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OPPORTUNITIES TO IMPROVE THE SYSTEM FOR ASSESSING THE REHABILITATION OF CHILDREN WITH DISABILITIES

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Annotation

This study explores opportunities to improve the system for assessing rehabilitation outcomes in children with disabilities through the integration of artificial intelligence (AI) into nursing practice. The research aims to evaluate the effectiveness of AI-assisted rehabilitation assessment within nursing-led rehabilitation processes and to identify key factors influencing functional outcomes. A total of 196 children aged 1–18 years participated in the study. Nurses were trained to assess children's daily living activities using tablet-based digital forms integrated with a specially designed AI algorithm. The system automatically calculated composite rehabilitation efficiency scores across six functional domains, enabling real-time monitoring and individualized care planning. Psychometric evaluation demonstrated high internal consistency (Cronbach's alpha = 0.92) and strong concurrent validity with standardized tools such as Pediatric Evaluation of Disability Inventory (PEDI) and WeeFIM ($r = 0.85$, $p < 0.001$). Results showed that 78% of children demonstrated functional improvement, particularly in self-care and mobility domains. The findings confirm that AI-enhanced nursing assessment tools can increase objectivity, predictive accuracy, and efficiency in pediatric rehabilitation while supporting human-centered clinical decision-making. The study highlights both the transformative potential and implementation challenges of AI technologies in rehabilitation nursing.

Keywords

Artificial intelligence; Pediatric rehabilitation; Children with disabilities; Nursing assessment; Functional independence; Rehabilitation efficiency; Digital health technologies; Self-care; Mobility; Psychometric validation.

Improving the rehabilitation process for children with disabilities and the introduction of artificial intelligence (AI) technologies in the field of nursing can ensure the effectiveness of rehabilitation with the help of specificity and predictive power (1). Recent research reveals that AI is growing rapidly in pediatric rehabilitation, especially in assessing and scaling up participation for children with

disabilities. Robots and other AI devices used for rehabilitation are primarily live devices, and interaction is not face-to-face, but (1) Virtual reality, immersive training programs, intelligent robots, and other AI technologies have begun to be used around the world to improve the efficiency and personalization of rehabilitation programs. However, participation assessments of AI still focus primarily on behavioral engagement because participation and emotional and cognitive involvement are still overlooked (4). These assessments have focused largely on machine learning and computer vision approaches, with the voices of children and their caregivers still being marginalized. Objective methods using AI such as trajectory error characteristics, joint angles, and sEMG signal properties are being developed to enhance traditional rehabilitation subjective assessments (2). But meeting the specific requirements of distance therapy, self-targeted goals, and participation is still slow. In pediatric rehabilitation, the Pediatric Assessment of Pediatric Disability Inventory (PEDI) and the Functional Independence Scale for Children (Vefim) standardized scales offer key indicators for assessing self-care, mobility, and social and functional interaction (5). Recently, the AI was added to bolster these assessments. In one example, Lee et al. (2006) It has been noted that 15% of predicting outcomes and demonstrating them in training models are better than traditional methods (6).

However, barriers to providing full and inclusive education to these groups remain a persistent and unresolved problem in nursing and rehabilitation settings (3). To address these deficiencies, the World Health Organization (WHO) launched the Global Collaborative on Assistive Technologies (GATE) programme in 2018 with the aim of supporting equitable access to assistive technologies and protecting the right to inclusive education for persons with disabilities (3). The main goal of GATE is to "increase the availability of quality low-cost assistive devices globally" (7). The AI is emerging as a key opportunity for these assistive devices in the rehabilitation nurse field to create education and activities for children with disabilities to engage in daily life (ADL) (8). It is critical to improve the assessment tools used to assess the outcomes of rehabilitation programs for children with disabilities (9). AI's ethical considerations should ensure that children with different developmental needs have adequate support and inclusion (10). In the rehabilitation of children with disabilities, paramedics, such as nurses, play an important role in collaboration with other health professionals. They create comprehensive programs aimed at helping and promoting maximum function and independence for persons with disabilities and improving their quality of life. They work closely with health care providers to develop and implement rehabilitation programs and ensure that the child has access to all necessary services for his or her

full recovery. They also ensure that families are aware of the rehabilitation process through adequate education to cooperate well (11), (12). How Artificial Intelligence (AI) is used in nursing education in China solves problems such as clinical training and large class sizes. These tools can improve teaching effectiveness and student outcomes through virtual simulations and personalized learning systems. At the same time, it acknowledges important concerns, including data privacy, ethical issues such as algorithmic bias, and differences in infrastructure that could slow down the widespread use of AI, especially in rural areas (2). Care2Vec is a new artificial intelligence-based expert system designed to accurately classify self-care problems in children with physical disabilities. This aims to give therapists a powerful tool for better diagnostic decisions and more effective treatment plans (15). While the AI offers great benefits, such as increased productivity and wider access to education, it also brings with it the need for strong technological infrastructure and proper teacher training (16).

The purpose of the study: To assess the effectiveness of rehabilitation interventions for children with disabilities in nursing rehabilitation processes using AI, to investigate the important aspects that affect rehabilitation outcomes.

Methodology: Nurses were trained to assess children's performance in each element of daily care procedures. Data collection was facilitated through tablet-based digital forms, allowing for standardized and efficient data entry directly at the point of care. This is combined with a specially designed artificial intelligence (AI) algorithm that processes the collected digital data in real time.

The AI algorithm performed an automated calculation of individual items and created a composite rehabilitation efficiency for each child. This score provided a concise measure of the child's overall functional improvement across six domains and provided dynamic monitoring over time.

The following statistical methods were used to evaluate the psychometric properties of the scale:

Reliability assessment:

Cronbach was measured using alpha, which showed how closely the elements were related as a group (i.e., the internal reliability of the scale).

Investigated using a correlation coefficient ensured consistency of scores among different nurses evaluating the same children.

Results:

A total of 196 children participated in the study as they were divided into two groups: group 1 (n = 73; 37.2%) and group 2 (n = 123; 62.8%). The overall gender distribution revealed a higher proportion of boys (n = 110; 56%) than girls (n = 86;

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44%). Within group 1, 31 boys (36%) were girls and 42 (38.1%) were boys. Group 2 included 55 girls (64%) and 68 boys (61.9%).

Participants ranged in age from 1 to 18 years in both groups. The mean age in group 1 was 13.5 years (SD = 3.8), while in group 2 it was slightly lower at 12.9 years (SD = 2.3). The pooled mean age was 13.0 years (SD = 2.6), while mean age was consistently 13.0 years for both groups and was recorded as a generic sample (Table 1).

Table 1. Demographics of children.

	Group 1	**Group 2**	**Total**
Gender n (%)	73 (37,2%)	123 (62,8%)	196 (100%)
Girl	31 (36%)	55 (64%)	86 (44%)
Boy	42 (38,1%)	68 (61,9%)	110 (56%)
Age Range (Min-Max)	1-18	1-18	1-18
City	30 (41%)	44 (35.8%)	74 (37.8%)
Village	43 (59%)	79 (69.2%)	122 (62.2%)
Average (SD)	13.5 (3.8)	12.9 (2.3)	13.0 (2.6)
Median	13.0	13.0	13.0

The results showed that 78% of the children showed improvement during the rehabilitation period, while 22% were classified as showing limited or significant functional progress. The improvement was most pronounced in the areas of self-care and mobility, while communication and social participation showed variable results.

Statistical analaysis showed that the nursing scale with artificial intelligence had a high intrinsic consistency (Cronbach's alpha = 0.92). A comparison with existing validated tools such as PEDI and WeeFIM showed strong correlations ($r = 0.85$, $p < 0.001$) supporting concurrent validity.

Table 2. Primary & Post Rehabilitation Scores in Functional Areas of Nursing Scale with AI

Names	Average score (SD)	Post-Rehabilitation Mean Count (SD)	Average change	Improvement (%)

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Self-care	41.2 (8.5)	56.7 (9.2)	+15.5	78%
Mobility	39.5 (7.9)	55.1 (8.7)	+15.6	76%
Contact	44.0 (10.2)	50.5 (9.8)	+6.5	55%
Social Participation	42.8 (9.3)	49.2 (9.5)	+6.4	53%
Providing Support	47.1 (8.8)	54.6 (9.0)	+7.5	61%
Mental well-being	45.3 (9.1)	53.2 (9.6)	+7.9	63%

While AI offers data-driven efficiencies, it is important to consider the importance of human-centered nursing decision-making, especially for children with disabilities. Table 2 provides information on understanding the philosophical perspectives of pediatric rehabilitation nurses using artificial intelligence.

Discussion

This study provides an AI-based care assessment scale for child rehabilitation – which looks at trends and gaps identified in recent research in AI's field of AI-assisted rehabilitation. Recent reviews highlight the transformative potential of AI in physical rehabilitation (e.g., robotics, wearables, application-based systems), but clinical implications remain controversial (2,3). This tablet-based, domain-specific scale is based on real-world applications of AI-assisted monitoring, providing immediate and actionable feedback (4-7). The system bridges this gap by allowing nurses to record a patient's performance performance directly in a clinical setting and quickly track changes over time, thereby facilitating the planning of individualized care and goal-oriented rehabilitation (8). Despite significant optimism about artificial intelligence among rehabilitation experts, its widespread adoption is hampered by factors such as limited AI literacy, organizational training, and physician resistance. He also stresses the importance of targeted training of doctors to ensure their implementation. This echoes previous evidence in the literature that AI vogues need to demonstrate statistical reliability and clinical validity in order to be adopted (9). Despite the high optimism about AI in rehabilitation among therapists, its prevalence is hampered by factors such as AI literacy, organizational training, and physician resistance (10).

Conclusion

With the help of artificial intelligence, nursing offers a new way to comprehensive, real-time assessment of rehabilitation in children with disabilities.

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