

Fear of Ebola and willingness to work during an Ebola outbreak among healthcare workers in a non-affected city of the Democratic Republic of the Congo

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Abstract

Introduction :

The ongoing Ebola outbreak in the DRC highlights the urgent need to assess healthcare workers' readiness to respond, as they constitute a particularly exposed population during Ebola virus disease outbreaks. This study aimed to assess the level of fear of Ebola and to analyse its association with willingness to work in the event of a potential outbreak in Lubumbashi, Democratic Republic of the Congo (DRC).

Methods

A descriptive cross-sectional observational study with an analytical component was conducted from 24 May to 22 June 2026 among healthcare workers practising in the city of Lubumbashi, a city not directly affected by the ongoing Ebola outbreak in the DRC. Convenience sampling was used to include 135 participants. Fear of Ebola and willingness to work were assessed using two 10-item scales, with satisfactory internal consistency (Cronbach's α : 0.75 and 0.86, respectively). Associations were assessed using bivariate analyses and multivariable logistic regression.

Results

The median age of participants was 30 years and the median professional experience was 4 years; 63.7% were men and 67.4% were physicians. Fear was particularly related to concerns about the safety of relatives (40.3/50) and the risk of transmitting Ebola to family members (39.0/50). In bivariate analysis, fear of Ebola was negatively associated with willingness to work (Spearman's $\rho = -0.34$; $p < 0.001$), whereas previous Ebola training was positively associated with willingness to work ($p = 0.038$). After adjustment, only fear of Ebola remained significantly associated with willingness to work (aOR = 0.93; 95% CI : 0.88–0.98 ; $p = 0.005$), with each one-point increase in the fear score being associated with a 7.4% decrease in the odds of willingness to work.

Conclusion

Fear of Ebola is an independent determinant of healthcare workers' willingness to participate in the outbreak response. Preparedness for future outbreaks should incorporate, in addition to prevention measures and training, interventions aimed at reducing risk perception and protecting healthcare workers' relatives.

INTRODUCTION

Since 1976, the Democratic Republic of the Congo (DRC) has experienced recurrent outbreaks of Ebola virus disease (EVD). The 17th outbreak, declared in May 2026 in the provinces of Ituri, North Kivu, and South Kivu, underscores the persistent threat posed by this filovirus to the health system (1). During such outbreaks, healthcare workers are on the front line and bear a heavy burden. During the 2013–2015 West African Ebola outbreak, the risk of infection among healthcare workers was 32 times higher than that in the general population (2). Similarly, during the 2022 Ebola outbreak in Uganda, healthcare workers accounted for more than 13% of confirmed cases and deaths (3).

Beyond the direct risk of infection and mortality, EVD has a profound psychological impact on healthcare workers. Faced with heavy workloads, the deaths of colleagues, and social stigmatisation, more than half of healthcare workers practising in outbreak-affected areas experience significant psychological distress (4, 5). This psychological impact is not limited to areas with active transmission. In an interconnected world where information spreads rapidly, the perceived threat of an outbreak may generate intense fear among healthcare workers practising in areas that have not yet been affected.

Fear of a highly lethal disease may directly affect the availability of human resources and compromise the public health response. Indeed, a healthcare worker's decision to continue working during a health crisis involves a complex balance between professional duty and the perceived risk to themselves and their families. Although few studies have explored willingness to work during an Ebola outbreak, the available evidence suggests considerable hesitation. In Guinea, only 18% of healthcare workers and members of the general public considered that there was an unconditional obligation to care for patients with Ebola (6), whereas in South Korea, only 26.8% of nurses reported being willing to care for patients with EVD (7). In the DRC, despite the recurrent occurrence of Ebola outbreaks, no study has quantitatively assessed healthcare workers' willingness to work and its psychological determinants in the context of Ebola.

Most previous research has been conducted retrospectively in areas directly affected by outbreaks. However, the World Health Organization has emphasised that the risk of spread to unaffected areas remains high because of substantial population mobility and transportation flows (1). Assessing risk perception and willingness to work while an outbreak is occurring elsewhere in the country provides an opportunity to evaluate the behavioural preparedness of healthcare teams before the first cases emerge locally.

It is within this context that the present study was conducted in Lubumbashi, a major urban and economic centre that was not directly affected by the ongoing outbreak but remained exposed to the risk of importation. The study aimed to assess the level of fear of EVD among healthcare workers in Lubumbashi and to analyse its association with their willingness to work in the event of a potential Ebola outbreak in the city.

METHODS

Study design and setting

A descriptive cross-sectional observational study with an analytical component was conducted from 24 May to 22 June 2026. The study was carried out in the city of Lubumbashi, the capital of Haut-Katanga Province, in south-eastern DRC. Lubumbashi is one of the country's major urban, economic and healthcare centres. The choice of this setting was based on several epidemiologically relevant characteristics in the context of the study.

At the time of the survey, the DRC was experiencing an EVD outbreak, although no cases had been reported in the city of Lubumbashi. During the outbreak, Lubumbashi maintained exchanges with other cities, notably through its international airport, where air links remained operational. This substantial population mobility was relevant to assessing the potential risk of introduction of the disease into an area that had not previously been directly affected. In this context, Lubumbashi provided a particularly appropriate setting for assessing how healthcare workers perceived a real but geographically indirect epidemic threat, as well as their willingness to participate in the public health response should cases occur in the city.

Study population and eligibility criteria

The target population consisted of all healthcare workers practising in the city of Lubumbashi. They were specifically targeted because of their potential role as frontline responders in the event of a possible outbreak.

Healthcare workers were eligible for inclusion if they were practising in Lubumbashi at the time of the survey, had received the study questionnaire, had voluntarily agreed to participate, and had provided a sufficiently complete questionnaire to allow analysis.

Sampling

Given the short duration of the survey period and the specific nature of the epidemic context, non-probability convenience sampling was used. The sample size corresponded to the number of healthcare workers who agreed to participate and completed the questionnaire during the study period. A total of 135 healthcare workers were included in the analysis. This sampling method was chosen because of the exploratory nature of the study, the short data collection period, and the need to rapidly capture healthcare workers' perceptions during the epidemic period.

Data collection and study variables

For data collection, a structured questionnaire was specifically developed for this study based on information available in the literature. The questionnaire was administered by an electronic version

developed using Google Forms and was disseminated through the various communication platforms used by healthcare workers.

The questionnaire primarily comprised three sets of information: participants' sociodemographic and professional characteristics; items assessing fear of Ebola; and willingness to work in the event of a potential outbreak. The main variable of interest was the level of fear of Ebola, quantitatively assessed using the overall fear score. The dependent variable was willingness to work during a potential Ebola outbreak, assessed using the overall willingness-to-work score.

Measurement instruments

In this study, fear was conceptualised as an emotional response to the perceived threat of Ebola, including concerns related to personal infection and the potential transmission of the disease to family members. Fear of Ebola was assessed using a specific scale developed for this study based on the literature. The scale comprised 10 items, each rated on a five-point Likert scale (from 1 to 5), giving a theoretical score ranging from 10 to 50 points. The items explored several dimensions of threat perception, including concerns regarding personal risk, the safety of relatives, the possibility of transmitting the disease to family members, and protective conditions in the workplace.

Willingness to work during a potential Ebola outbreak was assessed using a second scale specifically developed for this study. This scale also comprised 10 items, similar to the previous scale.

A pilot test of the online questionnaire was conducted among a small group of healthcare workers known to the research team and practising in selected healthcare facilities in Lubumbashi. The purpose of the study and their role in testing the questionnaire were explained to them before participation. They were informed that the final survey would subsequently be conducted using an online questionnaire and were asked not to participate in it. The pilot test assessed the clarity and comprehensibility of the questionnaire items before the final survey was launched.

The internal consistency of the scale assessing fear of Ebola was evaluated by calculating Cronbach's alpha coefficient. Preliminary analysis required reverse-scoring item 10 to ensure a consistent direction of responses. The final scale demonstrated good internal consistency, with an overall Cronbach's alpha coefficient of 0.75 (95% CI: 0.69–0.81), exceeding the standard threshold of 0.70. The willingness-to-work scale demonstrated excellent internal reliability, with an overall Cronbach's alpha coefficient of 0.86 (95% CI: 0.82–0.89), well above the standard threshold.

Statistical analysis

Data analysis was performed using R software (version 4.3.2). The normality of the distributions of continuous quantitative variables was assessed using the Shapiro–Wilk test. Accordingly, continuous data were summarised using medians and interquartile ranges. Categorical qualitative variables were expressed as absolute frequencies and percentages.

Bivariate analysis was performed to identify determinants of willingness to work. Associations involving continuous variables were assessed using Spearman's correlation coefficient. Comparisons of scores between dichotomous qualitative variables were performed using the non-parametric Wilcoxon–Mann–Whitney test. For multinomial variables, the Kruskal–Wallis test was applied.

Multivariable logistic regression analysis was performed. In the absence of a validated clinical or psychometric cut-off for the willingness-to-work score, the dependent variable was dichotomised at the sample median as a pragmatic approach for exploratory analysis. This allowed participants to be classified into relatively lower and higher willingness-to-work groups within the study sample; these categories do not represent normative or clinically validated thresholds. All independent variables showing a bivariate association with a significance threshold of ≤ 0.25 were simultaneously entered into the initial model.

The results of the logistic regression were presented as adjusted odds ratios (aORs) with 95% confidence intervals. The adequacy and goodness of fit of the final logistic regression model were assessed using the Hosmer–Lemeshow test. For all statistical tests, a two-sided significance threshold of 0.05 was used.

Ethical considerations and Consent to participate

The study was conducted in accordance with the ethical principles applicable to research involving human participants and the principles of the Declaration of Helsinki. Participants' privacy and confidentiality were respected, as was the voluntary nature of participation in the study. Informed consent to participate was obtained electronically from all participants before enrolment. Participants were informed about the study objectives, confidentiality, and their right to withdraw. Consent was obtained via Google Forms before accessing the questionnaire.. Approval from the Ethics Committee of the University of Lubumbashi was obtained.

RESULTS

A total of 135 healthcare workers practising in the city of Lubumbashi were included in the study. Of these, 63.7% were male and 67.4% were physicians. The median age and median professional experience were 30 years and 4 years, respectively. In the bivariate analysis, only two variables were significantly associated with willingness to work. These were:

- Fear of Ebola score ($p < 0.001$): a statistically highly significant negative correlation (Spearman's $\rho = -0.34$), indicating that increasing fear of Ebola was moderately and significantly associated with a reduced willingness to engage professionally in the event of an outbreak in Lubumbashi.
- Previous Ebola training ($p = 0.0379$): having received specific training was the second variable significantly associated with the willingness-to-work score.

Further details on the participants' general characteristics are summarised in Table 1.

Table 1
Univariate and bivariate analyses of participants' characteristics in relation to willingness to work

Variables	Frequency (percentage)	Statistical test	p-value
Fear of Ebola Scale	Median : 30	Rho = - 0.34	< 0.001*
Age (years)	Median : 30	Rho = - 0.135	0.1174
Professional experience (years)	Median : 4	Rho = - 0.06	0.4765
Sex	Male: 86 (63.7)	W = 1864.5	0.2657
	Female: 49 (36.3)		
Marital status	Single: 75 (55.5)	$\chi^2 = 1.8018$	0.4062
	Married: 58 (43.0)		
	Divorced/Widowed: 2 (1.5)		
Profession	Physician: 91 (67.4)	$\chi^2 = 3.5029$	0.3204
	Nurse: 22 (16.3)		
	Laboratory/Imaging technician: 14 (10.4)		
	Other (pharmacist, etc.)		
Type of healthcare facility	Private: 76 (56.3)	$\chi^2 = 1.214$	0.545
	University: 32 (23.7)		
	Public: 27 (20.0)		
Previous experience during an outbreak	Yes: 78 (57.8)	W = 2214	0.9698
	No: 57 (42.2)		
Previous Ebola training	No: 98 (72.6)	W = 1392	0.0379*
	Yes: 37 (27.4)		

Rho: Spearman's correlation coefficient; **χ^2** : Kruskal–Wallis test; **W**: Wilcoxon–Mann–Whitney test; * statistically significant; **bold**: variables selected for the logistic regression model.

1. Fear of Ebola Scale

The results showed that fear of Ebola was particularly high for two main reasons: concern about the safety of relatives (4.03/5) and fear of infecting family members (3.90/5) (Table 2).

Table 2
Description of the items of the Fear of Ebola Scale

Scale items	Mean score /5	Median score /5
I am afraid of contracting Ebola at work	2.94	3
I believe that I am at high risk of infection	2.47	2
The possibility of an Ebola outbreak worries me greatly	3.42	4
I am afraid of transmitting Ebola to my family	3.90	4
I am concerned about the safety of my relatives if an outbreak occurs	4.03	4
I would feel stressed when caring for a suspected patient	2.64	2
I would lack confidence in my safety at work	2.51	2
I would avoid suspected patients as much as possible	2.42	2
I would be tempted to reduce my contact with patients	2.43	2
I believe that my institution is not sufficiently prepared for Ebola	3.03	4

2. Willingness to Work Scale

Table 3 shows that willingness to work was highest for the following reasons: receiving training on the subject (4.10/5) and the availability of personal protective equipment (PPE) (4.06/5). Conversely, willingness to work decreased markedly when safety was not ensured (2.50/5).

Table 3
Description of the items of the Willingness to Work Scale

Scale items	Mean score /5	Median score /5
I would be willing to continue working during an Ebola outbreak	3.27	3
I would remain at my post despite the risk of infection	3.17	3
I would participate in the care of patients with Ebola	3.36	4
It is the duty of healthcare workers to work during an outbreak	3.84	4
I would feel morally obliged to continue working	3.64	4
I would be more willing to work if protective equipment were available	4.06	4
Good training would increase my willingness to work	4.10	4
I might refuse to work if my safety were not ensured	2.50	2
I might be absent from work for fear of becoming infected	3.90	4
Fear for my family could reduce my availability for work	3.50	4

3. Multivariable analysis of factors independently associated with willingness to work

After adjustment, only the fear-of-Ebola score remained independently associated with willingness to work. Specifically, each one-point increase in the fear-of-Ebola score was associated with a significant 7.4% decrease in the probability of expressing a high willingness to work (aOR = 0.93; $p = 0.005$).

Although training appeared to be protective in the bivariate analysis, its effect was attenuated in the multivariable model. This indicates that the initially observed positive effect was probably confounded by, or related to, the level of fear. Age and male sex were not significantly associated with the outcome after controlling for confounding factors (Table 4). The adequacy and goodness of fit of the final model were rigorously assessed using the Hosmer–Lemeshow test ($\chi^2 = 0$; $p = 1$), confirming perfect agreement between the predicted probabilities and the observed outcomes.

Table 4
Logistic regression model

Variables	aOR (95% CI)	p-value
Fear of Ebola Scale	0.93 (0.88–0.98)	0.005*
Age	0.97 (0.92–1.02)	0.223
Previous Ebola training (Yes/No)	1.95 (0.86–4.52)	0.113
Sex (Male/Female)	1.67 (0.79–3.63)	0.183

DISCUSSION

Summary of the main findings

This study included 135 healthcare workers, most of whom were physicians (67.4%), with a median age of 30 years and a median professional experience of four years. The main finding was a significant inverse association between fear of Ebola and willingness to work, which remained independently associated after adjustment. Concerns about infecting family members and other close relatives emerged as the predominant source of fear,

Interpretation and comparison with the literature

The main finding of this study is consistent with a body of literature showing that healthcare workers' willingness to care for patients during an outbreak depends largely on how they perceive the threat. In South Korea, Kim and Choi reported that only 26.8% of the healthcare workers surveyed stated that they were willing to care for patients with Ebola (7). This low level of willingness illustrates the potential gap between the theoretical capacity of a health system and its actual human capacity to mobilise when a highly contagious disease emerges. Our findings provide an additional insight into this observation. They show not only that willingness to work may be insufficient, but also that it varies according to the intensity of fear. Although this relationship was moderate in strength, it indicates that fear is an important component of willingness to work. The persistence of the association after adjustment further supports the hypothesis that the emotional perception of risk has an independent role in professional availability.

This relationship can be interpreted through the psychology of threat perception. When faced with Ebola, healthcare workers simultaneously assess the probability of infection, the potential severity of the infection and their ability to control the risk. Fear emerges when the perceived threat exceeds the individual and collective resources that healthcare workers believe are available to cope with it. From this perspective, withdrawal or hesitation does not necessarily reflect a lack of courage or professionalism. It may represent a coherent protective response to a threat perceived as substantial and insufficiently controllable. Studies based on Protection Motivation Theory support this interpretation. Kim et al. showed, among nurses exposed to infectious risks, that perceived effectiveness of protective measures and self-efficacy promoted proactive protection motivation, whereas perceived vulnerability and the costs associated with the response increased defensive motivation (7). Fear should therefore be understood within a broader system involving perceived threat, vulnerability, the effectiveness of protective measures and individual capacity to act. Greenberg et al., in their work on the motivations and barriers experienced by healthcare workers potentially involved in the Ebola response, also showed that the decision to participate in an outbreak response results from a balance between professional and altruistic motivations, as well as between personal risks and practical constraints (8). Professional availability therefore cannot be regarded as a fixed characteristic of healthcare workers; it is partly shaped by the context in which they are required to work.

Analysis of the different dimensions of the fear scale helped to elucidate the underlying drivers of this fear. Concerns about the safety of relatives reached 4.03/5, while fear of transmitting Ebola to family members reached 3.90/50. These were among the highest scores. Fear therefore appears to be less a simple fear of contracting a disease than a fear of the consequences of infection for one's relatives. This observation is particularly consistent with the findings of Pițigoi et al.), whose study among Romanian healthcare workers showed that the perceived risk to family members was rated at a median of 6.5/10, higher than the perceived personal risk of 5.5/10 (9). These findings indicate that, even in a context where actual exposure to Ebola was very different from that in West Africa or the DRC, family risk was a major dimension of threat perception. From an anthropological perspective, healthcare workers are not isolated individuals making decisions solely on the basis of their personal interests. They belong to families and communities. Their decision to work with patients with Ebola potentially affects people who are not themselves involved in the outbreak response. Thus, indirectly, working during an Ebola outbreak may mean risking bringing the disease home. The threat therefore moves beyond the hospital environment into the domestic sphere, turning the workplace into a potential source of danger for the household.

This dimension is particularly relevant in the Congolese context, where family and community relationships strongly structure everyday practices and mechanisms of solidarity. Individuals are often defined by their responsibilities towards their relatives. Under these circumstances, family protection may come into tension with the professional duty to provide care. The family-related fear observed in our study may therefore represent one of the mechanisms through which an occupational infectious threat can translate into a decision to withdraw from professional activities.

This tension between professional commitment and family protection lies at the heart of the literature on the *duty to care*. Kpanake et al., in Guinea, examined this issue among 220 healthcare workers and 252 members of the general population (6). Only 18% considered that the obligation to care for patients with Ebola was unlimited. For 38%, this obligation depended on working conditions, while other participants considered the level of risk, family responsibilities and circumstances. These findings suggest that the decision to participate in the Ebola response may result from a moral trade-off between several obligations: the duty to care for patients, the duty to protect oneself and the duty to protect one's relatives. These findings help to qualify the interpretation of our results. Fear does not necessarily imply a lack of motivation or a lack of professional duty. A healthcare worker may experience considerable fear and nevertheless agree to work because they consider their professional commitment morally necessary. Conversely, a highly committed healthcare worker may refuse an exposure they consider disproportionate if protective conditions appear inadequate. This distinction is essential for outbreak preparedness. A policy relying solely on healthcare workers' sense of duty could overestimate the human capacity that would actually be available during an outbreak.

The psychology of fear cannot, however, be separated from the environment in which healthcare workers are required to work. In our study, dimensions relating to protective measures were also high, with a score of 40.6/50 for the dimension related to personal protective equipment. This observation was also

reported in the study by Adongo et al. in Ghana (10). Among the 44 nurses surveyed, 38 expressed fear or reluctance to work in an Ebola treatment centre, citing, among other barriers, inadequacies in the availability and accessibility of protective equipment. A healthcare worker may accept the abstract idea of caring for a patient with Ebola but change their behaviour when they perceive that equipment is insufficient, care pathways are poorly organised, or there is uncertainty regarding the management of accidental exposure.

The study by Muzembo et al., conducted among 290 healthcare workers in 72 health facilities in Kinshasa, illustrates this organisational vulnerability (11). Reported practices revealed shortcomings in certain infection prevention and control measures. In such an environment, individual risk perception is necessarily influenced by perceptions of the institution's capacity to control that risk.

In this study, previous Ebola training was associated with willingness to work in the bivariate analysis. Although this association did not persist after multivariable analysis, it remains relevant to understanding the mechanisms that may modulate fear. In Liberia, Enriquez et al. showed that feelings of safety at work increased with the number of training sessions, demonstrating an important association between training and perceived protection (12). Jones-Konneh et al., in Sierra Leone, also demonstrated the value of intensive training in improving healthcare workers' knowledge and prevention skills. These findings suggest that training may reduce uncertainty and increase perceived self-efficacy (13). However, our findings suggest that training alone is unlikely to be sufficient. A healthcare worker may have a thorough knowledge of Ebola transmission while remaining concerned if they believe that PPE will not be available or that an accidental exposure could have serious consequences for their family. Training should therefore be considered as one component of a broader safety system rather than as an isolated solution.

The anthropology of epidemics also helps explain why an exclusively biomedical approach would be insufficient. Studies conducted in the DRC during previous outbreaks have shown that the Ebola response also depends on trust in institutions, perceptions of health authorities, representations of the disease, and relationships between communities and the health system. This issue also concerns healthcare workers. They belong to the same society as the populations they serve and may share certain representations, concerns and experiences of mistrust. The qualitative study by Muzembo et al. on the Congolese experience therefore highlights the importance of social and cultural factors in the acceptance of the Ebola response (11).

Local context and practical implications

Although exploratory, this study suggests that a conventional assessment of response capacity based primarily on the number of available healthcare workers may be insufficient. The number of healthcare workers present in an area does not necessarily correspond to the number who would actually be available for mobilisation. The human capacity of a health system can therefore be conceptualised as both a quantitative and behavioural capacity. It depends not only on the number of healthcare workers, but also on their risk perception, confidence, ability to protect themselves and family responsibilities. It

follows that preparedness assessments in unaffected areas should ideally incorporate, before the first cases occur, an assessment of fear, willingness to work and the main sources of concern. Such an assessment could allow the early identification of psychological, organisational and social barriers likely to limit mobilisation.

Strengths and limitations of the study

This study was conducted during a real Ebola outbreak in the DRC among healthcare workers in an area that was not directly affected at the time of the survey. It therefore provides an opportunity to examine anticipated risk perception in a population that could potentially be mobilised if the outbreak were to spread. The use of a multidimensional fear scale also made it possible to identify the main sources of concern. However, willingness to work was assessed in a hypothetical situation and may differ from actual behaviour when faced with a patient with Ebola. Social desirability bias is also possible. Finally, recruitment in a single city limits the generalisability of the findings to healthcare workers across the DRC.

CONCLUSION

This study was conducted during a real Ebola outbreak in the Democratic Republic of the Congo, among healthcare workers practising in an area that was not directly affected at the time of the study (Lubumbashi, DRC). It provided an opportunity to explore threat perception and professional availability before direct exposure to the outbreak. The findings showed that fear of Ebola was substantial, particularly regarding the safety of relatives and the risk of transmitting the disease to family members. A statistically significant negative association was observed between the level of fear and willingness to work. The greater the fear of Ebola, the less willing healthcare workers were to work in an outbreak situation.

These findings suggest that preparedness for future outbreaks should incorporate, before geographical spread occurs, assessment of healthcare workers' fear and willingness to participate in the response, as well as measures to protect their relatives. The hypothetical nature of the situation assessed means that actual behaviour during an outbreak cannot be predicted. Longitudinal studies will be needed to determine how this fear evolves with actual exposure.

Declarations

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

Consent to participate

Informed consent to participate was obtained electronically from all participants before enrolment. Participants were informed about the study objectives, voluntary participation, confidentiality, and their right to withdraw. Consent was obtained via Google Forms before accessing the questionnaire.

Consent for publication :

Not applicable

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Author Contribution

PMK : conceptualization, methodology, investigation, data curation and analysis, writing draft, resources. MIK : Methodology, investigation, data curation, resources, critical review. MMN : investigation, critical review. PMC : methodology, data curation, critical review, supervision, administration. All authors have read and approved the final version of the manuscript.

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Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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