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PESSOAS TRANSPLANTADAS AO CORAÇÃO E TELESSAÚDE: SCOPING REVIEW
HEART TRANSPLANT PATIENTS AND TELEHEALTH INTERVENTIONS: SCOPING REVIEW
PACIENTES CON TRASPLANTE DE CORAZÓN E INTERVENCIONES DE TELESALUD: SCOPING REVIEW

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RESUMO

Introdução: A telessaúde tem sido reconhecida como uma oportunidade para enfrentar os desafios dos cuidados de saúde, superar barreiras geográficas e permitir uma monitorização consistente. Transplantados cardíacos (TC) necessitam de monitorização rigorosa para facilitar a manutenção da saúde, identificação precoce de complicações, adequada gestão do regime terapêutico e hábitos de vida saudáveis. Estas são áreas centrais da intervenção de enfermagem e a telessaúde é uma abordagem inovadora que pode aumentar o acesso aos cuidados de enfermagem
Objetivo: Mapear a intervenção de telessaúde em transplantados cardíacos.
Métodos: Foi desenvolvida uma scoping review segundo metodologia proposta pelo Joanna Briggs Institute, com pesquisa na Pubmed (via Medline), CINHAL (via Ebsco) e Web of Science. Foi realizada uma busca adicional por referências relevantes e literatura cinzenta. Foram incluídos todo o tipo de estudos com TC e o uso de qualquer intervenção fornecida por telessaúde. Três revisores independentes realizaram análise de relevância, extração de dados e síntese.
Resultados: Foram obtidos 706 artigos e seis atenderam aos critérios de inclusão. Foram identificadas três áreas de intervenção em telessaúde: acompanhamento de gestão de saúde, telemonitorização de sinais e sintomas e complicações, telerreabilitação; tele-educação, para literacia dos TC e seus cuidadores, e telecapacitação, uma intervenção de ensino/educacional para capacitar os doentes.
Conclusão: Diferentes áreas de intervenção em telessaúde podem ser realizadas para prestar cuidados às pessoas TC, o que deve ser considerado no planeamento de cuidados e recursos de saúde. No entanto, o acompanhamento presencial deve ser realizado sempre que considerado mais adequado. Este é o primeiro passo para a sistematização da intervenção de enfermagem nesta área.

Palavras-chave: transplante cardíaco; telessaúde, telenfermagem; revisão; cuidados de enfermagem

ABSTRACT

Introduction: Telehealth has been recognized as an opportunity to face healthcare challenges, overcome geographical barriers, and allow consistent monitoring. Heart transplant (HT) patients need close monitoring to facilitate health management, early identification of complications, adequate therapeutic regimen management, and healthy lifestyle habits. These are core areas of nursing intervention, and telehealth is a novel approach that may increase access to nursing care.
Objective: To map telehealth intervention in HT patients.
Methods: A scoping review was developed according to the proposed methodology of the Joanna Briggs Institute, with a search in PubMed, CINAHL (via Ebsco), and Web of Science. An additional search for relevant references and grey literature was performed. Primary studies with HT patients and the use of any intervention provided by telehealth were included. Three independent reviewers performed relevance analysis, data extraction, and synthesis.
Results: 706 articles were retrieved, and six met the inclusion criteria. Three areas of telehealth intervention were identified: telecare management for follow-up, telemonitoring of signs and symptoms and complications, telerehabilitation, tele-education, to educate HT patients and their caregivers, and teletraining, a teaching/educational intervention to empower patients.
Conclusion: Different areas of telehealth intervention can be performed to provide care to HT patients, which should be considered when planning health care and resources. However, face-to-face follow-up must be provided whenever considered more appropriate. This is the first step toward systematizing nursing intervention in this area.

Keywords: heart transplant; telehealth, telenursing; review; nursing care

RESUMEN

Introducción: La telesalud ha sido reconocida como una oportunidad para enfrentar desafíos de atención médica, superar barreras geográficas y permitir un seguimiento constante. Los pacientes trasplantados de corazón (TH) necesitan un seguimiento estrecho para facilitar el manejo de la salud, la identificación temprana de complicaciones, el manejo adecuado del régimen terapéutico y hábitos de vida saludables. Estas son áreas centrales de la intervención de enfermería, y la telesalud es un enfoque novedoso que puede aumentar el acceso a la atención de enfermería.
Objetivo: Mapear la intervención de telesalud en pacientes trasplantados de corazón
Métodos: Se desarrolló una revisión del alcance según la metodología propuesta por el Instituto Joanna Briggs, con búsqueda en Pubmed, CINHAL (vía Ebsco) y Web of Science. Se realizó una búsqueda adicional de referencias relevantes y literatura gris. Se incluyeron estudios primarios con pacientes con HT y el uso de cualquier intervención proporcionada por telesalud. Tres revisores independientes realizaron análisis de relevancia, extracción de datos y síntesis.
Resultados: Se recuperaron 706 artículos y seis cumplieron los criterios de inclusión. Se identificaron tres áreas de intervención de telesalud: gestión de teleasistencia para el seguimiento, telemonitoreo de signos y síntomas y complicaciones, telerehabilitación; teleeducación, para educar a los pacientes con TH y sus cuidadores, y teleformación, una intervención docente/educativa para empoderar a los pacientes.
Conclusión: Se pueden realizar diferentes áreas de intervención de telesalud para brindar atención a pacientes con HT, lo que debe considerarse al planificar la atención y los recursos de salud. No obstante, se deberá realizar un seguimiento presencial cuando se considere más adecuado. Este es el primer paso hacia la sistematización de la intervención de enfermería en esta área.

Palabras clave: trasplante de corazón; telessalude, teleenfermería; revisar; cuidado de enfermera

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INTRODUCTION

Heart transplant (HT) is considered the gold standard for treating selected patients with end-stage heart disease when medical therapy cannot halt the progression of the underlying pathology (Anderson et al., 2017). HT treatment has increased substantially in recent decades. It is performed yearly on 4,000 patients worldwide(Rosenbaum et al., 2016) with a post-transplant survival between 12 and 16 years (Transplantation, 2020).

Despite being a successful technique, reflecting on pre- and post-transplant limitations is essential to improving a patient's quality of life (Schmithausen et al., 2021). Before the transplant, patients and their families experienced a more or less extended period of an unpredictable and life-limiting condition motivated by heart failure(Awoke, Baptiste, Davidson, Roberts, & Dennison-Himmelfarb, 2019). This clinical condition carries, in most cases, different levels of dependence, a deficit in the effectiveness of self-monitoring, and adherence to the therapeutic regimen, which limits the post-transplant period; therefore, follow-up is of paramount importance(Borrelli et al., 2023). However, the reality is that HT patients struggle to comply with face-to-face health monitoring due to distance, economic factors, work, and sometimes clinical status. Telehealth can mitigate the impact of distance and improve health monitoring in HT recipients and their caregivers(Eivazzadeh, Berglund, Larsson, Fiedler, & Anderberg, 2018).

It is presented as an innovative solution that contributes to bringing citizens closer to health by solving geographical inequalities, improving access to health care, and ensuring more continuous and articulated monitoring between the different levels of care (hospital and primary health care)(Schmithausen et al., 2021) as well as greater effectiveness and efficiency of health systems(Fisher et al., 2023; SPMS - Serviços Partilhados do Ministério da Saúde, 2019). It is based on information and communication technologies (ICT) that remotely support health care, service organization, and training of healthcare providers and patients(SPMS - Serviços Partilhados do Ministério da Saúde, 2019). With the COVID-19 pandemic, the method for delivering healthcare changed overnight. Telehealth became the first choice to provide care. Suddenly, nurses were expected to utilize technology with very little, if any, training in telehealth(Ordem do Enfermeiros Centro, 2021).

Telenursing is the use of technological resources and communication systems to encourage the development of nursing. Its efficiency has been demonstrated to help countries overcome barriers to healthcare(Ordem do Enfermeiros Centro, 2021). The nurse interacts with patients remotely to prevent, assess, diagnose, intervene, electronically collect information on health/disease status, plan and implement nursing care, and monitor and record these interventions' results. Telenursing can include telecare management, tele-education, and teletraining, among other activities in the nurse's competence profile(Association, 2019; Ordem dos Enfermeiros Centro, 2021).

In Portugal, the role of telenursing has been progressively recognized as a valid and complementary modality in the provision of nursing care, especially in contexts with limited accessibility. The National Strategic Plan for Telehealth 2019–2022 (SPMS, 2019) establishes guidelines for the integration of telehealth into healthcare, highlighting the importance of telenursing in promoting continuity of care, equity of access, and efficiency of healthcare systems. At the same time, the Portuguese Nursing Association, through Position No. 53/2021, legitimizes remote nursing consultations, provided that the principles of informed consent, information security, professional responsibility, and clinical appropriateness of the modality used are ensured. However, the operationalization of telenursing in Portugal still faces several constraints, including training gaps in professionals' digital skills, the lack of specific regulations on remote prescribing, and ethical challenges related to the quality of remote clinical assessment. These factors require a strategic and integrated approach that combines regulatory development, professional training and investment in secure and interoperable technological infrastructures.

As a novel approach to HT patients, telehealth may enhance the accessibility, continuity, and effectiveness of post-transplant follow-up for patients, thus promoting greater adherence to the therapeutic regimen, translating into health gains sensitive to nursing care(Chen, Wei, Chen, Cheng, & Hou, 2020). Therefore, mapping telehealth interventions in HT patients contributes to the systematization of nurses' intervention in this context.

1. METHODS

A scoping review was developed to gather and synthesize the findings of studies using different methodologies to deepen knowledge of the investigated theme (Soares et al., 2014). One of the particularities of this methodology is that it does not aim to assess the methodological quality of the included studies since its objective is not to find the best scientific evidence but to map the existing scientific evidence(Aromataris et al., 2020). This scoping review was developed according to the Joanna Briggs Institute guidelines (Aromataris et al., 2020). The guiding question was defined using the participants, concept, and context (PCC) strategy: *Which telehealth interventions are used in healthcare for an HT person?*

In line with PCC, this scoping review included studies that address a) HT patients (participants) and b) the use of telehealth interventions (concept). No context limitations were applied (all potential contexts of implementation, either hospitals, outpatient, or community settings).

This scoping included qualitative, quantitative, or mixed studies of any level of evidence, literature reviews, gray literature, and articles with an abstract available.

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1.1 Search strategy

Data was collected through an electronic search between the 1st and 10th of May 2022 in PubMed, CINAHL (via Ebsco), and Web of Science. Additional hand search for relevant references from the reference list of the retrieved papers and grey literature in the Portuguese Open Access Scientific Repositories (RCAAP) were performed. MESH terms were used in the search in conjunction with the Boolean operators OR and AND: (((heart transplant) OR (cardiac transplant)) AND ((tele*))). Inclusion criteria were: articles published after 1967, considering that the first human HT was performed in December 1967; with an abstract available; retrievable in full text, in English, Portuguese, or Spanish, including adult participants submitted to HT. Articles published using telehealth but not describing the intervention were excluded. Two independent reviewers initially screened articles by reading the title and abstract. Full articles were retrieved from all articles whose abstracts met the inclusion criteria. The full article was retrieved whenever the abstract was unclear about whether the inclusion criteria were met. The two reviewers independently reviewed the full text of the articles, and a third reviewer resolved disagreements.

1.2. Data extraction

For data extraction, the reviewers prepared a matrix that was used independently, comprising the following items: authors/year, study design, participants, context, area of intervention, and interventions' characteristics.

2. RESULTS

The database search identified 706 records. One additional study was identified through the gray literature search. The screening process resulted in the inclusion of six studies in this review. Screening process results are presented according to the recommendations of the PRISMA Extension for Scoping Reviews, as shown in Figure 1.

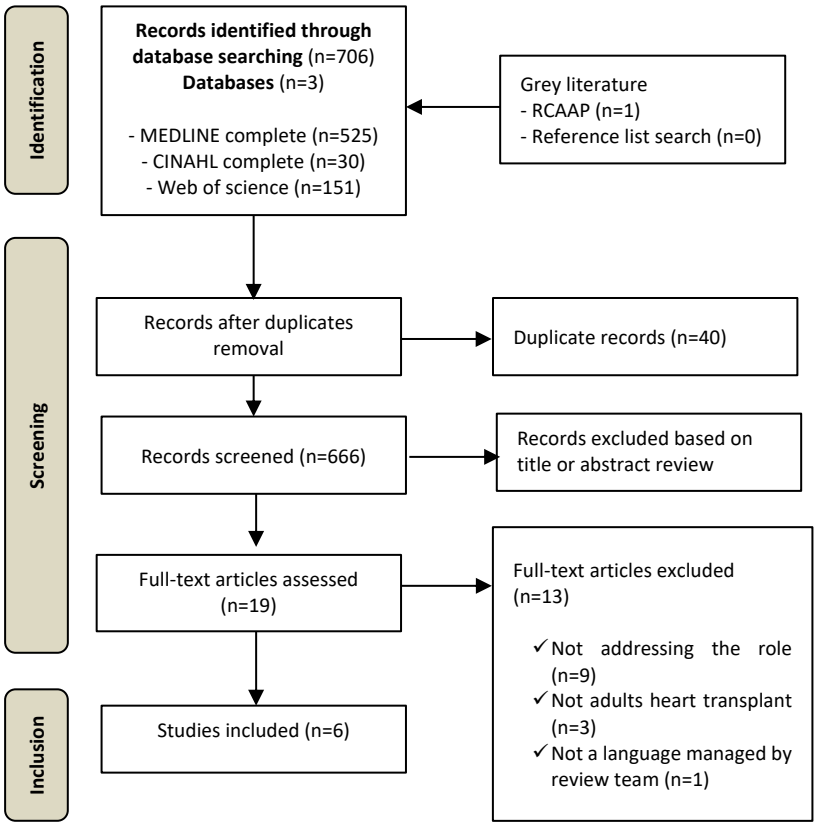

Figure 1 - *PRISMA Flowchart* - Adapted from Page et al. (2021)

All studies (S) included in this review were published between 2008 and 2021 in four different countries: the United States of America (n = 2), Spain (n = 2), South Korea (n = 1), Belgium (n =1) (Table 1). Regarding the population, not all studies were exclusively developed with HT patients, 387 HT patients participated in the selected studies (Table 1).

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Table 1 - Studies included in the scoping review

Study	Title	Country/Year	Study Design	Participants	Context
S1	Mobile Health to Improve Adherence and Patient Experience in Heart Transplantation Recipients: The mHeart Trial. *Healthcare* (Gomis-Pastor et al., 2021)	Spain 2021	Randomized Controlled Trial	134 HT patients: treatment group (TG)-71; control group (CG)-63.	Ambulatory Hospital center
S2	Heart Transplant Recipients Prefer a Telemental Health Cognitive-Behavioral Therapy Intervention Delivered by Telephone (Epstein, Liu, & Stevenson, 2019)	USA 2019	Quasi-experimental	120 HT patients three years after HT with stress, anxiety, and or depression symptoms.	Ambulatory Hospital center
S3	Support program for heart transplant patients: initial experience (Moro et al., 2008)	Spain 2008	Randomized Controlled Trial	30 HT patients (TG-15; CG-15)	Home
S4	Need Assessment for Smartphone-Based Cardiac Telerehabilitation (Kim et al., 2018)	South Korea 2018	Quantitative and prospective	40 HT patients and 56 heart failure patients.	Ambulatory Hospital center
S5	Technology Experience of Solid Organ Transplant Patients and Their Overall Willingness to Use Interactive Health Technology (Vanhoof et al., 2018)	Belgium 2018	Cross-sectional	32 HT patients (of a total of 122 solid organ transplant patients)	Ambulatory Consultation
S6	Feasibility and compliance with daily home electrocardiogram monitoring of the QT interval in heart transplant recipients (Carter et al., 2012)	USA 2012	Quantitative	31 HT patients	Home

Abbreviations- TG - *treatment group*; CG-*control group*

All three areas of intervention are represented (Table 2). However, telecare management was the most frequently described.

Table 2- Interventions/components and their characteristics.

Study	Area of Intervention	Interventions characteristics
S1	Teletraining Tele-education	An app (mHeart) with pre-defined drug regimen content, complemented by an informative website.
S2	Telecare management (Teleconsultation, mental health; Telemonitoring of signs and symptoms of psychological distress)	Follow-up via telephone and videoconference. A total of 5 appointments every two weeks, comprising a cognitive-behavioral therapy program with the following interventions: training in breathing exercises and relaxation; concept analysis of negative thinking and ways of restructuring; and planning activities to improve psychological symptoms
S3	Telecare management (Teleconsultation) Teletraining	A telephone line was set up, working from 8 am to 5 pm on working days, to clarify doubts in the 1st year after the transplant. The training focused on medication dosages, side effects, and lifestyle issues (type of exercise, infectious symptoms, and medication).
S4	Telecare management (Telerehabilitation, Telemonitoring) Tele-education	Development of a smartphone telerehabilitation app to identify learning needs and remote monitoring. Participants completed the self-report questionnaire, which assessed their experience participating in health education programs, their use of smartphones, and their needs for smartphone-based disease education and home monitoring systems.
S5	Telecare management (Telemonitoring (signs/symptoms) and Telerehabilitation)	Analysis of the more commonly used ICT by transplant recipients and most relevant features to address by ICT (medication, physical activity, weight control).
S6	Telecare management (Telemonitoring)	An electrocardiographic monitoring device (HeartOne ECG recorder) was used to continuously monitor the heart rhythm and check for changes related to graft rejection, transmitted by telephone to the monitoring center.

3. DISCUSSION

Results indicate different areas of telehealth intervention for HT patients. Telehealth is a healthcare delivery strategy and can be used to care for patients undergoing HT in three different areas: telecare management, tele-education, and teletraining. All studies presented telehealth interventions that nurses can implement; these areas correspond to what professional nursing associations describe as foci of nursing care (Association, 2019; Ordem do Enfermeiros Centro, 2021).

According to the American Nurses Association (ANA) (Association, 2019), connected health technologies are helpful in nursing practice to provide evidence-based and high-quality personalized care when face-to-face is impossible. A set of standards accompanied by a set of specific competencies was issued by ANA, recognizing the relevance of these resources and the need for clear guidelines and particular skills to be developed for nursing practice in this context. The COVID-19 pandemic boosted its use and revealed the need to strengthen the competencies of nurses in this field (Curioso, Peña-Ayudante, & Oscuvilca-Tapia, 2021).

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The studies analyzed demonstrated that three areas of telehealth may comprise different interventions. For example, telecare management can include telecthe onsultation, telerehabilitation, and telemonitoring. Tele-education can integrate information to patients and their caregivers about therapeutic regimens and increase literacy about health status and use of health services. In teletraining, specific techniques and drug preparation may be taught, for example (Association, 2019; Ordem dos Enfermeiros Centro, 2021).

Epstein et al, Moro et al., and Carter et al. represented telecare management using telemonitoring. This is considered a type of intervention for patients undergoing HT as it allows monitoring of both physical and psychological symptoms. In this way, it is possible to evaluate the appearance or worsening of depression and anxiety symptoms, being able to intervene earlier (Epstein et al., 2019). The same can be said for vital sign monitoring, electrocardiography, symptoms that can be transmitted, and changes related to transplant rejection or dysfunction identified promptly (Carter et al., 2012; Moro et al., 2008). The systematic literature review by Bashi, Karunanithi, Fatehi, Ding, & Walters, (2017) presents the possibility of telemonitoring in people with heart failure (clinical situation before HT), verifying that this strategy allows for the early identification of complications and clinical changes, among others. Ruberti, Yugar-Toledo, Moreno, & Rodrigues (2021) study with hypertensive patients adds the possibility of blood pressure telemonitoring, which aligns with the findings.

Kim et al. (2018) describe the areas of cardiac rehabilitation to be included in the telerehabilitation program from the perspective of HT recipients, with the two most frequently mentioned areas being knowledge about the management of their new health condition and exercise monitoring, representing a way of telecare management. The area of cardiac telerehabilitation is referenced as an alternative to center-based by the Committee for Cardiovascular Prevention and Cardiac Rehabilitation of the Netherlands Society of Cardiology (Brouwers et al., 2020), with two areas to be implemented: a remotely supervised exercise program and a structured behavioral change program. The aim is to improve an individual's lifestyle to reduce the risk of recurrent cardiovascular events and/or cardiovascular disease progression, which these findings corroborate. In the study by Vanhoof et al. (2018), there is also a reference to telerehabilitation in physical activity/exercise. Ruberti et al. (2021) present the Remote Physical Training protocol for hypertensive patients that aligns with the same area.

Gomis-Pastor et al. (2021). Vanhoof et al. (2018) and Kim et al. (2018) describe the use of teletraining in several domains of the therapeutic regimen. These findings are consistent with a study targeting the adolescent HT population and their caregivers (Killian, Clifford, Lustria, Skivington, & Gupta, 2022). This study suggests that a medication education app increases medication adherence, demonstrating that this is a feasible intervention area. Epstein et al. and Moro et al.(2008) describe teleconsultation as another possible intervention, focusing on evaluation, therapeutic intervention, and screening for possible post-transplant complications. The study by Fisher et al., during the COVID-19 pandemic, reports that nursing teleconsultation ensures continuity of care for people with cardiovascular disease, adding value to previous findings.

In addition to the identified intervention areas, the findings of Vanhoof et al. (2018) and Carter et al. warn about assessing the patients' ICT literacy. Otherwise, results and their preferences regarding devices may be compromised. Therefore, it is essential to know the social and cultural context of the patient so that the use of ICT can effectively become an ally in providing care to transplant patients, leading to the desired health gains. In their study, Yun et al. (2022) analyze the literacy levels in ICT in a person with heart failure, listing its importance.

HT represents a patient's health/disease transition process, resulting in the need to live with a new health condition and a more or less complex change of roles (Delgado et al., 2021; Meleis, 2018; Sousa, Martins, & Novo, 2020) Therapeutic self-care for these patients includes adequate management of the therapeutic regimen (especially immunosuppressants), infection self-control, regular outpatient appointments, dietary management, and a healthy lifestyle, such as incorporating physical exercise in their daily lives (Loureiro et al., 2023). The diversity of needs presented by these patients requires nurses to be able to put into practice, in a short period, all their assessment, planning, and execution skills, which are essential to provide an effective, efficient, and quality response to these demands. However, after hospital discharge, this facilitating role of nurses is more complex, and the return home is a challenge, given the risk of numerous complications that these people present (Lee, Jeon, Kang, & Kim, 2017).

The analysis also demonstrates that HT patients and professionals can use various formats (ICT) in telehealth, including phone calls, remote monitoring, videos, and mobile applications, which was also described by MacKinnon & Brittain (2020).

Based on a global analysis of articles, it has been found that various interventions can be used to promote health, well-being, and self-care, prevent complications, encourage functional readaptation, and improve the satisfaction of the person receiving care. With the advent of telehealth interventions, there is a need for further research with a more significant number of participants, including heart transplant recipients and their caregivers, and with an experimental design. While telehealth is believed to be an essential tool in health systems to improve nursing care for heart transplant patients, it must not replace in-person care if deemed more appropriate. This study has limitations, mainly regarding selection bias, considering that relevant papers might have been overlooked since not all data sources have been exhausted. Language limitations may also have enhanced selection bias.

CONCLUSION

The results show that telehealth interventions may be helpful for telecare management, teletraining, and tele-education. Telehealth can provide different interventions to HT patients, which should be considered when planning nursing care and resources. This approach can

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increase access to care for HT patients, allowing prompt identification of complications, health education, and cardiac rehabilitation, which are relevant areas in nursing clinical practice. As technology advances rapidly in this era of globalization, nurses need to develop skills that allow them to integrate these new technologies into patient care. Telenursing interventions may be a valuable resource to meet patients' needs in an increasingly digital world. However, it is essential to provide face-to-face follow-up when deemed more appropriate. This scoping review is the first step in systematizing nursing interventions in this area. Further research should focus on assessing the effectiveness of these interventions in clinical practice. Doing so will enhance the Nursing discipline knowledge and the structuring and substantiation of interventions by nurses in the context of care provision.

AUTHORS' CONTRIBUTION

Conceptualization, M.L., I.O. and R.S.; data curation, M.L., I.O. and R.S.; formal analysis, M.L., I.O., L.M., M.M.M., A.N., and R.S.; investigation, M.L., I.O. and R.S.; methodology, M.L., I.O., L.M., M.M.M., A.N., and R.S.; project administration, M.L..; resources, M.L., I.O., L.M., M.M.M., A.N., and R.S.; software, M.L., I.O., L.M., M.M.M., A.N., and R.S.; supervision, M.L., I.O., L.M., M.M.M., A.N., and R.S.; validation, L.M., M.M.M., and A.N.; visualization, M.L., I.O., L.M., M.M.M., A.N., and R.S.; writing-original draft, M.L., I.O. and R.S.; writing-review and editing, I.O., L.M., M.M.M., and A.N.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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