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Systematic review of the use and challenges of electronic health records in physiotherapy practice

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ABSTRACT

Objective To synthesise current evidence on physiotherapists' use of electronic health records (EHRs), with a focus on the determinants of adoption, implementation processes and associated implementation outcomes.

Design A systematic review employing a narrative synthesis approach.

Data sources PubMed, Cochrane, Scopus and Web of Science, covering all records from the inception of each database to 10 May 2024.

Eligibility criteria Studies conducted in physiotherapy clinical settings and using the International Classification of Functioning, Disability and Health (ICF).

Data extraction and synthesis Two authors independently screened articles and assessed methodological quality. Risk of bias was assessed using the Critical Appraisal Skills Programme tool for qualitative and for cohort studies, the Mixed Methods Appraisal Tool for mixed-methods studies and the JBI Critical Appraisal Checklist for analytical cross-sectional studies.

Results From 3820 records screened, 9 observational studies met inclusion criteria. Key factors influencing EHR adoption included organisational readiness, perceived usefulness, managerial support and training availability. Implementation patterns clustered into three domains: recorded content, ICF framework integration and record quality. Reported outcomes focused on care quality metrics and evidence of clinical effectiveness.

Conclusions Persistent challenges in physiotherapy EHR use were identified, notably in data quality, completeness and alignment with the ICF framework. Improving EHR practices is crucial to improve clinical assessment and support digital health integration. However, limited evidence and methodological heterogeneity remain key limitations.

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STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The limited availability of primary research in this field constrains the depth of analysis and limits the generalisability of the review's conclusions.
⇒ The high heterogeneity of the included studies limited the ability to establish standardised metrics.
⇒ Two reviewers independently screened the full texts of potentially eligible studies using predefined inclusion and exclusion criteria to minimise the risk of error.
⇒ Methodological quality of the included studies was comprehensively assessed by two independent reviewers using validated, design-specific risk of bias tools, ensuring the robustness of the critical appraisal.

INTRODUCTION

A foundational element of digital health is the collection and optimisation of electronic health data to improve individual and population health outcomes. Among the core technologies enabling this process are electronic health records (EHRs).[1] EHRs serve as centralised repositories of patient health information, systematically compiled by healthcare professionals to support the documentation, retrieval and analysis of clinical data.[2]

The implementation of EHRs has been shown to enhance service quality, improve patient outcomes and strengthen care safety.[3] Beyond clinical benefits, the digitisation of healthcare data also carries broader societal implications, enabling the emergence of new research domains and promoting the secondary use of health data across diverse sectors, including public health, policy and innovation.[4]

Given that EHRs form the foundation of digital health, and their widespread adoption across healthcare systems, it is imperative that physiotherapists advance and standardise their documentation practices. Such an evolution is essential for leveraging the distinct clinical insights of the profession and for ensuring that physiotherapists actively contribute to improving patient outcomes and the broader quality of healthcare delivery.[5]

Building large-scale computational models from EHRs is challenging due to data quality concerns, including high dimensionality, heterogeneity, data sparsity, random errors and systematic biases.[6] These systems have the potential to transcend the simple

organisation of data, playing a strategic role in personalising care and improving clinical results, especially in areas such as physiotherapy, where effective intervention depends on an approach centred on the functional needs of users. The acknowledgement of the potential of EHR data for enhancing care processes and outcomes is growing among various health disciplines.[7]

The International Classification of Functioning, Disability and Health (ICF) emerges as a crucial classification tool for physiotherapists. It provides a comprehensive and standardised language for describing functionality,[5] playing a pivotal role in effective communication, treatment planning, outcome measurement and research in physiotherapy and related areas. The ICF is structured into four primary dimensions: body functions, body structures, activities and participation, and environmental factors. Each dimension is subdivided into chapters and hierarchical categories that enable the coding of specific aspects of human functioning.[5] This model offers a robust conceptual foundation for structuring EHRs to capture multidimensional aspects of health that extend beyond biomedical diagnoses. Unlike the International Classification of Diseases-10, which primarily focuses on the classification and coding of diseases, the ICF framework emphasises a broader understanding of functioning and contextual factors. ICF, including users' functionality, limitations and contextual factors, thereby promotes the collection and use of data that supports holistic and personalised interventions aligned to individual needs. However, the implementation and effective use of EHRs face challenges such as limited interoperability between systems, inconsistencies in data quality and difficulties in adapting professionals to new digital practices.[8] These challenges have compelled clinicians to modify their work patterns, leading to feelings of frustration when the perception is that the EHR is being used as a means of adapting to the system rather than the system being used to facilitate more efficient and higher-quality care.[9]

Despite ongoing challenges, the integration of EHRs into healthcare practice is both inevitable and irreversible.[9] In the era of digital transformation, the adoption of EHRs within physiotherapy represents a critical area of inquiry. EHRs have significantly advanced the documentation, accessibility and management of patient data, offering substantial potential to enhance clinical decision-making, continuity of care and overall efficiency in physiotherapy settings. However, despite widespread adoption across other healthcare disciplines, there remains a notable gap in the literature regarding the implementation processes, utilisation patterns and clinical impact of EHRs specifically within the field of physiotherapy. Understanding the impact of EHRs in clinical practice is therefore imperative in order to optimise the use of these tools and maximise their benefits.

Thus, this systematic review aims to synthesised current evidence on physiotherapists' use of EHR, with a focus on the determinants of adoption, implementation processes and associated implementation outcomes.

METHODS

Data sources and searches

This systematic review followed the framework of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement (PRISMA).[10] The protocol was registered in the International Prospective Register of Systematic Reviews (PROSPERO) with the registration code CRD42023420267.

In this systematic review, we considered studies using quantitative, qualitative and mixed-methods approaches to examine the implementation of EHR in physiotherapy. The studies were included if they aimed to use EHR for clinical care provision, if they were conducted by either physiotherapists or multidisciplinary teams that included physiotherapists and were developed in accordance with the conceptual model of the ICF. If any of these criteria were not met, the study was excluded.

Studies using EHR in physiotherapy for academic and/or scientific research purposes, review articles, systematic reviews, meta-analyses, letters, conference abstracts, case reports, case series, position papers and author's replies were excluded.

Study selection and data extraction

Initially, we conducted a scoping search in Google Scholar to pinpoint pertinent articles and relevant search terms. Subsequently, comprehensive searches for relevant articles were conducted across various databases, including PubMed, Cochrane, Scopus and Web of Science, up until 10 May 2024. No constraints were imposed on language or year of publication. Medical Subject Headings (MeSH) terms as well as unstructured text terms pertaining to physiotherapists were combined with terms related to EHRs and health information systems. The search strategy employed in PubMed was adapted for use in other databases (see online supplemental material 1). Furthermore, we meticulously examined references from the incorporated studies to uncover supplementary articles.

The online tool Rayyan[11] was used to eliminate duplicates, all of which were subsequently validated by the researchers. Furthermore, Rayyan was employed to assess the eligibility of articles in accordance with predefined criteria. Two independent reviewers (SV and CR) assessed article titles and abstracts for relevance. Also, when necessary, full-text articles were consulted for comprehensive information. Subsequently, studies showing potential relevance underwent a rigorous eligibility assessment based on established criteria (see online supplemental material 2) through the complete analysis of the full articles that were preselected in the first phase. Excluded studies and their respective exclusion rationales were recorded. Any reviewer disagreements were resolved through discussion.

Risk of bias of individual studies

The risk of bias in individual studies was assessed through a comprehensive approach, using four different evaluation tools. This strategy accommodated the diverse range of studies in the analysis. Each tool was meticulously

selected for its specific capacity to evaluate different study types, thus facilitating a thorough and precise assessment of the research findings. The use of multiple tools enhances the soundness of the assessment process, ultimately ensuring the validity and reliability of the results obtained. In regard to qualitative studies, the Critical Appraisal Skills Programme (CASP)[12] tool for qualitative studies was used, while cohort studies were evaluated using the CASP tool designed for this study type.[13] Mixed-methods studies were subjected to appraisal using the Mixed Methods Appraisal Tool[14] and analytical cross-sectional studies underwent assessment with the Joanna Briggs Institute (JBI) Critical Appraisal Checklist.[15] The evaluation process was conducted by two independent reviewers, both of whom were unaware of each other's assessment. Any discrepancies were resolved through a consensus-building process.

Data synthesis and analysis

Data items were extracted by two authors for each study, including the first author, year of publication, country of origin, study design, objective, methods and discussion/conclusion. Due to the substantial heterogeneity in methodology among the included studies, the absence of a common metric and the descriptive nature of data from observational studies, a meta-analysis was not feasible. Consequently, we chose narrative synthesis as a more suitable approach to effectively integrate and present the diverse findings in a coherent manner.

RESULTS

Study selection

The systematic literature search initially yielded 2444 citations, after the removal of duplicates. The titles and abstracts of 2409 articles were subjected to a rigorous evaluation process to ascertain their relevance. Subsequently, a comprehensive evaluation of the full texts of the 35 remaining articles was conducted. Ultimately, 26 studies were excluded for various reasons, including failure to meet the scope of the review, involvement of an inappropriate population or having an unsuitable outcome. Consequently, nine observational studies[16–24] were deemed eligible for inclusion in the systematic review, as illustrated in figure 1.

Study characteristics

The studies that were included encompassed a variety of study designs published between 2008 and 2023 from nine countries. Table 1 provides a summary of the distinctive characteristics of the included observational studies specifically: country, clinical background, study design, methods, objective and discussion/conclusion.

Risk of bias within studies

The results of the methodological assessment are shown in figure 2. None of the studies met all the quality criteria outlined by the various assessment tools. While

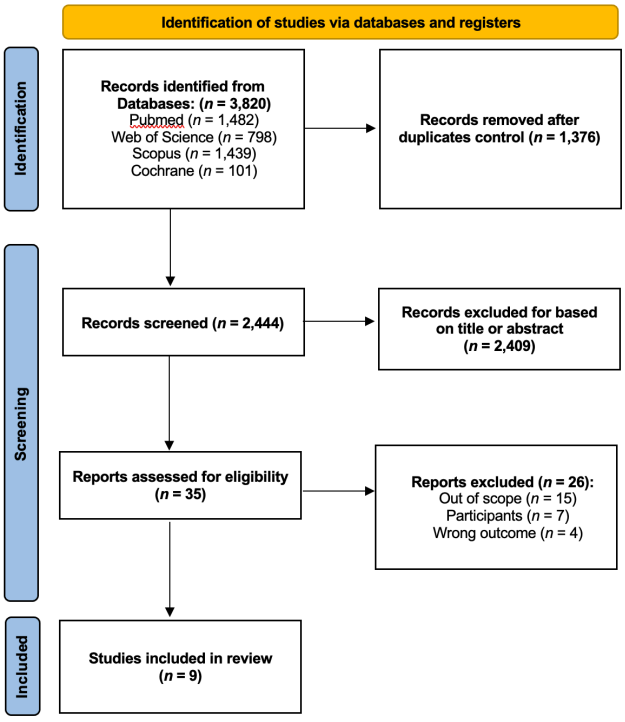

Figure 1 PRISMA study flow diagram describing the process of study selection. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

the authors acknowledged that all studies appropriately defined their objectives and employed suitable methodologies, they concurred that the primary challenges in the included studies revolved around identifying potential biases and formulating strategies to mitigate them. The studies do not identify potential biases and consequently do not define strategies to mitigate them, which impacts the methodological quality of the research. The articles included and analysed in the present review do not exhibit a very high methodological quality.

Synthesis of results

This section presents the results of the study and is organised into three parts: (1) factors influencing the adoption of EHR in physiotherapy, (2) implementation of EHR in physiotherapy practice, and (3) the impact of EHR implementation on physiotherapy outcomes (figure 3).

Factors influencing the adoption of EHR in Physiotherapy

Five studies were included in this category (table 2). The study conducted by Deutscher *et al*[17] introduced a multidisciplinary record that incorporated the ICF, focusing specifically on the dimension of 'activity'. The findings indicated that the routine collection of outcome data is feasible within a large public physiotherapy service and can be seamlessly integrated into EHR data. This integration was identified as a valuable platform that enhances clinical practice, facilitates service evaluation and supports research outcomes. The study identified barriers

Table 1 Characteristics of included studies

Study	Country	Clinical background	Study design	Methods	Objective	Discussion/conclusion
Deutscher *et al* [17]	Israel	Physiotherapist working in neuromusculoskeletal setting.	Mixed methods	Prospective, observational cohort study	Describe the implementation of an electronic patient- centred functional outcomes data collection system and integration of these data into an existing EHR and to assess the effect of routine electronic outcomes data collection in a large-scale public healthcare service in relation to patient and clinic burden.	The findings demonstrate the feasibility of systematically collecting outcome data within a large public physical therapy service. Successful integration with EHR data establishes an effective clinical practice improvement platform, facilitating service evaluation and outcomes research.
Mitchell [24]	Scotland	NHS in Scotland.	Quantitative	Descriptive study	Highlight the way ICF was used in the AHP Census as a means of describing physiotherapy cases across NHS in Scotland.	In summary, high-level ICF plays a crucial role in describing physiotherapy cases for national statistics. It provides a foundation for comparing care within the field of physiotherapy and across diverse professional groups. As global interest in ICF continues to grow, high-level ICF becomes a valuable tool for assessing trends in physiotherapy care on the international stage.
Buyl and Nyssen [19]	Belgium	National implementation.	Qualitative	Descriptive study	Establish a framework for the electronic physiotherapy record and to define a model for the interoperability with the other healthcare providers involved in the patients' care.	Established a robust structural model for electronic physiotherapist record systems, enhancing administrative efficiency through the widespread implementation of operational elements like the electronic registry. The proposed framework includes essential components, laying the foundation for future data exchange and communication with healthcare entities.
Häyrinen [23]	Filand	Physiotherapists working in the neurological care setting.	Mixed methods	Retrospective, descriptive study on physiotherapy documentation	This study aims to answer the following questions: 1. To what extent have physiotherapists used headings in documentation? 2. What main categories of the National Classification of Physiotherapy Practice can be identified in physiotherapists' documentation? 3. What chapters of the ICF can be identified in physiotherapists' documentation?	Physiotherapists' documentation exhibits deficiencies, lacking a comprehensive portrayal of the entire care process. The prevalent use of free text hinders effective searching, summarisation, decision support and statistical analysis. Addressing this, the adoption of classifications, such as the National Classification of Physiotherapy Practice, proves beneficial in documenting interventions. Furthermore, integrating the ICF enhances documentation, offering a more detailed insight into physiotherapy practices.

Continued

Table 1 Continued

Study	Country	Clinical background	Study design	Methods	Objective	Discussion/conclusion
Kauhanen *et al* [18]	Filand	Physiotherapists working in CR.	Quantitative	Retrospective register-based research design	Describe and evaluate the contents of the clinical phase documentation of CR from the care notes written on a specific physical therapy or physiatry sheets in the patients' EHRs.	The main findings highlight that: (1) A minority of eligible patients' records incorporate Cardiovascular Rehabilitation (CR) documentation. (2) Patients with CR documentation tend to be significantly older compared with the age distribution of all cardiac patients (p<0.001). (3) The documentation lacks systematic adherence to national guidelines. (4) Treatment evaluations are infrequently documented. (5) The most frequently documented therapy pertains to walking and breathing exercises.
Chiu and Ku [20]	Hong Kong	Physiotherapists working in hospital context.	Quantitative	Descriptive, cross-sectional study.	To examine the moderating effect of voluntariness on the actual use of an EHR designed for use by AHPs. This study specifically aimed to explore and compare the moderating effects of voluntariness on factors organised into three categories: technology, implementation and individual contexts.	The findings of this study offer preliminary evidence that the voluntary nature of the implementation has a moderating effect on the utilisation of EHR by AHPs. Two factors were identified as being associated with actual use: (1) ease of use in a mandatory environment and (2) organisation facilitating conditions in a voluntary environment.
Scholte *et al* [16]	Netherlands	Physical therapists in primary care.	Quantitative	Prospective cohort study	To test whether data extracted from EHRs was of comparable quality as survey data for the calculation of QI.	The data quality of EHRs is adequate for calculating QIs, but comparability to survey data poses challenges. Standardisation is essential not only for proper comparison across diverse data collection methods but also for practices using different EHRs. Although EHRs can capture narrative data, the use of natural language processing tools is crucial for quantifying information within text boxes. Advancements in this area can bridge the comparability gap between QI scoring from EHR data and survey data. Additionally, EHRs hold the potential to offer real-time feedback.

Continued

Table 1 Continued

Study	Country	Clinical background	Study design	Methods	Objective	Discussion/conclusion
Filipec and Brumini [22]	Croatia	Physical therapists working in clinical hospital centres, clinical hospital, general hospitals and specialty hospitals.	Quantitative	Descriptive, cross-sectional study.	To determine attitude of physiotherapists towards the implementation of information technology in their work and to identify any differences in attitude that may be associated with gender, age, level of education and type of health institution.	The attitude of Croatian physiotherapists towards EHRs varies according to several demographic factors, including age, gender, level of education and type of healthcare institution. This finding may facilitate the implementation of EHR in physiotherapy.
Wingood *et al* [21]	USA	Physiotherapist working with patients with low back pain.	Quantitative	Descriptive study	The study had two objectives: (1) to develop and test a data abstraction form that captures physical activity documentation and (2) to explore physical therapists' documentation of physical activity assessments and interventions.	There is a dearth of documentation pertaining to the assessment and intervention of physical activity among patients with chronic low back pain.

AHP, allied health professional; CR, cardiac rehabilitation; EHR, electronic health record; ICF, International Classification of Functioning; NHS, National Health Service; QI, quality indicators.

to EHR adoption, including clinician disagreement about outcomes, difficulty integrating new systems into routines and concerns about the treatment of data.

The following study[19] presents a distinction focused on national implementation, aiming to establish a framework for EHR in physiotherapy. The authors outlined the essential components of a record model and developed a robust and structured model for physiotherapy records. They emphasised that the real challenge lies in persuading end-users to initiate the use of these electronic record systems.

While the other two studies presented were prospective, a pivotal observation arises from the Häyrinen[23] study, which is retrospective, evaluating previously recorded records. The objective of this study was to elucidate the use of headings in physiotherapists' documentation. The study was conducted within a multiprofessional and structured context around the physiotherapy process and revealed significant shortcomings in the content of physiotherapists' documentation. Furthermore, the authors also suggested the need to persuade physiotherapists to initiate EHR use and document the entirety of the therapy process.

The following study introduces a new variable, voluntariness, into the context of records. The study by Chiu and Ku[20] sought to examine the moderating influence of voluntariness on the actual use of an EHR system designed for allied health professionals in Hong Kong. This study specifically explored the moderating effects of voluntariness across factors organised into three contexts: technology, implementation and individual. The study population consisted of 135 physiotherapists working in eight hospitals. The findings offered preliminary support for the moderating effects of voluntariness on the use of EHR by allied health professionals. Different factors were identified as being associated with actual use: ease of use in a mandatory environment and organisational facilitating conditions in a voluntary environment.

A study has been included that differs from all others in that it presents results on the influence of professionals' characteristics.[22] This study had two primary objectives: first, to ascertain the attitudes of physiotherapists towards the integration of information technology into their professional practice; second, to investigate the influence of demographic factors, including gender, age, level of education and type of healthcare institution, on these attitudes.

The study included 534 physiotherapists, and the primary findings were that the attitudes of Croatian physiotherapists towards EHRs exhibited variation according to age, gender, level of education and type of healthcare institution.

The current review of the literature highlights the challenge of encouraging physiotherapists to adopt EHRs. This impediment may be related to the work environment and the characteristics of the physiotherapist.

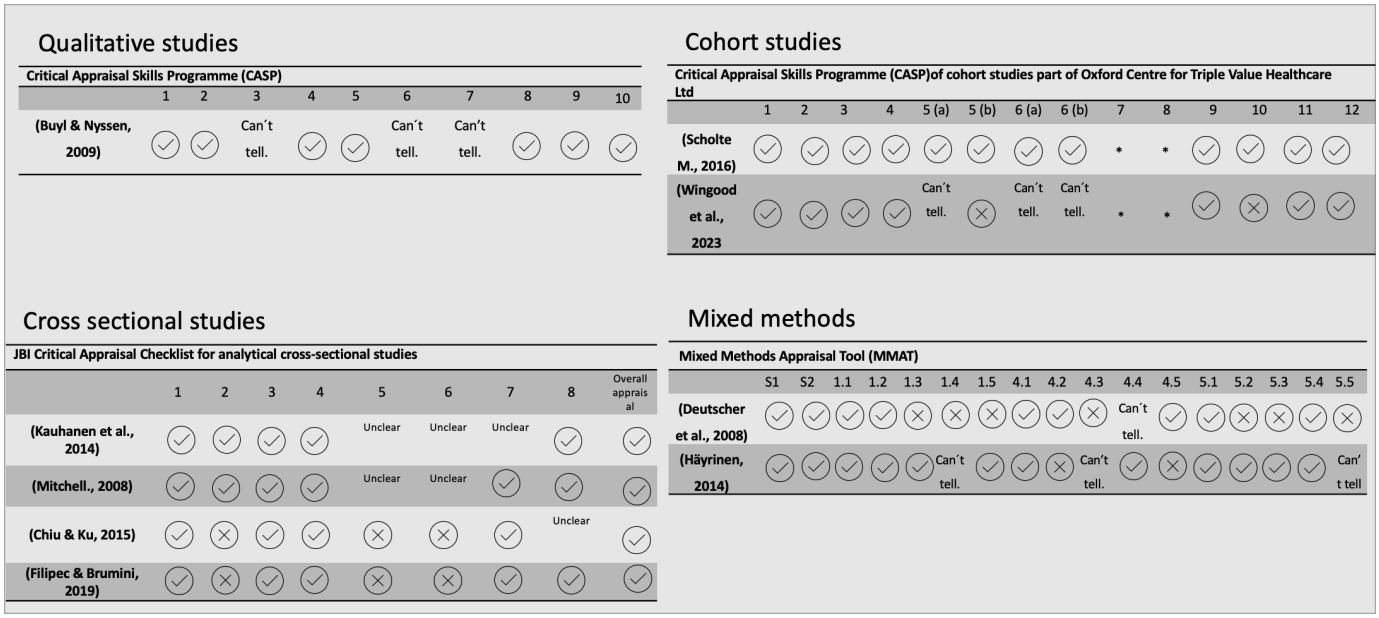

Figure 2 Methodological quality assessment. JBI, Joanna Briggs Institute.

Implementation of EHR in physiotherapy

Six studies pertinent to the implementation phase of EHR in physiotherapy are summarised in table 3. While these studies display heterogeneity, each one provides valuable insights or showcases experiences related to the implementation of EHR

The study conducted by Deutscher *et al*[17] introduced a multidisciplinary record that incorporated the ICF, although focusing specifically on one dimension, namely 'activity'. The findings indicated that the routine collection of outcome data is feasible within a large public physiotherapy service and can be seamlessly integrated into EHR data. This integration was identified as a valuable platform that enhances clinical practice, facilitates service evaluation and supports outcomes research.

Another study[24] emphasised the utilisation of the ICF as a means of describing physiotherapy cases across the National Health Service in Scotland. The study concluded that the ICF effectively describes physiotherapy cases for national statistics and provides a foundation for global comparisons of physiotherapy care. As interest in the ICF grows, it could become a foundation for measuring global trends in physiotherapy care. Additionally, the study conducted by Buyl and Nyssen[19] incorporates the ICF in the diagnosis within the realm of physiotherapy.

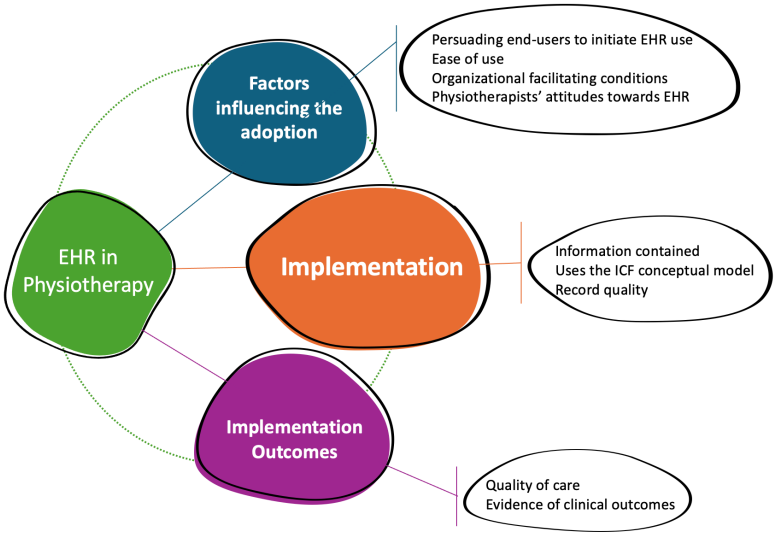

Figure 3 Conceptual diagram illustrating the relationships between the study's variables and key finding. EHR, electronic health record; ICF, International Classification of Functioning.

Table 2 Factors influencing the adoption of EHR in physiotherapy

Study	Factors influencing the adoption of EHR in physiotherapy
Deutscher *et al* [17]	They assert that one of the barriers is the clinician's disagreement with the outcome used, the difficulty implementing a new system into their routine clinical work, and they expressed concern regarding data treatment.
Buyl and Nyssen [19]	Emphasised that the real challenge lies in persuading the end-users to initiate the use of these electronic record systems.
Häyrinen [23]	It suggests that a future challenge lies in motivating physiotherapists to utilise classifications in documentation and to comprehensively document all phases of the physiotherapy process.
Chiu and Ku [20]	Two distinctive factors have been identified to be associated with actual use, although in different voluntariness contexts: (1) ease of use (technological context) in mandatory environment (low voluntariness) and (2) organisation facilitating conditions (implementation context) in voluntary environment (high voluntariness).
Filipec and Brumini [22]	The present study indicates differences in attitude of Croatian physiotherapists towards EHR in relation to gender, age, level of education and type of healthcare institution. This suggests the importance and necessity of educating physiotherapists to improve their computer skills and enhance their motivation for using computers in their daily clinical work.

EHR, electronic health record.

Häyrinen[23] highlighted the necessity to integrate classifications into physiotherapy documentation, suggesting that the incorporation of the ICF may provide more comprehensive insights into practice. The study underlined limitations such as the use of free text, which hinders functions such as search, summary, decision support and statistical analysis.

Similarly, Kauhanen *et al*[18] analysed EHR care notes for cardiac rehabilitation and found that only a minority of patient records included rehabilitation documentation, with the evaluation of treatment being infrequently documented. Wingood *et al*[21] explored physical therapists' documentation of physical activity assessments and interventions among patients with chronic low back pain and identified a lack of documentation in these areas.

These studies present significant insights into the content that should be included in the EHR in physiotherapy. Comprehensive details about the content of records are presented in online supplemental table 1.

Implementation of EHR in physiotherapy outcomes

The results of the implementation of the EHR in physiotherapy (table 3) are divided into two subthemes, the first is related to the demonstration of the evidence of clinical outcomes and the second is related to the role that EHRs can play in assessing the quality of care provided.

In the first subtheme, five studies[17–19 21 23] focus on evaluating intervention outcomes. Deutscher *et al*[17] assesses functional status (FS), representing the 'activity' dimension of the ICF, demonstrating treatment effectiveness by comparing functionality at the start and end of treatment. Kauhanen *et al*[18] highlight the need to include treatment response in records but find it infrequently documented (35%). Another study[23] indicates that physiotherapist registrations, organised by headings, should include outcome evaluation and documentation of test results. While the fourth study[19] does not provide intervention effectiveness data, it emphasises the structural model's requirement to record functionality results and changes. Lastly, the study by Wingood *et al*[21] employed an instrument, the Patient-Specific Functional Scale, which was documented at the initial and subsequent evaluations.

Regarding the role that EHRs can play in assessing the quality of care provided, one study was included. Scholte *et al*[16] state that one of the benefits of using EHRs is that it serves as a tool to facilitate completeness of administering the clinical process. EHRs present a possibility for continuous and automated data extraction for real-time monitoring of the quality of care and for providing direct feedback to patients, medical professionals and health insurance companies.

DISCUSSION

The aim of this review was to ascertain the use of EHR in the field of physiotherapy, on the determinants of adoption, implementation processes and associated implementation outcomes. Notable strengths of this systematic review comprise the adherence to rigorous methodological standards, including a prospectively registered protocol and employing a robust search strategy. It was considered an option to include all studies found on the topic that met the inclusion criteria, as this review aimed to highlight how EHR has been addressed over time.

The findings of this review can be summarised into three principal categories. The initial area of focus is an examination of the factors that influence the adoption of EHR in physiotherapy. The second area of focus is the implementation of EHR in physical therapy. This encompasses an examination of the quality of the records, the defined content for EHRs, and whether it is based on the conceptual model of the ICF. The third area illustrates that the implementation of EHRs in physical therapy provides evidence of the results in the physiotherapist's clinical practice and suggests that EHRs can play a role in assessing the quality of care provided.

This review examines several factors that may influence the adoption of EHR. One study indicates that the ease of use and organisational conditions are associated with the use of this specific type of record.[20] Nevertheless, the most frequently cited factor influencing the implementation of

Table 3 Implementation outcomes

Study	Quality of care	Evidence of clinical outcomes
Deutscher *et al* [17]		The outcome in the study was FS, defined as an operationally as the patients' perception of their ability to perform functional tasks described in the FS items. It represents the 'activity' dimension of the ICF.
Buyl and Nyssen [19]		Although it does not provide data on the effectiveness of physiotherapy intervention, one of the studies establishes, in its structural model, the need to record the results and changes in functionality.
Häyrinen[23]		The contents of the physiotherapist's registration, organised by headings, are the evaluation of outcomes (outcome of care follow-up treatment plan) and a status documentation results of tests performed for example, the Berg Balance Test, the Box and Block test, the Straight Leg Raising test, measurement of hand grip strength or Visual Analogue Scale.
Kauhanen *et al* [18]		The response to treatment and the effectiveness of CR is rarely documented (existing only in 35% of the notes).
Scholte *et al* [16]	One of the benefits of using EHRs is that they serve as a tool to facilitate completeness of administering the medical process. They found evidence for this because there were fewer missing values in the EHR data than in the survey data for three out of four quality indicators. EHRs are normally completed during or right after the consult with the patient, making it easier to answer questions on the communication process with the patient. At the least, it can help mistakes be more easily retrieved, increasing transparency and accountability. Using the EHRs for quality measurements saves valuable time as clinicians do not have to complete additional surveys for quality assessments next to the regular administration of their patients. The administration is done electronically in the EHRs during or right after the therapy session, and the data can be directly extracted without further action from the therapist. That is time better spent on patient care and may potentially lead to an indirect positive effect on the quality of care. EHRs present a possibility for continuous and automated data extraction for real-time monitoring of the quality of care and for providing direct feedback to patients, medical professionals and health insurance companies.	
Wingood *et al* [21]		The Patient Specific Functional Scale was documented at the time of the initial and subsequent evaluations.

CR, cardiac rehabilitation; EHR, electronic health record; FS, functional status; ICF, International Classification of Functioning.

this technology is the physiotherapist.[17 19 22 23] Buyl and Nyssen[19] highlight a significant challenge in the implementation process, noting that convincing physiotherapists to embrace the electronic record system is a primary obstacle. One of the studies[22] included in this review indicates that the attitudes of physiotherapists towards EHR may be related to gender, age, educational level and the type of institution. Those findings align seamlessly with the existing literature, specifically highlighting that barriers to implementation are intricately linked to the attitudes and behaviours of physiotherapists toward her. The resistance to change,[25] the integration of record-keeping

practices into their workflow, time consumed and time management[26] as well as the individual characteristics of the professionals,[22] collectively contribute to the challenges identified in fostering the adoption of EHR in physiotherapy.

Given the potential impact of EHRs on the quality-of-care delivery, and the well-documented influence of healthcare professionals' perceptions on successful implementation, a critical area of inquiry lies in exploring physiotherapists' intentions to adopt and use EHR systems. Despite its relevance, this remains a notable gap in the existing literature within the field of physiotherapy. Investigating this dimension would not only contribute to a deeper understanding of the motivational and contextual factors underpinning EHR adoption, but also align physiotherapy research with existing studies conducted among other healthcare professionals, where such determinants have been more thoroughly examined.[27]

Another apparent gap in the existing literature pertains to the assessment of digital literacy among physiotherapists. It is well established that digital literacy levels significantly influence professionals' use of information systems. Low proficiency in computer usage not only affects attitudes towards information systems and communication technologies but can also emerge as a substantial barrier to the successful implementation of EHR.[28] Consequently, it is recommended that future studies investigate this aspect, as well as the impact of digital literacy on physiotherapists and contributing valuable insights to the discourse surrounding EHR implementation.

In examining the implementation of EHR in physiotherapy, particular attention is directed towards the quality and comprehensiveness of such records. The included studies[18 21 23] identify deficiencies in adequately portraying the entirety of the care process. These findings are consistent with existing literature, which indicates that an investigation into the accuracy of documentation by physiotherapists highlights the need for improvement.[29] The absence of an electronic record in physiotherapy may result in a reduction in the quality of care. Electronic records offer several advantages, including improved accessibility to patient information, enhanced continuity of care, superior documentation quality and increased efficiency in documentation execution.[30]

In order to analyse the information content, we made use of the guidelines set forth by the World Confederation of Physical Therapy.[31] This authoritative entity has defined the minimum items that should be included in the assessment by a physiotherapist. These include basic patient information, informed consent, evaluation, functional diagnosis, prognosis, intervention plan, reevaluation and other information. It states that all stages of the physiotherapy process should be included in the record.

A notable degree of variability was identified in the inclusion of required information across the studies reviewed, with critical elements frequently missing. Among the studies that assessed the quality of documentation,[18 21 23] all reported incomplete or inconsistent records, underscoring the need for a systematic and comprehensive approach to enhance documentation standards. One viable strategy to address these deficiencies would be the development and implementation of standardised registration models led by regulatory bodies or professional associations. Such initiatives could harmonise documentation practices, foster greater consistency across clinical settings and better support healthcare professionals in embedding standardised documentation into routine physiotherapy practice.

Implementing a standardised documentation strategy would not only improve the completeness and quality of clinical records but also enhance the evidence base for physiotherapy interventions. Across the reviewed studies, outcomes were documented either in terms of FS or through the use of varied measurement instruments, although considerable heterogeneity in approach was evident.[17–19 21 23] While the lack of standardisation remains a significant barrier, consistent outcome documentation is essential for assessing patient progress, monitoring treatment effectiveness and informing evidence-based clinical decision-making. Moreover, these real-world clinical outcomes have the potential to guide the refinement of existing practices and contribute to the design of future, data-informed interventions in physiotherapy.

The adoption of standardised documentation models holds the potential to significantly improve the quality, consistency and comparability of clinical data, thereby strengthening both clinical decision-making and research efforts aimed at evaluating and optimising professional physiotherapy practices. Importantly, all studies reviewed demonstrated the integration of physiotherapy records within multidisciplinary care frameworks, underscoring their role in facilitating interprofessional communication and supporting coordinated patient care.

Besides the specific items documented, it is important to understand the conceptual model on which this record is built. Notably, three of the included studies explicitly adhere to the conceptual model of the ICF.[19 23 24] Conversely, one study[17] uses only a singular dimension, while another study[18] seems to incorporate it based on the presented record model, although clarity in this regard is lacking. This observation aligns with a study[32] affirming that while the ICF serves as a framework for physiotherapy to encapsulate the entire spectrum of human functionality, there exists room for improvement in its application to patient recording.

The ICF is widely used in healthcare settings, serving as a foundation for data recording, outcome evaluation and functionality measurement. It has been acknowledged for its capacity to enhance clinical practice and is recognised as a starting point for standardised record models. A literature review by Maritz *et al*[33] outlines the advantages of incorporating the ICF into EHR, emphasising its unique perspective and interdisciplinary focus. Furthermore, it is as a starting point for standardised record models.[34] However, challenges include structuring the ICF as a compatible formal terminology for EHR and selecting

codes for practical daily usage. This review strongly supports the integration of the ICF into EHRs within physiotherapy practice. A key strategy to facilitate this implementation is the provision of targeted educational initiatives. Evidence suggests that supervised instruction and personalised feedback are critical components of effective interventions aimed at improving the documentation of ICF elements in physiotherapy records.[32] Therefore, structured training programmes focused on the accurate and consistent application of the ICF framework may play a pivotal role in enhancing the quality, completeness and clinical utility of physiotherapy documentation.

Several studies[35–38] have demonstrated the significance of using electronic records, the advantages of their use, and the positive impact they have on healthcare quality. However, the current review did not identify any studies that specifically evaluated the use of EHRs and the quality of care provided in the context of physiotherapy. The findings from the review suggest that EHR can serve as a tool for evaluating clinical quality and demonstrate that the use of EHRs offers benefits and there is an indirect positive effect on the quality of care.[16] While EHRs appear to play a pivotal role in enhancing the quality-of-care delivery within physiotherapy, the existing body of evidence remains limited and inconclusive. Despite widespread recognition of their potential benefits, there is a notable lack of empirical research specifically examining the impact of EHR implementation on care quality in physiotherapy settings. Accordingly, there is a clear need for future studies that rigorously evaluate how EHR systems influence clinical outcomes, workflow efficiency, interprofessional collaboration and patient satisfaction in physiotherapy practice.

The relevance of this topic across all healthcare professions is underscored by a growing body of recent literature that has actively engaged with the subject.[39–42] However, it was not feasible to extract specific data related to physiotherapists, as the studies in question encompass a range of professions within the healthcare field. It is therefore recommended that future studies be published specifically in the field of physiotherapy. Improving the practice of maintaining accessible and comprehensive clinical records has implications not only for the individual practice of physiotherapists, but more critically, for the entire continuum of patient care. The completeness and quality of clinical records are central to supporting integrated, patient-centred care, enabling informed decision-making across multidisciplinary teams. However, existing EHR systems often suffer from limited data accessibility, poor data quality and a high degree of heterogeneity, which collectively hinder effective data use and interoperability.[43] This lack of standardisation represents a substantial barrier to the digital transformation of healthcare, particularly in efforts to scale coordinated, data-driven clinical practices.

Emerging technologies, particularly artificial intelligence (AI), offer substantial potential to advance the utility of EHRs. AI can facilitate the analysis of large-scale clinical datasets, enhance the accuracy of data coding and interpretation, and support evidence-based clinical decision-making across healthcare disciplines.[44] When integrated into EHR systems, AI may not only improve the efficiency and completeness of documentation, but also strengthen their role in clinical planning, interdisciplinary communication and outcome evaluation.[45] For physiotherapists specifically, AI-enabled EHRs hold promise for personalising treatment, monitoring patient progress and designing data-informed interventions tailored to individual patient profiles. Given its transformative potential, the application of AI in physiotherapy EHRs represents a critical and emerging line of research that warrants focused scholarly attention.

The findings of this review offer important insights to guide the future development and implementation of EHRs. Physiotherapists, alongside other healthcare professionals, play a central role in the effective adoption and utilisation of these systems. Among the key factors identified, the level of digital literacy emerged as a critical determinant of successful engagement. Accordingly, targeted educational interventions aimed at enhancing digital competencies and promoting the clinical value of EHRs may represent a promising strategy to increase consistent and meaningful use in routine physiotherapy practice.

However, responsibility for successful implementation should not rest solely with individual healthcare professionals. Health system decision-makers, information system designers and administrative leaders must also recognise the strategic importance of functional and interoperable EHR platforms, grounded in standardised frameworks such as the ICF. Such structures can improve the quality, consistency and utility of clinical data across settings. Furthermore, both professionals and organisational stakeholders must prioritise the monitoring and reporting of clinical outcomes as a fundamental element in advancing patient-centred, evidence-based care in the digital age.

This study presents several limitations. Notably, the limited volume of research in this area poses a significant challenge, as the heterogeneity among existing studies, in terms of design, population and outcome measures, makes it difficult to establish a standardised evaluation framework. The paucity of available literature also constrained the ability to conduct a more comprehensive comparison across different clinical contexts or patient populations, thereby limiting the generalisability of the findings. In addition to methodological considerations, this review also presents limitations related to the representativeness of physiotherapy clinical practice. The included studies do not encompass the full spectrum of physiotherapists' areas of intervention, with important domains such as paediatrics or intensive care notably absent. This incomplete coverage limits the ability to comprehensively understand the adoption and impact of EHRs across the diverse contexts in which physiotherapists operate. To strengthen the applicability and generalisability of future findings,

research efforts should aim to broaden the inclusion of varied clinical specialties and settings, thereby capturing the complexity and heterogeneity of contemporary physiotherapy practice. These limitations should be considered when interpreting the results, which may reflect the varying levels of EHR advancement in physiotherapy and the differing levels of importance placed on this topic within the profession.

CONCLUSIONS

This review provides a comprehensive analysis of the current state of EHR use in physiotherapy, with particular attention to the factors that influence the adoption, the implementation processes and associated implementation outcomes.

The findings highlight a pressing need to improve the quality, completeness and standardisation of physiotherapy documentation, emphasising the importance of aligning clinical records with the ICF framework to ensure consistency, interoperability and clinical relevance. Furthermore, the review addresses the persistent factors limiting their use, many of which are related to limitations experienced by physiotherapists. The integration of physiotherapists' records is of significant importance, both in terms of providing insight into the current variability of clinical practice and in improving the evaluation of healthcare. In addition, organising physiotherapists' records according to the conceptual model of functionality facilitates the identification of health gains, as functionality serves as a principal indicator of health outcomes. Moreover, the development, quality and accuracy of emerging digital solutions are contingent on the quantity and accuracy of the data on which they are based. It is crucial to implement strategies that will provide a robust foundation and optimisation in the use of EHR in order to respond to the accelerated advancements in digital health and to ensure that the future of physiotherapy is not impeded.

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