testing

The survey was distributed by email to all ASFA physician members (N = 445). An online survey format was chosen to provide flexibility and to reach a respondent pool of all ASFA physician members. Qualtrics software version 2020 (Qualtrics, Provo, UT, U.S.) was used. Participation was voluntary and anonymous. On August 26, 2020, the online survey link was sent to all ASFA physician members for voluntary participation. Reminder emails were sent to all ASFA physician members on September 2, 2020 and on September 10, 2020 and the survey closed on September 16, 2020. Over these 22 days, the survey was entered by 103 potential respondents, of which 70 (68.0%) attending level physicians answered the well-being rating scale questions and were included in the analysis. The survey introduction included consent information and survey logic such that clicking yes to participate led them into the survey, whereas clicking no took them to the end of the survey. The study was approved by the University of Virginia Institutional Review Board for Social and Behavioral Sciences.

2.3 | Statistical analysis

The raw data generated by Qualtrics were downloaded into PowerPoint 2013 and Excel 2013 (Microsoft Corporation, Redmond, WA, U.S.) for further analyses. For descriptive analysis, results are presented as the number and frequency (%) of respondents for each question. For the purpose of determining differences between categorical variables, non-parametric chi-square tests were performed. To determine changes in well-being scores between four time points, a repeated measures ANOVA, controlling for both geographic location and work site type (primary institution), was performed. When comparing two specific time points, a two-tailed paired t-test was performed. Tabular data are represented by percentages and Figure 1 indicates means ± standard error. A p value of ≤ 0.05 was considered statistically significant. Statistical analysis was performed using the Statistical Package for the Social Sciences version 26 (SPSS, Inc., Chicago, IL).

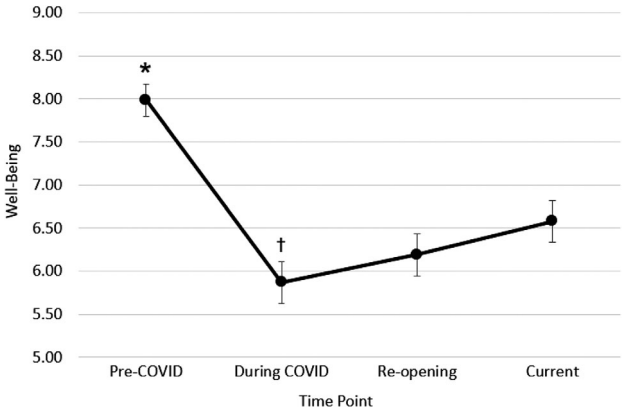

FIGURE 1 Changes in well-being across time points. The well-being rating scale ranges from 0 (as bad as it can be) to 10 (as good as it can be). *Denotes $p < 0.01$ compared to "During COVID," "Re-opening," and "Current." †Denotes $p < 0.05$ vs. "Current"

3 | RESULTS

3.1 | Respondent characteristics

One hundred and three recipients opened the link from the email. Of these 103 people who entered the survey, 102 chose to participate and of these 75 (73.5%) were APs. The 25 (24.5%) respondents who were not APs plus 2 (2.0%) respondents who did not answer this question were excluded from the survey by survey logic. Seventy of 75 (93.3%) AP respondents who answered some or all of the well-being questions were included in the analyses.

The geographic locations were evenly distributed; however, due to a large percentage of academic medical center respondents, work types were different (67% vs. 32%; $p \leq 0.05$) (Tables 1 and 2). There were no differences detected in institutional resource availability between geographic regions or work site types (Table 2).

3.2 | Availability and effectiveness of institutional resources and personal actions

Table 2 summarizes the availability and effectiveness of institutional resources and personal actions taken for well-being. Among respondents, 64.3% stated that their institution implemented resources (actions), to support physician well-being during the COVID-19 pandemic. Furthermore, 80.5% of these respondents believed that the resources offered by their institution were effective. However, there was no question or metric to objectively determine how many subjects utilized institutionally available resources. Therefore, it is unknown how many respondents took advantage of institutional resources.

TABLE 1 Respondent group and location

Group[a,b]	Location: Number of respondents (%)
Group 1 Pacific and Northeast 11 states 22 respondents (31.4%)	California: 2 (2.9) Connecticut: 1 (1.4) District of Columbia: 1 (1.4) Maine: 1 (1.4) Massachusetts: 1 (1.4) Maryland: 1 (1.4) New Hampshire: 1 (1.4) New Jersey: 3 (4.3) New York: 5 (7.1) Pennsylvania: 3 (4.3) Washington: 3 (4.3)
Group 2 Middle States 15 states 31 respondents (44.3%)	Arizona: 1 (1.4) Colorado: 2 (2.9) Florida: 3 (4.3) Georgia: 1 (1.4) Illinois: 4 (5.7) Iowa: 1 (1.4) Louisiana: 1 (1.4) Michigan: 2 (2.9) Minnesota: 3 (4.3) Nebraska: 1 (1.4) North Carolina: 3 (4.3) Ohio: 2 (2.9) Texas: 5 (7.1) Utah: 1 (1.4) Wisconsin: 1 (1.4)
Group 3 Outside U.S. 17 respondents (24.3%)	I do not reside in the U.S.: 17 (24.3)

[a]There were 53 response options: Each of the 50 states of the U.S., the District of Columbia, Puerto Rico, or "I do not reside in the U.S."
[b]There were no respondents from Puerto Rico.

Although not significant, there was a trend for academic medical centers to offer resources versus non-academic hospitals and facilities (70.2% vs. 52.2%; $p = 0.14$).

Personal action was taken by 80.6% of respondents. Among these respondents, 96% believed that their own personal action was effective in improving well-being. In contrast to institutional resources, the non-academic hospital respondents reported taking more personal action (95.4% vs. 72.5%, $p \leq 0$ .05). There were no differences detected in the number of subjects that took personal action among geographic regions.

3.3 | Types of institutional resources and personal actions

Table 3 summarizes what respondents listed as institutional resources. Responses were clustered into nine categories of resources, with counseling and mindfulness categories making up the majority of resources. Table 4 lists the resources that respondents believed should have been provided. The top two responses were adequate personal protective equipment (PPE) and flexible work hours/time-off. Table 5 depicts the personal actions taken by surveyed APs. The top two responses were exercise and mindfulness/faith/self-improvement.

3.4 | Well-being scores

Figure 1 shows the serial scores of well-being over the four time points evaluated. "Pre-COVID" well-being scores were significantly higher compared to all other time points ($p \leq 0.01$ at all time points). The greatest effect on well-being was demonstrated by a significant decrease in well-being from "Pre-COVID" to "During COVID" scores (7.95 ± 1.58 vs. 5.82 ± 1.98; $p \leq 0.01$). Also, "During COVID" well-being was lower compared to "Current" well-being (5.82 ± 2.00 vs. 6.57 ± 2.03; $p \leq 0.05$). Although the geographic location for Group 1 (Pacific Coast + Northeast United States [U.S.]) showed a trend for having a greater impact on well-being, geographic location did not statistically affect well-being scores. Respondents from outside the U.S. (non-U.S.) had a higher well-being score across all four time points with "Pre-COVID" and "Current" time points being significantly different ("Pre-COVID" well-being U.S. 7.77 ± 1.55 vs. non-U.S. 8.64 ± 1.49; $p < 0.05$ and "Current" well-being U.S. 6.24 ± 2.05 vs. non-U.S. 7.68 ± 1.53; $p < 0.05$). Similarly, academic medical center work sites showed a trend toward having more impact on well-being compared to all other work sites combined (includes nonacademic hospitals, blood donor/collection center, mobile apheresis service, and other), but this was not statistically significant. Well-being scores trended upward from "During COVID" through "Current," but recovered less than 50% from "Pre-COVID" scores.

4 | DISCUSSION

Due to the environment, responsibilities (personal and professional), and long hours, physicians are at a higher risk for decreased well-being. APs are involved in the care of patients with both acute and chronic conditions that span indications across multiple specialties. Due to this widespread involvement across services and populations, APs are susceptible to the increased stress that COVID-19 has invoked to the healthcare system. This investigation sought to identify how COVID-19 affected the well-being of APs and what resources or

TABLE 2 Geographic and primary work site affiliation

Characteristic	Percent (number/total)	Institutional resources available (%, number/total)	Believe institutional resources effective (%, number/total)	Personal action taken (%, number/total)	Believe personal action effective (%, number/total)
Geographic group					
Group 1 (Pacific and Northeast U.S.)	31.4 (22/70)	59.1 (13/22)	72.7 (8/11)	83.3 (15/18)	93.3 (14/15)
Group 2 (Middle U.S.)	44.3 (31/70)	71.0 (22/31)	75.0 (15/20)	79.3 (23/29)	100.0 (23/23)
Group 3 (Outside U.S.)	24.3 (17/70)	58.8 (10/17)	100.0 (10/10)	80.0 (12/15)	91.7 (11/12)
All Groups	100.0 (70/70)	64.3 (45/70)	80.5 (33/41)	80.6 (50/62)	96.0 (48/50)
Primary work site affiliation					
Academic Medical Center	67.1 (47/70)[a]	70.2 (33/47)	76.7 (23/30)	72.5 (29/40)[b]	93.1 (27/29)
Non-Academic Hospital	11.4 (8/70)	50.0 (4/8)	100 (3/3)	85.7 (6/7)	100.0 (6/6)
Blood Donor/ Collection Center, Mobile Apheresis Service, Other	21.5 (15/70)	53.3 (8/15)	87.5 (7/8)	100.0 (15/15)	100.0 (15/15)
All work site types	100.0 (70/70)	64.3 (45/70)	80.5 (33/41)	80.6 (50/62)	96.0 (48/50)
All respondents (Geographical Locations + Primary Work Site Affiliations)	100.0 (70/70)	64.3 (45/70)	80.5 (33/41)	80.6 (50/62)	96.0 (48/50)

[a]Denotes differences across work site types, $p < 0.05$.
[b]Denotes personal action difference between academic vs. non-academic, $p < 0.05$.

interventions best improved their well-being. This is the first study in this specialty, to our knowledge, that addresses this topic. The most important findings of this study were: (1) COVID-19 negatively affects the well-being of a sub-population of APs, (2) although both institutions and individuals are implementing ways to combat lower well-being, neither are completely resolving the problem, and (3) it appears that personal actions may be superior to institutional resources.

A well-being score of 7.95/10 "Pre-COVID" demonstrated that respondents were generally happy, comfortable, and healthy before the pandemic started. A significant drop of well-being occurred from "Pre-COVID" to "During," providing evidence that the COVID-19 pandemic detrimentally affected the well-being of the physicians who responded to the survey (Figure 1). Furthermore, well-being increased during "Re-opening" and "Current" compared to "During." While we hypothesized that different geographic areas would reflect different well-being scores due to the difference in severity of COVID-19 across regions and that the type of work site would influence well-being, these were not the case. Well-being changes occurred independent of either geography or work site type.

We were specifically interested in the value of institutional resources compared to personal action. Results indicate the greatest change in improvement occurred from "During" to "Current," and were significant in both groups (institution available resources, 5.86 ± 2.1 to 6.81 ± 2.1, $p < 0.01$ and personal action, 5.83 to 6.59 ± 1.8, $p < 0.01$). However, we do not know how many of the respondents actually utilized institutional resources or how many potentially did both. Therefore, the effectiveness may be perceived rather than experienced. Furthermore, although both showed significant improvement, the improvement accounted for less than half of the initial decrease in well-being from "Pre-COVID" to "During COVID." Among respondents, 64.3% stated that their institutions offered some type of resources to support physician well-being. Of these respondents, 80.5% stated that they believed the resources offered were effective. There was a trend of increased resource availability at academic medical centers versus all other work sites combined (includes non-academic hospitals, blood donor/collection center, mobile

TABLE 3 Institution provided well-being resources (n = 41)

Resource	Number of responses (%)[a]
Counseling: Hotlines, call centers, online sessions, counseling offices and psychiatrists	30 (73.2)
Mindfulness Activities: Meditation, yoga, and in-person or on-line gatherings	11 (26.8)
Working from home or flexible working hours	7 (17.1)
Benefits: Carryover of annual funds, paid time off, extended sick leave times and free parking	7 (17.1)
Frequent updates: Townhall meetings and emails	5 (12.1)
Free meals and snacks	4 (9.7)
Child support and optional accommodation	4 (9.7)
Entertainment: Happy hours and music concerts	2 (4.8)
Gifts and spirit gear	2 (4.8)
Do not know	2 (4.8)

[a]Total percentage is greater than 100 because more than a single response was allowed per respondent.

TABLE 4 Well-being resources that should be provided by institutions according to respondents (n = 62)

Resource	Number of responses (%)[a]
Adequate and proper PPE	12 (19.3)
Flexible work hours and time off, limit work hours	12 (19.3)
Encourage telemedicine and virtual meetings	10 (16.1)
Job maintenance/adequate staffing/avoiding furloughs	9 (14.5)
Mindfulness, spiritual activities, community meetings	8 (12.9)
Increased communications/updates	6 (9.6)
Access to counseling	6 (9.6)
Childcare	5 (8.0)
Free food	4 (6.4)
Care for safety of staff	4 (6.4)
Flexible clinic time	2 (3.2)
Housing	2 (3.2)
None	2 (3.2)
Not sure	1 (1.6)
Other: Improved health coverage benefits, exercise, transportation, free audiobooks, advocacy for flexible CME and licensing requirements, staff engagement in decisions, economic gratification and more time away from patient care (research)	8 (12.9)

[a]Total percentage is greater than 100 because more than a single response was allowed per respondent.

apheresis service, and other), 70.2% versus 52.2% ($p = 0.14$). In contrast, the other work sites combined reported taking more personal action (95.4 vs. 72.5%, $p < 0.05$). The latter is likely true because physicians recognized their decreased well-being, but their institutional resources were unsatisfactory. It is also possible that the 20% who did not believe that the institutional resources were effective were the majority of respondents who took personal action, seeking to improve their well-being independently. Based on the feedback that 96% stated personal action was effective and only 80% reported institutional resources were effective, it would appear that personal action improved well-being better than institutional resources. This may indicate that although both institutional and personal actions helped improved well-being to some degree, neither sufficiently provided resolution to the pandemic's stress as illustrated by the decrement of well-being between "Pre-COVID" and "Current" time points.

The higher effectiveness reported by personal action compared to institutional implementations suggests that leadership should work more closely with employees to ascertain what matters for well-being could prove invaluable in establishing strategies with outcome evaluations to optimize the positive impact on well-being. This is further supported by the differences between what institutions actually implemented (Table 3) versus what respondents said should have been implemented (Table 4) and personal action that was listed (Table 5). Studies have found that the perception of poor communication between hospital leaders and healthcare staff was a major stressor for physicians.[27–29] Actions to improve the aforementioned communication are a modifiable factor to mitigate the stress and emotional distress of front line workers.[27–29] Due to the success of personal action versus institutional resources, institutions should start with asking what physicians want beyond the traditional offerings of generic resources. Although not resolving the well-being back to normal, personal actions appear to be better than institutional offerings. Of those indicating personal action was taken, the top three interventions included exercise (physical activity), mindfulness/faith/self-improvement, and spending time with family and friends. A small percentage (2/50, 4%) retired/resigned from clinical practice. This appears to be consistent with previous surveys of other sub-specialty disciplines.[30,31] Most respondents shared their ideas/thoughts as to what their organization could provide to further support physician well-being during the COVID-19 pandemic. The top answer was to provide adequate proper personal protective equipment (PPE). In the

TABLE 5 Personal well-being resources (n = 50)

Resource	Number of responses (%)[a]
Exercise	21 (42)
Mindfulness, faith, and self-improvement	15 (30)
Family and friends	13 (26)
Time away from work with/without travel	11 (22)
Outdoor time	6 (12)
Retired/resigned from practice	2 (4)
Journaling	2 (4)
Community involvement	1 (2)
Avoiding social media	1 (2)

[a]Total percentage is greater than 100 because more than a single response was allowed per respondent.

U.S., much of the stress and anxiety for front line workers has developed from a lack of PPE.[22,23,27,29]

4.1 | Limitations and future areas of research

There are several limitations to the current study that attenuate our ability to interpret results. Several categories have non-respondents making conclusions difficult. It is possible that respondents may have self-selected (e.g., only those who were negatively affected by COVID-19 filled out the survey). It is also unknown how many physicians utilized their institution's resources, or used both their institution's resources and personal action. Also, it is unknown when action was taken. Low numbers in some groups limit the power of the study. We do not know how many people felt they needed help, what type of help was sought (counseling, help line, meditation, exercise, etc.) or duration (one session, 4 weeks, etc.). Last, future research needs to investigate if the major stressors originate from domestic or workplace issues. It is unknown if increased family responsibilities (e.g., home schooling, daycare, elder care, etc.), enhanced prolonged isolation (e.g., travel restrictions limiting ability to see friends and family, especially for singles), and/or longer more stressful work hours are responsible for decreased well-being. It was interesting that non-U.S. respondents, in general, demonstrated a trend toward higher well-being. This may have occurred due to differences in culture, or because of different approaches taken to cope with the pandemic. However, due to the few number of non-U.S. respondents (N = 17), we hesitate to make strong conclusions. This warrants further investigation to potentially learn how physicians in different countries approach and maintain well-being during a public health crisis.

5 | CONCLUSION

This survey shows that the COVID-19 pandemic has led to a decline in APs' well-being and this decline is independent of geographic location or work-site type. Since the time of this survey, the COVID-19 pandemic surge continues with daily cases and deaths hitting new highs with consequent strains on our healthcare system nationwide. We suspect that the prolonged and rising stressors may have led to further well-being decline among APs. While institutions have provided resources for coping with or improving physician well-being, they may be inadequate. Many had taken personal actions to improve their own well-being. Physician well-being requires a multidimensional approach involving not only the individual physicians but also a vested interest and engagement of healthcare organizations. To further improve AP well-being during a public health crisis, it behooves institutions to ask its physicians about their needs and to implement strategies addressing their needs whenever feasible. Investigating the differences in well-being practices between the U.S. and foreign countries may also be enlightening.

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CONFLICT OF INTEREST

None of the authors have any conflict of interest to disclose.

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APPENDIX 1. APHERESIS PHYSICIAN WELL-BEING SURVEY QUESTIONS

Demographic questions	Answer choices
1. Are you an attending level physician?	Yes No (end survey)
2. Which of the following best describes your primary institution (work place)?	Academic medical center Hospital/medical center (no academic affiliations) Blood donor center collection facility Mobile apheresis service Other, please specify
3. In which state do you currently reside?	53 response options: • Each of the 50 United States • District of Columbia • Puerto Rico • I do not reside in the United States
4. In regards to COVID-19, in what phase is your state?	Shelter in place Phase 1 Phase 2 Phase 3 Phase 4 I do not know
Core survey questions	
How would you rate your overall well-being during each of these times?	
5. Well-being before COVID-19	Rating scale 0–10 0 = As bad as it can be 10 = As good as it can be Not Applicable
6. Well-being during COVID-19 related, "Shelter in place"	Rating scale 0–10 0 = As bad as it can be 10 = As good as it can be Not Applicable
7. Well-being during reopening of your community	Rating scale 0–10 0 = As bad as it can be 10 = As good as it can be Not Applicable
8. Well-being today	Rating scale 0–10 0 = As bad as it can be 10 = As good as it can be Not Applicable
9. During the COVID-19 pandemic, has your organization implemented resources (actions) to support physician well-being?	Yes No (skip to #13)
10. Briefly describe what your organization implemented (e.g., a counseling hotline or call center):	Free text answer
11. Do you believe what your organization implemented works or makes a difference?	Yes No
12. Briefly explain why or why not.	Free text answer
13. Briefly describe what resources (actions) you feel should be provided by your organization to support physician well-being during the COVID-19 pandemic.	Free text answer
14. During the COVID-19 pandemic, have you personally done something for your well-being?	Yes No (end survey)
15. Briefly describe what you have done for your well-being.	Free text answer
16. Do you believe what you have done works or makes a difference?	Yes No
17. Briefly explain why or why not.	Free text answer
End of survey	

Note: Well-being in the survey encompasses the respondent's overall physical, emotional, spiritual, and intellectual well-being.