Systematic Reviews

PROTOCOL

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Mapping the evaluation of the electronic health system PEC e-SUS APS in Brazil: a scoping review protocol

Mariano Felisberto[1,2], Júlia Meller Dias de Oliveira[1,3], Eduarda Talita Bramorski Mohr[1,2], Daniel Henrique Scandolara[1,4], Ianka Cristina Celuppi[1,5], Miliane dos Santos Fantonelli[1], Raul Sidnei Wazlawick[1,6] and Eduardo Monguilhott Dalmarco[1,7*]

Abstract

Background The Brazilian Ministry of Health has developed and provided the Citizen's Electronic Health Record (PEC e-SUS APS), a health information system freely available for utilization by all municipalities. Given the substantial financial investment being made to enhance the quality of health services in the country, it is crucial to understand how users evaluate this product. Consequently, this scoping review aims to map studies that have evaluated the PEC e-SUS APS.

Methods This scoping review is guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P) framework, as well as by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Checklist extension for scoping reviews (PRISMA-ScR). The research question was framed based on the "CoCoPop" mnemonic (Condition, Context, Population). The final question posed is, "How has the Citizen's Electronic Health Record (PEC e-SUS APS) been evaluated?" The search strategy will be executed across various databases (LILACS, PubMed/MEDLINE, Scopus, Web of Science, ACM Digital Library, and IEEE Digital Library), along with gray literature from ProQuest Dissertation and Theses Global and Google Scholar, with assistance from a professional healthcare librarian skilled in supporting systematic reviews. The database search will encompass the period from 2013 to 2024. Articles included will be selected by three independent reviewers in two stages, and the findings will undergo a descriptive analysis and synthesis following a "narrative review" approach. Independent reviewers will chart the data as outlined in the literature.

Discussion The implementation process for the PEC e-SUS APS can be influenced by the varying characteristics of the over 5500 Brazilian municipalities. These factors and other challenges encountered by health professionals and managers may prove pivotal for a municipality's adoption of the PEC e-SUS APS system. With the literature mapping to be obtained from this review, vital insights into how users have evaluated the PEC will be obtained.

Systematic review registration The protocol has been registered prospectively at the Open Science Framework platform under the number 10.17605/OSF.IO/NPKRU.

Keywords Electronic health records, Management in health, Primary health care, Health information systems, Diffusion of innovation, Scoping review

*Correspondence:
Eduardo Monguilhott Dalmarco
dalmarco@bridge.ufsc.br
Full list of author information is available at the end of the article

Background

The Brazilian Unified Health System (SUS) was launched in Brazil in 1998 [1–3]. Its structure adheres to a triad of principles: integrality, universality, and equity of health services offered to the nation's population [4]. In 1990, Primary Health Care (PHC) was established as a national policy under Basic Operational Standard 96, which provided support for the implementation of Family Health and Community Health Agents programs throughout Brazil [5, 6]. Currently, PHC has become a central component within the organization of the health care network and is considered the main entry point to the Brazilian health system, extending healthcare provision throughout the entire territory [3, 7, 8].

Examining Brazil's demographic and epidemiological aspects is crucial to ensure these services reach all citizens. Hence, health policy planning depends on this information, which is typically sourced from healthcare system data [9]. This data may represent the reality and needs of a specific community, municipality, state, or country and, thus, directly influences health surveillance activities, forming the basis of health service management [10]. Health information systems aim to generate, organize, and analyze health indicators, thereby producing knowledge about the health status of the population [11].

To digitize SUS and facilitate health professionals' efforts in care coordination, the Brazilian Ministry of Health instituted the e-SUS Primary Care Strategy in 2013. Its key objectives were to individualize records, integrate data between official systems, reduce redundancy in data collection, and computerize health units [12]. It is worth noting that this strategy extends beyond a federal management and national information system context; it touches on the daily routines of professionals, the challenges faced, and the information essential for individual care in territories [13]. To further facilitate this process, the Ministry introduced the Citizen's Electronic Health Record (PEC), which is a freely available health information system for municipalities, aiding the computerization of Basic Health Units throughout Brazil [1, 14].

The role of software products and intensive computer systems has grown to become essential for a broad array of business and personal operations. Consequently, achieving personal satisfaction, business success, and human security increasingly rely on the quality of these software and systems [15]. The development and implementation of these technologies are fundamental; however, they require substantial financial resources, and their success hinges on user acceptance [16]. Therefore, it is critical for those investing in technology to understand what factors affect acceptance and usage, aiding organizations in implementing user-level interventions [17].

Understanding how users evaluate a software product is critical in a nation of continental proportions like Brazil, especially given the significant financial investment to enhance health services' quality. Given this context, this scoping review aims to map out the studies that have evaluated the PEC e-SUS APS using various quality models. This will be done using ISO/IEC 25010 as a theoretical foundation to define these models, which present in-depth quality models for computer systems, software products, data quality, and usage.

Methods

The protocol and its registration have been adapted based on elements taken from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P) and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Checklist extension for scoping reviews (PRISMA-ScR) [18, 19]. The adapted protocol was subsequently registered on Open Science Framework under the number https://doi.org/10.17605/OSF.IO/NPKRU. The research question was formulated and structured around the CoCoPop approach (Condition, Context, and Population), as shown in Table 1.

Inclusion and exclusion criteria

All studies evaluating the PEC e-SUS APS will be considered for the inclusion criteria. Given the myriad aspects of electronic health record systems open to analysis (e.g., user experience, usability, efficiency, accessibility, security, and economic aspects), this review will include studies evaluating the general function and effectiveness of the PEC e-SUS APS, regardless of the language. The exclusion criteria will include studies that will not clearly outline the evaluation method used for the health information system; will not employ an evaluative tool or method; will focus solely on medical records differing from the PEC e-SUS APS; will be published before 2013 (i.e., PEC e-SUS APS was first distributed to municipalities in 2013); will be conducted by authors from the Bridge Laboratory (i.e., the group responsible for the PEC

Table 1 CoCoPop approach used to determine the research question

Condition:	Context:	Population:
The system's characteristics (assessment tools, which aspects are evaluated and how, and the results)	System evaluation	PEC e-SUS APS

Question: "How has the Citizen's Electronic Health Record (PEC e-SUS APS) been evaluated?"

Table 2 PubMed/MEDLINE search strategy

Search terms used in the databases
("brazil"[MeSH Terms] OR "brazil"[Title/Abstract] OR "brasil"[Title/Abstract] OR "brazilian"[Title/Abstract] OR "brazilians"[Title/Abstract] OR "SUS"[Title/Abstract] OR "unified health system"[All Fields] OR "Brazilian Unified Health System"[All Fields] OR "Brazilian Unified National Health System"[All Fields] OR "Single Health Care System"[All Fields] OR "Single Health System"[All Fields] OR "Unified Health Care System"[All Fields]) AND ("e sus"[Title/Abstract] OR "e sus"[Title/Abstract] OR "e-SUS-AB"[Title/Abstract] OR "e-SUS-APS"[Title/Abstract] OR "electronic health records"[MeSH Terms] OR "electronic health records"[All Fields] OR "electronic medical records"[All Fields] OR "electronic medical record"[All Fields] OR "electronic health record"[All Fields] OR "computerized medical record"[All Fields] OR "computerized medical records"[All Fields] OR "computerized medical records systems"[All Fields] OR "automated medical record systems"[All Fields] OR "automated medical records system"[All Fields] OR "automated medical records systems"[All Fields] OR "computerized medical record system"[All Fields] OR "computerized medical record systems"[All Fields] OR "computerized medical records system"[All Fields] OR "computerized medical records systems"[All Fields] OR "computerized patient medical records"[All Fields] OR "automated medical record system"[All Fields] OR "health information systems"[MeSH Terms] OR "computer systems"[MeSH Terms] OR "computer systems"[All Fields] OR "Computer System"[All Fields]) AND ("primary health care"[MeSH Terms] OR "primary health care"[All Fields] OR "primary healthcare"[All Fields] OR "Primary Care"[All Fields] OR "public health"[MeSH Terms] OR "public health"[Title/Abstract] OR "community health"[Title/Abstract] OR "public service"[Title/Abstract])

implementation); will be review articles, letters, book chapters, conference abstracts, opinion articles, brief communications, editorials, and clinical guidelines; and if the full text will not found for full reading or correspondence authors will not reply to contact attempts.

Sources of information and search strategy

A comprehensive search strategy will be deployed across various databases: LILACS, PubMed/MEDLINE, Scopus, Web of Science, ACM Digital Library, and IEEE Digital Library. Moreover, the gray literature will also be explored using the ProQuest Dissertation and Theses Global and Google Scholar databases with support from a healthcare librarian experienced in systematic reviews. The search strategy developed for the PubMed/MEDLINE databases is presented in Table 2.

Furthermore, experts will be contacted for the potential inclusion of more studies, with manual searches of bibliographies from included studies and key journals also conducted. The database search will cover the period from 2013 until 2024. The search will be implemented in March 2024, and the results will be imported into the EndNote Online reference software (Thomson Reuters, USA).

Methods to select the sources of evidence

Three independent reviewers will decide on what will be included in the final studies. In the first stage, the three reviewers will assess the titles and abstracts for eligibility. In the second stage, they will examine the full texts of the articles, applying the same criteria as in the first stage. The reviewers will then cross-validate all the information gathered during both stages. If disagreements occur, an arbitrator, not involved in the initial article selection stage, will be brought in before a final decision is reached. If review-critical data are missing or ambiguous, the study's corresponding author will be contacted for resolution or clarification. The data mapping process and related entities will involve these same three independent reviewers.

Data extraction and synthesis

A descriptive analysis will synthesize the results, following the narrative review approach of Pawson and Bellamy [20]. Independent reviewers will chart the data based on the method of Hilary Arksey and Lisa O'Malley (2005), as depicted in Table 3.

In the event of discrepancies, a consensus discussion will ensue and, if necessary, independent reviewers will be brought in to reach a final decision. Any disagreements will be addressed among the reviewers. The corresponding author will be contacted if any crucial information is unclear or missing. The studies included will be grouped according to the various characteristics and sub-characteristics pertinent to all software products and computer systems, as defined by the ISO/IEC 25010–2011 standard.

Tabular summaries will be employed to present the findings and cover study characteristics, methodologies, and aspects evaluated. Subsequently, a narrative synthesis will be carried out to elucidate the evidence found relating to the review objective.

Table 3 Criteria proposed by Hilary Arksey and Lisa for charting data in narrative reviews

1) Author(s), year of publication, country;
2) Study aim;
3) Study population (PEC e-SUS APS);
4) Study condition (system assessment tool, methodologies, and results);
5) Study context (system evaluation)
6) Main findings

Discussion

The success of PEC implementation can be influenced by various characteristics of municipalities, including their location, population density, level of urbanization, municipal management assistance, computerization levels, and technological infrastructure, among others [21]. These factors, coupled with the challenges confronted by healthcare professionals and managers, may determine a municipality's adoption of the PEC. Literature emphasizes several barriers or difficulties encountered during implementation and usage, such as inadequate material resources in municipalities, lack of professional technology training, and poor internet connectivity [22–24].

Considering the myriad software product quality assessment models available, this review will utilize ISO/IEC 25010–2011 as its theoretical foundation. This model provides precise definitions of the attributes that must be evaluated. It is crucial to note that this international standard underwent rigorous evaluation by numerous international organizations before publication, reinforcing its suitability for assessing software product quality.

The literature map derived from this review will provide crucial insights into user evaluations of the PEC. Through these insights, it will be possible to identify the strengths and weaknesses of this software product. This knowledge will empower those responsible for developing and implementing this system to make significant improvements, thereby ensuring a substantial return on investment.

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Authors' contributions
All co-authors constructed, read, and approved of the final manuscript.

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Availability of data and materials
Not applicable.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable.

Competing interests
The authors declare the presence of financial and political conflicts of interest related to the content of this study protocol. The Laboratório Bridge is involved in the development and maintenance of the PEC e-SUS APS, a health information system, in collaboration with the Brazilian Ministry of Health. This collaboration entails financial and political agreements, as the Ministry of Health is a governmental institution responsible for public health in Brazil. We acknowledge that these conflicts may influence our research and analysis. However, we are committed to reporting the results impartially and transparently in the future, following the ethical and editorial guidelines of the international scientific journal in which this article will be published. Our financial and political interests will not compromise the integrity of the research or the objectivity in presenting the results.

Author details
[1]Bridge Laboratory, Federal University of Santa Catarina, Florianópolis, Brazil. [2]Graduate Program in Pharmacy, Federal University of Santa Catarina, Florianópolis, Brazil. [3]Graduate Program in Dentistry, Federal University of Santa Catarina, Florianópolis, Brazil. [4]Graduate Program in Engineering, Management, and Knowledge Media, Federal University of Santa Catarina, Florianópolis, Brazil. [5]Department of Nursing, Federal University of Santa Catarina, Florianópolis, Brazil. [6]Department of Informatics and Statistics, Federal University of Santa Catarina, Florianópolis, Brazil. [7]Department of Clinical Analysis, Federal University of Santa Catarina, Florianópolis, Brazil.

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