Review Paper

Public Safety Answering Point Models: A Scoping Review Protocol to Explore National and International Experiences

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ABSTRACT

As public safety answering points (PSAPs) have become the elementary contact point between clients and rescue service providers, the planning of the call center has become a key task for administrators. Connect call centers accelerate dispatch center performance, particularly during an overloaded period. The efficient dispatch of emergency medical services and prompt response to urgent requests could be achieved with their help. This study aims to explore national and international experiences to identify PSAP models and their key dimensions. In this research, Arksey and O'Malley's five-step framework will be followed. Additionally, incorporating the PRISMA extension into this scoping review will allow us to extensively investigate the available literature on PSAP models up until the year 2024. For this purpose, a comprehensive review will be conducted using PubMed, Web of Science, and Scopus to examine officially published reports. In addition, grey literature will be sourced from Google Scholar, the World Health Organization (WHO) website, and relevant regional offices.

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Introduction

Illness, injury, crime, or fire emergencies can happen anytime, anywhere, and to anybody without warning. In such situations, individuals will seek appropriate help as quickly as possible, even though first aid should be accessible within three to four minutes. An efficient emergency communication system is critical for enabling rescue workers to reach the scene of an incident [1]. Evidence suggests that having a common emergency contact number can be incredibly helpful in saving lives and improving the quality of care in life-threatening situations [2]. The public safety answering point (PSAP) is a connector between people and rescue agencies, playing a crucial role in verifying calls to an emergency number [3]. PSAPs answer emergency calls widely and collaborate in disseminating information between the various rescue services so that the appropriate resources and forces can be deployed without delay [3-5]. While emergency call centers in different nations may have their distinct characteristics, there are certain universal features that all good centers share. However, the following elements are essential for establishing emergency call centers: A regulatory and institutional framework, a method for contacting emergency services, a strategy for dealing with unforeseen events, an early warning system (EWS), and several channels of communication and coordination [6]. An emergency call procedure can be initiated by a person or an automated system [7].

In Iran, the existence of numerous emergency call numbers has created significant challenges in delivering efficient emergency services to patients, including confusion among citizens and delays in accessing appropriate services [8]. Given the multiple emergency numbers in Iran and the limited knowledge within the Iranian government regarding their integration, this study is both necessary and timely. This scoping systematic review aims to comprehensively analyze literature from national and international databases. It will examine the experiences of various countries concerning the requirements and challenges of implementing PSAP systems, along with their conceptual and theoretical frameworks. The ultimate objective is to develop a PSAP model tailored to Iran, drawing on national and international experiences. To ensure a comprehensive understanding, this review included all available literature on PSAP models, irrespective of their methodological quality.

Objective

The objective of this scoping review was to identify the different types of PSAPs and the key indicators for evaluating their performance. This protocol outlines the method for identifying successful types of PSAP worldwide along with their characteristics. The purpose is to identify high-performing PSAP models and systems for potential integration on a broader scale. We will implement a rigorous investigation of the existing literature on ongoing PSAP models worldwide, aiming to identify areas requiring additional research.

Materials and Methods

Systematic scoping review studies aid in identifying key concepts, highlighting knowledge gaps, and addressing complex questions that may require diverse methodologies. In this research, Arksey and O'Malley's five-step framework will be followed. Additionally, a comprehensive systematic scoping review will be conducted to achieve the study's objectives. The primary aim of systematic scoping reviews is to delineate the boundaries of specific knowledge domains. Such reviews may serve various purposes, including identifying the breadth of a knowledge domain, refining and enhancing definitions, or defining key concepts within that domain [9, 10]. Furthermore, scoping review protocols will be implemented using the PRISMA extension [11], which has been widely endorsed and recommended in the methodological literature [12, 13].

Step 1: Identifying the research question

Due to the unique nature of the subject, the following goals will be achieved using a scoping review: a) Assessing the existing body of evidence, models, or approaches related to PSAP; b) Elucidating the core ideas, terminology, and elements of PSAP; and c) Collecting data, requirements, or suggestions for developing or executing PSAP.

To better understand what is required to develop or execute PSAP, we considered the following research questions: How many different PSAP models are there in the world today?, How to create and develop any PSAP model?, What are the key ideas, definitions, parts, requirements, tactics, obstacles, and efficiency measures for each PSAP model?

Step 2: Identifying relevant studies

Working with an emergency management specialist, we devised a search strategy and set of terms to systematically search PubMed, Scopus, and Web of Science for English-language publications. It should be mentioned that we will not have any time limit for the search. Obtaining current data valid for PSAP models was the objective. The search strategy was fine-tuned by doing a pilot search with two reviewers to test the terms and then applying constraints using Boolean operators. This was done to ensure the search results were appropriate and relevant [11, 14, 15]. Databases were searched using the following syntax (Table 1).

Step 3: Study selection

After a comprehensive database search, the studies will be imported into EndNote software, version 20, and any duplicate items will be eliminated. We will examine their titles and abstracts to determine which papers are relevant. After that, Morteza Mortazavi and Babak Farzinnia, who have extensive knowledge of the subject, will independently evaluate the complete texts of the selected studies. Group discussion and consensus will address any issues among these reviewers. If necessary, we seek the advice of a third-party reviewer. To identify any publications that could be relevant, we will also review the references of the selected papers. Additionally, expert opinions will be utilized to individually examine specialized journals in this field for relevant papers (Figure 1).

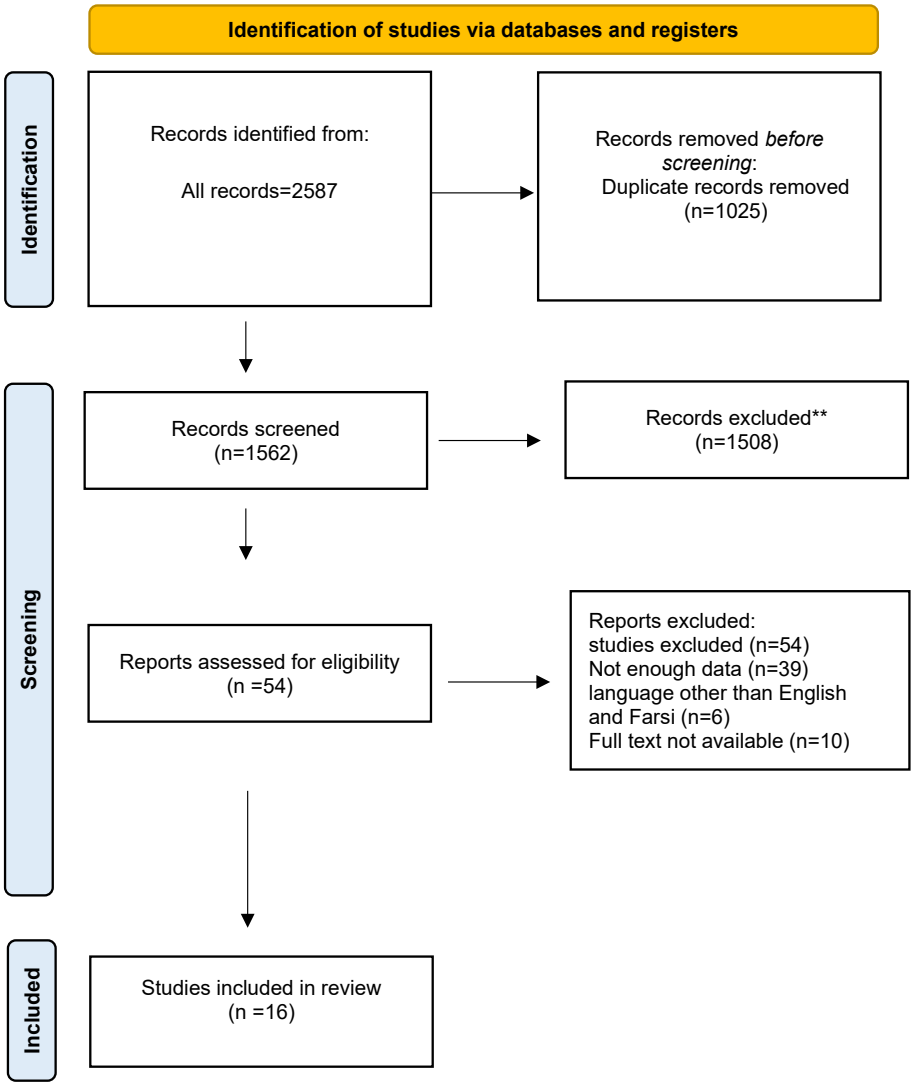

Figure 1. PRISMA flow diagram of the study selection process [11]

Table 1. Search strategy

Database	Formula
PubMed	"Public safety answering point" [Title/Abstract] OR "emergency call" [Title/Abstract] OR "emergency medical dispatch" [Title/Abstract] OR "emergency medical dispatch" [Mesh Terms]
Web of Science	((TS=("emergency medical dispatch")) OR TS=("emergency call")) OR TS=("public safety answering point"))
Scopus	(TITLE-ABS-KEY ("public safety answering point") OR TITLE-ABS-KEY ("emergency call") OR TITLE-ABS-KEY ("Emergency Medical Dispatch"))
Others	Google scholar, site: .org, .gov, .int, and file type: .pdf, .doc, .docx

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Inclusion and exclusion criteria

Published, peer-reviewed quantitative and qualitative studies focusing on describing PSAP models, their implementation requirements, challenges, and solutions, published in English, will be included in this review. No exclusions will be made based on study design, allowing for diverse perspectives. Editorials and other opinion-based articles derived from experiences with PSAP models will also be considered to capture practical insights. Additionally, conference abstracts will be treated as valuable resources for identifying unpublished data. However, studies that do not address implementation issues or propose potential solutions for PSAP models will be excluded.

Step 4: Data extraction and charting

An exhaustive assessment of each study's title, abstract, and complete text is part of the review process. After reviewing the titles and abstracts, the reviewers will agree on the eligible papers. All titles and abstracts will be carefully examined by two separate reviewers, Morteza Mortazavi and Babak Farzinnia, and Hamidreza Khankeh will be involved in resolving any issues to maintain accuracy and consistency. Research describing the use of PSAP models, in particular, will be chosen in the next stage. The development of PSAP models and the requirements, difficulties, and solutions faced by executives will be significantly aided by the models, implementation protocols, indicators, and frameworks supplied by this research. Furthermore, this research will clarify key terms, definitions, and components of PSAP models.

Each included study will carefully document the following information:

Authors, year of publication, the place of origin or publication (the nation) of the study, the primary objectives of the research, the researched population and, if relevant, the sample size, the procedures followed during the research, and the primary outcomes or conclusions that are pertinent to the research questions.

This systematic scoping study will provide a thorough overview by integrating data from multiple sources, thereby increasing the credibility and accuracy of the results. Identifying similarities and differences in the evidence is a significant benefit of this approach. With the integrated data, we can more quickly achieve our research goals, observe patterns or differences, and generate valuable ideas for future directions based on our findings.

Step 5: Data analysis and synthesis

The collected data will be systematically organized and analyzed to develop a comprehensive understanding of PSAP models. Data will be grouped into key themes, such as implementation requirements, challenges, solutions, and key performance indicators. Findings will be summarized descriptively, with patterns, trends, and gaps in the literature clearly identified. Thematic content analysis will be applied to synthesize qualitative and quantitative data into thematic categories aligned with the research objectives. Results will be presented narratively, complemented by tables and figures for enhanced clarity. Furthermore, similarities and differences among PSAP models across various contexts will be highlighted to identify best practices and areas for improvement. Ultimately, this step will yield actionable recommendations for the design, implementation, and evaluation of PSAP models while offering guidance for future research.

Timeline

As of now, the initial search based on the developed search strategy has been conducted, and the preliminary results are being reviewed to ensure relevance. Currently, no formal data extraction or analysis has been performed. The next steps will involve screening the identified articles in detail, followed by the extraction of relevant data and the synthesis of key findings. Once this phase is completed, the development of a PSAP framework tailored to Iran's context will be planned in collaboration with relevant stakeholders to ensure its practicality and sustainability.

Discussion

The scoping review study extracted from this protocol has significant potential to advance the understanding and development of PSAP models, particularly in countries, like Iran, where the complexity and fragmentation of emergency call systems pose considerable challenges. By reviewing existing literature and integrating experiences from other countries [4, 16–20], this study aims to address critical gaps in knowledge and propose actionable solutions. The protocol is designed to identify the key components, challenges, and requirements for implementing PSAP systems, thereby filling important gaps in current research. It will also serve as a foundational reference for policymakers, emergency service providers, and researchers to develop evidence-based strategies that will improve emergency response efficiency [21, 22].

Additionally, the study will emphasize the importance of developing a context-specific model, which will be crucial for creating adaptable solutions that take into account local infrastructure, organizational culture, and societal factors. By involving relevant stakeholders throughout the process, this research will ensure that the proposed model is both practical and sustainable in the Iranian context. Ultimately, the upcoming scoping review based on this protocol is expected to enhance the global repository of knowledge on PSAP models by offering valuable insights into the challenges and opportunities of implementing such systems in resource-constrained and diverse settings. Its findings will guide future research and support informed decision-making to enhance the development of more effective and equitable emergency response systems worldwide.

Ethical Considerations

Compliance with ethical guidelines

The study was approved by the Research Ethic Committee of University of Social Welfare and Rehabilitation Sciences, Tehran, Iran (Code: IR.USWR.REC.1402.193).

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Authors' contributions

Conceptualization and funding acquisition: Hamidreza Khankeh and Babak Farzinnia; Methodology: Morteza Mortazavi, Hamidreza Khankeh, and Mehrdad Farrokhi; Investigation and data curation: Morteza Mortazavi and Mohammad Saatchi; Resources: Babak Farzinni; Writing the original draft: Morteza Mortazavi; Supervision: Hamidreza Khankeh, Mehrdad Farrokhi, and Babak Farzinnia; Project administration: Hamidreza Khankeh; Review, editing and final approval: All authors.

Conflict of interest

The authors declared no conflict of interest.

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