

## 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

<b>TITLE (PROVISIONAL)</b>	Impact of mRNA Vaccines in Curtailing SARS-CoV-2 Infection and Disability Leave Utilization Among Healthcare Workers During the COVID-19 Pandemic: Cross Sectional Analysis from a Tertiary Healthcare System in the Greater Houston Metropolitan Area
<b>AUTHORS</b>	Pan, Alan; Vahidy, Farhaan S; Hagan, Kobina; Bako, Abdulaziz; Sostman, H Dirk; Schwartz, Roberta; Phillips, Robert; Boom, Marc

### VERSION 1 – REVIEW

<b>REVIEWER</b>	Tomer Talmy The Hebrew University of Jerusalem Hadassah Medical School
<b>REVIEW RETURNED</b>	23-Jun-2021

<b>GENERAL COMMENTS</b>	<p>This paper discusses the real-world effectiveness of COVID-19 vaccination in a Houston healthcare system. The authors utilize data on voluntary testing and short-term disease leave among healthcare workers to portray vaccine effectiveness. The paper is of a descriptive nature and details the experience across one healthcare system.</p> <p>Overall, the paper is well written and clear, but its findings are fairly limited and do not provide sufficient insight as to the methodology of surveillance and vaccine administration which may be of value to the readers of this paper. Additionally, the vaccine effectiveness results must be paralleled to trends in the region at hand, and details on vaccination status, timing and nature of post-vaccination infections are central towards understanding the true effectiveness of the vaccine rollout in this healthcare system.</p>
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<b>REVIEWER</b>	Odilon Nouatin Centre de Recherches Médicales de Lambaréné
<b>REVIEW RETURNED</b>	05-Jul-2021

<b>GENERAL COMMENTS</b>	<p>The manuscript is very well written and is very interesting. However, a few details can be provided.</p> <p><b>Introduction</b> The authors should clearly mention in the introduction the importance of evaluating the utilization of short-term disability leave.</p> <p><b>Methods</b> 1- The authors can mention the parameters used as well as the techniques to evaluate the efficacy of the vaccines used. 2- Were samples collected after vaccination for PCR, etc...? this information must be added.</p> <p>2- An important remark is that the authors did not mention the</p>
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	<p>vaccines used.</p> <p>Results</p> <p>1- If available, the authors can provide a characteristic table of the study population.</p> <p>2- Do the observed results differ depending on the age of the participants? sex? and the number of vaccine doses received? This information appears to be important and should be mentioned in the manuscript.</p> <p>Discussion</p> <p>The authors mentioned that "SARS-CoV-2 positivity rate among HM HCWs declined by 84.3%, compared to a 54.7% decline in the Houston metropolitan area". this difference between the two regions should be discussed</p>
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**VERSION 1 – AUTHOR RESPONSE**

**AUTHOR RESPONSE TO REVIEWER 1:**

**1. Introduction:**

**The introduction does not discuss the state of the COVID-19 pandemic in the region. The authors should consider highlighting important trends leading up to vaccine availability.**

**Response:** We appreciate the reviewer’s suggestion. We have highlighted how case numbers in the Houston area were reportedly rising in the weeks leading up to vaccine availability in mid-December of 2020 (lines 87-89). Notably, this trend paralleled that of STDL utilization among HM HCWs during the same timeframe (Figure 2).

**Page 7, Line 27- The authors discuss tiered vaccination approaches but do not offer prior examples as to that matter and present**

**Response:** We thank the reviewer for the comment. As an example, we have included a reference to the Phase 1A (frontline healthcare workers and long-term care facility residents) and 1B (individuals aged ≥65 years or with co-existing risk factors) vaccine prioritization scheme which was specifically recommended in the state of Texas (lines 84-86).

**2. Methods:**

**Page 8, Line 17- The issue of STDL is not detailed enough to outline the surveillance strategy. To my understanding, STDL was taken as a representation of COVID-19 positivity among healthcare workers but is available to all healthcare workers for other conditions as well. Additionally, it is unclear whether exercising the STDL is voluntary or mandatory after testing positive for COVID-19. I suggest the authors should offer a more detailed explanation of the COVID-19 surveillance program.**

**Response:** We appreciate the reviewer’s comment. We would like to clarify that the enhanced STDL referenced in this study is, in fact, specific to COVID-19 specific leave and distinct from disability leave that is not related to COVID-19. Furthermore, STDL was mandatory after testing positive for COVID-19 as part of the program. We have added a fuller description of the employee surveillance program in the Methods (lines 104-113).

### 3. Results:

**Page 8, line 29 – The authors report the vaccination data which in comparison to other healthcare systems seems very high, however, they do not detail the methodology of vaccine administration which may have contributed to this vaccination rate. Such information may be valuable to decision makers looking to plan vaccine administration and is a key point of this report.**

**Response:** We thank the reviewer for this comment. We have included additional details on how vaccine administration was rolled out across the HM healthcare system (lines 113-129). Briefly, we have described how our vaccine advisory committee (VAC) was established to review available data and guidance in order to develop a risk-based tiered approach for vaccine administration among employees. During the early stages of vaccine rollout, vaccination was not mandated and employees were offered various incentives for receiving their vaccines by certain dates.

Furthermore, we included in the Discussion an account of how hospital leadership maintained a consistent and transparent line of communication with the workforce (lines 200-203). This included weekly communication of the latest scientific and policy updates, reminders on public health guidance, and encouragement of individual vaccination.

**Page 9, line 13 – In reporting of the results, the comparison to the trends in the Houston area are critical towards better understanding of the vaccine effectiveness. The downward trend in the region is most likely a key factor in the demonstrated decrease in positivity rate after vaccine administration.**

**Response:** We thank the reviewer for highlighting this important point. Though our data demonstrate a high degree of correlation between vaccination and infection and STDL utilization reduction, the potential influence of protective effect offered by lower community spread of the virus or differences in behavioral patterns between health system employees and the general community cannot be ruled out. We have included this as a potential interpretation of the findings in the Discussion (lines 245-249).

**If possible, the results should include data on the temporality of infection as opposed to vaccination among the hospital staff. Such data would give the reader more insights on**

**Response:** We appreciate the reviewer's suggestion. Our objective for reporting the overall SARS-CoV-2 positivity rate among HCWs across the duration of vaccine rollout was to derive an analogous measure to compare with the community-wide positivity rate. Broadly, we did previously include descriptive detail on the number of employees (n [%]: 117 [0.4%]) who were reported to have tested positive more than 7 days after receiving their second vaccine dose (lines 168-172). Among these positive cases, 56.4% were symptomatic.

### 4. Discussion:

**Page 12, Line 42 – The issue of protective public health measures is important to understanding the relative decrease in SARS-CoV-2 positivity among healthcare workers. The authors should briefly discuss the differences in protective measures and policies between the healthcare system and the greater public in the Houston area. For example – was mask wearing deemed involuntary in public spaces in the region as opposed to within the healthcare system? Have hospital policies or availability of personal protective equipment changed during the course of the pandemic? I contemplate whether such**

**differences in restriction measures may have contributed to the differences in infection/positivity rates.**

**Response:** We thank the reviewer for this important suggestion and agree that there is value in further discussing the circumstances of protective public health measures. Briefly, we note that throughout the duration of the pandemic, the hospital system has consistently followed public health recommendations. Personal protective equipment (PPE) for frontline workers was rarely in short supply; masks and social distancing guidelines were followed, even in non-clinical settings. Patients were required to wear masks and the allowance of visitors was restricted, depending on the severity of case surges at the time.

Conversely, although a statewide mask mandate was in effect for a duration of the pandemic (July 2020 – March 2021), adherence to these public health measures was not enforced as strongly or consistently as within healthcare systems in the greater Houston area, with issuance of citations or tickets at the discretion of public spaces, businesses, and/or law enforcement. We have acknowledged these differences in the Discussion (lines 220-228).

**Overall, the paper is well written and clear, but its findings are fairly limited and do not provide sufficient insight as to the methodology of surveillance and vaccine administration which may be of value to the readers of this paper. Additionally, the vaccine effectiveness results must be paralleled to trends in the region at hand, and details on vaccination status, timing and nature of post-vaccination infections are central towards understanding the true effectiveness of the vaccine rollout in this healthcare system.**

**Response:** We thank the reviewer for the comment. We have made a concerted effort to add important details as to the methodology of how our system's surveillance (lines 104-113) and vaccine administration programs (lines 113-129) were established and managed. Reporting of vaccine effectiveness was limited to evaluating analogous trends in infection rates between the HM HCW population and the general Houston population. We do provide descriptive accounts of the number and proportions of breakthrough infections as assessed through the employee surveillance program (lines 168-172). Furthermore, we have added substantial new language to the manuscript highlighting how the important contextual differences (indicated by the reviewer) need to be evaluated for more precise estimates of vaccine efficacy.

## **AUTHOR RESPONSE TO REVIEWER 2:**

### **Introduction:**

**The authors should clearly mention in the introduction the importance of evaluating the utilization of short-term disability leave.**

**Response:** We thank the reviewer for the suggestion and have included language describing the importance of evaluating short-term disability leave utilization as a measure of SARS-CoV-2 infection as well as impact on healthcare services (lines 89-94).

### **Methods:**

**1- The authors can mention the parameters used as well as the techniques to evaluate the efficacy of the vaccines used.**

**Response:** We appreciate the reviewer's suggestion. Reporting of vaccine efficacy was limited to descriptive accounts of the number and proportion of breakthrough infections as assessed through the employee surveillance program. We have included this language in the Methods (lines 142-144).

**2- Were samples collected after vaccination for PCR, etc...? this information must be added.**

**Response:** We thank the reviewer for this question. Samples continued to be collected after vaccination as part of the employee surveillance program and used PCR tests for presence of SARS-CoV-2 RNA. We have included this information in the Methods (lines 106-108).

**3- An important remark is that the authors did not mention the vaccines used.**

**Response:** We appreciate this remark. We have described in the Methods the specific vaccines offered to employees across our healthcare system (lines 124-127). Briefly, employees were administered 1 of 2 available mRNA COVID-19 vaccines on the day of appointment: BNT162b2 or mRNA-1273.

**Results:**

**1- If available, the authors can provide a characteristic table of the study population.**

**Response:** We thank the reviewer for this suggestion. This project was approved by our system's Institutional Review Board as a quality improvement project and was exempt from human subject research approval. Hence the currently stipulated parameters of reporting do not permit us to provide demographic or other details for our employees.

**2- Do the observed results differ depending on the age of the participants? sex? and the number of vaccine doses received? This information appears to be important and should be mentioned in the manuscript.**

**Response:** We thank the reviewer for this question. As mentioned in the prior response, the currently stipulated parameters of reporting for this project do not permit us to provide demographic or other details for our employees.

**Discussion:**

**The authors mentioned that "SARS-CoV-2 positivity rate among HM HCWs declined by 84.3%, compared to a 54.7% decline in the Houston metropolitan area". this difference between the two regions should be discussed.**

**Response:** We thank the reviewer for the comments. During the 12-week rapid rollout period (December 15, 2020 to March 6, 2021), vaccines were made available to all HM employees on a voluntary basis. At the same time, vaccine administration throughout the greater Houston metropolitan area followed recommendations set by the state of Texas and was only available to frontline workers (Phase 1A) and individuals aged 65 years and older or with co-existing conditions (Phase 1B).

Vaccine administration for individuals aged 50 years and older in the general public was not initiated until Phase 1C (March 15, 2021).

Given this, it is possible that the phased differences in vaccine eligibility and administration contributed to the observed differences in SARS-CoV-2 positivity rate between the HM workforce and the general Houston population. We have amended the text to include this discussion (lines 109-219).

**VERSION 2 – REVIEW**

<b>REVIEWER</b>	Tomer Talmy The Hebrew University of Jerusalem Hadassah Medical School
<b>REVIEW RETURNED</b>	13-Sep-2021

<b>GENERAL COMMENTS</b>	Response to authors: I appreciate the authors for providing a revision to this manuscript according to the comments set forth by the reviewers. I believe that after revising the methodology of the study and offering a greater perspective as to its generalizability and setting in a grander scope it is fit for publication.
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