77th FEMTEC Scientific Congress

Artificial Intelligence in Rehabilitation

Assessment · Intervention · Outcomes

15-minute scientific presentation | Working draft

The question that matters

Does AI simply improve how we measure rehabilitation,

or can it genuinely improve the quality of life

of persons with disabilities by enhancing

their functioning and participation?

Three linked clinical questions

01 · ASSESSMENT

Measure better?

Can AI improve our understanding of functioning and its limitations?

02 · INTERVENTION

Decide better?

Can predictions support better choices and adaptation of rehabilitation?

03 · OUTCOMES

Live better?

Do patients gain meaningful activities, autonomy and participation?

ICF provides the clinical language connecting all three.

Assessment | What can AI see?

Examples

MOVEMENT

Gait & balance

Wearables and movement data may help detect patterns that are difficult to quantify routinely.

FUNCTION

Performance

Combining assessments over time can reveal heterogeneous functional trajectories.

CLINICAL VALUE

Interpretability

Accuracy is useful only if information is valid, understandable and actionable.

Caution: sensors and digital tools are not automatically AI.

A growing field — still limited validation

240

studies mapped (2014–2024)

5.8%

reported external validation

A promising model is not yet a dependable clinical tool.

Source: Living systematic mapping review, 2025

Intervention | Can prediction guide decisions?

AI may support — but must not replace — clinical reasoning.

PATIENT

Who might benefit?

Identify patients likely to need different rehabilitation support.

PROGRAMME

What to adapt?

Investigate dose, intensity, frequency and progression.

REASSESSMENT

When to reconsider?

Use longitudinal findings to identify insufficient functional improvement.

Hydrotherapy and balneotherapy in rehabilitation

Evidence of intervention benefit ≠ evidence of AI benefit

HYDROTHERAPY

Aquatic exercise

Evidence supports improvements in pain and physical function for selected people with knee osteoarthritis.

BALNEOTHERAPY

Therapeutic resources

Selected clinical studies report benefits, but protocols and study quality remain heterogeneous.

Illustrative evidence: aquatic exercise meta-analysis, 2022; balneotherapy systematic review, 2023

One concrete AI example | Aquatic rehabilitation

Stroke survivors receiving aquatic therapy

1,320

patients analyzed

0.818

AUC in temporal validation

Predicted insufficient motor improvement — not proven improvement from AI-guided care.

Chen, Zhang & Qie, Front Neurol, 2026

What does the example actually prove?

YES

Prediction

A model identified patients at greater risk of insufficient motor improvement.

NOT YET

Clinical impact

No evidence that model-guided adjustment itself improves functioning.

NEXT

Prospective testing

External validation and comparative trials are needed.

Prediction ≠ personalization ≠ improved patient outcomes

Outcomes | ICF puts the person first

BODY FUNCTIONS

What changes?

Motor performance, mobility, balance, pain and other measured functions.

ACTIVITIES

What can they do?

Walking, transfers, self-care and meaningful daily tasks.

PARTICIPATION

How do they live?

Roles, relationships, education, work and community life.

Quality of life cannot be reduced to an algorithmic score.

The most important evidence gap

Does AI-assisted rehabilitation improve patient outcomes

compared with high-quality usual rehabilitation?

External validation · prospective studies · meaningful ICF outcomes

Three answers — deliberately modest

ASSESSMENT

Often promising

AI can identify and quantify patterns of functioning.

INTERVENTION

Potentially useful

Models may support rehabilitation decisions, but clinical benefit needs testing.

OUTCOMES

Still the test

Functional improvement, autonomy and participation must be demonstrated.

A question for the moderated discussion

Are we ready to evaluate AI not by the sophistication of the technology, but by what persons with disabilities can achieve in daily life?

Q&A AND MODERATED DISCUSSION

Thank you

AI should serve rehabilitation goals —

not redefine them.

Presenter(s) and affiliation(s): to be added

Bibliography | Evidence about AI in rehabilitation

BACK-UP / NOT FOR THE TIMED PRESENTATION

Artificial intelligence in rehabilitation: a living systematic mapping review — first release. Eur J Phys Rehabil Med. 2025;61:694–708. DOI: 10.23736/S1973-9087.25.09331-1

First update (search through May 2025). PMID: 42678181. Includes 335 studies in cumulative dataset; external validation remains uncommon.

Bibliography | Hydrotherapy and predictive AI

BACK-UP / NOT FOR THE TIMED PRESENTATION

Efficacy and safety of aquatic exercise in knee osteoarthritis: a systematic review and meta-analysis of randomized controlled trials. Clin Rehabil. 2022. DOI: 10.1177/02692155221134240. 22 trials, 1,394 participants.

Chen Y, Zhang J, Qie S. Development of an interpretable machine-learning model to predict insufficient functional improvement after aquatic therapy in stroke. Front Neurol. 2026;17:1871732. DOI: 10.3389/fneur.2026.1871732.

Bibliography | Clinical and conceptual references

BACK-UP / NOT FOR THE TIMED PRESENTATION

WHO. International Classification of Functioning, Disability and Health (ICF). Geneva: World Health Organization; 2001.

Protano et al. Balneotherapy for osteoarthritis: a systematic review. 2023. PMID: 37301799.

Interpretation caution: prediction, model validation, prospective clinical utility and the effect of an intervention are distinct questions.