



## EDITORIAL

# Rehabilitation enhanced by artificial intelligence: introducing the living systematic mapping review from REHALISE initiative

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In recent years, artificial intelligence (AI) has demonstrated its potential to revolutionize how healthcare professionals work. The literature underscores the exponential growth of scientific research on AI in medicine, showcasing its applications across various clinical processes (including diagnosis, prognosis, clinical decision-making, and treatment) and revealing key methodological gaps in reporting. Notably, AI applications have experienced significant growth across various medical fields, with radiology and oncology being the most prominently represented.<sup>1</sup> However, there is no reason to believe that physical and rehabilitation medicine (PRM) should be an exception to this trend. In fact, research on the clinical applications of AI in rehabilitation has been growing steadily in recent years. Given this rapid spread of AI solutions in PRM, it is crucial to systematically organize and evaluate the available evidence to support clinicians and improve rehabilitation outcomes. To address this need, in collaboration with the *European Journal of Physical and Rehabilitation Medicine*, we have launched the REHALISE (Rehabilitation Enhanced by Artificial Intelligence: A Living Systematic

Mapping Review) initiative. This initiative aims to monitor and routinely update AI-related literature through a living systematic mapping review (LSMR),<sup>2</sup> providing current applications, limitations, and future perspectives of AI in PRM. By adopting a mapping review framework,<sup>3</sup> this approach will allow us to comprehensively cover the broad and heterogeneous field of AI across all types of rehabilitation, identify knowledge gaps more effectively, and guide future research directions in AI-based rehabilitation.

The project was developed through the collaborative efforts of diverse expertise from the Italian Society of Artificial Intelligence in Medicine (SIIAM), the Cochrane Rehabilitation, and healthcare professionals (*i.e.*, PRM physicians, physiotherapists, neuro-psychomotor therapists). Through a systematically updated LSMR, the REHALISE group will rigorously evaluate the current literature to identify all relevant clinical applications of AI in PRM, with a primary focus on translational research. In particular, clinical studies that have adequate translationality and apply AI in a rehabilitation treatment path or on a patient will be included.

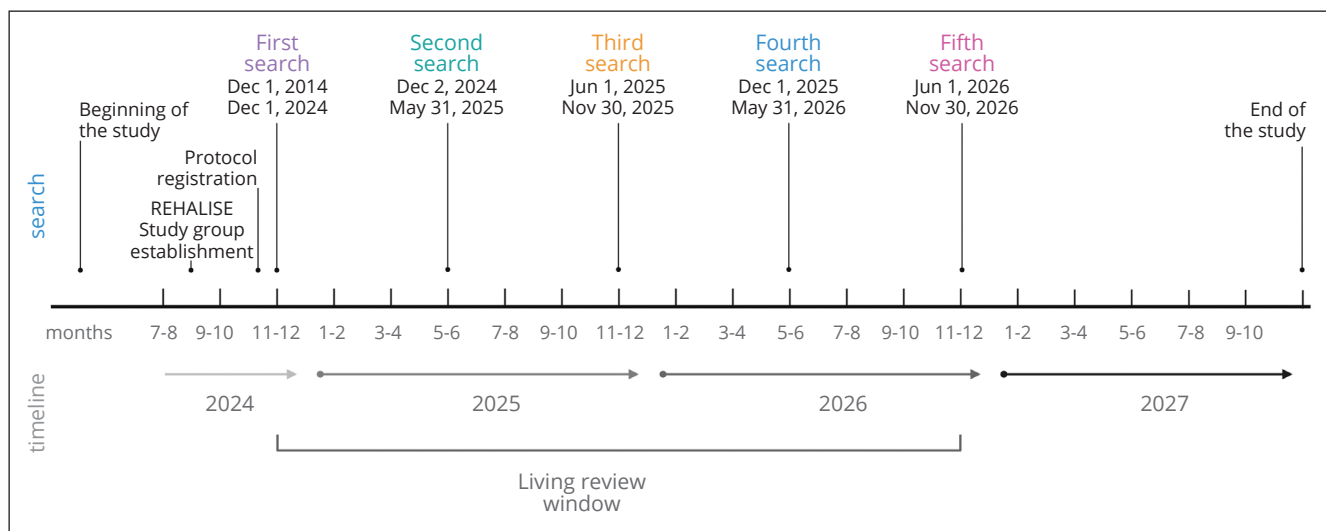


Figure 1.—REHALISE initiative timeline. The figure displays the milestone dates of the project. The study end date may be extended based on the results of the living review. In such a case, the protocol will be revised, and a formal notification will be provided. The figure was created with BioRender.com.

The LSMR will be reported following the PRISMA-LSR guidelines.<sup>4</sup> The LSMR will be updated every six months (the protocol is available on PROSPERO database CRD420250622434 recorded on 24 February 2025). The first edition, which explores the past 10 years of medical literature, has been completed and will serve as a comprehensive background for the following LSMR's updates<sup>5</sup> (Figure 1).

AI in PRM has been utilized to personalize rehabilitation by utilizing patient data, including movement analysis in physical therapy and cognitive support for neurological recovery. AI-driven tools, such as wearables and sensors, integrate diverse data sources to support decision-making for rehabilitation teams.<sup>6</sup> Furthermore, AI can work in conjunction with other technologies such as robotic, virtual reality, or brain-computer interfaces to optimize their performance and increase their rehabilitative value.<sup>7</sup> Beyond enhancing individualized care, AI also improves healthcare efficiency by automating administrative tasks, optimizing scheduling, and enabling early intervention through predictive analytics.<sup>8</sup> These advancements streamline processes and improve patient access and long-term outcomes.

Several challenges must be addressed before AI can seamlessly integrate into rehabilitation practice.<sup>9</sup> The inability to fully understand how an AI model reaches a decision creates a significant barrier to trust and adoption, with key concerns in healthcare AI including the risk of

errors leading to adverse outcomes, challenges with the quality and heterogeneity of training data, and the need for robust data governance.<sup>10, 11</sup> Ensuring high-quality, representative datasets is essential to prevent biases and ensure reliability.

Finally, ethical and regulatory issues, such as patient privacy, data security, informed consent, and validation standards adherence, are also critical for AI deployment. Parallely, there is a need for improved reporting on AI metrics, particularly regarding model training and dataset quality, as both are crucial for comprehensive quality assessment and mitigating bias through specialized evaluation tools.<sup>1</sup>

We believe that the REHALISE initiative can expand current knowledge by establishing the foundational steps for implementing AI in rehabilitation, highlighting its potential and limitations. By fostering a systematic and regulated implementation of AI, we aim to reduce the gap between algorithm development and clinical implementation, ensuring that these cutting-edge advancements can shortly be translated into healthcare practice.

In addition, highlighting the state of AI translationality of the different processes involved in PRM allows us to make useful information available to scientific societies, universities and translational clinical research institutions for training needs, resource planning, and mitigation of potential problems.

Finally, *via* real-time monitoring of AI's progress in

rehabilitation, this project will facilitate a fruitful collaborative dialogue to drive the PRM field forward. We hope the project meets the interest of the *European Journal of Physical and Rehabilitation Medicine* readership, promoting the openness to integrating AI to enhance the quality of care for future patients.

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### Conflicts of interest

The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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### Authors' contributions

All authors read and approved the final version of the manuscript.

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