PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (http://bmjopen.bmj.com/site/about/resources/checklist.pdf) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

<table>
<thead>
<tr>
<th>TITLE (PROVISIONAL)</th>
<th>Protecting the Front Line: A cross-sectional survey analysis of the occupational factors contributing to health care workers’ infection and psychological distress during the COVID-19 pandemic in the United States</th>
</tr>
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<tr>
<td>AUTHORS</td>
<td>Firew, Tsion; Sano, Ellen; Lee, Jonathan; Flores, Stefan; Lang, Kendrick; Salman, Kiran; Greene, M.Claire; Chang, Bernard</td>
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VERSION 1 – REVIEW

<table>
<thead>
<tr>
<th>REVIEWER</th>
<th>Devan Hawkins</th>
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<td>MCPHS University, USA</td>
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<tr>
<td>REVIEW RETURNED</td>
<td>08-Aug-2020</td>
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</table>

GENERAL COMMENTS

This manuscript represents very important work to assess factors that impact the risk of COVID-19 infections and subsequent mental health problems among healthcare workers. The findings from this study will be useful in establishing a baseline in what we know about this risk and informing future work. These findings are also helpful because they show the impact that lack of PPE has likely had on spreading the virus among healthcare workers. I provide some suggestions that I think may help to improve the manuscript below.

Abstract:
• Page 2, line 51: I would not describe this as an intervention study. This can likely be removed.
• Page 4, line 8: If Emergency Medicine is referring to the department, I would make that clear. I would also put the percentage right after emergency medicine.

Methods:
• Page 6, lines 35-36: Define the PHQ-2 and GAD-2 acronyms.
• Can you explain why the survey was considered exempt?

Results
• Because the major limitation of this analysis is the convivence sample, would it be possible to compare the distribution of the demographic variables to the distribution for HCWs or the health care industry in the US? The Bureau of Labor Statics Current Population Survey data or the American Community Survey may be a place to get this data.
• Table 1: Should physician attending be listed as the reference?
• Table 3: I think this needs more explanation in the text. What does the beta coefficient represent? Mean scores should be shown for each of the responses to these questions.
• This is a good opportunity to explore predictors of infection. While the univariate PRs in table 1 are very useful, in some cases these findings may be confounded. For example, it is surprising to see Black workers with a lower risk of infection. Emerging research has suggested workers of color to be at an elevated risk. You might consider constructing multivariate models to explore these associations further.

• I recommend considering performing a sensitivity analysis to see whether the predictors of COVID infection are different when you compare confirmed and probable infections. This does not necessarily need to be depicted in your results (unless there are major difference), but it would be important to discuss.

• This data may also be a good opportunity to explore predictors of being tested. Some of the differences may not be due to certain groups actually being at a high risk for infection, but rather due to differences in testing. You could do something similar to table 1, but with the outcome being whether the worker had been tested.

Discussion:
• Limitations: The discussion of the limitations related to the representatives of this sample needs to be explained further. Comparisons should be made to the healthcare industry and not the overall US population. For some industries and occupations, workers of color account for a greater proportion of workers in health care. The links below may be useful:
  https://www.bls.gov/cps/cpsaat11.htm
  https://www.bls.gov/cps/cpsaat18.htm

• The findings about the contribution of the lack of PPE deserve further discussion. This seems to be one of the main failures in the initial response. The role that both hospital administration played in this should be discussed. According to the OSHA act, hospitals and other healthcare facilities are required to provide their workforce with workplaces free from known hazard. It may be worth discussing this responsibility and how hospitals can compensate their workers for the risks that they placed on them.

REVIEWER
Luís Carlos Lopes-Júnior (PhD)
Health Sciences Center at the Federal University of Espírito Santo (UFES), Vitória, ES, Brazil

REVIEW RETURNED
10-Aug-2020

GENERAL COMMENTS
August 10th, 2020

Manuscript ID: bmjopen-2020-042752

Title: Protecting the Front Line: A cross-sectional survey analysis of the occupational factors contributing to health care workers' infection and psychological distress during the COVID-19 pandemic in the United States.

General comments:
Thank you for the opportunity to review this timely article about an important and understudied topic regarding the broad overview of disease group of health care workers (HCWs) and their perceived risk during the COVID-19 pandemic, mainly in the current global scenario of an unprecedented pandemic with repercussions in all
dimensions of the health-disease process of individual, population, including HCW at the frontline against COVID-19. The authors carried out a cross-sectional study aimed to assess factors contributing to HCW infection and psychological distress during the COVID19 pandemic in the U.S.A.

Although the study is well-written as well as relevant, presents some weaknesses in the method as well as results section that need to be better worked. However, this study brings some interesting results and new insights as a potential contribution to the field. I believe that this is a novel paper with a topic that will be great interest for BMJ Open readers. I have some comments, suggestions in order to strengthen the potential contribution of this topic in any revision the author(s) might undertake.

Major Revision:

INTRODUCTION

Page 6. Lines 5-7: Please, to update the information according to the last Situation report COVID-19 from the reference 1. It is also interesting to point out the current epidemiological data in the USA - the scenario of your study.

Page 6. Lines 24-47: There are some relevant outputs about this particular topic that were not quoted in the introduction section. Please, check out the following references, considering cite them. Also, the authors should be to explain better your rationale. What does your study add to the previously published studies? What is the potential contribution of your study to the frontier of knowledge?

doi: 10.1016/S0140-6736(20)30644-9
doi:10.1016/S2468-2667(20)30164-X
doi:10.1101/2020.04.29.20084111
doi:10.12669/pjms.36.COVID19-S4.2790
doi:10.1371/journal.pone.0235460
doi:10.1136/bmjopen-2020-039426

METHODS

This section needs to be better rearranged, i.e., the information must be presented following the STROBE Checklist. Please, to start by describing the Study Design and the Setting of the research. Suggestion: We conducted a cross-sectional survey of US HCWs who worked at the frontline against COVID-19 in 48 states, the District of Columbia, and US territories (Puerto Rico, US Virgin Islands) during May 2020. The survey followed the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (Reference). Lines 7-14, Must be transposed in this section, however, below in the subsection data collection and procedures. Then, approach the Participants (please establish more clearly for the reader, the inclusion and exclusion criteria of your study), the study sample and then the Ethical Aspects. Line 16. “Study procedures were reviewed and deemed exempt by the Columbia University IRB” Please, to inset the Process Number of the approval obtained from the IRB.
After ... to, start the Measures and Variables subsection.

Page 7. Lines 33-38. For the validated instruments such as, PHQ-2, GAD-2 and Maslach Burnout Inventory), please, to provide here the values of the psychometric properties of this validated instrument (the Cronbach’s alpha coefficient, the Intraclass Correlation Coefficient - ICC) for the validated version in US.

In addition, briefly describe these instruments - what these instruments are intended to evaluate; how is the type of scale used in these 3 instruments? Is there a cut-off? How is the classification is done/rated?

Importantly, the study variables must be presented (independent and dependent variables more clearly, for better visualization of the results).

After - Data collection and procedures. Here, you should be transpose the sentence: “The survey was disseminated using various Social Media Platforms (Facebook, Twitter, Instagram), and health care professional social media groups with a QR scan code and a link that directed participants into a HIPAA approved Qualtrics web survey which required 5 minutes to complete (Supplementary File)”.

Please, also to inform the duration of data collection period. It would be interesting to add about the Unique site visitor: Qualtrics assigns a unique response ID based on participant IP address. Qualtrics’s anonymized response feature was enabled so participant IP addresses were not viewable by the research team.

Finally, Statistical Analysis
Please, to inform the level of statistical significance adopted. Why did the authors perform any multivariate analysis? It would be more interesting to propose some regression models and analyze the effect of independent variables in relation to dependent ones.

RESULTS

Table 1, 2 and 3 - It is not necessary to put the questions in the first column. This column should directly present the variables explored, for example in the Table 1 the first column should contain the following variables: Age; Gender; Ethnicity, Position / Professional at the Hospital; Clinical Specialty; Setting of practice in the past 6 months while taking care of COVID patients.

TABLE 1. Check for missing data

Page 11. Lines 30-38. Regarding gender, the n does not match nor the percentage. For example, 594 male (29.11% instead of 29.15%); 1432 (70.19% instead of 70.26%), and other 12 (0.59%).

There are 2 participants left to total 2040 participants.

There are several inconsistencies of n and% in the three tables and I request to the authors to carefully check all the data again.

If no information - specify Not informed n (%)
Line 12. - Confidence interval is missing (in the last column)
Page 14 and 15. The numbers and percentages do not match. You need to check all the data.

Example: Available of PPE - lines 19-25. The percentages are not match.

143 (9.91%) 116 (19.40%)
568 (39.39%) 242 (40.47%)
731 (50.70%) 240 (40.13%)

Lines 49-56. In the first column there are 1340 participants. 102 are missing. In addition, the percentages do not match. Review all data in this table.

Table 3 e19. Please, to review the n and percentages in entire Table.

DISCUSSION

Page 20 line 17. Quote 13-15 should come right after well-being

Page 21. Lines 21-47. These results are very interesting, however, as these results corroborate or not with the studies already published on the subject. The authors need to discuss the light of the scientific literature. Please, to developing this section further by comparing their findings with other studies.

Some references:

doi:10.1016/S2468-2667(20)30164-X
doi:10.1101/2020.04.29.20084111
doi:10.12669/pjms.36.COVID19-S4.2790
doi:10.1371/journal.pone.0235460
doi: 10.1016/S0140-6736(20)30644-9

Page 22. Strength and limitations. Please include other limitations of your study related mainly to the bias inherent in cross-sectional studies. In addition, comment on the elaborated instrument, the bias and the next steps for future research.

CONCLUSION

It is not consistent with the purpose of your study. Please return to the objective and answer the conclusion in your study. “Our study sought to assess factors contributing to HCW infection and psychological distress during the COVID19 pandemic in the U.S.A”. Conclude from the objective outlined and adjusted in the same way in the Abstract.

“REFERENCES” instead of “BIBLIOGRAPHY

Ad hoc consultant 1

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1
Reviewer Name: Devan Hawkins
Institution and Country: MCPHS University, USA
Competing interests: None declared.

Please leave your comments for the authors below
This manuscript represents very important work to assess factors that impact the risk of COVID-19 infections and subsequent mental health problems among healthcare workers. The findings from this study will be useful in establishing a baseline in what we know about this risk and informing future work. These findings are also helpful because they show the impact that lack of PPE has likely had on spreading the virus among healthcare workers. I provide some suggestions that I think may help to improve the manuscript below.

Thank you for the comments. We greatly appreciate it and have addressed your individual comments below in bold.

Abstract:
• Page 2, line 51: I would not describe this as an intervention study. This can likely be removed.

Good point We have removed the wording of this to reflect this
• Page 4, line 8: If Emergency Medicine is referring to the department, I would make that clear. I would also put the percentage right after emergency medicine.

We have edited the text to make this more explicit. We also now put the percentage right after emergency medicine

Methods:
• Page 6, lines 35-36: Define the PHQ-2 and GAD-2 acronyms.

We now define the PHQ-2 and GAD-2 (Patient Health Questionnaire-2) and Generalized Anxiety Disorder-2 item. We now include this in the methods section of the text.

• Can you explain why the survey was considered exempt?

This study was considered exempt by our local Institutional Review Board, due to the fact that the survey was anonymous, contained no personal identifiable information, and was judged to have minimal/no risk for participants in completing the online survey. We have now added the above text to the methods section

Results
• Because the major limitation of this analysis is the convenience sample, would it be possible to compare the distribution of the demographic variables to the distribution for HCWs or the health care industry in the US? The Bureau of Labor Statics Current Population Survey data or the American Community Survey may be a place to get this data.

This is an important comment and we thank the reviewer for this suggestion. We have now included demographic data on the distribution of HCWs in the US based on the latest data from the Bureau of Labor Statistics. When comparing our data to the health care industry
workforce from the Bureau of Labor Statistics, individuals employed in Health care and Social assistance are predominantly women (78.1%) with Whites (72.0%) making up the majority compared to Blacks or African Americans (17.7%), Asians (6.9%) and Hispanics (14.2%). Our survey had Whites (67.89%), Black or African Americans (10.83%), Asians (9.31%) and Hispanics (5.44%). Our survey was accessed by more females than male health care workers and we lacked the representation of Blacks and Hispanic Health Care workers but other races reflected the distribution in the US. Since most of our respondents were Physicians (31.2%) and Nurses (26.80%), our respondents’ racial data reflects the distribution of occupation specific data for nurses and physicians from the U.S. department of Health and Human Services with the percentage of Hispanic Physicians (6.3%), Black or African American Physicians (4.8%), Hispanic nurses (5.7%) and Black or African American nurses (10.4%). We have now added the above text to the limitation sections.

• Table 1: Should physician attending be listed as the reference?

We included attending physician as the reference group because attendings are permanently bound to their own department and specialty unlike nurses and residents how rotate in various departments and specialty services. Furthermore, one-third of our respondents were attending physicians, which gave us more statistical power for comparisons with the other healthcare worker categories with less representation in our sample.

• Table 3: I think this needs more explanation in the text. What does the beta coefficient represent? Mean scores should be shown for each of the responses to these questions.

We now specify and define what the beta coefficient represents in the statistical analysis section and provide the mean scores with each response to the questions in Table 3.

• This is a good opportunity to explore predictors of infection. While the univariate PRs in table 1 are very useful, in some cases these findings may be confounded. For example, it is surprising to see Black workers with a lower risk of infection. Emerging research has suggested workers of color to be at an elevated risk. You might consider constructing multivariate models to explore these associations further.

Thanks for this excellent point, we now have included an additional multiple regression models. We have added our finding and added to the results section as below.

In a post-hoc analyses we examined whether the association between race/ethnicity and COVID-19 infection was confounded by age, gender, geographic location, facility type or proportion of patients with COVID-19. We observed an attenuation in the increased risk of COVID-19 infection for Asian relative to White HCWs (PR=1.15, 95% CI: 0.71, 1.21). The association between race/ethnicity and COVID-19 infection did not appear to be confounded by these demographic and clinical covariates for other racial/ethnic groups.
I recommend considering performing a sensitivity analysis to see whether the predictors of COVID infection are different when you compare confirmed and probable infections. This does not necessarily need to be depicted in your results (unless there are major difference), but it would be important to discuss.

Thank you for this suggestion. We now include a sensitivity analysis where we restrict our case definition to confirmed cases of COVID-19. In summary, our sensitivity analysis found that predictors of COVID infection were not different regarding confirmed and probable infections, with a couple exceptions. We found that when restricted to confirmed cases there was an elevated risk of infection among healthcare workers in academic institutions, which was not identified in the analysis that classified both confirmed and probable cases as ‘infected’. Second, the elevated distress and burnout observed in confirmed and probable cases was nullified when restricted to confirmed cases only. We have added description of the sensitivity analyses to our statistical analysis section and a table summarizing these findings in our results section.

This data may also be a good opportunity to explore predictors of being tested. Some of the differences may not be due to certain groups actually being at a high risk for infection, but rather due to differences in testing. You could do something similar to table 1, but with the outcome being whether the worker had been tested.

Thank you for this recommendation. We have added a table describing the demographic and clinical workplace predictors of being tested (Table 1b).

Discussion:

Limitations: The discussion of the limitations related to the representatives of this sample needs to be explained further. Comparisons should be made to the healthcare industry and not the overall US population. For some industries and occupations, workers of color account for a greater proportion of workers in health care. The links below may be useful:

https://urldefense.proofpoint.com/v2/url?u=https-3A__www.bls.gov_cps_cpsaat11.htm&d=DwIFaQ&c=G2MiLlal7SXE3PeSnG8W6_JBU6FcdVjSsBSb w6gcR0U&r=lAYQEufw2bilprewVnS- kixgRHuwLqogFXFOSBUw&m=f4w- SRbLh88PCQ8owyizR31bdhKqoNnFKh80WfHl301&s=9Bx3qOAbqGxwSmeQS1qjC- oSslgbNqgQMEf1mk7c&e=
https://urldefense.proofpoint.com/v2/url?u=https-3A__www.bls.gov_cps_cpsaat18.htm&d=DwIFaQ&c=G2MiLlal7SXE3PeSnG8W6_JBU6FcdVjSsBSb w6gcR0U&r=lAYQEufw2bilprewVnS- kixgRHuwLqogFXFOSBUw&m=f4w- SRbLh88PCQ8owyizR31bdhKqoNnFKh80WfHl301&s=K5kCtG7nopCfW- ZqHMZ7Q8PLEgHrJ6an59ksZLcUZw8&e=

Thank you for this. We now highlight this in the limitations section.

We have added the text below as shared above. When comparing our data to the health care industry workforce from the Bureau of Labor Statistics, individuals employed in Health care
and Social assistance are predominantly women (78.1%) with Whites (72.0%) making up the majority compared to Blacks or African Americans (17.7%), Asians (6.9%) and Hispanics (14.2%). Our survey had Whites (67.89%), Black or African Americans (10.83%), Asians (9.31%) and Hispanics (5.44%). Our survey was accessed by more females than male health care workers and we lacked the representation of Blacks and Hispanic Health Care workers but other races reflected the distribution in the US. Since most of our respondents were Physicians (31.2%) and Nurses (26.80%), our respondents’ racial data reflects the distribution of occupation specific data for nurses and physicians from the U.S. department of Health and Human Services with the percentage of Hispanic Physicians (6.3%), Black or African American Physicians (4.8%), Hispanic nurses (5.7%) and Black or African American nurses (10.4%). We have now added the above text to the limitation sections.

- The findings about the contribution of the lack of PPE deserve further discussion. This seems to be one of the main failures in the initial response. The role that both hospital administration played in this should be discussed. According to the OSHA act, hospitals and other healthcare facilities are required to provide their workforce with workplaces free from known hazard. It may be worth discussing this responsibility and how hospitals can compensate their workers for the risks that they placed on them.

Excellent point. We have now added several sentences fleshing this out discussing the importance of PPE and the responsibility on the system and broader leadership response necessary to ensure healthcare worker safety. The text we modified and included is below.

One of the factors that contributed to HCW infection was availability of PPE and training. Those who had inadequate access to PPE or inadequate PPE training were at higher risk of developing COVID-19 symptoms, showing a dose dependent effect. The lack of preparation and availability of PPE in the initial response might have contributed to the risk of increased infection. According to the OSHA act, though hospitals and other healthcare facilities are required to provide their workforce with workplaces free from known hazard, the dearth of clear evidence and clear guidelines on PPE have led to increased infection in Health Care Workers. Furthermore, in places like in New York, the spread of the disease was underestimated at the time of detection, and healthcare workers were exposed to COVID-19 patients before proper guidelines were placed. (NYT and DOH). While some hospitals have provided compensation for their employees and the federal government sponsored assistance through the CARES act, however the resources are not allocated universally, often excluding the low-wage essential health workers.

Reviewer: 2
Reviewer Name: Luís Carlos Lopes-Júnior (PhD)
Institution and Country: Health Sciences Center at the Federal University of Espírito Santo (UFES), Vitória, ES, Brazil
Competing interests: None

Please leave your comments for the authors below
August 10th, 2020

Manuscript ID: bmjopen-2020-042752

Title: Protecting the Front Line: A cross-sectional survey analysis of the occupational factors contributing to health care workers’ infection and psychological distress during the COVID-19 pandemic in the United States.

General comments:
Thank you for the opportunity to review this timely article about an important and understudied topic regarding the broad overview of disease group of health care workers (HCWs) and their perceived risk during the COVID-19 pandemic, mainly in the current global scenario of an unprecedented pandemic with repercussions in all dimensions of the health-disease process of individual, population, including HCW at the frontline against COVID-19.

The authors carried out a cross-sectional study aimed to assess factors contributing to HCW infection and psychological distress during the COVID-19 pandemic in the U.S.A.

Although the study is well-written as well as relevant, presents some weaknesses in the method as well as results section that need to be better worked. However, this study brings some interesting results and new insights as a potential contribution to the field. I believe that this is a novel paper with a topic that will be great interest for BMJ Open readers.

I have some comments, suggestions in order to strengthen the potential contribution of this topic in any revision the author(s) might undertake.

Thank you very much for taking the time to review our paper! We address your individual comments below

Major Revision:

INTRODUCTION

Page 6. Lines 5-7: Please, to update the information according to the last Situation report COVID-19 from the reference 1. It is also interesting to point out the current epidemiological data in the USA - the scenario of your study.

Thank you. We have updated the information from reference 1 to reflect the most up to date numbers on page 6. The text inserted is “The COVID-19 pandemic has created a dramatic global disruption, with over 28 million confirmed cases and over 900,000 deaths globally and 6.4 million cases and 190,000 deaths in the USA as of September 1st 2020.”

Page 6. Lines 24-47: There are some relevant outputs about this particular topic that were not quoted in the introduction section. Please, check out the following references, considering cite them. Also, the authors should be to explain better your rationale.

What does your study add to the previously published studies? What is the potential contribution of your study to the frontier of knowledge?

doi: 10.1016/S0140-6736(20)30644-9
We appreciate the additional references and we have added several of them into the manuscript. Additionally, we have added several sentences to the introduction to describe how our study builds on existing work and what unique contributions our study makes. Specifically we state:

While previous studies have broadly described occupational stressors and lack of availability of PPE for frontline providers, few studies have attempted to sample a broad range of both clinicians and non-clinical healthcare staff. For example, security staff and technologists may face many of the health risks that clinicians such as nurses and physicians make, yet little is known about the health and psychological outcomes in these individuals. Additionally, with the current pandemic and restrictions in the conduct of research during this elevated time of infection risk, the use of platforms such as social media, may permit the rapid collection of a diverse and broad range of providers.

METHODS

This section needs to be better rearranged, i.e., the information must be presented following the STROBE Checklist.

Suggestion: We conducted a cross-sectional survey of US HCWs who worked at the frontline against COVID-19 in 48 states, the District of Columbia, and US territories (Puerto Rico, US Virgin Islands) during May 2020. The survey followed the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (Reference).

Excellent point, we have rearranged and reordered the methods section to read more clear and following the STROBE checklist. The formatted section is included below.

**Design and Setting**

We conducted a cross-sectional survey, using a convenience sample of US HCWs who worked on the front lines during the COVID-19 pandemic in 48 states, the District of Columbia, and US territories (Puerto Rico, US Virgin Islands) during May 2020. The survey followed the Checklist for Reporting Results of Internet E-Surveys (CHERRIES). The survey was disseminated using various Social Media Platforms (Facebook, Twitter, Instagram), and health care professional social media groups with a QR scan code and a link that directed participants into a HIPAA approved Qualtrics web survey which required 5 minutes to complete (Supplementary File). Qualtrics’s anonymized response feature was enabled so participant IP addresses were not viewable by the research team. The data collection period for this study was seven days. Study procedures were reviewed and deemed exempt by the Columbia University IRB, IRB-
AAAT0382, since the survey was anonymous, contained no personal identifiable information, and was judged to have minimal/no risk for participants in completing the online survey.

**Participants**

All individuals who were at least 18 years of age, self-identified as essential health care workers and who interacted with COVID-19 patients were eligible for participation. Participants accessed the survey using the link or QR scan code over a period of seven days. They were given resources for mental health support at the end of the survey. No personal identification information was collected.

**Questionnaire**

We developed a 42-item survey with questions on PPE, COVID-19 testing, demographic information, professional responsibilities and practice location, self-assessment of exposure, isolation behavior, peer and family illness history, and psychological distress (Supplementary File). Content of the survey was evaluated by an expert consensus panel of five board certified physicians, one epidemiologist with training in biostatistics, one medical student and one public health student, who also performed a narrative review of potential risk factors for COVID-19 infection risk (e.g. disease exposure, place of work environment, gender, race).

**Outcomes**

Demographics

Respondents were asked their age, gender, race, location (city, state) and zip code of their healthcare institution.

Clinical setting and healthcare role

Respondents were also asked to identify their primary clinical setting of practice, clinical setting of practice specifically when interacting with COVID-19 patients, role in the hospital, and healthcare specialty.

Personal Protective Equipment

Respondents were asked to rate how often PPE was available at their primary institution on a scale ranging from all the time, most of the time, half of the time, rarely, to never. Respondents were additionally asked if PPE training was provided in the past 6 months.

COVID-19 exposure, symptoms, and testing

COVID-19 exposure was assessed in many ways. Respondents were asked to approximate number of COVID-19 patients they treated, the approximate percentage of working hours they were in close contact with COVID-19 patients, and if they were present during an aerosolizing
procedure with a confirmed COVID-19 patient or person under investigation for COVID-19. For the dependent variable, health care worker infection, the independent variables included race, gender, adequacy of PPE and clinical setting.

Isolation and Mental Health

Respondents were asked to identify the isolation mechanism/precautions they took at home as well as Covid-19 symptom and disease prevalence among family members.

Mental health questions included the Patient Health Questionnaire-2 (PHQ-2), a validated screener for depressive symptoms and anhedonia, a Generalized Anxiety Disorder-2 (GAD-2) a validated anxiety screening instrument, as well as a validated one-item version of the Maslach Burnout Inventory assessing psychological burnout. PHQ-2 evaluates depressive symptoms and GAD-2 evaluates symptoms of anxiety. They have been commonly used as screening tools for depression, generalized anxiety disorders and to assess general psychological distress. We reported continuous scores instead of using cut-offs given these scales have not been validated in HCWs within the context of COVID-19. The Maslach Burnout Inventory has been validated among physicians and nurses, specifically the single item Inventory used in our survey provided meaningful information on burnout in medical professionals. To assess the dependent variable of psychological stress, we included the independent variables of self-isolation, COVID-infection and illness of a family or a friend.

Lines 7-14, Must be transposed in this section, however, below in the subsection data collection and procedures.

OK done included above

Then, approach the Participants (please establish more clearly for the reader, the inclusion and exclusion criteria of your study), the study sample and then the Ethical Aspects.

OK done included above

Line 16. “Study procedures were reviewed and deemed exempt by the Columbia University IRB” Please, to inset the Process Number of the approval obtained from the IRB.

OK done included above

After ... to, start the Measures and Variables subsection.

OK done included above

Page 7. Lines 33-38. For the validated instruments such as, PHQ-2, GAD-2 and Maslach Burnout Inventory), please, to provide here the values of the psychometric properties of this validated instrument (the Cronbach’s alpha coefficient, the Intraclass Correlation Coefficient - ICC) for the validated version in US.
In addition, briefly describe these instruments - what these instruments are intended to evaluate; how is the type of scale used in these 3 instruments? Is there a cut-off? How is the classification is done/rated?

We now include the psychometrics of this study, including data on cut-offs and classification. We added the sentence below into method part.

PHQ-2 evaluates depressive symptoms and GAD-2 evaluates symptoms of anxiety. They have been commonly used as screening tools for depression, generalized anxiety disorders and to assess general psychological distress. We reported continuous scores instead of using cut-offs given these scales have not been validated in HCWs withing the context of COVID-19. The Maslach Burnout Inventory has been validated among physicians and nurses, specifically the singe item Inventory used in our survey provided meaningful information on burnout in medical professionals.

Importantly, the study variables must be presented (independent and dependent variables more clearly, for better visualization of the results).

We appreciate this comment and now have rewritten the methods section to highlight the independent and dependent variables. The two sentences we added are:

For the dependent variable, health care worker infection risk, the independent variables included race, gender, adequacy of PPE and clinical setting... To assess the dependent variable of psychological stress, we included the independent variables of self-isolation, COVID-infection and illness of a family or a friend.

After - Data collection and procedures. Here, you should transpose the sentence: “The survey was disseminated using various Social Media Platforms (Facebook, Twitter, Instagram), and health care professional social media groups with a QR scan code and a link that directed participants into a HIPAA approved Qualtrics web survey which required 5 minutes to complete (Supplementary File).”

Please, also to inform the duration of data collection period.

Thank you we have done this now.

It would be interesting to add about the Unique site visitor: Thank you we added this text: Qualtrics assigns a unique response ID based on participant IP address. Qualtrics’s anonymized response feature was enabled so participant IP addresses were not viewable by the research team... The data collection period for this study was 7 days.
Finally, Statistical Analysis
Please, to inform the level of statistical significance adopted.

We used $p<0.05$ as the threshold for this paper and have added this to the statistical analysis section.

Why didn’t the authors perform any multivariate analysis? It would be more interesting to propose some regression models and analyze the effect of independent variables in relation to dependent ones.

Thank you for the suggestion and we have added multivariate analysis as also suggested by the decision editor. We have included this as below.

In a post-hoc analyses we examined whether the association between race/ethnicity and COVID-19 infection was confounded by age, gender, geographic location, facility type or proportion of patients with COVID-19. We observed an attenuation in the increased risk of COVID-19 infection for Asian relative to White HCWs (PR=1.15, 95% CI: 0.71, 1.21). The association between race/ethnicity and COVID-19 infection did not appear to be confounded by these demographic and clinical covariates for other racial/ethnic groups.

RESULTS

Table 1, 2 and 3 - It is not necessary to put the questions in the first column. This column should directly present the variables explored, for example in the Table 1 the first column should contain the following variables: Age; Gender; Ethnicity, Position / Professional at the Hospital; Clinical Specialty; Setting of practice in the past 6 months while taking care of COVID patients.

Thank you we have now updated the tables to reflect these suggestions. For a few of the items in Table 3 we felt that reporting the original question was the clearest way to present the item and have retained the original questions.

TABLE 1. Check for missing data

Page 11. Lines 30-38. Regarding gender, the n does not match nor the percentage. For example, 594 male (29.11% instead of 29.15%); 1432 (70.19% instead of 70.26%), and other 12 (0.59%). There are 2 participants left to total 2040 participants.

Thank you for the careful review of these values. The discrepancies you have identified are due to item-level missingness in the data. Most of the questions did not require that the participant input a response, which resulted in minor levels of item-level missingness. We
report both the numerator and the proportion in each cell so that the reader can identify the exact numbers that were used to inform the statistical analyses for each variable. We have added mention of this to the limitations.

There are several inconsistencies of n and% in the three tables and I request to the authors to carefully check all the data again.

Thank you for the careful review of this. We have reviewed all the results and added mention of this to the discussion section. We have provided enough information in the tables to allow the reader to identify the number of participants that contributed to each analysis and have double-checked that all reported values are correct.

If no information - specify Not informed n (%)
Line 12. - Confidence interval is missing (in the last column)

TABLE 2
Page 14 and 15. The numbers and percentages do not match. You need to check all the data.

Example: Available of PPE - lines 19-25. The percentages are not match.
143 (9.91%)                      116 (19.40%)
568 (39.39%)                      242 (40.47%)
731 (50.70%)                      240 (40.13%)

In tables 1 & 2 we report row percentages as opposed to column percentages (which you report above) to be more consistent with how we are interpreting the results. We have specified in the tables that these are row percentages.

Lines 49-56. In the first column there are 1340 participants. 102 are missing. In addition, the percentages do not match. Review all data in this table.

Table 3 e19. Please, to review the n and percentages in entire Table.

Thank you we have reviewed the data in Table 3. We added the n (%) for all response categories to the table and have checked that what is reported is accurate.

DISCUSSION
Page 20 line 17. Quote 13-15 should come right after well-being

We have changed this per the above recommendation

Page 21. Lines 21-47. These results are very interesting, however, as these results corroborate or not with the studies already published on the subject. The authors need to discuss the light of the scientific literature. Please, to developing this section further by comparing their findings with other studies.
Some references:

doi:10.1016/S2468-2667(20)30164-X
doi:10.1101/2020.04.29.20084111
doi:10.12669/pjms.36.COVID19-S4.2790
doii:10.1371/journal.pone.0235460
doii:10.1016/S0140-6736(20)30644-9

Thank you for this comment. We have looked at the studies above and modified the discussion section as the sentence below.

Overall, our results corroborate presumptions regarding the correlation between various risk factors and HCW infection with more recent studies showing adequacy of PPE, clinical settings, gender and ethnic background as important factors of HCW infection. Our sample of HCWs, overall had higher reported COVID-19 infection risk (29%) compared to general population estimates. Furthermore, unlike other studies, we sampled a diverse set of HCWs and explored the impact of secondary factors, including specific role in the healthcare industry, the effects of isolation while being infected, the risks of family members, and the effects of co-workers being afflicted with COVID-19 on psychological well-being. Mindful of the challenges of in person recruitment during the pandemic, we were able to leverage social media platforms to rapidly obtain a broad and diverse sample of HCWs across the country.

Page 22. Strength and limitations. Please include other limitations of your study related mainly to the bias inherent in cross-sectional studies. In addition, comment on the elaborated instrument, the bias and the next steps for future research.

We now have updated the strength and limitations (also factoring in the earlier comment by the decision editor). We note the potential bias inherent in cross sectional studies and highlight the selection bias from social media as well. We now add additional discussion regarding future research and implications of our work. Specifically:

While we attempted to sample a diverse group of healthcare works, our study was limited by potential bias inherent in our cross section design. The initial findings of our work can be used to build on existing studies to shed light on the environmental hazards and risks experienced by healthcare workers. This data may be used to help target interventions aimed at supporting healthcare providers, identifying particular points of vulnerability and shed light on the urgent need for behavioral and mental health support for frontline healthcare staff. Future research may focus on the impact of interventions such as mental health tools, or innovative models of PPE supply and testing models, and their impact on the physical and psychological well-being of providers.
CONCLUSION
It is not consistent with the purpose of your study. Please return to the objective and answer the conclusion in your study. “Our study sought to assess factors contributing to HCW infection and psychological distress during the COVID19 pandemic in the U.S.A”. Conclude from the objective outlined and adjusted in the same way in the Abstract.

Thank you we have now changed the conclusion:

Our study assessed factors contributing to HCW infection and psychological distress during the COVID19 pandemic in the U.S.A, shedding light on the multipole challenges experienced by HCWs. Building on our work and others, we hope future investigations will provide key insight into the development of system wide interventions aimed at supporting HCWs during this unprecedented global pandemic.

“REFERENCES” instead of "BIBLIOGRAPHY"

Done
Ad hoc consultant 1

VERSION 2 – REVIEW

<table>
<thead>
<tr>
<th>REVIEWER</th>
<th>Devan Hawkins</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCPHS University, USA</td>
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<td>26-Sep-2020</td>
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<table>
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<tr>
<th>GENERAL COMMENTS</th>
<th>I have review the abstract and found that changes made addressed my concerns.</th>
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<td></td>
<td>There is only a very minor change. Table 3 does not have a heading at the top indicating what the different columns represent.</td>
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</table>

<table>
<thead>
<tr>
<th>REVIEWER</th>
<th>Dr. Luis Carlos Lopes Júnior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal University of Espírito Santo (UFES), Brazil</td>
<td></td>
</tr>
<tr>
<td>REVIEW RETURNED</td>
<td>27-Sep-2020</td>
</tr>
</tbody>
</table>

| GENERAL COMMENTS | I am satisfied with the changes made by the authors. In fact, the manuscript has improved substantially. I would like to congratulate the authors for this important scientific contribution. |