OBJN
ONLINE BRAZILIAN JOURNAL OF NURSING
ISSN: 1676-4285

REVIEW PROTOCOL

Technologies for Adherence to Tuberculosis Treatment: A Scoping Review Protocol

Tecnologias para a adesão ao tratamento da tuberculose: protocolo de scoping review

Jaine Souto da Silva[1]
ORCID: 0000-0002-6360-4552

Lara Évilly Leandro da Costa[1]
ORCID: 0009-0007-1425-3606

Francisca Brigyda Alves Pereira[1]
ORCID: 0009-0007-4390-9758

Renata Diniz Vieira Silva[1]
ORCID: 0000-0002-0928-8368

Rayrla Cristina de Abreu Temoteo[1]
ORCID: 0000-0003-1980-7819

[1]Federal University of Campina Grande, Campina Grande, PB, Brazil

Corresponding author:
Rayrla Cristina de Abreu Temoteo
E-mail: rayrla.cristina@professor.ufcg.edu.br

Submission: 03/04/2023
Approved: 07/10/2023

RESUMO

Objetivo: Identificar e mapear as tecnologias desenvolvidas e/ou validadas para incentivar e auxiliar na adesão ao tratamento da tuberculose na Atenção Primária à Saúde. **Método:** Trata-se de uma *scoping review*, seguindo as orientações do Joanna Briggs Institute (JBI) *Reviewer's Manual*, com a seguinte pergunta de pesquisa: "Quais as tecnologias têm sido desenvolvidas e/ou validadas para incentivar e auxiliar na adesão ao tratamento da tuberculose na Atenção Primária à Saúde?" Serão incluídos artigos, teses e dissertações a partir de buscas nas bases: *Medical Literature Analysis and Retrieval System Online* (Medline/PubMed), Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS)/Biblioteca Virtual de Saúde (BVS), *Cumulative Index to Nursing and Allied Health* (CINAHL), *Web of Science* (WOS), Scopus, *Excerpta Medica Database* (Embase) e literatura cinzenta. A busca, avaliação, seleção e extração dos dados serão realizadas de forma cega entre pares; quando houver divergências, um terceiro revisor será consultado. Os resultados serão descritos na íntegra, utilizando-se de narrativa e diagramas, de forma que estejam alinhados com o objetivo e a questão norteadora desta revisão. Protocolo registrado na *Open Science Framework* (OSF): 10.17605/OSF.IO/PKWTC.
Descritores: Tuberculose; Tecnologia; Cooperação e Adesão ao Tratamento.

RESUMO

Objective: To identify and map technologies developed and/or validated to promote and support adherence to tuberculosis treatment in primary health care settings. **Method:** This is a scoping review, following the guidelines of the Joanna Briggs Institute (JBI) Reviewer's Manual, with the following research question: "What technologies have been developed and/or validated to promote and support adherence to tuberculosis treatment in primary health care?". Articles, theses, and dissertations will be included by searching the following databases Medical Literature Analysis and Retrieval System Online (Medline/PubMed), Latin American and Caribbean Health Sciences Literature (LILACS)/Virtual Health Library (VHL), Cumulative Index to Nursing and Allied Health (CINAHL), Web of Science (WOS), Scopus, Excerpta Medica Database (Embase), and gray literature. The search, assessment, selection, and data extraction will be performed in a blinded manner between peers; in case of disagreement, a third reviewer will be consulted. The results will be fully described using narratives and graphs to align with the objective and guiding question of this review. Protocol registered with the Open Science Framework (OSF): 10.17605/OSF.IO/PKWTC.
Descriptors: Tuberculosis; Technology; Cooperation and Adherence to Treatment.

INTRODUCTION

Tuberculosis (TB) is an age-old disease transmitted by *Mycobacterium tuberculosis*, commonly known as the Koch *bacillus*. Despite being curable, TB remains alarming and is responsible for 1.5 million deaths, and Brazil is one of the countries with the highest disease burden in the world[1].

Despite the existence of treatments and various technological resources for TB containment, treatment abandonment is common, leading to increased rates of relapse and mortality. This is primarily due to the pervasive social stigma associated with the disease[2]. Therefore, a multifactorial intervention is necessary to control the tuberculosis epidemic and implement effective programs[3].

How to cite: Silva JS, Costa LEL, Pereira FBA, Silva RDV, Temoteo RCA. Technologies for adherence to tuberculosis treatment: a scoping review protocol. Online Braz J Nurs. 2023;22 Suppl 1:e20236658. https://doi.org/10.17665/1676-4285.20236658

The COVID-19 pandemic has also posed challenges in TB control, reversing years of progress in reducing TB-related deaths. The difficulty in establishing early diagnosis due to the similarity in symptoms between the two diseases and the global emergence of the novel coronavirus resulted in an 18% reduction in TB notifications, despite a significant increase in deaths[4].

Among the challenges, delays in the suspicion and diagnosis of TB must also be mentioned. A swift diagnosis, especially in the early stages of the disease, contributes to controlling TB spread and ensuring treatment effectiveness[5].

Above all, considering all these obstacles to TB control in Brazil, non-adherence to treatment is a major concern, leading to treatment abandonment, drug resistance, increased mortality, and disease incidence. The primary factors contributing to non-adherence are social determinants, lack of information about the disease, and delayed seeking of medical assistance, hampering early diagnosis[6].

Hence, mapping and identifying existing technologies promoting treatment adherence is crucial. New educational strategies must be implemented to foster adherence, reduce abandonment rates, and empower patients to be active agents in their care process rather than passive recipients.

In preliminary searches conducted in November 2022 through databases such as the International Prospective Register of Systematic Reviews (PROSPERO), Medical Literature Analysis and Retrieval System Online (MEDLINE), and Joanna Briggs Institute (JBI) Evidence Synthesis, a systematic review titled "Interventions to promote Tuberculosis Adherence and Outcomes: A Systematic Review and Network Meta-Analysis"[7] was identified through PROSPERO, which addresses interventions to promote treatment adherence, though not specifically focusing on technologies. Another scoping review, "Nursing actions promoting adherence to tuberculosis treatment: a scoping review"[8], exclusively focuses on nursing interventions to promote treatment adherence in tuberculosis.

Hence, conducting a Scoping Review will provide an overview of the technologies being developed and shared among countries, which will be valuable for future evaluation projects and guiding public policies regarding tuberculosis treatment adherence. The objective of this study is to identify and map the technologies developed and/or validated to encourage and assist in tuberculosis treatment adherence in Primary Health Care.

METHOD

This is a scoping review based on the JBI criteria, building on the work of Peters et al.[9], and guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR)[10].

A review protocol was prepared and registered with the Open Science Framework (OSF), accessed via the following link: https://doi.org/10.17605/OSF.IO/PKWTC.

Thus, the review will be conducted based on the following steps[9]:

Objective and research question

The research question was formulated through the conceptual model of the anagram PCC (Population, Concept, and Context), which allows mapping a wide spectrum of information to detect possible gaps in knowledge to evidence on a given topic, among other aspects[9], as highlighted:

P - People on treatment for tuberculosis
C - Technologies to aid adherence to treatment
C - Primary Health Care

Therefore, the guiding question of this study is: "What technologies have been developed and/or validated to encourage and assist in tuberculosis treatment adherence in Primary Health Care?"

The reference concepts of the mnemonic elements adopted in this review are presented in Figure 1:

Inclusion criteria

The scoping review protocol includes the inclusion of publications dealing with health or educational technologies used in primary health care to promote and support adherence to tuberculosis treatment, implemented in different countries, and available as full-text articles, theses, and dissertations accessible through the CAPES Periodicals Portal via the Federated Academic Community (CAFe) of the Federal University of Campina Grande (UFCG).

However, duplicate publications and those characterized as literature reviews (in their different types), theoretical essays, editorials, and expert opinions are excluded. In addition, publications discussing technologies unrelated promoting and supporting TB treatment adherence will be excluded.

Selection of evidence

The search strategy is designed to include the largest possible number of publications and gray literature. Initially, a search of the PubMed portal was performed to identify the main descriptors,

Concept	Definition
Person undergoing treatment for tuberculosis	"Any individual diagnosed with tuberculosis should undergo appropriate therapeutic management with the use of standard chemotherapy"[11].
Technologies	"Technology does not refer solely to machines but encompasses all human creations, their application, and ways of utilization, seen as a social asset and a means of adding value to society"[12].
Educational technologies	"Educational technologies can be defined as facilitating, supporting, and enhancing tools for teaching and learning that promote the dissemination of knowledge"[12].
Health technologies	"Health technologies are tools that leverage scientific knowledge to facilitate, enable and ensure the effectiveness of care in health services and systems"[13].
Adherence to treatment	"A process that promotes acceptance of a therapeutic approach, reduces the risk of dropping out, and makes the individual proactive and collaborative in making decisions about his or her treatment"[13]. "The degree to which a patient adheres to prescribed treatment, such as attending scheduled appointments and taking medications, to achieve the desired therapeutic outcome. This involves active shared responsibility between the patient and health care providers"[14].
Primary Health Care	"It is the way of organizing and integrating health services from a population perspective. A health system based on primary health care aims to ensure coverage and access to comprehensive and acceptable health care for the population, emphasizing clinical care, disease prevention, and health promotion"[15]

Source: Developed by the authors, 2023.

Figure 1 - Definition of the concepts that will be used in the review and their respective sources. Cajazeiras, PB, Brazil, 2023

synonyms, and keywords in English present in the titles, abstracts, and index terms of publications related to the topic of interest. This search involved using specific combinations of Medical Subject Headings (MeSH) adopted for the review. The search was carried out similarly for Portuguese but using the Descriptors in Health Sciences (DeCS) and the Virtual Health Library (BVS).

The Extraction, Conversion, Combination, Construction, and Use (ECUs) model was used to construct the strategy to ensure the accuracy and sensitivity of search strategies.

Figure 2 illustrates the conversion of mnemonic elements into key terms representing them:

The complete strategy built for the collection in MEDLINE via PubMed, carried out on January 3, 2023, is presented in Figure 3:

After defining the high-sensitivity strategy as described above, data collection will be performed in the following databases: MEDLINE/PubMed, Latin American and Caribbean Health Sciences Literature (LILACS/BVS), Cumulative Index to Nursing and Allied Health (CINAHL), Web of Science (WOS), Scopus, Excerpta Medica Database (EMBASE), as well as gray literature search fields such as Google Scholar; Catalog of Theses and Dissertations of the Coordination for the Improvement of Higher Education Personnel (CAPES); Digital Library of Theses and Dissertations (BDTD); Open Access Theses and Dissertations (OATD); ProQuest Dissertations & Theses Global (PQDT); National Institute of Industrial Property (INPI).

After a comprehensive analysis of the texts and references used in the publications and gray literature, additional sources are researched and retrieved using the previously adopted search strategy. If necessary, the authors of the studies are contacted by e-mail to obtain additional information that may not have been included in the text.

Evidence searches

The data collection process will be initiated using appropriate strategies in the various specified databases. The identified studies will be stored in the review database using Rayyan software, where duplicates will be removed. Next, a pilot test will be conducted with the four reviewers. A random sample of studies will be selected, and the reviewers will assess the titles and abstracts to determine whether they meet the inclusion criteria defined in the protocol. The goal is to achieve a minimum of 75% agreement among the reviewers to proceed with independent data collection. After the pilot test, the reviewers will independently assess all identified studies using Rayyan software to ensure blinding. They will analyze the titles and abstracts according to the

Mnemonic	Extraction	Conversion
Population	People undergoing treatment for tuberculosis	*Tuberculosis*
Concept	Technologies to support adherence to tuberculosis treatment	*Digital adherence technology*
		Digital adherence technologies Educational technology
		Biomedical technology
		Technology
		Technologies
		Treatment adherence and compliance
		Treatment adherence
		Adherence
Context*	Primary Health Care	*Primary Health Care*
		Primary Care
		Primary Healthcare

*Primary Health Care, Primary Care, Primary Healthcare, and other similar descriptors and keywords were used in the test search, but they narrowed the results too much and did not select studies that addressed the guiding question, making the search unsatisfactory. Therefore, it was decided to use the context of the PCC mnemonic as an inclusion criterion in the study screening phase.

Source: Developed by the authors, 2023

Figure 2 - Conversion of the mnemonic elements adopted in the review. Cajazeiras, PB, Brazil, 2023

Query	Terms	Retrieved records
#1	tuberculosis[Title/Abstract]	232,760
#2	"digital adherence technology"[Title/Abstract] OR "digital adherence technologies"[Title/Abstract] OR "educational technology"[Title/Abstract] OR "biomedical technology"[Title/Abstract] OR technology[Title/Abstract] OR technologies[Title/Abstract]	576,096
#3	"treatment adherence and compliance"[Title/Abstract] OR "treatment adherence"[Title/Abstract] OR adherence[Title/Abstract]	151,698
	#1 AND #2 AND #3	122

Source: Developed by the authors, 2023.

Figure 3 - Strategy for collection in MEDLINE via PubMed. Cajazeiras, PB, Brazil, 2023

established criteria. Any discrepancies between the reviewers will be discussed after the selection process has been completed. The goal is to reach a consensus among the reviewers. A third reviewer will be invited to resolve the discrepancies if a consensus cannot be reached.

Evidence selection

After selecting of publications based on title and abstract, the full text of relevant studies will be retrieved. Both reviewers will comprehensively read the text and independently decide whether the study meets the inclusion criteria defined in the protocol. Both reviewers will extract relevant data independently, and any discrepancies will be discussed to reach a consensus.

The reasons for exclusion are adequately recorded during the study selection process, eligibility, inclusion, and exclusion. These steps will be presented in a specific flowchart, following the guidelines of PRISMA-ScR[10].

Evidence extraction

Data extraction is set to take place from a spreadsheet developed in Microsoft Excel for Microsoft 365 and will aim to identify the following indicators, as depicted in Figure 4:

Evidence analysis

The extracted data from the studies will be analyzed descriptively, using tables aligned with the objective and guiding question of the review.

Variable	Standardization	Extraction of data from publications
Type of publication	If article, dissertation, or thesis	
Year	Year the study was published	
Country	Country where the study was carried out	
Author's degree	Degree of the main author	
Objective	To describe the main objective of the study	
Methodological design	Type of research conducted by the study authors	
Type of Educational/Biomedical Technology	To describe which technology was used	
Purpose of Technology	To describe the purpose of the technology	
Theme of Technology	To detail the subject of the technology used	
Target audience	To describe which audience the technology is intended for	
Level of Health Technology	If health care, medical, or biomedical	
Validation of Technology	To describe whether the technology has been validated (if yes, what type of validation).	
Impacts of the use of technology	Describe the impacts of using	
Challenges for the use of technology	Describe the challenges for using	

Source: Developed by the authors, 2023.

Figure 4 - Data extraction instrument. Cajazeiras, PB, Brazil, 2023

This analysis will be conducted in consensus between the two reviewers, ensuring a consistent, accurate approach.

Results presentation

The results will be comprehensively presented in the form of narratives and diagrams. The search process will be emphasized by producing illustrative tables and figures showing the review results, including and excluding publications. The final report of the review will follow the PRISMA-ScR guidelines[10].

Summary of evidence, conclusions, implications of findings

The synthesis of the findings will be prepared in accordance with the original research objective. If any gaps or knowledge deficiencies are identified, they will be duly highlighted.

CONFLICT OF INTERESTS

The authors have declared that there is no conflict of interests.

REFERENCES

Moreira ASR, Kritski AL, Carvalho ACC. Social determinants of health and catastrophic costs associated with the diagnosis and treatment of tuberculosis. J Bras Pneumol. 2020;46(5):e20200015. https://dx.doi.org/10.36416/1806-3756/e20200015

2. Mansour GK, Ferreira LPQ, Martins GO, Melo JLL, Freitas PS, Nascimento MC. Factors Related to Non-Adherence and Abandonment of Pulmonary Tuberculosis Treatment. Medicina (Ribeirão Preto). 2021;54(2):e-172543. https://doi.org/10.11606/issn.2176-7262.rmrp.2021.172543

3. Cortez AO, Melo AC, Neves LO, Resende KA, Camargos P. Tuberculosis in Brazil: one country, multiple realities. J Bras Pneumol. 2021;47(02):e20200119. https://dx.doi.org/10.36416/1806-3756/e20200119

4. Torres PPTS, Rabahi MF. Tuberculosis in times of COVID-19: we cannot lose focus on the diagnosis. Radiol Bras. 2022;55(2):1-2. https://doi.org/10.1590/0100-3984.2022.55.2e1

5. Martins VDO, Miranda CVD. Diagnóstico e tratamento medicamentoso em casos de tuberculose pulmonar: revisão de literatura. Rev Saúde Multidisciplinar [Internet]. 2020 [cited 2023 Feb 27];7(1):1-10. Available from: http://revistas.famp.edu.br/revistasaudemultidisciplinar/article/view/111

6. Orlandi GM, Pereira EG, Biagolini REM, França FOS, Bertolozzi MR. Social incentives for adherence to tuberculosis treatment. Rev Bras Enferm. 2019;72(5):1247-1253. http://dx.doi.org/10.1590/0034-7167-2017-0654

7. Müller AM, Osório CS, Silva DR, Sbruzzi G, de Tarso P, Dalcin R. Interventions to improve adherence to tuberculosis treatment: systematic review and meta-analysis. Int J Tuberc Lung Dis. 2018;22(7):731-740. https://doi.org/10.5588/ijtld.17.0596

8. Zago PTN, Maffacciolli R, Mattioni FC, Dalla-Nora CR, Rocha CMF. Nursing actions promoting adherence to tuberculosis treatment: scoping review. Rev esc enferm USP. 2021;55:e20200300. https://doi.org/10.1590/1980-220x-reeusp-2020-0300

9. Peters MDJ, Godfrey C, McInerney P, Munn Z, Tricco AC, Khalil, H. Chapter 11: Scoping Reviews (2020 version). In: Aromataris E, Munn Z, editors. JBI Manual for Evidence Synthesis [Internet]. Adelaide: JBI; 2020 [cited 2023 Feb 23]. Available from: . https://doi.org/10.46658/JBIMES-20-12

10. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAS-cR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. https://doi.org/10.7326/M18-0850

11. Ministério da Saúde (BR). Manual de Recomendações para o Controle da Tuberculose no Brasil [Internet]. Brasília (DF): Ministério da Saúde; 2019 [cited 2022 Nov 08]. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/manual_recomendacoes_controle_tuberculose_brasil_2_ed.pdf

12. Maack AC, Ananias C, Cruz LC, Campregher N. Aproximação da tecnologia no ambiente escolar: tecnologia e ensino híbrido - primeiras impressões. Rev. Inova Educ [Internet]. 2021 [cited 2023 Mar 16]6:1–18. Available from: https://econtents.bc.unicamp.br/inpec/index.php/inovaeduc/article/view/15252

13. Novaes HMD, Soárez PCD. Health Technologies Assessment: origins, development, and current challenges. In the international and Brazilian scenarios. Cad Saúde Pública. 2020;36(9):e00006820. https://doi.org/10.1590/0102-311X00006820

14. National Library of Medicine (US). Treatment Adherence and Compliance [Internet]. 2018 [cited 2022 Nov 08]. Available from: https://id.nlm.nih.gov/mesh/D000074822.html

15. Ministério da Saúde (BR). Carteira de Serviços da Atenção Primária à Saúde (CaSAPS) [Internet]. Brasília (DF): Ministério da Saúde; 2019 [cited 2023 mar 28]. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/carteira_servicos_atencao_primaria_saude_profissionais_saude_gestores_completa.pdf

16. Araújo WCO. Recuperação da informação em saúde: construção, modelos e estratégias. ConCI. 2020;3(2):100-134. https://doi.org/10.33467/conci.v3i2.13447

AUTHORSHIP CONTRIBUTIONS
Project design: Silva RDV, Temoteo RCA
Data collection: Silva JS, Costa LEL, Pereira FBA, Silva RDV, Temoteo RCA
Data analysis and interpretation: Silva JS, Costa LEL, Pereira FBA, Silva RDV, Temoteo RCA
Writing and/or critical review of the intellectual content: Silva JS, Costa LEL, Pereira FBA, Silva RDV, Temoteo RCA
Final approval of the version to be published: Silva JS, Costa LEL, Pereira FBA, Silva RDV, Temoteo RCA
Responsibility for the text in ensuring the accuracy and completeness of any part of the paper: Silva JS, Costa LEL, Pereira FBA, Silva RDV, Temoteo RCA