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RESEARCH ARTICLE

REVISED Knowledge and compliance with Covid-19 infection prevention and control measures among health workers in regional referral hospitals in northern Uganda: a cross-sectional online survey [version 2; peer review: 1 approved, 1 approved with reservations]

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Abstract

Background: Infection prevention and control (IPC) has increasingly been underscored as a key tool for limiting the transmission of coronavirus disease 2019 (Covid-19) and safeguarding health workers from infections during their work. Knowledge and compliance with IPC measures is therefore essential in protecting health workers. However, this has not been established among health workers in northern Uganda in light of the Covid-19 pandemic. The objective of this study was to determine the knowledge and compliance with Covid-19 infection prevention and control measures among health workers in regional referral hospitals in northern Uganda.

Methods: An online cross-sectional descriptive study was conducted among health workers in regional referral hospitals within northern Uganda. A structured questionnaire was distributed to health workers via WhatsApp messenger. Sufficient knowledge was considered at a correct response score of ≥80%, while adequate compliance was rated ≥75% of the maximum score. Data were analyzed using SPSS v21.

Open Peer Review

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Any reports and responses or comments on the article can be found at the end of the article.

Results: Of the 213 health workers approached, 75 (35%) participated in the study. The majority were males, 39(52%) and the mean age was 36.92 years. Of the 75 participants, 52(69%) had sufficient knowledge of Covid-19 IPC while 51(68%) had adequate compliance with Covid-19 IPC. Adequate compliance was significantly associated with training in Covid-19 IPC (OR, 2.86; 95% CI, (1.04-7.88); p=0.039), access to Covid-19 IPC materials at workstations (OR, 2.90; 95% CI, (1.06 - 8.09); p=0.036), and having strong institutional support (OR, 3.08; 95% CI, (1.08 – 8.74); p=0.031). However, there was no significant relationship between knowledge and compliance with IPC (p=0.07). The socio-demographic characteristics of health workershad no statistically significant relationship with Covid-19 IPC knowledge or compliance. Conclusion: Our results show fairly good knowledge and compliance with Covid-19 IPC among health workers in northern Uganda. There is need for more training and provision of guidelines to promote compliance with Covid-19 IPC.

Keywords
Infection prevention and control, knowledge, training, compliance



This article is included in the Emerging Diseases and Outbreaks gateway.



This article is included in the Coronavirus collection.

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REVISED **Amendments from Version 1**

The following updates were made to the previous version:

Abstract
Results section was revised to include the response rate, odds rations and confidence intervals

Introduction
In the last paragraph, the sentence, "we believe....." has been substituted with , "we hypothesize..."

Methods
Study design and setting: Total number of all health workers at the hospitals has been included

Study size: Wording has been revised for clarity

Data management and analysis: Section revised to include details of univariate and multivariate analysis

Results
Demographic characteristics of respondents: Section revised to include the response rate.

Table 1: The section of age has been revised for clarity

Table 2: The knowledge secton was evised as follows: Sufficient knowledge (80–100%), Insufficient knowledge (≤79%). The Compliance section was revised as follows: Adequate compliance (75–100%), Inadequate compliance (≤74%)

Table 3: Revised for clarity, ORs and CI reported in 2dps.

Discussion: Revised to incorporate data from studies done in Uganda.

Any further responses from the reviewers can be found at the end of the article

Introduction

Coronavirus disease 2019 (Covid-19) is arguably the greatest global health threat of our time. As of January 24, 2021, 19,462,112 people were infected globally, with 2,112,759 deaths[1]. In Uganda, the cases are on the rise, with 39,044 cases as of January 24, 2021[1]. As the case numbers grow, health workers are increasingly at risk of infection as they care for the ever -growing number of Covid-19 patients. Because the safety of health workers is key to winning the fight against the virus, infection prevention and control (IPC) measures remain critical tools.

The World Health Organization (WHO) issued interim guidance on Covid-19 IPC that emphasized several measures, including applying standard precautions to all patients, ensuring early triage and case recognition, and applying additional precautions such as wearing masks[2]. As the Covid-19 pandemic grows, countries have further stepped up IPC measures, including mandatory wearing of face masks and hand washing in all public places[3,4]. Without compliance, however, these measures will not help in achieving the intended goal, and the health workers will increasingly be at risk of Covid-19 infection, a fact becoming evident in Uganda where health workers have been infected[5].

Uganda has designated treatment sites for Covid-19 patients at regional referral hospitals[6] where rigorous IPC standards are implemented. However, some asymptomatic Covid-19 patients are likely to seek care from non-designated hospital departments where IPC measures might be inadequate. We hypothesize that health workers in these departments are much more at risk of Covid-19 as they could be managing undiagnosed Covid-19 patients and therefore may not feel compelled to practice strict Covid-19 IPC measures. In this study, we evaluated the knowledge and compliance with Covid-19 IPC measures among health workers in regional referral hospitals in northern Uganda.

Methods

Study setting and design

A descriptive cross-sectional online study was conducted among health workers at regional referral hospitals (RRHs) in northern Uganda. The RRHs include: Lira RRH, Arua RRH, and Gulu RRH, which serve as referral centers for the 30 districts in northern Uganda. The health workers who participated in the study were those assigned to hospital departments other than the treatment center. In total, there are approximately 500 health care workers in the respective RRHs. Data collection took place between July and August 2020.

Study population

The study targeted health workers whose work involves primary contact with patients, including doctors, nurses, midwives, clinical officers, and laboratory officers. All health workers present at the health facility within the data collection period were included in the study. We excluded health workers who were on study leave and those who were working in designated Covid-19 treatment centers during the data collection period.

Study size

The sample size was determined using the single population proportion formula[7] based on a previous study among health workers in Mulago National Referral Hospital and Makerere University Teaching Hospitals that reported the level of knowledge regarding Covid-19 IPC of 69%[8], with a marginal error of 5%, and a standard normal value corresponding to 95% certainty, and a non-response rate of 15%. This yielded a sample size of 213 health workers.

Study procedure and tool

Convenience sampling was used to identify and select WhatsApp groups with the health workers of interest from the respective RRHs. The researchers obtained verbal consent from the group administrators and requested their help in mobilizing members on the WhatsApp platforms. A link to the questionnaire on Google forms (Alphabet Inc., California, USA) was shared with the potential respondents via WhatsApp messenger (Facebook, Inc., California, USA). Participants were invited to voluntarily participate in the study by following the link shared.

Data was collected from health workers using an anonymous, self-administered, online, structured questionnaire adapted from the literature. Knowledge and institutional support were

assessed using an eight-item questionnaire adapted from Haridi *et al.*[9] and modified to assess Covid-19 IPC knowledge among health care workers. Compliance was assessed using an eight-item questionnaire from the WHO protocol for the assessment of potential risk factors for Covid-19 infection among health care workers[10]. The data collection tool consisted of four sections. The first section captured the demographic characteristics of the participants. The second section comprised eight questions ascertaining the level of knowledge and understanding of the concepts of Covid-19 IPC and was scored as follows: one (1) point was awarded for each correct response and zero (0) for an incorrect response, and a correct response score of ≥80% was considered sufficient knowledge. The third section comprised eight questions to ascertain the level of compliance with IPC measures and scored as follows: 1, for 'never'; 2, for 'rarely'; 3, for 'sometimes'; and 4 for 'always', giving a possible score of 32 points. Adequate compliance was set at ≥75% (24) of the maximum score. The fourth section comprised three questions concerned with the perception of institutional commitment to IPC and was rated on a Likert scale (never, rarely, sometimes, and always). A scoring system was assigned as follows: 1, for 'never'; 2, for 'rarely'; 3, for 'sometimes'; and 4 for 'always', giving a total score of 12. Strong institutional support was considered with a score of ≥75% (9).

Ethical considerations

Ethical approval for this study was obtained from St. Mary's Hospital Lacor Research and Ethics Committee [Ref. No. LHIREC 0168/06/2020]. The study participants were availed with adequate information regarding the study purpose and procedures and thereafter invited to sign an online informed consent.

Data management and analysis

The responses from Google forms were downloaded in an Excel sheet (Microsoft Inc. Albuquerque, New Mexico, United States) and then exported to Statistical Package for the Social Sciences (SPSS) software, version 21.0 (SPSS, Chicago, IL, USA) for analysis. Frequencies and percentages were used to summarize knowledge and compliance with IPC among health care workers, while means and standard deviations were used to summarize data on age, work experience, and other numerical variables.

Binary variables of knowledge (sufficient and insufficient) and compliance (adequate and inadequate) were the dependent variables. Participant demographics e.g. sex, age, level of education and institutional characteristics e.g. having Covid-19 IPC guidelines were considered as independent variables during analysis. Age was categorized into a binary variable (20 – 39 years and ≥ 40 years). In univariate analysis, chi-square test was performed and repeated analysis done for each independent variable to determine their relationship with knowledge and compliance. A variable was considered significant in this analysis if it had a p-value < 0.05.

All variables with p-value < 0.1 and those reported to have plausible relationship with knowledge and compliance such as health worker cadre, level of education, age and work experience were considered for multivariate analysis. Assumptions for the use of multiple logistic regressions, e.g. absence of multicollinearity among the independent variables, were explored. A manual back-ward stepwise selection method was used to establish the final multivariate analysis model. The variables in the final multivariate model were then reported together with their adjusted odds ratio and 95% confidence intervals. A variable was considered significant if it had a p-value < 0.05.

Results

Demographic characteristics of respondents

Of the 213 health workers approached, 75 responded within the 1 month period for data collection giving a response rate of 35%. The majority were male 39(52%). More than half of the respondents (60%) belonged to the age group of 20–39 years with a mean age of 36.92 (SD ±9.39). The majority of the health workers interviewed had a bachelor's degree as their highest level of education and had a mean work experience of 10.4 years (SD ± 8.79). Of all the participants, only 50.7% reported to have received training in Covid-19 IPC, and 66.7% reported having Covid-19 IPC guidelines at their workstations. A significant number of respondents (94.7%) perceived themselves as being at risk of Covid-19 (Table 1).

Table 1. Demographic characteristics of respondents.

Variable	Frequency (n)	Percentage (%)
Sex		
• Male	39	52
• Female	36	48
Age category	36.92	9.39
• 20 to 39 years	45	60
• ≥40 years	30	40

Variable	Frequency (n)	Percentage (%)
Hospital		
• Lira Regional Referral Hospital	47	62.7
• Arua Regional Referral Hospital	9	12
• Gulu Regional Referral Hospital	19	25.3
Health worker cadre		
• Doctor	17	22.7
• Nurse	19	25.3
• Midwife	22	29.3
• Clinical Officer	12	16
• Laboratory Officer	5	6.7
Level of education		
• Certificate	6	8
• Diploma	21	28
• Bachelor's Degree	47	62.7
• Master's Degree	1	1.3
Work experience in years (mean and SD)	10.24	8.97
Working hours a week (mean and SD)	47.6	15.09
Workstation		
• Medical ward	13	17.3
• OPD	12	16
• Special Clinics	3	4
• Pediatrics	7	9.3
• Obstetrics and Gynecology	22	29.3
• Emergency	5	6.7
• Surgical ward	5	6.7
• Neonatal unit	4	5.3
• Laboratory	4	5.3
IPC training for Covid-19		
• Trained	38	50.7
• Not trained	37	49.3
Have Covid-19 IPC guidelines at workstation		
• Have	50	66.7
• Do not have	25	33.3
Perceive risk of Covid-19 infection while at work		
• Yes	71	94.7
• No	0	0
• Maybe	4	5.3

Covid-19, coronavirus disease 2019; IPC, infection prevention and control; OPD, outpatient department; SD, standard deviation.

Knowledge of Covid-19 infection prevention and control

The majority of the respondents (69.3%) had sufficient knowledge, with a mean knowledge score of 5.88/8 (SD ±1.05) (Table 2). Knowledge varied by item assessed. The vast majority of health care workers provided correct responses to items concerning the cleaning of frequently touched surfaces (97.3%), use of contact precautions (94.7%), screening for Covid-19 signs and symptoms (94.3%), applicability of standard precautions (92%), and cleaning of shared equipment (89%). Few correct responses were obtained for items regarding airborne precautions (41.3%) and applicability of hand hygiene (57.4%) (*Underlying data* file 1). There was no statistically significant relationship between knowledge and socio-demographic variables of respondents (Table 3).

Table 2. Knowledge and compliance with Covid-19 infection, prevention, and control (IPC) among health care workers in regional referral hospitals in northern Uganda.

IPC Score	Frequency (n)	Percentage (%)
Knowledge		
Sufficient knowledge (80–100%)	52	69.3
Insufficient knowledge (≤79%)	23	30.7
Compliance		
Adequate compliance (75–100%)	51	68
Inadequate compliance (≤74%)	24	32

Compliance with Covid-19 infection prevention and control

Majority of the respondents (68%) had adequate compliance, with a mean score of 27.35/32 (SD±3.3) (Table 2) and varied by item assessed (*Underlying data* file 2). Compliance was associated with having received training in Covid-19 IPC (p=0.039), having Covid-19 IPC guidelines at workstations (p=0.036), and sufficient institutional support (p=0.031). There was no statistically significant relationship seen between compliance and sociodemographic characteristics of participants such as age, level of education, working hours, work experience and health worker cadre (Table 3).

Institutional support for Covid-19 infection prevention and control

Generally, there was strong perceived institutional support, with the majority of participants (70.7%) feeling adequately supported by their respective institutions. Moreover, strong institutional support was associated with Covid-19 IPC compliance (p=0.031) (Table 3). Just as knowledge and compliance, institutional support score varied by item assessed (*Underlying data* file 3). For example, only 18.7% of the participants reported always being availed with adequate personal protective equipment (PPE) by their hospitals, while 50.5% reported always having access to handwashing facilities and products, and 49.3% reported always being availed sufficient supplies for the collection of medical waste (*Underlying data* file 3).

Discussion/Conclusion

In this study, we evaluated COVID-19 infection prevention control knowledge and compliance among health workers at RRHs in northern Uganda. Our findings suggest that the majority of the health workers in RRHs in northern Uganda are knowledgeable and compliant with Covid-19 IPC. We have identified that 69.3% of the respondents have sufficient knowledge of Covid-19 IPC and that it varied by item assessed. Our findings are comparable to those of a previous study among Ugandan Health workers that reported that 69% of the health workers had sufficient knowledge regarding Covid-19[8]. More so, studies among members of the general public in Uganda have also indicated that a great majority of the population (>80%) are knowledgeable about Covid-19[11,12]. However, pre-Covid-19 pandemic studies have shown lower knowledge scores[13,14]. Taken together, these findings imply that training in IPC during the Covid-19 pandemic has enhanced health workers' IPC knowledge and therefore needs to be sustained. Furthermore, similar to previous studies[9,15,16], we demonstrate that knowledge on various parameters of IPC varies. In our study, we found that most health workers were less knowledgeable about parameters related to airborne precautions and hand hygiene. This limited knowledge suggests a need to focus on training, audit and feedback methods to improve knowledge in these areas, as they are central Covid-19 IPC. Furthermore, we did not find a statistically significant relationship between knowledge and participants' sociodemographic characteristics, IPC training or presence of guidelines. However, previous studies have reported a positive association between knowledge of IPC and age, years of experience, training in IPC, and availability of guidelines[15,17]. One possible reason for this discrepancy is the context in which the studies were conducted. Unlike these previous studies, our study was conducted during the Covid-19 pandemic, where health workers have been exposed to various training and information sources regarding IPC in the setting of Covid-19.

We also found that the majority of the health workers (68%) had good compliance with Covid-19 IPC measures. The high score of self-reported compliance is comparable to a previous self-report study[15]. However, previous studies that used observation methods for data collection reported lower compliance rates; for example, a hand hygiene compliance score of 53–57%[13,17,18]. This discrepancy could be due to the difference in methods, as self-reported studies are likely to find more compliance with IPC. Moreover, compliance scores also varied by item assessed, as reported in previous studies[19,20]. In addition, compliance was found to be associated with having had training in Covid-19 IPC, having IPC guidelines, and perceived strong institutional support. Previous studies have shown that training in IPC and access to guidelines improves compliance with IPC[13,14,17]. Accordingly, the WHO and the Uganda Ministry of Health have emphasized training of all health care staff and developed and supplied guidelines for IPC[4,21]. These efforts are likely to have contributed to the high knowledge and compliance scores noted in our study.

Table 3. Factors associated with knowledge and compliance with Covid-19 IPC.

Variable	Knowledge status		Odds ratio (95% CI)	P value	Compliance status		Odds ratio (95% CI)	P value
	Sufficient n = 52	Insufficient n = 23			Adequate	Inadequate		
Sex								
• Female	27	12	0.99 (0.371-2.644)	0.984	27	12	1.125 (0.426-2.970)	0.812
• Male	25	11			24	12		
Age category								
• 18 to 39 years	34	11	2.06 (0.760-5.59)	0.152	28	17	0.50 (0.18-1.42)	0.189
• ≥40 years	18	12			23	7		
Health worker cadre				0.3004				0.830
• Doctor	13	4			11	6		
• Nurse	15	4			15	4		
• Midwife	13	9			14	8		
• Clinical Officer	9	3			8	4		
• Laboratory Officer	2	3			3	2		
Level of education								
• Certificate	4	2			4	2		0.408
• Diploma	13	8		0.751	13	8		
• Bachelor's Degree	34	13			34	13		
• Master's Degree	1	0			0	1		
Work experience								
• 1–9 years	35	10	2.67 (0.977-7.33)	0.052	29	16	0.66 (0.24-1.82)	0.419
• ≥10 years	17	13			22	8		
Working hours a week								
• ≤40 hours	33	17	0.67 (0.217-1.932)	0.434	35	15	1.17 (0.411-3.31)	0.772
• >40 hours	18	6			16	8		
IPC training for Covid-19								
• Trained	29	9	1.96 (0.721-5.33)	0.184	30	8	2.86 (1.035-7.88)	0.039*
• Not trained	23	14			21	16		
Have Covid-19 IPC guidelines at workstation								
• Have	34	16	0.83 (0.287-2.37)	0.723	38	12	2.90 (1.056 - 8.09)	0.036*
• Do not have	18	7			13	12		
Institutional support								
• Strong support (70.7%)	34	0.40 (0.117	0.13		40	13	3.08(1.08 – 8.74)	0.031*
• Weak support (29.3%)	18	-1.35)			11	11		

*Statistically significant. CI, confidence interval; Covid-19, coronavirus disease 2019; IPC, infection prevention and control; SD, standard deviation.

Therefore, our findings provide support for the notion that support to health care workers in terms of training, provision of guidelines and appropriate facilities and supplies for IPC increases compliance.

In the present study, we also report strong institutional support (70%) for health workers. Despite the high scores, fewer health workers reported adequate provision of PPE. Indeed, inadequate supply of PPE has been a key challenge in health care systems worldwide during this pandemic, with policy makers advocating for the provision of more PPE to protect health care workers[22,23]. In this regard, Uganda is not spared as the Covid-19 cases and hospital admissions continue to grow. As of January 24th, there were more than 39,000 cases of Covid-19 reported in Uganda[1]. More so, over 1200 health workers had been infected with the disease as of November 24th, 2020[24]. Our findings point to the need for an adequate and consistent supply of PPE to RRHs in northern Uganda.

Nonetheless, the small sample size coupled with the self-report method of measuring compliance are key limitations of this study, and we therefore suggest that further studies consider observation methods to improve the objectivity of the data.

In conclusion, there is generally good knowledge and compliance with Covid-19 IPC among health workers in regional referral hospitals within northern Uganda. Majority of the respondents (69.3%) had sufficient knowledge on Covid-19 IPC while 68% had adequate self-reported compliance with IPC. Moreover, compliance was associated with health workers having had training in IPC and having Covid-19 guidelines available at their workstations as well as institutional support. These findings suggest a need for more training on a regular basis as well as up-to-date guidelines to ensure compliance with Covid-19 IPC. This limits the spread of Covid-19 to health workers their patients.

Data availability

Underlying data

Open Science Framework: [Knowledge and compliance with Covid-19 infection prevention and control measures among health workers in regional referral hospitals in northern Uganda], DOI: 10.17605/OSF.IO/84KJG

This project contains the following underlying data:

- Underlying data file 1 (Knowledge score by item assessed to determine the knowledge of Covid-19 infection prevention and control among health workers at regional referral hospitals in Northern Uganda)

- Underlying data file 2 (Compliance score by item assessed to determine health workers' compliance with Covid-19 infection prevention and control measures)

- Underlying data file 3 (Institutional Support for Covid-19 infection prevention and control score by item assessed)

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

Extended data

[Open Science Framework]: [Knowledge and compliance with Covid-19 infection prevention and control measures among health workers in regional referral hospitals in northern Uganda] [DOI: 10.17605/OSF.IO/84KJG]

This project contains the following extended data:

- Questionnaire (questionnaire used to collect data in this study)

Study data file (SPSS data file with the raw data collected from participants)

The authors confirm that they have received permission to reproduce the above questionnaire from the owner of the original questionnaire.

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

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Open Peer Review

Current Peer Review Status: ✔ ?

Version 2

Reviewer Report 14 September 2021

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Hassan Kasim Haridi
Academic Affairs & Postgraduate Studies, Health Affairs, Najran, Saudi Arabia

Thank you for sending me the manuscript titled: "Knowledge and compliance with Covid-19 infection prevention and control measures among health workers in regional referral hospitals in northern Uganda: a cross-sectional online survey" by Amanya SB, Nyeko R, Obura B, Acen J, Nabasirye C, Nakaziba R, Oyella F, Afayo V, *et al.*", submitted to the Journal for review.

This is an interesting, well-written manuscript and addresses an important issue. The authors aimed to determine the knowledge and compliance with Covid-19 infection prevention and control measures among health workers in regional referral hospitals in northern Uganda. They used an online questionnaire as a data collection tool.

The following points authors' needs to consider to more clarify and improve the paper:

Methods section:

Page 3, line 9: "The health workers who participated in the study were those assigned to hospital departments other than the treatment center."
To be unambiguous to the readers, better clarify as: "other than the **Covid-19** treatment centers"
The authors need to clarify:

- If a pilot study was initially carried out?
- What about the validity & reliability of the data collection tool, since it was adapted in some parts from other sources and modified to fit Covid-19 situation?
- In data management and analysis, "Frequencies and percentages were used to summarize knowledge and compliance with IPC among health care workers, ", Authors need to describe what is also used in analysis to include knowledge and compliance scores summaries as continuous variables

Results section:

- Page 4, line 4: "The majority were male 39(52%)". 52% are not a majority, better change the

word majority.

- Table 1, the heading: “working hours a week (mean and SD)”, better to merge the two cells in the table of means and SD and to be written as 47.6 (15.09), because it was written under column heads frequency and percentage.

- Page 6, line 2, authors mentioned: “Majority of the respondents (68%) had adequate compliance, with a mean score of 27.35/32 (SD±3.3) (Table 2)”. While the table only included frequencies and percentages and no “mean & SD”.

Discussion section:
Page 8, third paragraph, paragraph of the study limitations. The authors need also to mention the limitations of encountering online surveys.

Hope my review will help authors to more clarify and improve their paper
Best regards,

Dr. Hassan Kasim Haridi.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Emerging infectious diseases in Public Health domain

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 20 April 2021

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Felix Bongomin
Department of Medical Microbiology and Immunology, Faculty of Medicine, Gulu University, Gulu, Uganda

The authors have sufficiently addressed my comments. I have no further comments.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Medical Microbiology, Immunology, Mycology, and Internal Medicine.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 09 March 2021

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Felix Bongomin
Department of Medical Microbiology and Immunology, Faculty of Medicine, Gulu University, Gulu, Uganda

It is my pleasure to review this work on Knowledge and Compliance with IPC with regards to COVID-19 prevention among HCWs in 3 major RRHs in Northern Uganda. Patients actively involved in COVID-19 treatment in those centers were excluded and so were those on leave.

Comments to the authors.

1. Abstract: Please include the response rates, number of respondents, and basic demographic characteristics in the results section (the 75 could be removed from the methods section).

2. Abstract: Consider using both % and absolute numbers (n) to express results.

3. Abstract: Consider adding ORs and 95% to the significant variables to improve interpretation of your results.

4. Introduction: "We believe that HC ..." could be replaced with appropriate research terms such as We hypothesize...

   Methods

5. Study size: the 69% is not an assumed probably, its knowledge as reported from a previous study among HCWs in Mulago and Makerere.

6. The sampling frame is unknown, please clarify.

7. Number of respondents (75) throughout the section should be transferred to the results section, the authors are preempting the results within the methods section.

8. The response rate should also be transferred to the results section.

9. Please add how you compared numerical data (Mann Whitney U, T-test, etc).

10. Include how multivariable analysis was done, including 95% CI and OR generation.

    Results

11. Table 2; compliance ; 75-100; ??<75?

12. Table 3: ORs are not uniform, report to 1 dp for all.

    Discussion

13. Am surprised the authors started by comparing their results with a Chinese study, when

there are numerous Ugandan studies to begin with.

14. Include study limitations, strengths and future directions before conclusions.

15. Do you still think these findings are valid 7 months after the survey?

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Medical Microbiology, Immunology, Mycology, and Internal Medicine.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 25 Mar 2021

Sharon Bright Amanya, Lira University, Lira, Uganda

The reviewer makes a number of important comments and these have been addressed as follows:

Comment 1: Abstract: Please include the response rates, number of respondents, and basic demographic characteristics in the results section (the 75 could be removed from the methods section).
Revisions have been made in the result section of the abstract to incorporate the suggested information.

Comment 2: Abstract: Consider using both % and absolute numbers (n) to express results.
Revision made as suggested.

Comment 3: Abstract: Consider adding ORs and 95% to the significant variables to improve interpretation of your results.
ORs and 95% CI have been added in the results section

Comment 4: Introduction: "We believe that HC ..." could be replaced with appropriate research terms such as We hypothesize...
Revision made as suggested

Comment 5: Study size: the 69% is not an assumed probably, its knowledge as reported from a previous study among HCWs in Mulago and Makerere.
Revision made as suggested

Comment 6: The sampling frame is unknown, please clarify.
Sampling frame has been included

Comment 7: Number of respondents (75) throughout the section should be transferred to the results section, the authors are preempting the results within the methods section.
Number of respondents transferred to the results section

Comment 8: The response rate should also be transferred to the results section.
Response rate transferred to the results section

Comment 9: Please add how you compared numerical data (Mann Whitney U, T-test, etc).
Numerical data was such as age and years of work experience were categorized and analyzed as categorical data.

Comment 10: Include how multivariable analysis was done, including 95% CI and OR generation.
Revision made as requested

Comment 11: Table 2; compliance ; 75-100; ??<75?
Information has been clarified as follows: Inadequate compliance : 75-100%, inadequate compliance ≤74% of the total compliance score

Comment 12: Table 3: ORs are not uniform, report to 1 dp for all.
ORs reported in 2dp throughout the table

Comment 13: Am surprised the authors started by comparing their results with a Chinese study, when there are numerous Ugandan studies to begin with.
Data from Ugandan studies included in the discussion

Comment 14: Include study limitations, strengths and future directions before conclusions.
Section included

Comment 15: Do you still think these findings are valid 7 months after the survey?
Indeed there has been a delay in publishing these results since data collection, however the

findings are still valid and relevant given the fact that the Covid-19 pandemic is still on-going and the fact that Uganda is usually prone to epidemics that warrant constant adherence to IPC measures.

Competing Interests: We declare that we have no competing interests

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