

Digital Health Innovations in Nursing Care for Children with Disabilities

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Abstract

Disability is an integral part of the human experience. Disability is not merely a medical condition, but a situation encompassing the interaction between the characteristics of the society and environment in which a person lives. According to the International Classification of Functioning, Disability, and Health, disability is defined as an umbrella term encompassing impairments, activity limitations, and participation restrictions.

There are approximately 240 million children with various types of disabilities worldwide. These children have limited access to healthcare services. Children with disabilities have multidimensional medical treatment needs. These children face difficulties in accessing quality healthcare services.

The inadequacy of traditional care models in meeting these multidimensional needs has led to an urgent need for digital health technologies that can overcome geographical limitations and offer personalized interventions in pediatric disability management. Digital technologies offer strategic opportunities for pediatric nursing in terms of overcoming geographical barriers, personalizing care, increasing families' self-sufficiency levels, and optimizing the quality of home care.

This book chapter examines digital technologies such as telemedicine, tele-nursing, mobile health applications, virtual reality, and artificial intelligence used in the nursing management of children with disabilities. Furthermore, it addresses the ethical limitations encountered during the integration of these technologies into clinical practice, such as data privacy, algorithmic bias, and fairness, as well as the roles nurses assume in managing these challenges and proposed solutions.

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1. Introduction

Children with disabilities, one of the groups with limited access to healthcare services within health systems, struggle with multifaceted medical needs, functional limitations, and chronic structural barriers to accessing quality and qualified healthcare. The disadvantages of traditional care models can be overcome through the comprehensive and pragmatic use of digital health technologies. Digital health technologies, which can overcome geographical limitations and enable personalized interventions, can be central to purpose-driven solutions in pediatric disability management.

Pediatric nurses can develop useful strategic opportunities in care approaches for children with disabilities by utilizing innovative applications in digital health technologies. This section aims to synthesize current evidence on digital approaches used in nursing care for children with disabilities. This section analyzes the advantages offered by the use of telemedicine, mobile health applications, virtual reality, artificial intelligence, and wearable sensor technologies in terms of service accessibility, as well as their effects on care approaches and family-centered approaches.

2. Disability in the Pediatric Population: Conceptual Framework, Prevalence, and Burden of Disease

Disability is a biopsychosocial process shaped by social, environmental, and individual factors beyond its medical dimension. Understanding the concept within this framework has significant implications for how nursing care is planned and implemented (van der Veen et al., 2023). The nursing profession plays a critical role in providing care for individuals with disabilities, especially children with disabilities and their families. It is of great importance for nurses to know the conceptual framework and terminology of disability in order to deeply understand current approaches (van der Veen et al., 2023).

Disability constitutes an inherent aspect of human existence and represents a fundamental component of the human experience. The term disability serves as an umbrella concept encompassing impairments, activity limitations, and participation restrictions. Impairments refer to issues affecting body functions or structures. Activity limitations denote the challenges an individual encounters when executing tasks or actions. Participation restrictions describe the obstacles a person faces within their life circumstances (WHO, 2023).

Disability is not merely a health issue. It is a complex phenomenon reflecting the interaction between an individual's physical characteristics and the characteristics of the society in which they live. Disability is more prevalent among women, the elderly, children, and poor adults. People with disabilities

often have lower levels of education and live in deprived conditions, lacking adequate food, poor housing, and access to safe water and sanitation. This situation puts people with disabilities at the highest risk for both infectious and non-infectious diseases (WHO, 2023).

According to national legislation, disability is defined as an individual affected by attitudes and environmental conditions that limit their full and effective participation in society on an equal basis with others due to various levels of loss of physical, mental, psychological, and sensory abilities (Law on Persons with Disabilities, 2005).

The “Barrier-Free Life for Every Child Conference,” organized in 2012 in collaboration with the General Directorate of Services for Persons with Disabilities and the Elderly and UNICEF (United Nations Children’s Fund), marked a significant turning point in the transformation of disability terminology in Turkey. At this conference, it was decided that the term “disabled” in legislation would be replaced with the term “person with disabilities.” The report prepared within the scope of the conference, which sheds light on the current situation, adopted a more inclusive and rights-based perspective by using the term “person with a disability” for individuals with disabilities (Güdücü Tüfekçi, 2021).

A radical change was implemented in the terminology regarding disability in Turkey through Law No. 6462, dated May 3, 2013. With the enactment of the ‘Law Amending the Law on People with Disabilities and Certain Laws and Decree Laws,’ previously used terms in the legislation such as ‘defective’, ‘crippled’, or ‘unfit’ were replaced with the term ‘disabled’ (Law Amending the Law on People with Disabilities and Certain Laws and Decree Laws [Law No. 6462], 2013).

This law is not merely a change in terminology; it is also an effort to shift the perspective on disability from a ‘medical/deficit’ approach to a ‘social/ rights-based’ approach that prioritizes the rights of the individual. The World Health Organization’s International Classification of Functioning, Disability, and Health is also fully consistent with this emphasis on ‘participation’. (WHO, 2001).

Definition of Disability According to the Turkish Language Association:
A person who, due to any reason from birth or later in life, has lost their physical, mental, psychological, sensory, or social abilities to varying degrees and experiences difficulties in adapting to social life and meeting their daily needs. Turkish Language Association Current Dictionary (Access Date: February 2026).

Disability is a complex, multidimensional, and dynamic concept that affects a significant proportion of the global population. According to the World Health Organization, approximately 1.3 billion people are reported to experience significant disability. This figure represents 16% of the world's population, which is equivalent to one in every six people worldwide (WHO, 2023).

A comprehensive report published by the United Nations International Children's Emergency Fund (UNICEF) in 2021 states that the number of children with disabilities worldwide has reached approximately 240 million. One of the striking details in the report is that one in ten children with disabilities experiences multidimensional deprivation, being severely deprived in basic welfare areas such as health, education, and protection services (UNICEF, 2021).

UNICEF (2021) reports that the experience of disability varies greatly and involves a complex set of risks determined by factors such as the type of disability and access to services. In this context, it is emphasized that solutions offered to eliminate inequalities must be designed to address these specific risk factors.

Developmental disabilities are highly prevalent on a global scale, with estimates from the 2019 Global Burden of Disease study indicating that 316.8 million children and adolescents worldwide live with health conditions that result in developmental disability. According to the study, the overall prevalence of these conditions is 7.5% among children under the age of five, whereas it increases to 13.9% in the 15 to 19 age group.

When examined by gender, prevalence rates were found to vary between 7.9% (<5 years) and 15.4% (15-19 years) in males and between 7.1% (<5 years) and 12.4% (15-19 years) in females. According to 2019 Global Burden of Disease data, the five leading causes of developmental disabilities are, in order: hearing loss, idiopathic developmental intellectual disability, attention deficit hyperactivity disorder, cerebral palsy, and vision loss. The Child Functioning Module of the Multiple Indicator Cluster Surveys (MICS) conducted by the United Nations Children's Fund (UNICEF) complements these data, documenting that one in ten children experiences moderate to severe functional difficulties (WHO & UNICEF, 2023). The discrepancy between these striking prevalence data and global health policies restricts access to essential services for the disabled population, which ultimately leads to suboptimal and insufficient care (Cieza et al., 2021).

The burden of pediatric disability is not distributed homogeneously across society. Distinct sociodemographic disparities are observed in prevalence rates and the processes of accessing healthcare services. In particular, children with disabilities from ethnic and minority groups, those residing in rural areas, and those from low-income families are exposed to multifaceted disadvantages, such as delays in diagnosis, the under-identification of specific conditions like autism spectrum disorder without co-occurring intellectual disability, and restricted access to evidence-based interventions (Cogswell, 2022; Hanson et al., 2023; Ogourtsova, 2023).

The concentration of specialized services in urban centers exacerbates existing disparities, compelling families in rural or resource-limited areas to navigate long travel distances and fragmented care systems (Koob et al., 2024). These persistent inequalities underscore the urgent need for scalable, sustainable, and equitable pediatric care models that can reach underserved populations and dismantle systemic barriers to service access. In this context, leveraging digital technologies plays a critical role as a primary driver for extending care to underserved populations and forms the basis for next-generation inclusive nursing interventions.

3. Contemporary Digital Technologies in the Nursing Management of Children with Disabilities

3.1. Tele-health, Tele-nursing, and Remote Monitoring Technologies

The rapid development of telehealth and remote monitoring technologies, particularly in the context of the COVID-19 pandemic and its lasting effects on healthcare systems, has fundamentally changed the delivery of pediatric nursing care for children with disabilities. Telehealth encompasses a wide range of digital models that enable nurses to provide remote assessment, intervention, education, and care coordination. It has thus focused on addressing barriers arising from geographical distance, transportation difficulties, and access to specialized pediatric services (Hurtubise et al., 2022; Hanson et al., 2023).

A review study covering the years 2003-2020 shows that research on tele-nursing for children with disabilities and their families is still very limited in the literature. It is observed that existing studies largely focus on children with high medical complexity, but research on children with neurodevelopmental disabilities is insufficient. Another noteworthy point in this field is the confusion surrounding terminology; even though nurses play an active role in interventions, these practices are generally referred to as “telemedicine” or

“telehealth,” while the term “tele-nursing” is used only for processes in which nurses provide services independently (Nishigaki et al., 2025).

Evidence from studies confirms that telecommunications technologies offer a feasible, cost-effective, and accessible solution for overcoming barriers to healthcare access for children with disabilities. These digital interventions have been reported to improve children’s care experiences, enhance families’ quality of life, and optimize overall health outcomes (Nishigaki et al., 2025).

The effectiveness of digital technologies in ensuring continuity of care is particularly prominent in chronic diseases that require intensive follow-up and high levels of parental support. In this context, a quasi-experimental study examining the self-efficacy and anxiety levels of mothers of children diagnosed with epilepsy investigated the impact of telenursing interventions. In this study, where a total of 90 mothers were randomized into intervention and control groups, systematic nursing support was provided to the intervention group through ten structured telephone calls during the two-month post-discharge period (Seif et al., 2025).

The study results indicated that regular education and counseling provided through telenursing led to a significant reduction in mothers’ anxiety levels and enhanced their perceptions of caregiving self-efficacy (Seif et al., 2025). Based on this evidence, it can be argued that telenursing applications are effective in providing immediate answers to parental concerns, meeting educational requirements, and strengthening parenting skills. Digital technologies, such as telenursing, not only improve child health outcomes but also contribute to a holistic recovery process by optimizing the psychosocial well-being of the caregiver.

The family-centered telehealth model is an important application that brings nursing care in pediatric rehabilitation into the home environment. An Education Intervention and Support Program for the Family-Centered Telehealth Application was developed by Hurtubise et al. (2022). This program aims to help users internalize the model. The telehealth application works through clinician competency, workflow integration, and family participation. Pediatric nurses are at the center of this process by undertaking family education, coordinating multidisciplinary teams, and adapting evidence-based interventions to remote access (Hurtubise et al., 2022).

The review found that live and video sessions conducted through applications such as Zoom and specialized telehealth software yielded results comparable to those of traditional face-to-face therapy. These results indicated that they provided significant gains in gross motor functions and balance skills

in children with cerebral palsy, and were important in managing behavioral problems in children diagnosed with autism spectrum disorder (ASD). Furthermore, these digital approaches have been seen to optimize the physical activity levels of other children and adolescents with movement disorders and to significantly contribute to clinical improvement by strengthening the rehabilitation process in traumatic brain injury (TBI) cases (Dehghani et al., 2023). The advancement and development of these technologies necessitates that nurses develop competence in both digital health technologies and family coordinator methodologies.

Telehealth applications can provide equal opportunities in healthcare. It is particularly important for children with disabilities and their families living in rural areas or regions with inadequate services to have access to specialist healthcare personnel, especially pediatric nurses. A study examining the experiences of parents who used telehealth applications reported high levels of satisfaction among families due to reduced transportation difficulties, less disruption to their working lives, and a significant decrease in care problems for other children at home.

Parents have reported that virtual consultations are more comfortable than traditional clinic visits. They have noted that this facilitates communication and increases active participation in care (Finnegan et al., 2022). However, parents have experienced difficulties in establishing trust with new specialists and in effectively demonstrating their child's behavior or symptoms via video. They have reported concerns about the adequacy of remote assessments (Finnegan et al., 2022).

Telemedicine nursing for children with different types of disabilities requiring multidisciplinary care is a strategic mechanism that ensures continuity of care, reduces the burden on families, and lowers healthcare costs. Pediatric nurses can address these concerns through relationship-building strategies within the scope of tele-nursing, such as pre-visit phone calls, structured observation protocols, and follow-up communications to address the family's lack of information. Thanks to its advantages, such as low cost and accessibility, tele-nursing plays a key role in overcoming physical and economic barriers to accessing healthcare services. Therefore, it is imperative that tele-nursing practices are supported by academic research and integrated into national standard care protocols to meet the unique needs of children with disabilities and their families.

3.2. Immersive Technologies: Virtual Reality, Augmented Reality, and Gamification

Immersive technologies, including virtual reality (VR), augmented reality (AR), and gamification, offer numerous benefits such as entrepreneurial pain and anxiety management and facilitating neuro-rehabilitation. These immersive technologies are effective in increasing the participation of children with disabilities in therapeutic activities. Among the digital applications incorporated into pediatric nursing, they remain innovative tools. These technologies create multisensory experiences by diverting children's attention and increasing their participation in long, tedious therapies. The inclusion of immersive technologies in pediatric nursing care is important for moving beyond traditional approaches. As immersive technologies evolve, nurses must develop new skills in technology selection, innovative application protocols, and outcome evaluation (Lino *et al.*, 2021; Traficante & Antonietti, 2022).

Virtual Reality (VR) and Augmented Reality (AR) technologies make the rehabilitation process much more feasible for children with cerebral palsy, developmental coordination disorder, and various motor impairments. The use of these technologies can enhance therapeutic collaboration. These digital tools can increase children's interest in treatment and play an active and effective role in developing physical skills (Lino *et al.*, 2021; Traficante & Antonietti, 2022).

Serious games are among the most powerful and highly motivating applications in digital technologies, combining entertainment with therapy. They can facilitate the rehabilitation processes of children with disabilities. They can also improve motor planning, balance, and coordination skills (Lino *et al.*, 2021). Immersive digital technologies have important advantages in terms of providing immediate feedback to the child, adjusting the difficulty level to the child's pace, and celebrating small successes with motivating rewards. This can reduce the perception of physical fatigue for children. They can perform repetitive movements that they might resist with traditional applications through a voluntary and enjoyable participation process (Traficante & Antonietti, 2022).

A comprehensive review study evaluating the use of gamification in mobile applications for children with disabilities has been conducted. In this study, a total of 38 scientific studies and 32 mobile applications incorporating gamification techniques were analyzed. It was found that more than half of the applications examined focused specifically on children diagnosed with Autism Spectrum Disorder (ASD). It was reported that the majority of these applications used moderate gamification strategies and made meaningful

contributions to improving children's health outcomes, particularly by targeting areas such as communication, social interaction skills, and oral health education. The findings confirm that gamification strategies are a universal tool that provides clinical benefits and increases participation in children with different disability groups (Mahmoudi et al., 2024).

According to a systematic review by Komaini et al. (2024), virtual reality (VR) interventions demonstrate effectiveness in improving motor coordination abilities and reducing physical, cognitive, and emotional stress factors in pediatric populations. Through the analysis of eight comprehensive studies, the authors found that VR-based applications yielded favorable clinical outcomes, especially among children with motor developmental delays, and substantially enhanced motivation levels when compared to conventional therapeutic approaches (Komaini et al., 2024).

While immersive technologies offer numerous benefits, including supporting stress reduction in nursing care and rehabilitation settings, research examining their clinical efficacy and cost-effectiveness remains insufficient. Current literature is constrained by methodological limitations, including inadequate sample sizes, absence of control groups, and brief observation periods, which collectively weaken the evidence base. Additionally, the widespread implementation of these technologies in clinical environments faces significant obstacles, such as expensive equipment requirements, technical sophistication, and the necessity for specialized user training (Silva et al., 2023; Komaini et al., 2024).

3.3. Artificial Intelligence and Mobile Health (mHealth) Applications

Within the framework of digital health technologies, artificial intelligence and mobile health applications are rapidly advancing. These innovative applications can be used in the development of clinical decision support systems. Furthermore, by enabling continuous remote monitoring of children with disabilities, they can significantly contribute to strengthening communication between parents and nurses. Pediatric nurses can thus extend nursing processes beyond the clinical setting and integrate them into the daily lives of children and their families. It can enable the development of dynamic care models that are tailored to the individual and include the individual's trackable health data.

Artificial intelligence-based clinical decision support systems are increasingly being preferred in pediatric healthcare services. However, there are still limited evidence-based applications for the disabled child population. The benefits of the big data approach have been highlighted for evaluating the care processes

of children diagnosed with cerebral palsy (CP). In the study, machine learning algorithms were used to analyze big data sets to identify patterns related to care delivery, treatment compliance, and outcome measures (Mitelpunkt et al., 2024).

Artificial intelligence (AI) applications have made significant progress in increasing the participation and cooperation of children and young people with disabilities in treatment. These advances can increase the participation of children with disabilities in social and daily life activities. A comprehensive review study has been conducted on this topic in the literature. In the study, 94 qualified studies were analyzed. The study reveals that the use of AI in pediatric rehabilitation is very diverse. These uses show that robotic technologies (77%) are effective in physical rehabilitation and mobility support, while human-machine interaction (54%) is effective in social skills and cognitive support processes (Kaelin et al., 2021).

The integration of artificial intelligence into nursing care for children diagnosed with autism can bring about significant changes in the care approach. It can improve early diagnosis processes, create individualized treatment plans, support communication skills, and facilitate the development of evidence-based behavioral interventions. For pediatric nurses, incorporating these technological developments into clinical practice may offer an opportunity to deepen the holistic care approach (Osuji, 2024).

In conclusion, it can be said that personalized artificial intelligence interventions that can be provided remotely to children with disabilities will be an important transformative element that enhances the quality and safety of care by strengthening clinical decision support mechanisms in nursing care.

4. Ethical Considerations and Limitations

The integration of artificial intelligence into pediatric nursing goes beyond mere technological adaptation; it also brings with it a multi-layered ethical dilemma that disrupts the critical balance between technical efficiency and patient autonomy. A review of the current literature reveals that while caregivers have a cautious acceptance of these tools, concerns about the risks posed by algorithmic errors and the erosion of human connections remain a dominant source of anxiety. The striking point here is that a large proportion of families insist on continuous human oversight and a highly transparent consent process rather than relying solely on technology. It is precisely at this juncture that pediatric nurses have a vital role to play: protecting the rights of children who are not yet able to make their own decisions, alongside families who are lost in the complexity of algorithms. Nurses must establish a transparent

information bridge, shifting this process from a purely technical procedure to an ethical advocacy platform.

It should not be forgotten that algorithms can have a bias in software. Models may not produce accurate results across different races or cultures. This situation is quite risky in terms of increasing health inequalities. Pediatric nurses should actively use their supervisory roles to reduce the specified risks. Pediatric nurses should evaluate the digital technologies used in terms of fairness and cultural appropriateness. The use of artificial intelligence should assist the nursing profession while also observing professional values and being consistent with the principles of empathy and accountability (Kim, 2025).

5. Conclusion and Recommendations

Despite the many opportunities offered by the digital world, children with disabilities have limited access to services within a biopsychosocial framework. There is a need for research led by nurses to broaden the scope of studies in the literature. Studies should be conducted to ensure equal access to digital technologies for children with different types of disabilities. Evidence-based digital technologies should be integrated into the clinical setting in a way that enables equal access for children with disabilities.

To enable nurses to take a leading role in the ever-evolving field of digital innovation, there is a need for more randomized controlled trials that demonstrate the effectiveness and success of the technologies being developed. Children with disabilities must be ensured equal access to the benefits of the digital technologies being developed. This situation should not be overlooked during the development of technological solutions. A holistic approach to nursing should develop new care models that combine humanistic values and the power of technology. The nursing education curriculum should be updated to develop digital health competencies and effective use of artificial intelligence. In conclusion, improving the quality of life for children with disabilities depends on integrating technology into clinical practice with ethical advocacy and a human-centered approach. In this process, pediatric nurses play a significant role in shaping the future of care.

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