

## Peer Review File

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### Reviewer A

Thank you for inviting me to review the manuscript “Covid-19 Outbreak and Integration of Social Media in Public Health Crisis 2 Communication: A Case Study of UMMC, Kuala Lumpur”. The article is quite interesting and can potentially be published in the journal. I have some comments regarding this manuscript:

**Comment 1:** The background should reference and acknowledge recent literature on crisis communication during covid-19 healthcare crisis. The current review is aware of the following the literature that might impact the theoretical background of this study: Chan, H. Y., Cheung, K. K. C., & Erduran, S. (2023). Science communication in the media and human mobility during the COVID-19 pandemic: a time series and content analysis. *Public Health*, 218, 106-113.

Cheung, K. K. C., Chan, H. Y., & Erduran, S. (2023). Communicating science in the COVID-19 news in the UK during Omicron waves: exploring representations of nature of science with epistemic network analysis. *Humanities and Social Sciences Communications*, 10(1), 1-14.

Pollett, S., & Rivers, C. (2020). Social media and the new world of scientific communication during the COVID-19 pandemic. *Clinical Infectious Diseases*, 71(16), 2184-2186.

**Reply 1:** Thank you for the feedback and the suggestions on the literature to be included to further enhance the background of this study. As per your suggested literature, all of them has been included in the background of the study.

**Changes in the text:** Added to line 49. Public health communication through news media is a crucial intervention tool used to direct behavioural change within the public during a crisis that requires the public to adapt new norms and practices. A study conducted in the United Kingdom amidst the COVID-19 pandemic suggested that how scientific information is presented to the public affects the mobility of the public (19), this study further elaborated that Nature of Science (NOS) contents on news media had better influence on public movement in comparison to data such as the number of COVID-19 cases. Findings from this study displays the role of media as vital channel to disseminate awareness based scientific information in a crisis to provide non clinical intervention. However, often times non clinical interventions such as health communication through news media is presented to the public through a political lens, and this issue highlights the need for the dissemination of unbiased scientific information to the public (20), and authoritative health institutions such as hospitals could play an important role in communicating impartial and unbiased health information to the public. The role of social media as a medium of communication during COVID-19 went further than informing the public on crisis related information, but also as a channel for scientist and medical researchers to share crucial information

within the scientific community online (21). This underscores the potential opportunities of social media as a comprehensive tool to facilitate real time communication within the complex environment of the pandemic, not just for disseminating information but also for scientific collaboration within health authorities.

**Comment 2:** In Figure 4, you have themes and subthemes there. However, I would suggest you gave some examples regarding subthemes, and talk about how you derive the themes.

**Reply 2:** Thank you for the feedback and highlighting this point. I understand it is crucial to give explanations regarding the sub-themes as well. As per your suggestion, I have included the explanation of all the subthemes used in this study together with how I derived them.

**Changes in the text:** added to line 196-217 The subthemes were also established on the grounds of deductive coding based on similar literature which utilised CERC framework and its principles to analyse crisis related information and derived from the essence of the meaning behind the main themes as described by the CERC framework (34,1).

The subthemes utilised for the analysis of data under each main theme are: 1. Risk messages (a) Disease Information: which provides any information regarding the COVID-19 virus and the disease (b) Symptoms: Any symptoms related to COVID-19; 2. Warning: (a) Risk Factor: Any information pertaining to associated risk surrounding the COVID-19 pandemic (b) Dangers: Any posts that highlights the dangers posed to the community with regard to COVID-19; 3. Uncertainty Reduction: (a) Case Reports: Updates on the number of cases of Covid-19 in Malaysia and any information that provides case numbers associated with COVID-19 such as the number of hospitalised COVID patients or death figures associated with COVID-19 (b): Information Resources- Any posts that provides information resources to the public such as COVID-19 hotlines in Malaysia. 4.Efficacy (a) Personal Prevention: Posts providing information on any specific personal preventative measure for the community such as social distancing and wearing of face masks (b): Common Responsibility: Post providing directions or information on the responsibility of the community members in tackling with the outbreak such as staying at home or shelter in place. 5. Reassurance: (a) Calming: Posts that provide calming messages to the public to reduce the public uncertainty and to reduce fear surrounding the Covid-19 outbreak (b) Thanks to the public: Posts that shows gratitude to the public and expresses thanks to them for their role in keeping community safe and following the health guidelines (c) Government Intervention: Posts that depicts the work done by the government and authoritative sources to curb the spread of the virus and control the outbreak such as the enforcing movement control order and the COVID-19 vaccination drive for the Malaysian community. Figure 4 depicts the five themes and its subthemes used in this study.

**Comment 3:** Did you do any intercoder reliability?

**Reply:** Intercoder reliability was not done, however expert opinion was used for the confirmation of data.

**Comment 4:** Try to tie your discussion to communication theories, such as framing (Nisbet, 2009). This would add to the crisis communication literature.

**Reply:** Thank you for the feedback and the suggestion. Revisions have been done to include framing by Nisbet and situational crisis communication by Coombs.

**Change in the text:** added from line 442 to 482:

. The messaging strategy could be enhanced by using well researched communication approaches such as framing. As described by Matthew C. Nisbet, disseminating information through frames which takes into consideration the prevailing values and understanding of a certain subject matter of the audience, and constantly communicating the messages through trusted media sources and opinion leaders could generate favourable outcome in a crisis (43). Nisbet, further elaborated that framing messages works effectively, when the messages are aligned with or is pertinent to the audience's existing interpretation and this is inline with Coombs situational crisis communication theory which also states the importance of using audience's lived experiences and knowledge through past crisis situations to build crisis response (44).

During the maintenance phase CERC recommend continuing ongoing uncertainty reduction, self-efficacy, and reassurance. The data implies that uncertainty reduction messages were carried out on a more consistent basis in line with the CERC recommendation. As research suggests, regular uncertainty reduction messages would enhance public comprehension of the crisis and the risk involved (1). In this phase the reduction of uncertainty reducing postings with information resources was observed, and this finding aligns with a study conducted in Canada where media emphasised on case reporting's but lacked focus on information resources and call to action (45). During wave 1, postings with information resources were disseminated as videos and was conducted in the form of Facebook live broadcasting. One notable benefit of Facebook live broadcast is the opportunity for immediate engagement and interaction with the audience in real time, this would be an opportunity to simultaneously reach a mass audience. (46). Within the context of uncertainty reduction, no postings were made on Instagram in this phase of the crisis which shows inconsistency in messaging. Although CERC suggests ongoing efficacy messaging, there was a significant reduction in efficacy related posts in the maintenance phase. The ongoing reassuring posts on Facebook sending gratitude was mainly directed towards frontliners. As the public also plays a vital role in managing the crisis, it is equally essential to provide reassurance to the public, and this can be seen as a shortcoming in the approach of messages within the context of reassurance.

According to CERC principles, the messages in the resolution phase of the crisis are characterized by providing new understandings of risks and updates on the

resolution of the crisis (47). Risk messages on Instagram during wave 1 of the resolution phase associates with the principles of CERC while the lack of such messages during wave 2 showed lack of consistency. The resolution phase of the crisis could be an ideal opportunity for crisis communicators to use frames to shape public perception on new risks regarding COVID-19 and new developments such as the COVID-19 vaccine, as the public has lived through the initial and maintenance phase of the crisis, the pre-existing knowledge of the public could be utilised as a mean to direct future communication approach. During wave 1, Instagram effectively addressed new understanding of risks such as information for mothers on breastfeeding during Covid, guidance for expecting mothers and emergent disease information. As CERC urges providing updates on crisis resolution in this phase, the messages, and updates by UMMC on Facebook with regard to Covid-19 vaccine closely aligns with the CERC recommendation. As reported by Organisation for Economic Co-operation and Development (OECD), importance of public trust in COVID-19 vaccines and the vaccination process cannot be overstated (48). Framing messages on this crucial aspect of the pandemic resolution would allow communicators to emphasise the importance of COVID-19 vaccine and the positive outcomes while guiding the public towards a constructive interpretation on the COVID-19 vaccines. Usage of video and live streaming can be seen consistently on Facebook during this phase on information resources regarding Covid-19 vaccine program in Malaysia. This includes reshared video messages from other sources which would assist in expanding the reach of content.

### **Reviewer B**

The subject of the article is interesting as well as the adopted methodology. I suggest a minor revision as follows:

**Comment 1:** Introduction: Please improve this part by adding the following references that may help the reader to better understand the background.

-De Rosis, S, Lopreite M, Puliga, M, and Vainieri M (2023). Emotions in Twitter and crises management during the early phase of coronavirus outbreak: Lessons from a BVAR analysis on Italy. *Socio Economic Planning Sciences*. First published online: 12th May. DOI: 10.1016/j.seps.2023.101610. ISSN 0038-0121

-De Rosis, S, Lopreite, M, Puliga M, Vainieri M (2021). “The early weeks of the Italian Covid-19 outbreak: sentiment insights from a Twitter analysis”, *Vol 125, Issue 8*, pp. 987-994. *Health Policy*. DOI:10.1016/j.healthpol.2021.06.006.

-Lopreite, M., Panzarasa, P., Puliga, M. et al. Early warnings of COVID-19 outbreaks across Europe from social media. *Sci Rep* 11, 2147 (2021). <https://doi.org/10.1038/s41598-021-81333-1>

-Graham, Melissa W., Elizabeth J. Avery, and Sejin Park. "The role of social media in local government crisis communications." *Public Relations Review* 41.3 (2015): 386-394.

- Maal, Maren, and Mark Wilson-North. "Social media in crisis communication—the “do’s” and “don’ts”." *International journal of disaster resilience in the built environment* 10.5 (2019): 379-391.

**Reply 1:** Thank you for the comment and the suggestions on the literature. As per your guidance, all of the 5 suggested literature has been included in the background section.

**Change in the text:** added from line 17:

While social media provides several opportunities to communicate with the public in a dynamic crisis environment such as the COVID-19 pandemic in comparison to traditional forms of media, communicators are required to carefully construct the social media messages to obtain the most favourable outcomes. One of the vital aspects of social media is the ability to engage with the audience, hence it is vital for communicators to respond to comments and questions by the public through social media with timely credible information (8). By directly engaging with the audience and maintaining an open conversation, it helps to counter rumours that may arise amidst the crisis. The open discourse which is possible on social media creates opportunities for governments and health authorities to directly engage and create dialogue with the mass public swiftly, while it also provides the public to reach their government representative with concerns during a crisis (9).

The capabilities of social media in a crisis goes beyond communicating to the public. Firstly, research has suggested that social media can be a valuable tool for social listening, and to identify immediate threats within the community and if it needs to be addressed with urgency (10), this can be a valuable tool for governments and health authorities to assess the situation and public perception of the risk and act accordingly in a timely manner. Furthermore, social media has also been utilised as a resource by health specialist and government decision makers in making informed decisions. Social media enables assessing the communities emotional shift and deliver up to date and dynamic information with regard to the communities’ awareness and response to the crisis situation (11). This improves the crisis response by providing a more refined understating of the evolving situation. Moreover, in recent times, social media has increasingly become a supplementary surveillance tool for epidemic monitoring, and influencing the decisions made by health experts and health officials (12). These facets of social media underscore the importance of this medium in a crisis situation not only for crisis communicators, but also for governments and health experts in navigating through challenges in a crisis such as the COVID-19 outbreak.

**Comment 2:** Research Sample and Sampling Method. One of the most relevant limits of the social data is the potential sample bias due to unrepresentative sample. Please describe in the manuscript how the authors overcome this limit in their analysis.

**Reply 2:** The question regarding unrepresented samples has been answered in the manuscript, and the explanation added in the research sample and sampling method section.

**Change in the text:** Added to line 165: Within the stipulated time frame allocated for data collection, all social media posts by UMMC on Facebook and Instagram fitted into the selection criteria of this research, and was chosen to be analysed. This leaves out the possibility of any unrepresented samples within the pool of social media posts within this time frame.

**Comment 3:** Please discuss the section “Conclusion” in terms of “Policy implications”

**Reply 3:** Thank you for the feedback. Policy implication has been added to the conclusion section

**Changes in the text:** Added from line 592:

This qualitative study explored the usage of Facebook and Instagram by UMMC during Covid-19 Pandemic in Malaysia while employing CERC as a framework to investigate the social media postings. Through the analysis of the social media posts and messaging strategies, UMMC’s crisis response on Facebook exhibited better alignment with CERC than Instagram. However, both Instagram and Facebook could be better aligned with CERC across different phases of the crisis while maintaining consistency between the two platforms. This carries important policy implications for crisis communicators, especially for communicators engaged in health institutions in events such as the COVID-19 pandemic. This disparity between social media platform highlights the need to develop thorough communication strategies and policies based on the platform, and overall communication objectives. Such policies should emphasize consistent messaging across all communication platforms used by the institution across all phases of the crisis ensuring the messages aligns with an established crisis communication framework such as the CERC framework.

Facebook emerged as the platform utilised by UMMC to combat misinformation during the initial phase of the crisis. However, combatting misinformation was only significant during the initial phase of the crisis and it diminished in the subsequent phases. This shows the need for a consistent and sustained communication effort by UMMC in relation to combating misinformation throughout the crisis. This study also revealed that UMMC heavily relied on infographic for its messaging in different phases of the crisis across both the platforms. The usage of video and live broadcasting was

only apparent on Facebook which highlights the untapped potential of Instagram as it also has video sharing and live broadcasting features. UMMC leveraged on hashtags to brand its content and increase audience reach, at the same time using the resharing feature on Facebook to share content from other authoritative sources such as MOH becoming a mediating source for credible crisis related information. This calls for policymakers to promote training programs for health communicators and crisis communicators engaging in health institutions to familiarise themselves on the effective use of social media tools such as video sharing, live broadcasting features and other untapped functionalities on platforms like Instagram, This would empower institutions such as UMMC to maximise the potential of social media tools for crisis communication which would in turn contribute to a more comprehensive public health communication infrastructure.

Findings from this study contributes to the field of crisis communication in the era of social media and assists in expanding the limited literature on social mediated crisis communication by health institutions. By aligning crisis response to a framework such as the CERC, constructing content harnessing platform specific features and tools, while ensuring consistency and cohesiveness across social media platforms, health institutions like UMMC can emerge as a key participant in the field of crisis communication safe guarding public health.

**Comment 4:** Please discuss better the limitations of the study

**Reply 4:** Thank you for the feedback. Additions has been made to the limitation section of the study.

**Change in the text:** Added to line 573:

As with any scientific research, this study is also not without limitations. The data collection of this study was conducted during the COVID-19 pandemic. With the movement restrictions and strict protocols at UMMC, researchers were unable to conduct in-depth interviews with the crisis communicators at UMMC. This limited the researchers to content analysis of social media postings by UMMC. Further studies could incorporate in-depth interviews with crisis communicators or focus group interviews to compliment the content analysis of social media postings to achieve further understanding on crisis communication strategies and perception of crisis communicators. Another limitation of this study is that, this study focused on a single health institution. Further studies are required in crisis response by health institutions and the usage of social media which involves in-depth investigations of social media crisis strategy of more than one hospital and in different crisis situation which goes beyond qualitative methodologies. As this study is solely based on qualitative means, quantifiable findings could not be produced which would provide profound results in several aspect of social media messaging such as the usage of hashtags.

**Comment 5:** A linguistic review is strongly suggested.

**Reply 5:** Thank you for the feedback. A linguistic review has been conducted together with proof reading.

### **Reviewer C**

Overall, the writing of this paper is good.

**Comment 1:** Line 182-184: Please add a sentence to provide more details about the popularity of Facebook and Instagram in Malaysia.

**Reply 1:** Thank you for the feedback and suggestion. A sentence has been added to provide information on the popularity of Facebook and Instagram in Malaysia.

**Change in the text:** Added from line 142:

These two platforms were chosen by reviewing scholarly research which indicated their popularity, effectiveness, and widespread usage in crisis communication (1,33,34). As per statistics, Facebook and Instagram were noted as Malaysia's top two social networking sites, with 84.8% active Facebook users and 74.3% active Instagram users within the group of active internet users

**Comment 2:** Line 200: Please clearly state your selection criteria. This is crucial to the quality of the study. Citing a general method book is not sufficient.

**Reply 2:** The selection criteria has been added to the text.

**Change in the text:** Added from line 157:

The samples were chosen based on purposive sampling where the researcher purposely chooses specific samples depending on the information the samples impose in field of study specified by the researcher (36). The selection criteria for the social media posts were based on four key benchmarks: COVID-19, health intervention, crisis information and COVID-19 response communication. These benchmarks encompass content relayed through either texts or visual means. The samples were chosen within the time of 1<sup>st</sup> March 2020 to 31<sup>st</sup> March 2021.

**Comment 3:** Line 213-228: I have not seen this approach before. This looks to be a combination of thematic analysis and quantitative content analysis. I am not against innovative research methods, but the authors need to explain the pros and cons of their approach to existing methods. After reading the method section a few times, I realized that maybe the authors purposely sampled posts of the message principles of CERC model, and then they compared the themes per each content area across two platforms, for three phases. If that is the case, the authors did not do a good job of communicating their approach. As a result, there is a lack of crucial details of the method. This makes



it challenging to trust the quality of the findings.

**Reply 3:** Thank you for the feedback. Several additions have been made to the methods section in the attempt to further enhance the explanation of the methodology.

**Changes in the text:** Added from line 182-232

**Comment 4:** Additionally, the CERC model played an important role in framing the study. Readers may not be familiar with the framework. Can the authors add a short overview of this model in the background section?

**Reply 4:** Thank you for the feedback. It is indeed an important suggestion. A short overview of CERC framework has been added.

**Changes in the Text:** Added from line 82

Crisis and Emergency Response Communication Model (CERC) developed by Centres for Disease Control and Prevention (CDC), USA. is one of the most highly regarded crisis response frameworks, as it provides comprehensive guidance to crisis communicators on response strategies and principles (25). This model outlines that every crisis unfolds in five different stages and presents the most ideal strategic communication practices for each stage of the crisis lifecycle together with best practices to be implemented in any form of crisis (1). CERC is built upon the foundations of the existing crisis communication theories and models and integrates the best strategies to be implemented in a crisis situation (26). Although traditionally crisis and risk communication are viewed as separate communication areas, CERC is one of the few models that amalgamates both crisis and risk communication to provide a comprehensive approach in this area of communication (27). While there are several studies conducted with CERC as a backdrop to analyse crisis communication, a vast majority of these studies has been conducted in United States where the framework was developed or in other western settings. However, studies concerning application of CERC by health authorities such as hospitals are limited. This study employs CERC framework as a backdrop to facilitate the analysis of social media usage by University Malaya Medical Centre, one of Malaysia leading medical intuition in their crisis communication during the Covid-19 pandemic.

**Comment 5:** The authors may want to move 4.2 after 4.5. By doing so, all key discussion points can flow together. There is no 4.4. (i) of 4.3 is good. (ii) of 4.3 needs to be grounded in your data better. (iii) of 4.3 has the slightest relationship with your theoretical framework. Your analysis/data did not mention hashtags. You may want to consider this as “practical implications,” maybe making it part of 4.5. 4.5 reads more like “practical implications.

**Reply 5:** Thank you for the feedback. The flow has been corrected as per the suggestion.

(ii) to tie the data better, more data on misinformation has been added to the result section and to the discussion section. (iii) This is indeed important feedback: after giving much thought to this and reviewing similar studies. to tie this aspect better to the CERC, there has been additions made to the implications and the actions section of the text.

**Changes in the text:** Added to line 560

Although CERC comprehensively explains crisis lifecycles in stages and describes the ideal messaging strategies and best practices in crisis situations, CERC was not initially developed for the social media environment (34). While CERC has been adapted to use in the social media environment, by not having specific strategies tailored to be applied on the social media environment leaves a gap in the CERC crisis communication framework. As the use of social media in crisis communication is inevitable in today's digital era, it is vital for a model such as the CERC to be revised or updated to fit the current digital communication climate. Social media provides several tools and features such as live broadcasting, increasing communication reach through hashtags, and commentary on posts that could play a vital role in crisis communication which is conventionally not available on traditional form of media. Hence, future research could dive deep into the aspect of amalgamating social media into CERC and finding methods to update and revise the model to better fit the cotemporary digital communication sphere. This would give the crisis communicators a better guidance and a direction on the application of CERC in any crisis situation on social media.

**Comment 6:** A significant issue that requires extensive revision is to rewrite your method section so that your findings and discussions can be trusted.

**Reply 6:** Thank you for the feedback. Several additions have been made to the method section to comprehensively explain the methodology used in this study.