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Assessment of the prevalence of stress, anxiety and depression in healthcare workers providing services related to communicable diseases in primary-level health units in Maputo city, Mozambique: an observational cross-sectional study protocol

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ABSTRACT

Introduction Mental health is essential for well-being and critical to the quality of care delivered by healthcare professionals. Health workers face increased risks of mental health disorders due to long hours, high emotional and physical demands, and exposure to communicable diseases, which exacerbate stress and anxiety levels. Evidence from low-income countries, including Mozambique, is scarce, yet health professionals in these regions frequently deal with the dual burden of communicable diseases and resource constraints. This study addresses a critical evidence gap by focusing on the mental health of healthcare professionals in Mozambique who are frequently exposed to psychological stress while managing communicable diseases. It aims to assess the prevalence of stress, anxiety and depression among healthcare workers providing services related to communicable diseases in primary-level health units (PHUs) in Maputo City, Mozambique. The study also seeks to identify personal and professional factors associated with these mental health disorders.

Methods and analysis This is an observational cross-sectional study targeting healthcare workers in PHUs who provide services related to communicable diseases in Maputo City. Using convenience sampling, 382 participants will be recruited, stratified by health unit type. This sample size was calculated manually using the formula by Wang and Ji (2020). Data will be collected through a questionnaire, including demographic and professional information and a validated tool (Depression, Anxiety and Stress Scale, DASS-21), using the Research Electronic Data Capture (REDCap) Software for secure data capture. Descriptive and inferential statistical analyses will be performed using IBM SPSS Statistics to estimate prevalence rates and explore associated factors.

Ethics and dissemination The study was approved by the Interinstitutional Committee on Bioethics in Health of the Faculty of Medicine/Maputo Central Hospital (CIBS FM&HCM/117/2024). Written informed consent will be obtained, and participants experiencing significant discomfort will be referred for mental health support. Findings will be disseminated via academic theses, peer-reviewed publications, national conferences, and reports shared with the Ministry of Health to inform mental health interventions for healthcare workers.

Registration This protocol is registered with the Interinstitutional Committee on Bioethics in Health of the Faculty of Medicine/Maputo Central Hospital (CIBS FM&HCM).

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Focus on a critical population by targeting healthcare professionals.
⇒ Comprehensive assessment by employing validated tools to measure stress, anxiety and depression, ensuring robust and reliable data collection.
⇒ The study's cross-sectional nature limits its ability to establish causal relationships between personal/professional factors and mental health outcomes.
⇒ Reliance on self-reported measures for mental health symptoms could introduce reporting bias or social desirability bias, potentially underestimating or overestimating the prevalence of mental health disorders.
⇒ Focusing only on Maputo City may limit the applicability of findings to healthcare workers in other regions of Mozambique with differing work environments and stressors.

INTRODUCTION

Mental health is essential to well-being, underpinning our abilities to make individual and collective decisions.[1] This is especially critical for health professionals, who need robust mental health to deliver quality, structured and rationally targeted care.

Several studies indicate a high prevalence of mental disorders among health professionals.[2–8] Factors such as long working hours, rotating and irregular shifts, intense physical and emotional work and dealing with the suffering and death of patients, as well as low job satisfaction, significantly increase the risk of mental disorders.[3 9 10] In addition, exposure to communicable diseases with high morbidity and potential fatality increases the perception of risk.[4 9 11 12] This was particularly evident during the COVID-19 pandemic, which exacerbated the incidence of mental disorders among frontline healthcare workers.[4 12–15]

Evidence at the international level shows that health workers are at higher risk of developing common mental disorders compared with the general population,[2 7] with a high prevalence of mental health problems ranging from work-related fatigue to suicidal ideation and suicide attempts.[7] In a study conducted by Guillén-Burgos and colleagues, in Colombia, a prevalence of mental disorders was reported among health professionals of 59.97% for stress, 44.87% for anxiety and 23.02% for depressive symptoms.[6]

A global meta-analysis by Vizheh *et al* examined the mental health burden among healthcare workers during the COVID-19 pandemic, reporting a wide range of prevalence rates for anxiety (24.1%–67.55%), depression (12.1%–55.89%) and stress (29.8%–62.99%). These figures are notably higher than those observed in non-pandemic periods, during which the prevalence of common mental disorders among healthcare workers was generally lower and more stable. International evidence further suggests that healthcare professionals are at greater risk of developing common mental disorders compared with the general population,[2 7] with high rates of mental health problems ranging from work-related fatigue to suicidal ideation and attempts.[7]

Working on the front lines,[4 6] and facing a risk of infection, as well as the fear of transmitting the disease to their family and friends,[7 13 14 16] was associated with the prevalence of symptoms of mental disorders.

In Mozambique, communicable diseases are among the leading reasons people seek healthcare, which implies that many health workers regularly deal with these conditions.[17] However, there is a lack of specific studies focusing on health workers in Mozambique, despite the challenges they face, increasing the potential for mental health problems.

One study conducted during the COVID-19 pandemic found that 10.1% of 170 health workers on the 'frontline' in Nampula Province reported experiencing burnout.[5]

The potential for infectious diseases to disrupt or destroy human life still exists today, especially in low-income countries,[18] including Mozambique.[17] The health professionals assigned to the emergency department, and not only, constitute the first contact between the various communicable diseases and the health unit (HU).[19] This context exposes health professionals to a high risk of infection, and consequently to a high level of psychological stress.[4 6 9 20 21]

Study rationale

Despite the growing recognition of mental health challenges among healthcare workers globally, there remains a significant gap in data from low-income countries, including Mozambique. This lack of local evidence limits the ability to understand the extent and factors behind psychological distress among healthcare workers, particularly those working in high-risk settings such as communicable disease services.

This study addresses this gap by focusing on the mental health of healthcare workers in Mozambique who provide services related to communicable diseases, a group frequently exposed to psychological stress due to their work environment. By understanding the prevalence and factors associated with mental disorders in this population, the study will contribute to evidence-based strategies aimed at improving working conditions and mental healthcare for healthcare professionals in the country. Furthermore, the findings of this study have the potential to inform policies and interventions that support the mental well-being of health professionals, ensuring a healthier and more effective workforce.

This study aims to assess the levels of Stress, Anxiety and Depression among health professionals providing services related to communicable diseases in Maputo City. It also seeks to identify personal and professional factors associated with mental health disorders in this population.

Thus, we aim to answer the following research questions:

- To what extent do healthcare professionals providing services related to communicable diseases present stress, anxiety and depression symptoms in Maputo City? What and how personal and professional factors influence its occurrence?

Theoretical framework

The conceptual model of this research is based on the dynamic interaction between personal and professional factors that influence the mental health of health professionals (figure 1), considering the professional factors. This model was developed by the research team based on an integration of existing theories and empirical studies on occupational mental health. It synthesises key elements from prior research, adapting them to the specific context of healthcare professionals, particularly those exposed to high emotional and biological risks. The model will serve as the foundation for constructing the questionnaire and guiding the data analysis, helping to identify and interpret the relationships between personal and professional factors and the mental health outcomes of interest.

The mental health of health professionals is influenced by a combination of inter-related factors, which can act synergistically to increase or decrease the risk of mental disorders.[22 23] Among the main factors are *emotional*

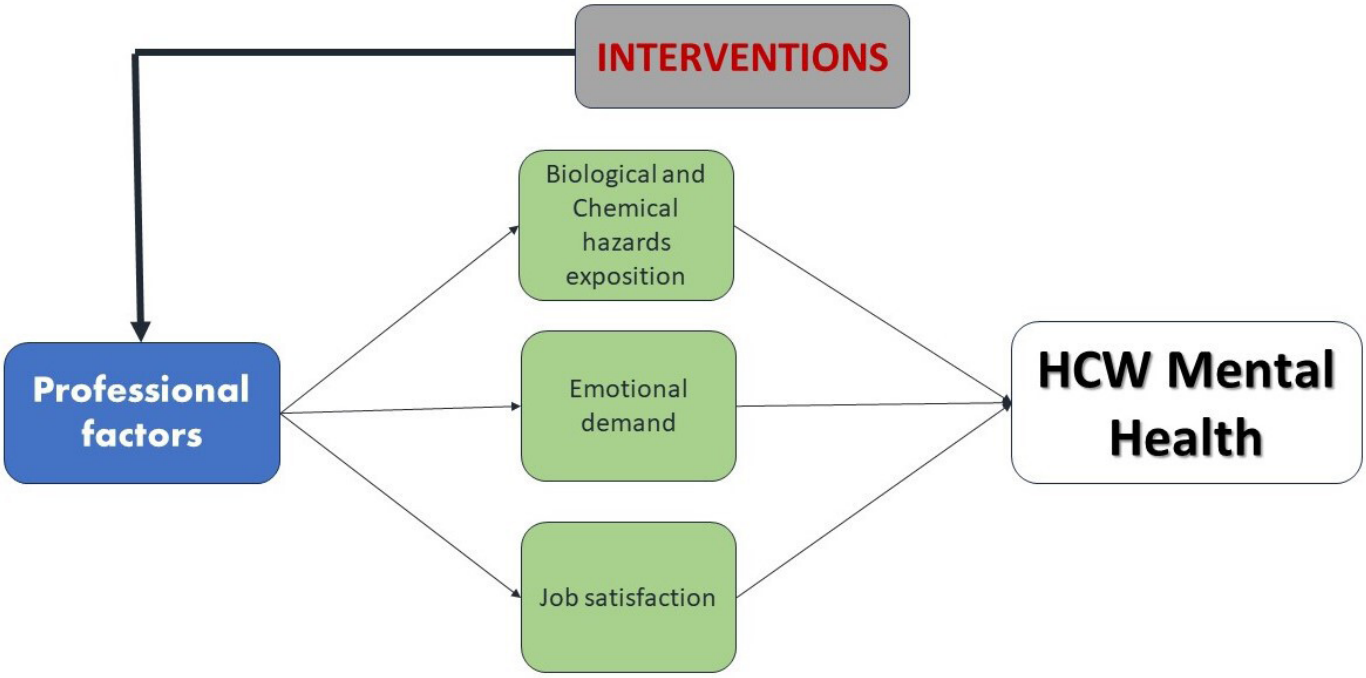

Figure 1 Factors influencing the mental health of healthcare professionals. HCW, healthcare workers.[16 22–25] Adapted based on the information on (Alvis and rodrigues, 2010; Westerhof and Keys,2010; Engel, 2012; Joseph and Joseph, 2016; CDC, 2023)

demand, exposure to biological and chemical risks and job satisfaction.[7 16]

Constant exposure to life-or-death situations, the need to make quick and accurate decisions and frequent contact with critically ill patients impose a significant emotional burden.[4] Emotional demand refers to the psychological impact of dealing with stressful situations, such as the need to manage patients in serious or terminal conditions. This type of demand can generate emotional exhaustion, leading to increased stress levels and contributing to the occurrence of disorders such as anxiety and depression.[16 23] The situation can be further aggravated by the perception contagion risk, especially in contexts of communicable diseases, where the fear of contracting diseases is constant.[11] When emotional demands are not accompanied by adequate support, such as psychological support or supervision, professionals can feel overwhelmed, exacerbating the negative impact on their mental well-being.[4]

Exposure to biological and chemical hazards is another significant source of stress. Working in environments with a high risk of contamination, such as in epidemic situations or when treating patients with communicable diseases, increases the perception of constant danger. This perception, when prolonged, can lead to a chronic state of alertness and fear, negatively affecting psychological well-being.[4 11] The interaction between emotional demands and exposure to risks can create a cycle of mental exhaustion, where the fear of contamination intensifies the emotional load and vice versa.

Job satisfaction also plays a crucial role in mental health. Feelings of professional recognition, institutional support and a safe and collaborative work environment can mitigate the negative impact of stressors, promoting a state of well-being.[7 23] However, when job satisfaction is low, due to factors such as work overload, lack of resources or inadequate support, the risk of mental disorders increases significantly. Dissatisfaction may amplify perceptions of emotional demand and make exposure to risks even more burdensome, creating an environment conducive to the development of mental health deterioration.[24]

Thus, the interaction between these factors does not occur in isolation, but in an interdependent way, where the aggravation of one factor can enhance the effects of the others. Understanding this dynamic is essential for developing integrated interventions aimed at improving the mental health of healthcare workers by addressing the multifaceted nature of their occupational environment.[16 25]

METHODS AND ANALYSIS

Patient and public involvement statement

None.

Study design

A quantitative observational cross-sectional design was chosen for this study as it allows for the assessment of the prevalence of mental health conditions at a specific point in time, as well as the identification of associated factors.[26] Moreover, this type of study is recognised for its cost-effectiveness in addressing the research objectives and is well suited for explaining associations among the variables being analysed.

Study setting

The study will be conducted in the PHUs located within Maputo City, the capital of Mozambique. Maputo City is the economic centre of the country, with a total population of 1 127 565 inhabitants, served by 7866 health professionals spread over 38 HUs, 31 of which are primary-level.[27] These PHUs serve as the primary point of care for the city's population and play a crucial role in the delivery of essential health services.[28]

In Mozambique, PHUs are classified as Urban and Rural. Urban Health Centres (UHC) are located in urban areas and, in principle, Rural Health Centres (RHC) are located in rural areas.[28] In turn, RHC are of two types (I and II) according to the degree of technical complexity of their physical infrastructure and their organisation and equipment according to their staffing and the population to be served in their Area of direct influence.[28] The UHCs are of three types (A, B and C), depending on the population to be served within a radius of 1–4 km.[28]

The choice of the PHUs in Maputo City as the study site is justified by their strategic importance in the National Health System (NHS). Maputo, as the capital and economic centre of Mozambique, concentrates a high population diversity and has a coexistence of communicable and non-communicable diseases, characteristics similar to those of other regions of the country. PHUs play an essential role as a gateway to the NHS, offering promotion, prevention and curative care services to the population. In addition, the concentration of health professionals and the existing infrastructure ensure the logistical and operational feasibility of the research, contributing to the efficient collection of data relevant to the objective of the study.

Study period

The study is expected to take place in 7 months, starting in October 2024. Of this period, 3 months (October to December) will be dedicated to the submission and approval of the Protocol by the Bioethics Committee, 2 months to data collection (January and February), including preparation for fieldwork, and the remaining 2 months (March and April) will be dedicated to data analysis, preparation of the study report and dissemination of results.

Study population

The study population of this research is the health professionals providing services related to communicable diseases in the primary-level HUs in Maputo City.

Inclusion and exclusion criteria

Inclusion criteria

- Healthcare professional working in a PHU in Maputo City
- Directly involved in the care of patients with communicable diseases (eg, doctors, nurses and health technicians).

$$n = \frac{z^2_{crit} p(1-p)}{e^2}$$

Figure 2 The formula used to calculate the sample size.[29]

Exclusion criteria

- Healthcare professionals working in administrative roles without direct patient contact

Sample size and sampling

The sample size was manually calculated using a sample size formula for proportions of infinite population[29] as described in figure 2, considering a 5% margin of error (e), a 95% confidence level, and an estimated prevalence of mental health disorders (p) of 54% (based on a similar study by Kakemam *et al*). This calculation resulted in a required sample size of 382 participants.

A stratified sampling approach will be employed, stratifying the PHUs by type (UHC A, B, C and RH C 1 and 2). Within each stratum, a convenience sampling technique will be used to recruit participants who meet the inclusion criteria and are available for inquiring (see table 1).

Data collection technique and procedures

Data will be collected through a structured questionnaire written in Portuguese. All target group members are fluent in Portuguese, the official language of the country, and therefore no translation of the instruments is expected. The questionnaire is structured into two main sections, as detailed in table 2: sociodemographic and occupational information, and the mental health assessment using the Portuguese version of the Depression, Anxiety and Stress Scale (DASS-21):

1. Sociodemographic and Occupational Information: data related to the relevant sociodemographic variables will be collected to characterise the health professionals involved in the study in terms of personal factors. Specific questions will be asked about the daily responsibilities of the professionals in the HU in order

Table 1 Sample size distribution by type of SC

PHUs type	No of existing HC	Ratio	Expected participants per HC
UHC A	15	0.48	185
UHC B	6	0.19	74
UHC C	4	0.13	49
RHC 1	2	0.06	25
RHC 2	4	0.13	49
Total	31	1.00	382

HU, health units; PHUs, primary-level health units.

Table 2 Description of study variables

Dimension	Variable	Value
Symptoms	Depression	Categorical
	Anxiety	Categorical
	Stress	Categorical
Sociodemographic	Gender	Categorical
	Age	Numerical
	Residence	Categorical
	Marital status	Categorical
	Academic level	Categorical
	Experience in healthcare practice (in years)	Numerical
About working at the HU	Role at the current HU	Categorical
	Sector of the HU assigned	Categorical
	Years of Service in the current HU	Numerical
	Shift work	Categorical
	Night shift work	Categorical
	Number of total shifts taken in the previous week	Numerical
	Number of night shifts taken in the previous week	Numerical
	Interaction with patients with CD	Categorical
	Frequency of contact with patients with CD	Categorical
	Support offered by the HU to the Professional	Categorical
	Resources available at HU	Categorical
	Insight into your workload	Categorical

CD, communicable disease; HU, health units.

to understand their activities and the extent of their interaction with patients suffering from communicable diseases. This information will be relevant to characterise the provider in terms of its work pattern.

2. The second section will be related to the screening of signs and symptoms of mental disorders: it will focus on the assessment of self-reported symptoms of mental disorders, using the Portuguese-validated version of the DASS-21.[30] This scale consists of 21 statements in which the participant must indicate the degree to which each statement applies to him/her, considering the last week before the assessment. The sum of the score attributed by the participant to each statement will be used to calculate the final score for each domain (Depression, Anxiety and Stress), which will allow classification into different severity levels of psychological distress, but does not constitute a clinical diagnosis.

Participants will be approached by the data collectors during the operation of the HU. Before starting data collection, each participant will be informed about the objectives of the study, the nature of their participation, the potential risks and benefits, and the confidentiality of the data.

Data collectors will be hired for data collection. These professionals must have previous experience in the health area, understood as practical experience in HUs or participation in similar studies. The data collectors will be responsible for recruiting participants and applying the data collection tools, which are estimated to last a maximum of 30 min. They will administer the questionnaire in person through face-to-face interaction, reading each question aloud to the participant and directly entering their responses onto a tablet using the Research Electronic Data Capture (REDCap), checking for completeness of responses before saving the questionnaire. This technique was chosen due to its potential to increase the response rate, clarify any doubts participants might have in real-time and guarantee the accurate completion of the instrument, especially considering the variability in familiarity with self-administered digital questionnaires. The training of the data collectors will be conducted by members of the research team with experience in data collection methodologies and mental health. The training will last 8 hours, divided into 2 days, to ensure adequate preparation. During the training, data collectors will be introduced to the research project, including details about the sample and sampling, the objectives of the study and the variables to be investigated. Detailed guidance on data collection tools and instructions on how to complete the questionnaire will be provided. In addition, there will be a hands-on session to simulate data collection, allowing the data collectors to familiarise themselves with the process.

Data management and analysis plan

The Principal Investigator will review all completed questionnaires to assess the quality and completeness of the data. If there are gaps or errors, the data collectors will be asked to correct or complete the questionnaires, where possible. The data will then be exported to MS Excel for cleaning and then to IBM SPSS V.25.0 data analysis software for further analysis.

The database will be inspected to identify and correct input errors. Duplicate data will be removed, and inconsistencies will be checked and corrected. Missing data will be treated according to the nature and extent of the missing data, choosing to remove the records containing the missing values or replace the missing values with a fixed value, such as zero or the mean of the variable in question.

Descriptive analysis will include calculating measures of central tendency and dispersion to describe the

participants' sociodemographic and occupational characteristics. Proportions and frequencies will be used to describe the prevalence of symptoms of mental disorders among health professionals.

The analytical component of the quantitative data will be based on simple and multiple logistic regression analysis, to estimate the effect of different factors on the occurrence of symptoms of mental disorders.

Comparisons of groups of patients with different diagnoses based on quantitative variables (eg, age) will be made based on Student's t-tests or analysis of variance, depending on the number of subgroups to be compared.

By convention, a margin of error of 5% will be considered and 95% s will be calculated to estimate the significance of all measures and tests used in this study.

Data availability statement

This study is a research protocol and does not use any secondary or publicly available data sets. All data to be analysed will be collected prospectively by the research team during the implementation phase of the study. No external data sources were used in the development of this protocol.

Study limitations

The study acknowledges the potential for biases that could influence the results. First, the use of convenience sampling introduces a risk of selection bias, as the participants included in the sample may not be representative of the broader target population. However, the study's primary aim is not to make generalisable inferences but rather to explore specific associations and patterns within the sampled group.

Second, data on mental health status will be collected through self-reported questionnaires. This method is prone to response bias, as participants may overestimate or underestimate their symptoms due to factors such as social stigma or fear of professional repercussions. To mitigate this, the study will employ validated measurement scales and guarantee participant anonymity to reduce the influence of stigma on reporting.

Third, recall bias may occur if participants are required to report on past experiences or symptoms, as memory inaccuracies could affect the reliability of their responses. To address this, the questionnaire will focus on current or recent experiences to minimise recall errors.

While every effort will be made to minimise these biases, it is important to acknowledge their potential influence on the study findings and interpret results accordingly. Furthermore, to ensure research rigour, we will employ a validated instrument (the Portuguese version of the DASS-21), standardised data collection procedures and training of data collectors to maintain consistency. Validity will be supported through the use of a previously validated scale, and reliability will be enhanced by preprogramming logic checks into REDCap to minimise data entry errors and ensure uniform administration across participants

Ethics and dissemination

The protocol of this study has been approved by the Institutional Committee on Bioethics in Health of the Faculty of Medicine/Maputo Central Hospital (CIBS FM&HCM), following the reference number CIBSFM&HCM/117/2024. Administrative authorisation will also be obtained from the Ministry of Health (MoH) to ensure compliance with institutional and governmental regulations. The research team will present the administrative approval document, the Ethics Committee approval letter and the participant information sheet to each HU, and specific authorisation will be requested from the administrative body (HU Director/Clinical Director) of each facility prior to data collection.

Informed consent

All participants will be informed about the voluntary nature of participation in this study, emphasising their right to withdraw their participation or request the removal of their data at any stage without any repercussions to their work or employment status. Written informed consent will be obtained from participants immediately before administering the questionnaire.

Risks

Given the nature of the study, no substantial risks are anticipated. However, participants may experience some discomfort while discussing sensitive topics such as mental health. To minimise this risk, the study will prioritise confidentiality through strict data protection measures. Participants who experience significant discomfort or crises, such as anxiety episodes, will be promptly referred to mental health services within the health network for appropriate support and follow-up. Additionally, participants will be asked if they would like to know the results of their mental health screening. Those expressing interest will be informed after completing section 2 of the questionnaire. Participants with normal or mild conditions will receive educational handouts with mental health care tips, while those diagnosed with moderate to extremely severe conditions will also be provided with a referral guide to the health referral system alongside mental healthcare tips.

Confidentiality and privacy

To ensure anonymity and protect participant privacy, no identifying personal information will be collected and each questionnaire will be assigned a unique numeric code. Anonymisation of data, use of secure mobile devices and computers protected by individual passwords and administration of questionnaires in private settings will ensure participant privacy and data security. All data collectors and investigators will sign confidentiality agreements, ensuring that the data collected are exclusively used for the study's scientific objectives and advocacy efforts to strengthen health sector protections.

Benefits

Participants will not receive direct monetary or material benefits from their participation in this study. However, indirect benefits are expected through the study's contributions to raising awareness and improving mental health care and support for healthcare workers in the country.

Findings dissemination

Dissemination of the study findings will begin with the presentation of a Master's thesis. Subsequent dissemination will occur through submission to peer-reviewed journals, presentations at national conferences and journal clubs targeting stakeholders in health policy and practice, and via reports shared with the MoH to inform strategies for protecting the mental health of healthcare workers.

Contributors MJCP conceptualised the research protocol and is responsible for coordinating all phases of the research. He oversees the analysis and takes the lead on writing the final report, and is the guarantor for the overall content of the work. TM contributed to refining the research protocol. He will assist in the data analysis and refining the final report. Following the journal's policy on AI usage, we would like to transparently disclose the use of OpenAI's GPT-4, a large language model, during the preparation of this manuscript. AI technology was employed to assist in drafting and refining certain sections of the manuscript, particularly to enhance the clarity of complex explanations and ensure consistency in language and style. The goal of using AI was to improve the overall readability and coherence of the manuscript. During the drafting process, GPT-4 was used to generate initial versions of specific sections, such as the introduction, which helped structure ideas and present them in a clear and concise manner. It also assisted in reviewing the manuscript to ensure that the language and style remained consistent throughout. The input provided to the AI consisted of specific prompts related to content that required drafting or revision, along with detailed instructions for the expected output. The AI-generated content was treated as a draft or suggestion and was subsequently reviewed, refined and validated by the authors. The final manuscript fully reflects the authors' original research and ideas, with the AI used strictly as a tool to support the writing process.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting or dissemination plans of this research.

Patient consent for publication Not applicable.

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