Health Informatics Vision: From Data via Information to Knowledge
J. Mantas et al. (Eds.)
IOS Press, 2019

doi:10.3233/SHTI190027

Decision Support Systems for Tuberculosis: Protocol for a Scoping Review

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Abstract. Tuberculosis (TB) represents a global challenge in terms of prevention, care and control. Decision support systems (DSS) can supply the necessary knowledge basis to underpin investigators, policy makers and health personnel actions and to provide crucial elements that can help reducing TB burden. Thus, the objectives of this work are to present the protocol to be followed for carrying out a scoping review to identify topics where DSSs are used, to define appropriate categories and to clarify main outcomes and research gaps. As part of the protocol, five electronic bibliographic databases will be searched for articles from 2006 to 2019 and two investigators will independently screen each work using the study inclusion criteria. Data extraction will be performed, and findings will be reported. The results will be used to provide a broad understanding of how DSSs for TB are being used.

Keywords. Decision support systems, tuberculosis, protocol, scoping review

1. Introduction

Tuberculosis (TB) is a bacterial infectious disease that remains as a major public health problem in the world. Despite the success of some strategies to reduce the global burden, TB remains as a leading cause of mortality worldwide. It is estimated that in 2017 approximately 10.5 million people got infected with drug-sensitive TB, rifampicin-resistant (RR-TB) or multidrug-resistant (MDR-TB) [1]. The World Health Organization (WHO) End TB Strategy, a global strategy for tuberculosis prevention, care and control, aims to halt the TB epidemic by 2035 [2]. Technological innovation will strongly underpin the reduction of the global TB burden. Delays in diagnosis and the lack of clinical support tools not only result in poor treatment outcomes, but also in longer infectious periods resulting in sustained transmission at the community level [3].

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Also, policy makers and managers depend on crucial information to make difficult decisions about which available tool to implement and how to apply it considering the existing health care infrastructure and regional particularities [4]. Aiming to support decision making in both clinical and managerial scopes, Decision Support Systems (DSS) plays a relevant role. DSS is a general term for any information system that enhances a person or group's ability to identify problems and to make decisions that could help to solve such problems [5]. It usually allows knowledge extraction from several sources of information and guide clinical and administrative decision-making, directly affecting the management and quality of health services.

The main goal of this work is to present the steps to be followed for carrying out a scoping review, i.e., a protocol, that will formally verify, for the first time, the available literature that present the development and/or implementation of decision support systems for Tuberculosis. The methodology presented is this paper is based on studies from the literature, which provide guidelines for conducting reviews that can be applied to several research domains sin a nonspecific way.

2. Methods/Design

The protocol presented in this paper was established according to the methodology developed by Arksey and O'Malley [6] and other guidelines provided by the Joanna Briggs Institute [7], which recommend a five-stage framework for scoping review. The Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) [8] flow diagram will also be used to a better comprehension of study selection.

2.1. Stage 1: Identifying the research questions

The following research questions were drafted for the scoping review:

- What does DSSs for TB usually address?
- How to categorize DSSs for TB?
- What are the main outcomes and research gaps regarding DSS for TB?

2.2. Stage 2: Identifying relevant studies

2.2.1. Eligibility criteria

The scope review will include research (full papers, conference papers) and non-research studies (editorials, narrative reviews) that present a prototype or a fully functional computerized tool, regardless a graphical user interface, that could be applied to any subject related to TB. Thus, studies with only theoretical approaches without a practical implementation, such as models' definitions (operational, predictive) or ontologies, will be excluded. Also, selected works must address pulmonary tuberculosis (PTB) in humans.

2.2.2. Search strategy

The following databases will be searched: PubMed/MEDLINE, ACM Digital Library, IEEE Xplore Digital Library, Elsevier Scopus and Cochrane Database of Systematic

Reviews. Bibliographies of the retrieved articles will be searched for additional relevant works and experts in the field will be contacted to identify others. The search strategy will use combinations of the following terms: decision support, decision making, system, tuberculosis, drug-resistant, latent and diagnosis. The searches will include international articles, but only works in English language will be considered. The time frame will range from March 2006 (start of the WHO End TB Strategy [2]) to February 2019.

Detailed search strategies from each database will be available from the authors on completion of the scoping review. Bibliographic details will be downloaded into Mendeley software (https://www.mendeley.com/).

2.3. Stage 3: Study Selection

After performing searches using the terms in the mentioned databases, two investigators will independently screen each retrieved article based on title and abstract for eligibility according to the inclusion criteria. Then the full text will be retrieved, and the investigators will independently perform another round of review to determine if these full texts meet the eligibility criteria. Disagreement between the two reviewers will be resolved in consultation with the principal investigator.

Search results and eligibility screening process will be reported using the PRISMA diagram to detail the results of the search, study selection, addition of studies, and a final summary of included articles [8].

2.4. Stage 4: Charting the data

An extraction strategy was defined to capture relevant data from the selected studies to be further discussed in the scope review, such as: study descriptive information, main target audience, type of technology used to deliver decision support features and main outcomes and limitations. Data extracted must be enough to answer the research questions established in Stage 1. Table 1 summarizes the data that will be extracted from each included article.

Table 1. Data extraction strategy.

Scope	Data to be extracted
Summary	Author(s), title, citation, publication type, country of origin, aims/objectives, if it is a fully functional tool and if it contains a graphical user interface.
Question 1: addressing topic	DSS main applicability (clinical, epidemiological/managerial)
Question 2: DSS categorization	Type of technology used
Question 3: outcomes and gaps	Outcomes of interest, limitations

2.5. Stage 5: Collating, summarizing and reporting the results

Since scoping studies seeks to present an overview of all material reviewed [6], data will be organized thematically according to the identified topics and DSS categories, summarized and presented in a table ordered alphabetically. This table will contain narrative content with data obtained in Stage 4, that is, the metadata of all selected studies and written commentaries based on the following headings: objectives, type of

applicability, type of technology, research methods, stage of development, public availability, existence of a graphical interface, outcomes and limitations.

3. Final Considerations

The protocol proposed in this work may result in the first scoping review conducted to provide an overview of Decision Support Systems for Tuberculosis. The results will be used to provide a broad understanding of usability to a better dissemination. Furthermore, by applying a consistent approach to report findings, a valuable identification and comparison of relevant aspects of DSSs will be achieved, including topics of applicability, implemented technologies and the public availability.

Thus, once the scoping review is completed, it will be possible to determine the topics that the DSSs addresses in the line of TB care, to define categories, to point out main outcomes and possible research gaps and to identify where there is a lack of tools to underpin decision making processes of relevant stakeholders. Results will be published to make it available to all interested audience. In addition, consultation with health service providers, policymakers, health professionals and other stakeholders will be carried out to effectively disseminate the findings and to provide expert knowledge.

As possible limitations, relevant non-English language publications can be excluded. Also, due to the research design, the quality of articles will not be assessed.

Acknowledgements

This research is under development in the Bioengineering Postgraduate Program (EESC/FMRP/IQSC) of University of São Paulo and is supported by São Paulo Research Foundation (FAPESP), grant number 2018/00307-2, managed by author DA.

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