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Review Article

Technological evidence for outpatient and home care in pediatric urology: a scoping review

Evidências tecnológicas para assistência ambulatorial e domiciliar em urologia pediátrica: revisão de escopo

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ABSTRACT

Objective: to map the evidence on web-based technologies and their applicability in outpatient and home care in pediatric urology. **Methods**: this is a scoping review, with searches conducted in six databases, with no time limit, in Portuguese, English, and Spanish. **Results:** 2,200 articles were obtained, with 19 publications eligible for the final sample. The most used web-based technologies were telehealth and telemedicine (47.3%), online intervention programs (21.0%), and mobile apps (15.8%), with a lower rate of use of serious games, social media, and urination videos (5.3%), mostly in the home setting. **Conclusion:** the mapping of technological evidence in outpatient and home care in pediatric urology allowed us to identify the types of technology and their applications focused on self-management of symptoms and self-efficacy, for monitoring and follow-up of urologic care. **Contributions to practice:** the synthesized evidence contributes to an expanded, qualified, and innovative professional practice with the pediatric population with urinary and bowel symptoms, characteristics related to advanced nursing practice, in addition to favoring early diagnosis and greater therapeutic adherence, particularly by supporting interventions tailored to the needs of the pediatric patient and his family.

Descriptors: Ambulatory Care; Internet-Based Intervention; Urology; Pediatrics; Review.

RESUMO

Objetivo: mapear as evidências sobre as tecnologias baseadas na internet e sua aplicabilidade no cuidado ambulatorial e domiciliar em urologia pediátrica. **Métodos:** trata-se de revisão de escopo, com buscas conduzidas em seis bases de dados, sem limite de tempo, nos idiomas português, inglês e espanhol. **Resultados:** 2.200 artigos foram obtidos, sendo 19 publicações elegíveis para a amostra final. As tecnologias baseadas na internet mais utilizadas foram telessaúde e telemedicina (47,3%), programas de intervenção online (21,0%) e aplicativos móveis (15,8%), com uma taxa menor de uso de *serious game*s, mídias sociais e vídeos de micção (5,3%), majoritariamente no contexto domiciliar. **Conclusão:** o mapeamento das evidências tecnológicas na assistência ambulatorial e domiciliar em urologia pediátrica permitiu identificar os tipos de tecnologia e suas aplicações voltadas para o autogerenciamento dos sintomas e autoeficácia, para o monitoramento e acompanhamento do cuidado urológico. **Contribuições para a prática:** as evidências sintetizadas contribuem para uma prática profissional expandida, qualificada e inovadora junto à população pediátrica com sintomas urinários e intestinais, características relacionadas a uma prática avançada de enfermagem, além de favorecer diagnóstico precoce e maior adesão terapêutica, particularmente por apoiar intervenções personalizadas às necessidades do paciente pediátrico e sua família.

Descritores: Assistência Ambulatorial; Intervenção Baseada em Internet; Urologia; Pediatria; Revisão.

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Introduction

Currently, in the global scenario, health care has been transformed, particularly due to the incorporation of new means, methods, and processes brought about by the use of information and communication technologies[1-2]. Such technologies have stood out, such as telemedicine and telecare services, encompassing internet-based technologies (IBT), which involve websites, e-mail, social media, mobile applications, and video calls[3-4].

The term digital health refers to the use of IBT in the health care system so that the user has access to information, services, and facilitated support to health services available within an integrated digital platform. In Brazil, the digital health strategy signals the protagonism of users, whether patients, professionals, or health organizations, given the development of a national network of health data[5]. Therefore, different specialties and health professionals may benefit from IBTs by facilitating the exchange of knowledge, offering personalized interventions, as well as providing autonomy and engagement in health care in a more lasting way[3,6-9].

IBT has been a support tool in pediatric urology due to the complexity of treatment adherence, being used to involve patients and families in this process of self-management of symptoms, in a light and attractive way[10-12]. Particularly nurses, who work in Pediatric Urology and act in a multidisciplinary and collaborative manner in the diagnosis and management of urinary and/or bowel symptoms[13], have a unique role in the regular follow-up and encouragement of the child and family in symptoms (self-) management practices, especially with the application of standard urotherapy[13-14].

Therefore, nurses who work in urologic care can benefit from the incorporation of these technologies, particularly when focused on standard urotherapy, that is, the first-line therapeutic approach to promote elimination habits and changes to a healthier lifestyle for both the child and the family[13-14]. Moreover, by providing nursing care mediated by technology, nurses can plan care, directing it to autonomy in the process of seeking health knowledge, making informed clinical decisions, and providing more personalized care[15]. Thus, this study aimed to map the evidence on web-based technologies and their applicability in outpatient and home care in pediatric urology.

Methods

This is a scoping review, following the method recommended by the Joanna Briggs Institute (JBI). The Preferred Reporting Items for Systematic Reviews and the extension of the JBI's Manual for Evidence Synthesis[16-17] were adopted to systematize the review process. The synthesis of this research protocol was registered in the Open Science Framework (https://osf.io/5s6qm/).

The study was organized following the nine established steps: 1) Define and align the objective(s) and question(s); 2) Develop and align the inclusion criteria with the objective(s) and question(s); 3) Describe the planned approach for evidence search, data selection and extraction, and evidence presentation; 4) Evidence search; 5) Evidence selection; 6) Evidence extraction; 7) Evidence analysis; 8) Results presentation; 9) Summary of the evidence about the review objective, conclusions, and observations on any implications of the findings[17].

The scoping review was guided by the research question, based on the P-C-C strategy, in which (P) Population - Pediatric population with urinary and/or bowel symptoms; (C) Concept- Internet-based technologies; (C) Context 1 - Outpatient; (C) Context 2 - Pediatric Urology Home Care. In this context, the following research question was defined: What are IBTs and how are they applied in the context of outpatient and home care in Pediatric Urology?

The inclusion criteria consisted of studies that described the use of IBT in outpatient care and/or home care of uropediatric patients, published in Portuguese, Spanish, and English, in indexed and peer-

-reviewed journals, available in full text online until the year 2022. It is important to clarify that the emergence of IBTs in health care started in the 1950s, and, specifically in the urology specialty, in the 2000s, and that in 2011, in the United States, telemedicine services focused on outpatient care were already started[2].

Articles with incomplete texts in Portuguese, English, and Spanish were excluded; studies whose context was intensive care and surgery (intraoperative phase); and more complex procedures in the hospital environment (for example, endoscopic or imaging procedures with the use of radioisotopes such as scintigraphy), and palliative care.

The descriptors were selected, and then searches were performed in the databases. The selection of the descriptors was based on the controlled vocabulary of the Medical Subject Heading Terms (MeSH): pediatric, urology; internet-based intervention; Home care; Ambulatory/Outpatient. These were applied to the databases to identify the most used keywords in the published studies. Subsequently, the descriptors were crossed with the Boolean operators AND/OR: Pediatric urology AND Internet-based intervention AND Outpatient and/or home care. The combinations remained similar using different search keys, respecting the specificity of each database, as shown in Figure 1.

Bases	Strategy
MEDLINE/ PubMed	teleurology, telephone urology, pediatric urology, urological diseases, adolescent urologic, enuresis, nocturnal enuresis, mobile applications, telemedicine, m-health, Information Communication Technologies or ICTs or Information Systems or Information or communication technology, IoT OR Internet of things, social media, mobile health, homecare, ambulatory care telehealth, telerehabilitation, lower urinary tract symptoms, smartphone, (children or adolescents or youth or child or teenager), (enuresis or bedwetting or bedwetting or urinary incontinence or nocturnal enuresis), (mhealth or mobile health or m-health or mobile app or mobile application, telemonitoring or telehealth or telemedicine), wireless technologies, mobile voiding diary, remote consultation.
MEDLINE Complete (via plataforma EBSCO)	(continence or incontinence), information technology, (children or adolescents or youth or child or teenager), (enuresis or bedwetting or bedwetting or urinary incontinence or nocturnal enuresis), (mhealth or mobile health or m-health or mobile app or mobile application, telemonitoring or telehealth or telemedicine), remote sensing technology, remote consultation, teleurology, patient portals, internet, internet-based intervention, web browser, urinary bladder, neurogenic, user-computer interface.
CINAHL	telenursing, mhealth, telemedicine, urinary incontinence, pediatric care, urology diseases, wireless technology, telerehabilitation, Apps, urologic patients, communication technology, urology education, mobile health, intervention online game, urologic care, (enuresis or bedwetting or bedwetting or urinary incontinence or nocturnal enuresis), IoT OR Internet of things.
Embase	applications, smartphone, urology, wireless technology, lower urinary tract symptom, telemedicine, urinary tract symptom, 'mhealth', mobile health, mobile application, communication technology, education, child, enuresis, bedwetting, urinary incontinence, nocturnal enuresis, telehealth, internet of things, mobile applications.
SCOPUS	telemedicine, pediatric urology, smartphone, telecare, urinary, telehealth, serious game, urology, therapy games, voiding dysfunction, lower urinary, self-management, urinary bladder neurogenic, enuresis, education, virtual patients, internet care, remote care, continence, information technology, communication technology, urinary incontinence, internet, online.
Ovid Medline	mobile applications, telemedicine, urology (bed wetting or bedwetting or urinary incontinence or nocturnal enuresis), child, smartphone, cell phone, internet, urinary bladder neurogenic, internet of things, urologic diseases.
Web of Science	enuresis, smartphone, pediatric urology, telehealth, urology, mHealth, web-based intervention, urinary, communication technologies, continence, mobile technologies, applications, bladder diary, internet intervention, telephone, online intervention, lower urinary tract symptoms, chronic condition, children, spina bifida, urinary incontinence, internet, enuresis.
LILACS	incontinence, internet, online intervention, chronic condition, telehealth and child telemedicine, urology, urinary bladder, online self-management, ICTs, internet of things, health, social media, bladder, virtual clinic, urinary, serious game, education, online, constipation, LUTS, web.
PROQUEST	telemedicine, pediatric urology, smartphone, telecare, urinary, telehealth, serious game, urology, therapy games, voiding dysfunction, lower urinary, self-management, urinary bladder neurogenic, enuresis, education, virtual patients, internet care, remote care, continence, urinary incontinence, internet, online.
OPEN GREY	pediatric, urology, smartphone, telecare, urinary, telehealth, serious game, urology, therapy games, voiding dysfunction, lower urinary tract symptoms, self-management, urinary bladder neurogenic, enuresis, internet care, remote care, continence, information technology, communication technology, urinary incontinence, internet, telemedicine.

Figure 1 – Search strategies used in each database. Brasília, DF, Brazil, 2022

Electronic searches were performed in the Medical Literature Analysis and Retrieval System Online (MEDLINE) via PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science (WoS), SCOPUS, Embase, Ovid Medline, MEDLINE Complete and Latin American and Caribbean Health Sciences Literature (LILACS) databases. In addition, searches were expanded to Open Grey and ProQuest, and searches were conducted in the Periodical Portal of the Coordination for the Improvement of Higher Education Personnel (CAPES), through the Federated Academic Community (CAFe). Initially, the database searches were performed on a single day, December 10, 2020, by two reviewers independently, and then performed again on October 31, 2022, to generate an updated report.

Rayyan software[18] was used, which allowed the transfer and storage of the studies from the different databases. Data extraction was performed by two reviewers and confirmed by a third reviewer. Disagreements or doubts were resolved by consensus among the three reviewers. We extracted data on the characterization of the study (year, place, and periodical); characteristics of the target audience; methodological design, interventions using IBTs, main results, and health outcomes, which were stored in Microsoft Excel® spreadsheets and presented descriptively with raw data (total value) and relative data (percentage), as shown in Figure 3. Since this is a scoping review, and therefore does not involve research with human beings, the protocol of this study was not submitted for review to a research ethics committee.

Results

A total of 2,200 publications were identified, and 372 duplicate articles were excluded. After reading and analyzing the titles and abstracts, 36 studies were selected to be read in full. After applying the eligibility criteria, 19 articles were eligible to compose the final sample (Figure 2).

The characteristics of the studies that make up the review sample are described in Figure 3.

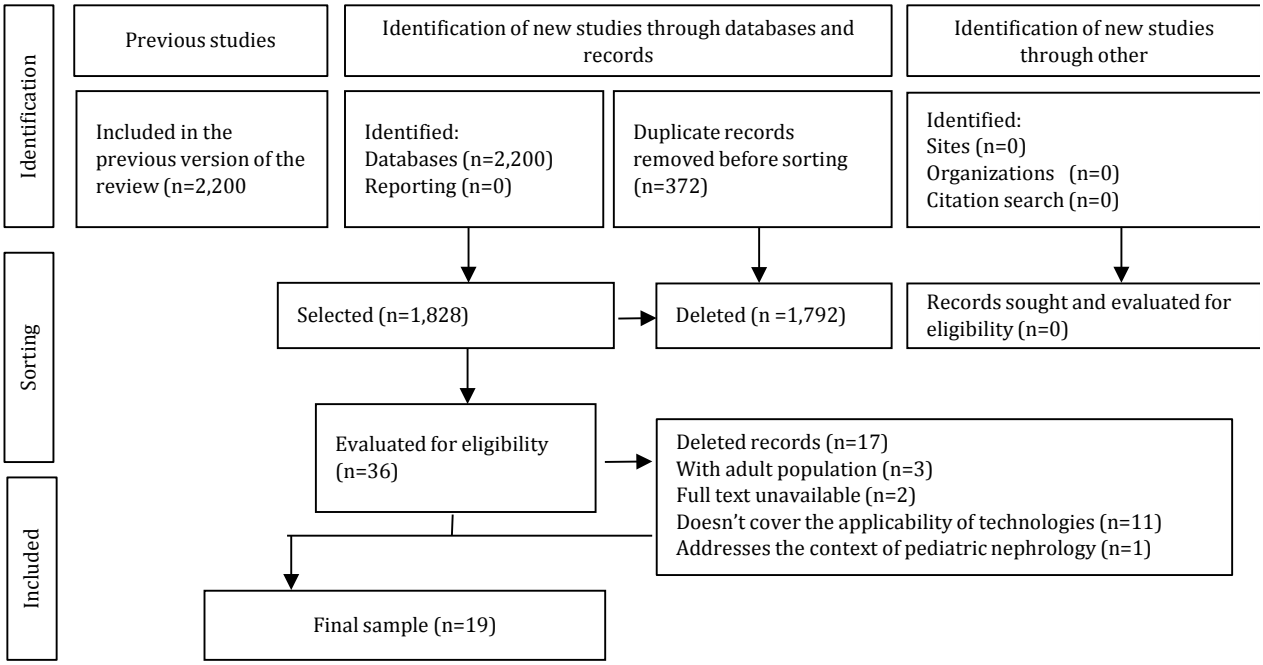

Figure 2 – Flowchart of the selection process of the identified studies, according to the PRISMA recommendations. Brasília, DF, Brazil, 2022

Authors	Journal, year and place	Method	Main Results	
			Types	Applicability
Magee et al[12]	J Pediatr Psychol 2009 EUA	Non-randomized intervention	Online intervention programs	Home-based intervention program for pediatric encopresis was used as an informational support tool for parents with questions regarding their child's condition.
Levy et al[19]	Inform Prim Care 2014 Europa (Reino Unido)	Prospective cohort	Telehealth/ telemedicine	Domiciliar: use of Skype by health care professionals with young people with complex needs has been shown to be an effective intervention to support continence care at home.
Modin et al[20]	J Pediatr Gastroenterol Nutr 2016 Dinamarca	Parallel, controlled, randomized clinical trial	Online intervention programs	Domiciliar: providing Web-based information during functional constipation treatment promoted faster recovery from constipation symptoms in children.
Myint et al[21]	J Pediatr Urol 2016 Austrália	Revisão da Literatura	Aplicativo móvel	Domiciliar: elimination diary apps have decreased the disadvantages of pen and paper diaries (such as loss, forgetfulness, and lack of legibility of urination diary notes) in the treatment of enuresis.
Mozafarpour et al[22]	J Pediatr Urol 2017 EUA	Intervention	Urination video	Domiciliar: the urine clip/video is a non-invasive tool, useful in the diagnosis and in reducing more invasive exams, such as urodynamics.
Richards et al[23]	IEEE J Biomed Health Inform 2018 Austrália	Randomized clinical trial	Online intervention programs	Domiciliar: the eADVICE program has made it possible to provide personalized advice on the treatment of urinary symptoms, favoring treatment adherence and self-management of symptoms.
Choi et al[11]	J Pediatr Urol 2019 Coréia do Sul	Feasibility study-type intervention	Mobile app	Outpatient: the mHealth Glowing Stars program for children with spina bifida promoted knowledge about self-management of symptoms and encouraged the sharing of their experiences, increasing motivation and engagement to practice symptom management.
Nieuwhof et al[24]	J Pediatr Urol 2019 Holanda	Non-randomized intervention	*Serious Games*	Domiciliar: the *serious game* proved to be an innovative tool in urological care, in the sense of complementing and supporting adherence to urotherapy practices in a playful way.
Carter et al[9]	J Child Health Care 2019 Canadá	Mixed	Telehealth/ telemedicine	Domiciliar: telehealth helped in the process of providing the main guidelines and follow-up of children with neurogenic bladder. Besides enhancing the empowerment process and the self-efficacy of the patient and family.
Van Leuteren et al[25]	J Pediatr Urol 2019 Holanda	Pilot intervention study - non-randomized	Online intervention programs	Domiciliar: the bladder sensor (SENS-U) was able to promote natural bladder monitoring and filling in children during activities of daily living and notify them of the presence of a full bladder without depriving them of their daily activities.
Truong et al[26]	Curr Urol Rep 2019 EUA	Literature Review	Social media	Domiciliar: social networks favor the direct communication of pediatric urologists with the public, providing medical advice through social media.
Winkelman et al[27]	J Pediatr Urol 2020 EUA	Non-randomized intervention	Telehealth/ telemedicine	Domiciliar: remote consultations promote time savings and also avoid travel, and corroborate changes in the care plan in a personalized way.
Tapiero et al[14]	World J Urol 2020 Alemanha	Literature Review	Telehealth/ telemedicine	Domiciliar: the study evidenced that telehealth is an effective means of encouraging young people to engage in activities related to their self-care, particularly with continence care.
Castaneda et al[28]	World J Urol 2020 Alemanha	Literature Review	Telehealth/ telemedicine	Domiciliar: telehealth practices have proven to be safe, effective, and satisfying for patients and professionals.
Finkelstein et al[29]	Pediatr Urol 2020 EUA	Transverse	Telehealth/ telemedicine	Domiciliar: the survey showed that almost all the families were satisfied or very satisfied with their experience of virtual consultations, as they emphasize that these consultations are resolutive.
Johnson et al[30]	Pediatr Urol 2020 EUA	Intervention	Mobile app	Outpatient: applicability of a mobile mictional diary was acceptable and feasible for the population of patients with lower urinary tract dysfunction, but no significant differences were shown in using a paper mictional diary and mobile app mictional diary.
Chrapah et al[31]	J Patient Exp 2021 EUA	Non-randomized intervention	Telehealth/ telemedicine	Domiciliar: families who attended the pediatric telemedicine clinic highlighted as main advantages: the time they saved, support in the process of diagnosing the condition, and improved access to health care in remote areas.
Gan et al[32]	J Pediatr Urol 2021 EUA	Retrospective	Telehealth/ telemedicine	Domiciliar: families reported high overall satisfaction with virtual video consultations, as they were able to adequately meet their children's medical needs. This consultation modality was also able to request and evaluate tests, as well as make diagnoses.
Holzman et al[33]	J Child Health Care 2021 EUA	Case-control	Telehealth/ telemedicine	Domiciliar: telehealth practices were compared with face-to-face consultations in a pediatric urology clinic and were found to be resolutive for follow-up and monitoring of pediatric urology patients during the period of the COVID-19 pandemic.

Figure 3 – Presentation of the articles included in the review. Brasília, DF, Brazil, 2022

Regarding the country of origin, 47.3% were from the United States of America (9), 42.1% were from Europe (8), and only 5.3% were from each country (1) below: Canada and South Korea. Regarding the year of publication, 2019 stood out with five published studies (26.3%), the year 2020 with four publications (21.0%) and the year 2021 with three publications (15.8%), with none in 2022 (up to October). The years 2014 and 2016 had two studies each (10.5%), while 2009, 2017, and 2018 had the lowest number, with only one publication (5.3%). Below, the results of this scoping review are presented in more detail, according to the types, target audiences, and applicability of IBTs.

The studies showed an age-related variability, as IBTs were used in children from 2 to 18 years old, and those younger than this age had the help of their parents or family members. Regarding urological conditions, almost half (47.3%) of the publications (9 articles) did not specify the condition, only using the term Pediatric Urology. The lower urinary tract dysfunctions had a quantitative of 26.3%, corresponding to five articles; 15.8% of the studies (i.e., three articles) were about children with spina bifida (consequently, neurogenic bladder and bowel); and 5.3% were about children diagnosed with enuresis, representing only one article. As for bowel symptoms, only one article (5.3%) addressed constipation (1) and another article (5.3%) addressed encopresis.

Telehealth and telemedicine stood out (47.3%) as the most used technologies among pediatric urologists for communication with their patients and parents, followed by online intervention programs (21.0%), mobile apps (15.8%), and, with a lower rate of use, *serious games*, social media, and urination clip/video (5.3% each). Figure 4 provides a summary of the applicability of IBTs in outpatient and/or home care in pediatric urology.

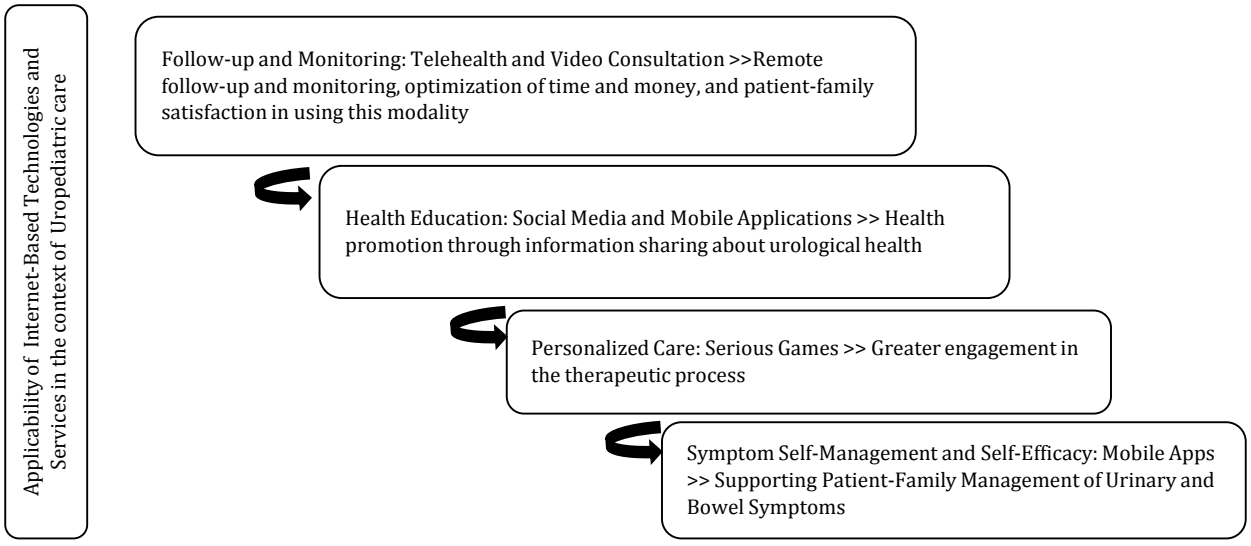

Figure 4 – Applicability of internet-based technologies. Brasília, DF, Brazil, 2022

Among the studies included, IBTs were mostly applied in the home setting in 17 articles (89.5%), and only two studies used these technologies in the outpatient setting (10.5%), mainly to favor adherence and provide guidance to parents and their families about the care that is planned in the outpatient setting and that must be continued at home. In the home setting, IBTs proved to be a useful tool to promote the engagement of patients and their caregivers in the process of (self-) management of urinary and bowel symptoms. They are effective in fostering some behaviors and care alternatives in the context of pediatric urology, such as:

Self-management and Self-efficacy: three stu-

dies have shown that the use of IBTs is an alternative that supports patients and their families in the process of self-management and self-efficacy in the management of urinary and/or bowel symptoms. One study[11] reports a self-management program composed of integrative education in the face-to-face modality and a mobile health (mHealth) intervention[11], which provided children with spina bifida with increased contact with other children with the same condition, favoring experience-sharing, motivation, and engagement. The results of telehealth services with children under five years of age with spina bifida and their caregivers[9] showed positive aspects, demonstrating that telehealth was able to stimulate the participation of family members of these children and promote empowerment and self-efficacy. Moreover, telehealth is an effective way to encourage young people to engage in self-care activities, especially focused on continence, as remote interventions, and Skype were seen as attractive, facilitating supported self-care practices[19].

Personalized care: is exemplified by the program called Electronic Advice and Diagnosis Via Internet Following Computerized Evaluation (eADVICE)[23], which provides personalized advice on the treatment proposed by the professional with the help of a virtual avatar named Dr. Evie. This remote program has promoted improved adherence rates, favoring the establishment of a collaborative care partnership with the user.

Health Education: IBTs, such as mobile apps and social media, are a strong ally for symptom management, health promotion, and information sharing about urologic care[14,26].

Monitoring and Follow-up: the most common application of telehealth has been video consultation (teleconsultation) to assess or follow up with patients [28]. Similarly, telemedicine follow-up of patients with enuresis[6] showed comparable effectiveness to in-person follow-up. Regarding follow-up[20], access to information made available on the Web during constipation treatment may promote faster and short-term recovery from constipation symptoms.

IBTs have also made it easier for patients and their families to follow the guidelines recommended by professionals, as well as assisting in providing better quality and more reliable data on urination, such as through the use of the elimination diary on mobile apps. They also expanded in response to the pandemic context, where one possibility for continuity of urological care was through video consultations (telemedicine)[27], seen as a successful alternative to be applied in this pandemic context.

Furthermore, IBTs have been innovating the care in pediatric urology where they are implemented, as in the case of the use of serious games[24] to increase the intrinsic motivation of pediatric patients in the practice of urotherapy interventions. The Bladder Sensor, named SENS-U, also sends data to a smartphone application and can monitor the natural filling of the bladder in children during activities of daily living and notify them when their bladder is full[34]. In addition, the use of the smartphone camera as a provider of data on urination in the home setting has been described, where clips or videos of urination were considered a non-invasive tool that does not require hospitalization or incur further costs and reduces the need for more invasive urological examinations such as urodynamic testing[35].

Discussion

IBTs have shown promise as promising tools in symptom management, especially focused on supported self-care, including informational and ongoing follow-up support for urologic health in the pediatric setting. In addition, IBTs are used in other specialties, especially in patients with chronic and complex conditions. For example, in children diagnosed with osteogenesis imperfecta and their caregivers[5] and in young people affected by chronic diseases[27] (such as asthma, type 1 diabetes mellitus, and epilepsy), to support the performance of daily health care activities, promoting family and patient empowerment regarding their condition. They are also implemented in the transition

care of adolescent and young adult patients to adult services by facilitating treatment adherence and promoting remote monitoring and supported self-care actions[19,35].

Telehealth is an effective means of attracting young people to engage in self-care activities related to continence care[19]. Benefits were noted by parents, the young people themselves, and physicians who were also caring for participants in other healthcare settings. These benefits were related to advances in supported self-care skills, culminating in improved readiness for transitional care by interacting effectively with different healthcare professionals[19].

IBTs are attractive, especially to young people, because most people own a smartphone, which helps in the process of symptom self-management[34]. Another point is that such technologies can promote a more private and comfortable environment. Regarding urinary and bowel symptoms that are generally stigmatized by society, attending a pediatric urology clinic in person may be considered shameful[19,36-37]. Thus, interventions through IBTs are a sensible and even more cost-effective alternative to reach a larger number of young patients[14,19-38].

These technologies can also be promoters of supported self-care[35], and only one study[9] has addressed such applicability in the context of urologic care. However, they are being implemented in the management of chronic diseases (such as osteogenesis imperfecta and spina bifida), standing out for their ability to promote interaction between pairs of patients with the same condition. This functionality of interaction and sharing of experiences has been a positive reinforcement for the development of individual self-management skills and peer-supported self-care[3,9,34].

IBTs have also stood out as innovative and complementary healthcare tools. Professionals can perform follow-up consultations, evaluate the evolution of symptoms, perform monitoring, and provide self-care guidance remotely, maximizing the efficiency of the work process and providing continuity of care[24]. Moreover, IBTs have been strong allies in times of pandemic, since professionals can counsel patients and their families remotely[2,27].

The Pediatric Urology specialty has embraced the use of telehealth, implementing it increasingly in different services and care centers, particularly for health education and patient and family empowerment[2,39]. The increasing level of telehealth activities in the specialty of pediatric nephrology is noteworthy[40], due to the advantages they offer such as access to specialized care in remote locations, the convenience of staying at home while receiving specialized care, and the ability to rapid and effective communication between patients, families, and professionals[29,40].

The technological devices used by telemedicine[41-42] can be considered a drastic change in the traditional way of providing health care. The professional-patient-family interaction mediated by IBTs needs to go through a process of acceptance and overcome cultural, institutional, and professional barriers to have the process of dissemination and consolidation of telemedicine[42]. The changes in clinical practice with the implementation of digital technologies[43] provide a greater interaction of the professional with the patient, as well as ease and flexibility in scheduling appointments, saving time and money in seeking care. As observed in the use of telemedicine for follow-up consultations for uropediatric patients living in remote areas[2,28], another benefit is the ability to store records, since access to them can be made from anywhere in the world, for example, through a cell phone[6,43].

The Online Health Centre at the University of Queensland is one of the pioneering telehealth services in the world[40]. It aims to optimize professional time traveling between hospitals and clinics, maintain high patient satisfaction, and increase the opportunity for a multidisciplinary approach[2], as well as decrease patient and family absenteeism from appointments[36].

Further research is recommended to identify and analyze the professional practices mediated by IBTs, especially those developed and implemented in the national context by nurses for the self-management of urinary and bowel symptoms, given the absence of national publications on this theme.

Study limitations

Although an exhaustive search was carried out in different electronic databases and the gray literature, since this was a scoping review, no methodological assessment tool was applied to the studies that comprised the sample of this review.

Contributions to practice

Such synthesized evidence brings relevant contributions to an expanded, qualified, and innovative professional practice with the pediatric population affected by urinary and bowel symptoms, characteristics related to advanced nursing practice. These technologies have also been shown to facilitate self-management and self-efficacy skills, simplifying the process of monitoring and follow-up of the pediatric patient and his family in urologic care, performed by the nurse.

Conclusion

The applicability of IBTs in the context of outpatient and home care in pediatric urology allowed us to identify the types of technologies and their applications aimed at self-management of symptoms and self-efficacy, monitoring and follow-up, and providing personalized care.

It is indisputable that IBTs, particularly in the telemedicine modality, are promising in the management of urinary and bowel symptoms, as they provide significant savings in money and time, clearly reducing absences from work and school. They also favor the interaction between professionals, patients, and families, facilitating the communication process between them, which can make them allies in the sense of outlining care experiences and promoting supported self-care practices that are more engaging and meaningful.

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Authors' contribution

Conception and design or data analysis and interpretation: Paiva SS, Silva ELRO, Martins G.
Writing of the manuscript or relevant critical review of the intellectual content: Paiva SS, Silva ELRO, Martins G.
Final approval of the version to be published: Paiva SS, Silva ELRO, Martins G.
Responsibility for all aspects of the text in ensuring the accuracy and integrity of any part of the manuscript: Paiva SS, Silva ELRO, Martins G.

References

1. Sheikh A, Anderson M, Albala S, Casadei B, Franklin BD, Richards M, et al. Health information technology and digital innovation for national learning health and care systems. Lancet Digit Health. 2021;3(6):e383-96. doi: https://dx.doi.org/10.1016/S2589-7500(21)00005-4
2. Miller A, Rhee E, Gettman M, Spitz A. The current state of telemedicine in urology. Med Clin North Am. 2018;102(2):387-98. doi: https://doi.org/10.1016/j.mcna.2017.10.014
3. Castro AR, Chougui K, Bilodeau C, Tsimicalis A. Exploring the views of osteogenesis imperfecta caregivers on internet-based technologies: qualitative descriptive study. J Med Internet Res. 2019;21(12):e15924. doi: https://doi.org/10.2196/15924
4. Early J, Gonzalez C, Gordon-Dseagu V, Robles-Calderon L. Use of mobile health (mHealth) technologies and interventions among community health workers globally: a scoping review. Health Promot Pract. 2019;20(6):805-17. doi: https://doi.org/10.1177/1524839919855391

5. Moura Júnior LA. A estratégia de saúde digital para o Brasil 2020 - 2028. J Health Inform [Internet]. 2021 [cited Dec 5, 2022];13(1):1-2. Available from: https://jhi.sbis.org.br/index.php/jhi-sbis/article/view/878

6. Smith E, Cline J, Patel A, Zamilpa I, Canon S. Telemedicine versus traditional for follow-up evaluation of enuresis. Telemed J E Health. 2021;27(2):213-7. doi: https://doi.org/10.1089/tmj.2019.0297

7. Risling T. Educating the nurses of 2025: technology trends of the next decade. Nurse Educ Pract. 2017;22:89-92. doi: https://doi.org/10.1016/j.nepr.2016.12.007

8. Almohanna AA, Win KT, Meedya S. Effectiveness of internet-based electronic technology interventions on breastfeeding outcomes: systematic review. J Med Internet Res. 2020;22(5):e17361. doi: https://doi.org/10.2196/17361

9. Carter B, Whittaker K, Sanders C. Evaluating a telehealth intervention for urinalysis monitoring in children with neurogenic bladder. J Child Health Care. 2019;23(1):45-62. doi: https://doi.org/10.1177/1367493518777294

10. Chu JTW, Whittaker R, Jiang Y, Wadham A, Stasiak K, Shepherd M, et al. Evaluation of MyTeen – a SMS-based mobile intervention for parents of adolescents: a randomised controlled trial protocol. BMC Public Health. 2018;18(1):1203. doi: http://doi.org/10.1186/s12889-018-6132-z

11. Choi EK, Jung E, Ji Y, Bae E. A 2-step integrative education program and mhealth for self-management in Korean children with spina bifida: feasibility study. J Pediatr Nurs. 2019;49:e54-e62. doi: https://doi.org/10.1016/j.pedn.2019.09.002

12. Magee JC, Ritterband LM, Thorndike FP, Cox DJ, Borowitz SM. Exploring the relationship between parental worry about their children's health and usage of an internet intervention for pediatric encopresis. J Pediatr Psychol. 2009;34(5):530-8. doi: https://doi.org/10.1093/jpepsy/jsn091

13. Souza BML, Salviano CF, Martins G. Advanced practice nursing in pediatric urology: experience report in the Federal District. Rev Bras Enferm. 2018;71(1):223-7. doi: https://dx.doi.org/10.1590/0034-7167-2016-0654

14. Tapiero S, Yoon R, Jefferson F, Sung J, Limfueco L, Cottone C, et al. Smartphone technology and its applications in urology: a review of the literature. World J Urol. 2020;38(10):2393-410. doi: https://doi.org/10.1007/s00345-019-02960-y

15. Silva RC, Ferreira MA. Tecnologia no cuidado de enfermagem: uma análise a partir do marco conceitual da Enfermagem Fundamental. Rev Bras Enferm. 2014;67(1):111-8. doi: https://doi.org/10.5935/0034-7167.20140015

16. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ. 2021;372:71. doi: https://doi.org/10.1136/bmj.n71

17. Peters MDJ, Godfrey C, McInerney P, Munn Z, Tricco AC, Khalil, H. Chapter 11: scoping reviews (2020 version). In: Aromataris E, Munn Z (Editors). JBI Manual for Evidence Synthesis, JBI, 2020. doi: https://doi.org/10.46658/JBIMES-20-12

18. Rayyan QCRI. Qatar Computing Research Institute [Internet]. 2022 [cited Dec. 31, 2022]. Available from: https://www.rayyan.ai/

19. Levy S, Henderson L, McAlpine C. Growing up with confidence: using telehealth to support continence self-care deficits amongst young people with complex needs. Inform Prim Care [Internet]. 2014 [cited Dec 13, 2022]; 21(3):113-7. doi: https://doi.org/10.14236/jhi.v21i3.58

20. Modin L, Walsted AM, Rittig CS, Hansen AV, Jakobsen MS. Follow-up in childhood functional constipation: a randomized, controlled clinical trial. J Pediatr Gastroenterol Nutr. 2016;62(4):594-9. doi: https://doi.org/10.1097/MPG.0000000000000974

21. Myint M, Adam A, Herath S, Smith G. Mobile phone applications in management of enuresis: the good, the bad, and the unreliable! J Pediatr Urol. 2016;12(2):112.e1-6. doi: https://doi.org/10.1016/j.jpurol.2015.09.011

22. Mozafarpour S, Abbasioun R, Kajbafzadeh AM. The mobile technology era: potential benefits in pediatric urology. J Pediatr Urol. 2017;(5):529-30. doi: https://doi.org/10.1016/j.jpurol.2017.07.003

23. Richards D, Caldwell P. Improving health outcomes sooner rather than later via an interactive website and virtual specialist. IEEE J Biomed Health Inform. 2018;22(5):1699-706. doi: https://doi.org/10.1109/JBHI.2017.2782210

24. Nieuwhof-Leppink AJ, Jong TPVM, Van de Putte EM, Schappin R. Does a serious game increase intrinsic motivation in children receiving urotherapy? J Pediatr Urol. 2019;15(1):36.e1-36.e7. doi: https://doi.org/10.1016/j.jpurol.2018.09.003

25. Van Leuteren PG, Nieuwhof-Leppink AJ, Dik P. SENS-U: clinical evaluation of a full-bladder notification – a pilot study. J Pediatr Urol. 2019;15(4):381.e1-381.e5. doi: https://dx.doi.org/10.1016/j.jpurol.2019.04.006

26. Truong H, Salib A, Rowe CK. The use of social media in pediatric urology-forging new paths or crossing boundaries? Curr Urol Rep. 2019;20(11):72. doi: https://doi.org/10.1007/s11934-019-0928-y

27. Winkelman AJ, Beller HL, Morgan KE, Corbett ST, Leroy SV, Noona SW, et al. Benefits and barriers to pediatric tele-urology during the COVID-19 pandemic. J Pediatr Urol. 2020;16(6):840.e1-840.e6. doi: http://doi.org/10.1016/j.jpurol.2020.09.028

28. Castaneda P, Ellimoottil C. Current use of telehealth in urology: a review. World J Urol. 2020;38(10):2377-84.doi:https://dx.doi.org/10.1007/s00345-019-02882-9

29. Finkelstein JB, Nelson CP, Estrada CR. Ramping up telemedicine in pediatric urology- tips for using a new modality. J Pediatr Urol. 2020;16(3):288-9.doi: https://doi.org/10.1016/j.jpurol.2020.04.010

30. Johnson EK, Estrada CR, Johnson KL, Nguyen HT, Rosoklija I, Nelson CP. Evaluation of a mobile voiding diary for pediatric patients with voiding dysfunction: a prospective comparative study. J Urol. 2014;192(3):908-13. doi: https://dx.doi.org/10.1016/j.juro.2014.03.099

31. Chrapah S, Becevic M, Washington KT, Sheets LR, Wallach E, Chitima R, et al. Patient and provider satisfaction with pediatric urology telemedicine clinic. J Patient Exp. 2021;8:2374373520975734. doi: https://doi.org/10.1177/2374373520975734

32. Gan Z, Lee SY, Weiss DA, Van Batavia J, Siu S, Frazier J, et al. Single institution experience with telemedicine for pediatric urology outpatient visits: adapting to COVID-19 restrictions, patient satisfaction, and future utilization. J Pediatr Urol. 2021;17(4):480.e1-480.e7. doi: https://dx.doi.org/10.1016/j.jpurol.2021.05.012

33. Holzman SA, Davis-Dao CA, Khoury AE, Fortier MA, N Kain Z. Telemedicine and patient satisfaction during the COVID-19 pandemic: a case-control study of outpatient pediatric urology patients. J Child Health Care. 2021;6:13674935211058272. doi: https://dx.doi.org/10.1177/13674935211058272

34. Nieuwhof-Leppink AJ, Hussong J, Chase J, Larsson J, Renson C, Hoebeke P, et al. Definitions, indications and practice of urotherapy in children and adolescents: a standardization document of the International Children's Continence Society (ICCS). J Pediatr Urol. 2021;17(2):172-81. doi: https://doi.org/10.1016/j.jpurol.2020.11.006

35. Virella Pérez YI, Medlow S, Ho J, Steinbeck K. Mobile and web-based apps that support self-management and transition in young people with chronic illness: systematic review. J Med Internet Res. 2019;21(11):e13579. doi: https://dx.doi.org/10.2196/13579

36. Otis-Chapados S, Coderre K, Bolduc S, Moore K. Evaluating the distance travelled for urological pediatric appointments. Can Urol Assoc J. 2019;13(12):391-4. doi: http://doi.org/10.5489/cuaj.5892

37. Whale K, Beasant L, Wright AJ, Yardley L, Wallace LM, Moody L, et al. A smartphone app for supporting the self-management of daytime urinary incontinence in adolescents: development and formative evaluation study of URApp. JMIR Pediatr Parent. 2021;4(4):e26212. doi: https://doi.org/10.2196/26212

38. Pettit S, Young E, Jung I. Systematic review of telemedicine in pediatric urology. J Pediatr Urol. 2022;18(1):17-22. doi: http://doi.org/10.1016/j.jpurol.2021.09.024

39. Socarrás MR, Loeb S, Teoh JY, Ribal MJ, Bloemberg J, Catto J, et al. Telemedicine and smart working: recommendations of the European Association of Urology. Eur Urol. 2020;78(6):812-9. doi: https://doi.org/10.1016/j.eururo.2020.06.031

40. Qiu Y, Coulson S, McIntyre CW, Wile B, Filler G. Adolescent and caregiver attitudes towards telemedicine use in pediatric nephrology. BMC Health Serv Res. 2021;21(1):537. doi: https://doi.org/10.1186/s12913-021-06506-0

41. Vallasciani S, Abdo B, Rauf Z, Anjum A, Ghulman S, Alghammas H, et al. Telehealth for the assessment of patients referred for pediatric urological care: a preliminary cost savings analysis and satisfaction survey. Telemed J E Health. 2019;25(8):756-61. doi: https://doi.org/10.1089/tmj.2018.0159

42. ElAgami H, Woodward B, Awolaran G, Kalidasan V. Virtual consultation in paediatric urology during the COVID-19 pandemic: The effect of pathology on the outcome. J Telemed Telecare. 2022;28(7):539-46. doi: https://dx.doi.org/10.1177/1357633X221076967

43. Kernebeck S, Busse TS, Böttcher MD, Weitz J, Ehlers J, Bork U. Impact of mobile health and medical applications on clinical practice in gastroenterology. World J Gastroenterol. 2020;26(29):4182-97. doi: https://doi.org/10.3748/wjg.v26.i29.4182