Editorial

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Exploring the history of exercise rehabilitation for the expansion of future rehabilitation projects

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'Exercise rehabilitation' can be considered as the fundamental starting point for intellectual or physical disability individuals, but recently it is also being used interchangeably with 'sports medicine', which is a field that focuses on managing and researching athletes, including enhancing their performance, treating and rehabilitating injuries that occur during games or training, and prevention. 'Exercise rehabilitation' not only involves the treatment and prevention of sports-related injuries but also encompasses proper exercise methods for the general population, as well as exercise techniques for individuals with chronic conditions. Furthermore, it covers a wide range of areas, including improving quality of life (QoL), enhancing physical abilities that may be compromised due to aging, illness, or trauma, and promoting the ability to perform daily activities without difficulty by increasing overall fitness levels.

In the United States, exercise rehabilitation originated under the term 'physical medicine and rehabilitation' as a medical specialty with a focus on enhancing and restoring the functional capabilities and QoL for individuals with physical disabilities. This field of medicine aims to improve the physical, psychological, and social well-being of patients through comprehensive rehabilitation programs. The goal is to help individuals achieve their maximum potential and regain independence in daily activities through various therapeutic interventions, including exercise, physical therapy, occupational therapy, and other modalities. The emphasis is on optimizing functional abilities, promoting mobility, managing pain, and enhancing overall QoL for individuals with physical impairments. In the early to mid-20th century, two unofficial specialties, physical medicine and rehabilitation medicine, began to emerge as separate disciplines within the field of medicine. While they were distinct in name, in practice, both specialties shared a common focus on providing care to individuals with disabling injuries or conditions. Physical medicine primarily focused on the diagnosis and management of physical disabilities and impairments, utilizing various therapeutic modalities, such as exercise, physical agents (heat, cold, electricity), and assistive devices. Rehabilitation medicine, on the other hand, had a broader scope that encompassed not only the physical aspects but also the comprehensive management of disabilities. Rehabilitation medicine incorporated physical therapy, occupational therapy, speech therapy, and other interventions to address the physical, cognitive, and psychosocial aspects of disability. Although these two specialties had some differences in terms of their focus and approaches, in practice, their patient populations often overlapped. Both physical medicine and rehabilitation medicine aimed to provide comprehensive care and improve the well-being of individuals with disabling injuries or conditions, regardless of the specific disciplinary label. Over time, these specialties have evolved and become more integrated, and in many healthcare systems, they are now considered as a single specialty known as physical medicine and rehabilitation (PM&R).

Dr. Krusen played a significant role in the field of physical medicine, particularly in the utilization of physical agents. He initially practiced at Temple University and later at Mayo Clinic. In 1938, Dr. Krusen coined the term 'physiatry' to describe this specialty. Dr. Rusk, an internal medicine physician, became a pioneer of rehabilitation medicine during World War II when he was appointed to rehabilitate airmen. His contributions in this area were sig-

nificant. In 1944, the Baruch Committee, commissioned by Bernard Baruch, defined the specialty as a combination of PM&R medicine. This committee's work provided the foundation for the acceptance of physiatry as an official medical specialty. The specialty that is now recognized as PM&R in the United States was formally established in 1947. During this time, an independent Board of Physical Medicine was created under the jurisdiction of the American Board of Medical Specialties. However, it was in 1949, influenced by the advocacy of Dr. Rusk and other professionals, that the specialty expanded to include rehabilitation medicine and adopted the name 'PM&R' (Dillingham, 2022). This change reflected the growing recognition and integration of rehabilitation principles within the field.

As technological advancements continue to progress across different domains, the quality of human life is experiencing positive transformations. In recent times, society has entered a phase of technological revolution, where metaverse technology holds a central position in driving these changes. The emergence of artificial intelligence (AI) has the potential to significantly impact exercise rehabilitation in several ways:

1. Personalized treatment plans: AI can analyze vast amounts of data, including patient records, medical history, and assessment results, to create personalized exercise rehabilitation plans (Michie et al., 2017). By considering individual characteristics, AI algorithms can generate tailored programs that address specific needs, optimize outcomes, and adapt over time.
2. Remote monitoring and telehealth: AI-powered devices and wearable sensors can enable remote monitoring of patients' exercise routines, vital signs, and progress (Bachtiger et al., 2020). This allows healthcare professionals to provide real-time feedback and adjust treatment plans as needed, even from a distance. Telehealth platforms can facilitate remote consultations, reducing barriers to access and improving continuity of care.
3. Movement analysis and biomechanics: AI algorithms can analyze movement patterns and biomechanical data to assess technique, identify imbalances, and provide corrective feedback (Liao et al., 2020). This can enhance the effectiveness and safety of exercise rehabilitation by optimizing movement quality and reducing the risk of injury.
4. Virtual reality and gamification: Virtual reality technology and gamified exercise platforms can make rehabilitation more engaging and motivating (Charles et al., 2020). AI algorithms can adapt virtual reality environments and game mechanics based on a patient's performance and progress, providing interactive and immersive experiences that encourage adherence to exercise programs.
5. Predictive analytics and early intervention: AI algorithms can analyze patient data and identify patterns that may indicate an increased risk of injury or deterioration in function (Giordano et al., 2021). By detecting these patterns early, healthcare professionals can intervene proactively, modifying exercise programs or providing targeted interventions to prevent complications or setbacks.
6. Data-driven research and insights: AI can assist in analyzing large datasets from exercise rehabilitation studies, patient outcomes, and population health data. By uncovering patterns, correlations, and treatment effectiveness, AI can contribute to evidence-based decision-making, guide research efforts, and inform best practices in exercise rehabilitation.

Apart from the previously mentioned points, exercise rehabilitation is expected to witness the emergence of additional elements that will be integrated with future technologies. These advancements will be harnessed to further enhance the field of exercise rehabilitation. However, it is crucial to acknowledge that, for the time being, while AI possesses significant potential, its role should be one of complementing the expertise and judgment of healthcare professionals, rather than replacing them. Human oversight and interpretation are crucial to ensure the ethical use of AI, patient safety, and the delivery of personalized and patient-centered care.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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