PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	A cross-sectional survey of sexual health professionals' experiences and perceptions of the 2022 mpox outbreak in the United Kingdom
AUTHORS	Hayes, Rosalie; Dakin, Francesca; Smuk, Melanie; Paparini, Sara; Apea, Vanessa; Dewsnap, Claire; Waters, L.; Anderson, Jane; Orkin, Chloe

VERSION 1 – REVIEW

REVIEWER	Benjamin Bates Ohio University
REVIEW RETURNED	02-Oct-2023

GENERAL COMMENTS	I am supportive of this manuscript. Although a descriptive study, providing this kind of foundational research is needed when confronted with an unfamiliar or emergent disease. This paper provides this kind of foundation. The comments below are in order of the paper, and I think they are easily addressed. Abstract: In participants, it reads oddly that most healthcare workers encountered mpox in sexual health clinics (89%) and HIV clinics (21.4%). At a high-level report like this, I'm used to mutually-exclusive options, but these can't be mutually exclusive (given the %). This may be a national context difference. The results section accurately reflects the quantitative findings of the study, but there's no mention of the qualitative findings. I encourage the abstract to report the training needs and the workplace safety/workplace wellbeing that seem to be mostly from the qualitative data. The conclusion summary doesn't really follow from the results summary as currently presented. I'm not clear on how investment/coordination are following from the results. Perhaps rephrase? Main text: Background. In this section, I get a good sense of the context for this study. I think it would be helpful to add, to the "In the UK…" paragraph a little more concrete detail, indicating the number of suspected and confirmed patients with mpox who presented. If possible, quantifying the displacement of core/repro services would make this argument more impactful.

Methods.
You describe the questionnaire as containing 87 new, non-validated questions. Since mpox was a novel outbreak, I don't expect to see use of a validated instrument. It would be helpful, though, to provide three things.
1. First, more information on how the questionnaire was developed (i.e., was there an expert panel of infectious disease/tropical disease researchers employed, was there expert validation, was it modeled on a known disease questionnaire, etc.) would be helpful. That is, why these domains, and why are they a good sense of overall understandings of mpox among healthcare providers.
2. Second, it would be very helpful to have access to the questionnaire. You provide a link to OSF for the data analysis plan, which I appreciate, but not a link to questionnaire itself.
3. Last (and related to the previous), it appears that there are 8 domains of interest when you described the questionnaire. Depending on the nature of the questions (which is why it would be helpful to have an OSF link to the questionnaire), you might be able to do some statistical validation if you have multiple items measuring the same constructs. Right now, I can't tell. IF you are able to do that validation, please do so (if not, add as a limitation).

You then discuss the dissemination of the questionnaire. It appears that sexual health/HIV/AIDS organizations were chosen. Later in the paper, you say the findings are limited int hat they are broadly reflective of the sexual and reproductive health workforce but not representative of the NHS workforce. The limitation is, therefore, not surprising. I think you have a choice to make here. You can either state why you chose these channels for dissemination and why you would have initially thought they would allow you to characterize the breadth of NHS workers (which I wouldn't do) OR you can do a "find-and-replace" so that wherever you say "healthcare professional" or "healthcare worker", you specify that it is in the context of sexual health and HIV/AIDS work using whatever terminology is most accurate. Doing so will allow you to frame the manuscript around the specific population you access and turn the limitation into a strength.

In describing the qualitative procedure, I would like just a little more detail. Were the categories for coding determined by the quantitative question domains or emergent from that data? The sentence "RH produced the coding categories and brief findings under the question domains, with iterative feedback from remaining authors" implies that it started with question domains, but I don't know if it was limited just to the categories you already expected to emerge. It seems so, as the qualitative data are described as illustrating/contextualizing the statistical findings, but it could be more. More grounded theory/abductive coding researchers would want to know if new/surprising categories were allowed to emerge.

Results.
Demographics.
145 people is sufficient for a descriptive study. I would encourage you to report that the sample is also majority white (I can't tell if it is white British or white European). If you have demographics of the NHS workforce, you might report how well it corresponds to that overall population (if that is the population of interest; if you can drill down to whether reflects the sexual health workforce even better… see note above).

	There seems to be missing information from the quantitative and qualitative reporting where the domains in the questionnaire are not all addressed in the paper. The order of the questionnaire was described as: knowledge and confidence, preparedness, education resources, workload, risk assessment, emotional/psychological effects. The presentation of results goes: workload, preparedness (now with support and training), safety at work, vaccination, wellbeing (emotional, maybe psychological). The change in order is confusing to me, and it is not clear to me if you are combining/collapsing categories. Did knowledge and confidence fo into preparedness as part of support and training? Where do education resources go? Is risk assessment vaccination? Under which domain would safety at work go (maybe that's risk assessment? Why term how the outbreak affected them emotionally/psychosocially as "Wellbeing," when that also cold include physical? At minimum, going in the same order seems to be needed, but making sure the categories correspond to the questionnaire would also be helpful. The quotes used to illustrate the themes/domains are good. My research orientation would weave them into the text more, but that's a matter of tase. It would help to know if there are any salient demographics from the source; you tell us their profession but not whether they are men or women, or other registers of difference that might make a difference. Discussion. In reading this, given your sample, I highly encourage you to limit the discussion clearly to be about healthcare providers working in HIV/AIDS and sexual health. The claims made in the discussion seem to extrapolate to the whole NHS, but you have, at most, 15 people who saw a patient with a suspected or confirmed clinical case of mpox in any context that wasn't a sexual health clinics so you can't really speak to that broader population well. Conclusion. It reads to me that the emphasis is on coordination and communication, but is dropping out the issue of safety and preparedness. That is, the conclusion is about what to do once an outbreak of whatever disease occurs but not in laying preparatory actions before there is an outbreak. Things like vaccinating against neglected tropical diseases or zoonotic diseases, performing a risk assessment generally at clinics, training on NTD/zoonotic diseases, and general better funding of sexual health clinics so they have flex capacity are all core lessons, but they don't emerge as being as important as coordination/communication in the conclusion the authors ask us to draw. Assorted disclosures. The disclosures are sufficient to allow assessment of influence and objectivity. There appear to be full ethical practices employed. References. Reference list appears to be complete and to provide a sufficient relationship to existing research, I see no major sources missing. Figures. Figure 1 and 2 do not appear to be necessary. The key findings represented in these figures are reported in text. 16-Oct-2023

REVIEWER	Chibuike James, Batholomew Sheffield Hallam University, Public Health
REVIEW RETURNED	16-Oct-2023

GENERAL COMMENTS	The sample size seem to be limiting for a mixed method research. unless the population size will be stated and determined in the methodology. In general the manuscript should be accepted for publication.

VERSION 1 – AUTHOR RESPONSE

	Reviewer #1	Authors' response
6	Comments to the Author: I am supportive of this manuscript. Although a descriptive study, providing this kind of foundational research is needed when confronted with an unfamiliar or emergent disease. This paper provides this kind of foundation. The comments below are in order of the paper, and I think they are easily addressed.	We are grateful to the reviewer for their consideration of our manuscript, and for their kind and constructive feedback. We have made the suggested changes wherever possible and provided justification where we have decided not to make a suggested edit.
	Abstract:	
7	In participants, it reads oddly that most healthcare workers encountered mpox in sexual health clinics (89%) and HIV clinics (21.4%). At a high-level report like this, I'm used to mutually-exclusive options, but these can't be mutually exclusive (given the %). This may be a national context difference.	In the UK, sexual health clinics and HIV clinics are sometimes integrated in some services (with clinicians working across both clinics) and provided separately in other services. We allowed respondents to choose more than one option to accommodate this. As we have now restricted the sample to only those working in sexual health and/or HIV clinics (see response to comment #14), we have edited this to include the demographics characterising the sample instead. The paragraph now reads: "Participants who were employed as sexual health professionals in the UK and had direct clinical experience of mpox were included in the analysis. The survey was completed between 11 August and 31 October 2022 by 139 respondents, the majority of whom were doctors (72.7%), cis-female (70.5%) and White (78.4%)."
8	The results section accurately reflects the	Thank you raising this. Although we had

	quantitative findings of the study, but there's no mention of the qualitative findings. I encourage the abstract to report the training needs and the workplace safety/workplace wellbeing that seem to be mostly from the qualitative data.	referenced some of the qualitative findings related to clinical workload in the abstract, we have expanded on this to include further reference to the qualitative findings, within the constraints of the abstract word limit. The results section of the abstract now reads: "**Results:** Most (70.3%) reported that they were required to respond to mpox in addition to their existing clinical responsibilities, with nearly half (46.8%) working longer hours as a result. In the free-text data, respondents highlighted that workload pressures were exacerbated by a lack of additional funding for mpox, pre-existing pressures on sexual health services, and unrealistic expectations around capacity. 67.6% of respondents reported experiencing some form of negative emotional impact due to their mpox work, with stress (59.0%), fatigue (43.2%) and anxiety (36.0%) being the most common symptoms. 35.8% stated that they were less likely to remain in their profession as a result of their experiences during the mpox outbreak. In the free-text data, these feelings were ascribed to post-COVID exhaustion, understaffing, and frustration among some participants at the handling of the mpox response."
9	The conclusion summary doesn't really follow from the results summary as currently presented. I'm not clear on how investment/coordination are following from the results. Perhaps rephrase?	The conclusion section has now been rephrased to: "**Conclusions:** These findings indicate that sexual health services require increased funding and resources, along with evidence-based wellbeing interventions, to support healthcare workers' outbreak preparedness and recovery."
	Main text: Background	
10	In this section, I get a good sense of the context for this study. I think it would be helpful to add, to the "In the UK…" paragraph a little more concrete detail, indicating the number of suspected and confirmed patients with mpox who presented. If possible, quantifying the	We're pleased that this section provided sufficient context for the study. Based on your suggestion, we have included the following:

	displacement of core/repro services would make this argument more impactful.	"Between 6 May 2022 to 30 September 2023, there were 3732 cases of mpox in the UK, with 95% of these cases confirmed in England. At the peak of the outbreak, in July 2022, UK sexual health services were dealing with 350 cases of mpox every week." While there are no UK studies quantifying the displacement of core services, we have referenced the letter from clinical leaders citing anecdotal evidence and studies from other countries quantifying the displacement of core services have been referenced in the discussion.
	Main text: Methods	
11	You describe the questionnaire as containing 87 new, non-validated questions. Since mpox was a novel outbreak, I don't expect to see use of a validated instrument. It would be helpful, though, to provide three things. 1. First, more information on how the questionnaire was developed (i.e., was there an expert panel of infectious disease/tropical disease researchers employed, was there expert validation, was it modeled on a known disease questionnaire, etc.) would be helpful. That is, why these domains, and why are they a good sense of overall understandings of mpox among healthcare providers.	Thank you for highlighting that there is a need for further detail on how the questionnaire was developed. We have added the following: "The questionnaire (available at https://osf.io/dmu65) was developed using literature related to healthcare worker experience of infectious disease outbreaks and the clinical expertise within the authorship team [VA, CD, LW, JA, CO]. It was also reviewed by clinical colleagues in several countries within SHARE-Net, an informal network of researchers and clinicians responding to mpox from around the world, established at the beginning of the multi-country outbreak in May."
12	2. Second, it would be very helpful to have access to the questionnaire. You provide a link to OSF for the data analysis plan, which I appreciate, but not a link to questionnaire itself.	We have added the questionnaire to OSF (https://osf.io/dmu65) and referenced this within the manuscript where relevant.
13	3. Last (and related to the previous), it appears that there are 8 domains of interest when you described the questionnaire. Depending on the nature of the questions (which is why it would be helpful to have an OSF link to the questionnaire), you might be able to do some statistical validation if you have multiple items measuring the same constructs. Right now, I can't tell. IF	Thank you for this suggestion. The domains were chosen to explore broad topic areas based on relevant literature and the experience of clinical colleagues. Since the survey was exploratory and not designed to produce validated questions, the items included, while similar, were not the same construct. Validation would therefore be

	you are able to do that validation, please do so (if not, add as a limitation).	limited and add little to the overarching narrative of our manuscript.
14	You then discuss the dissemination of the questionnaire. It appears that sexual health/HIV/AIDS organizations were chosen. Later in the paper, you say the findings are limited in that they are broadly reflective of the sexual and reproductive health workforce but not representative of the NHS workforce. The limitation is, therefore, not surprising. I think you have a choice to make here. You can either state why you chose these channels for dissemination and why you would have initially thought they would allow you to characterize the breadth of NHS workers (which I wouldn't do) OR you can do a "find-and-replace" so that wherever you say "healthcare professional" or "healthcare worker", you specify that it is in the context of sexual health and HIV/AIDS work using whatever terminology is most accurate. Doing so will allow you to frame the manuscript around the specific population you access and turn the limitation into a strength.	Thank you for flagging this – upon your advice, we decided to re-run the analysis and restrict the sample to only those working in sexual health and HIV clinics. This reduced the sample size from 145 to 139 participants. It has not changed the findings of the study while allowing us to be more accurate in our statement of the findings. We have also changed all references to "healthcare workers" to sexual health professionals.
15	In describing the qualitative procedure, I would like just a little more detail. Were the categories for coding determined by the quantitative question domains or emergent from that data? The sentence "RH produced the coding categories and brief findings under the question domains, with iterative feedback from remaining authors" implies that it started with question domains, but I don't know if it was limited just to the categories you already expected to emerge. It seems so, as the qualitative data are described as illustrating/contextualizing the statistical findings, but it could be more. More grounded theory/abductive coding researchers would want to know if new/surprising categories were allowed to emerge.	As you have assumed, the overarching categories were largely determined deductively based on the question domains, although these were adapted slightly depending on the most prevalent topics within the free-text responses. For example, the section titled 'Clinical work' was renamed 'Mpox-related workload'. However, the coding categories reported within these domains, e.g., 'lack of additional funding' and 'poor communication', were generated inductively from the data. The amount of free text data generated in the survey required this combined approach as there are a substantial number of often brief free-text entries. We have clarified this approach within the methods section: "Free-text data was deductively organised by the question's survey domain (e.g., clinical workload), then RH inductively generated the coding categories and brief findings within these domains, with iterative feedback from remaining authors."

	Main text: Results	
16	Demographics. 145 people is sufficient for a descriptive study. I would encourage you to report that the sample is also majority white (I can't tell if it is white British or white European). If you have demographics of the NHS workforce, you might report how well it corresponds to that overall population (if that is the population of interest; if you can drill down to whether reflects the sexual health workforce even better… see note above).	Thank you for flagging this. We were constrained in collecting data on specific ethnicities since this was an international survey and understandings of race and ethnicity vary across cultures and contexts. We have added the following text to the discussion of participant demographics: "The majority of the sample identified as White (78.4%)." There is limited data on the demographics of the sexual health and HIV workforce in the UK – we have referenced this within the discussion as follows: "While demographic data for the overall sexual health and HIV workforce are not available, for comparison there were estimated to be 531 consultants working in sexual health and HIV in the UK in 2022, of whom 66.0% were female, 63% were White, and the median age group was 45-49."
17	There seems to be missing information from the quantitative and qualitative reporting where the domains in the questionnaire are not all addressed in the paper. The order of the questionnaire was described as: knowledge and confidence, preparedness, education resources, workload, risk assessment, emotional/psychological effects. The presentation of results goes: workload, preparedness (now with support and training), safety at work, vaccination, wellbeing (emotional, maybe psychological). The change in order is confusing to me, and it is not clear to me if you are combining/collapsing categories. Did knowledge and confidence fo into preparedness as part of support and training? Where do education resources go? Is risk assessment vaccination? Under which domain would safety at work go (maybe that's risk assessment? Why term how the outbreak affected them	Thank you for flagging this inconsistency. When drafting the methods section, we had outlined the range of different topics that the 87 questions were assessing within the survey domains. However, we appreciate that this is confusing when described separately from the survey domains. Consequently, and for consistency's sake, we have revised the methods section to read as follows: "The survey contained 87 new (non-validated) questions, assessing: clinical workload; preparedness, support and training; safety at work; mpox vaccination; wellbeing; and mpox research."

	emotionally/psychosocially as “Wellbeing,” when that also cold include physical? At minimum, going in the same order seems to be needed, but making sure the categories correspond to the questionnaire would also be helpful.	Since readers can now access the full questionnaire via OSF, they will be able to see the range of topics assessed by the questions within each survey domain, should they wish.
18	The quotes used to illustrate the themes/domains are good. My research orientation would weave them into the text more, but that’s a matter of taste. It would help to know if there are any salient demographics from the source; you tell us their profession but not whether they are men or women, or other registers of difference that might make a difference.	Thank you for flagging this. We have added information on collected demographics to respondent quotes as suggested.
	Main text: Discussion	
19	In reading this, given your sample, I highly encourage you to limit the discussion clearly to be about healthcare providers working in HIV/AIDS and sexual health. The claims made in the discussion seem to extrapolate to the whole NHS, but you have, at most, 15 people who saw a patient with a suspected or confirmed clinical case of mpox in any context that wasn’t a sexual health clinics so you can’t really speak to that broader population well.	As outlined above, we have re-run the analysis to limit the sample to those working in sexual health and HIV. We now refer to sexual health professionals throughout and agree that this makes the focus of the discussion more accurate.
	Main text: Conclusion	
20	It reads to me that the emphasis is on coordination and communication, but is dropping out the issue of safety and preparedness. That is, the conclusion is about what to do once an outbreak of whatever disease occurs but not in laying preparatory actions before there is an outbreak. Things like vaccinating against neglected tropical diseases or zoonotic diseases, performing a risk assessment generally at clinics, training on NTD/zoonotic diseases, and general better funding of sexual health clinics so they have flex capacity are all core lessons, but they don’t emerge as being as important as coordination/communication in the conclusion the authors ask us to draw.	We agree that general better funding of sexual health services is crucial to support preparedness and flexible capacity in responding to future outbreaks. As part of better funded sexual health, we agree that preparedness in terms of tropical or zoonotic diseases could be a component of training and immunisation strategies. However, this was not mentioned in our data in this particular study and our evidence in this case points more towards the coordination stage. It would be important to conduct research on the feasibility, cost-effectiveness and implementation of such measures as learning points from mpox.
21	**Assorted disclosures.** The disclosures are sufficient to allow assessment of influence and objectivity. There	Noted with thanks.

	appear to be full ethical practices employed.	
22	**References.** Reference list appears to be complete and to provide a sufficient relationship to existing research, I see no major sources missing.	Noted with thanks.
23	**Figures.** Figure 1 and 2 do not appear to be necessary. The key findings represented in these figures are reported in text.	We agree that these figures are superfluous and have removed them from the manuscript.

	Reviewer #2	**Authors' response**
24	The sample sie seem to be limiting for a mixed method research. unless the population size will be stated and determined in the methodology. In general the manuscript should be accepted for publication.	Thank you for your feedback and your recommendation that our manuscript be accepted for publication. Estimating the size of the sexual health and HIV workforce in the UK is difficult as it has never been fully defined. However, for comparison's sake, we have included in the discussion the estimated number of consultants working in sexual health and HIV in 2022 to give a sense of the scale of our study (see response to comment #16). While it is a relatively small sample, we believe it is sufficient for an exploratory and descriptive study.

VERSION 2 – REVIEW

REVIEWER	Benjamin Bates Ohio University
REVIEW RETURNED	07-Dec-2023

GENERAL COMMENTS	My concerns/comments have been fully addressed. I encourage acceptance of the paper.