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## A COMPREHENSIVE REVIEW ON THE USEFULNESS OF TELEHEALTH INTERVENTION FOR CHILDREN WITH DISABILITY WITH SPECIAL REFERENCE TO SAUDI ARABIA

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### Keywords:

Telehealth, Disability, Active participation, Self-care management

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**ABSTRACT: Background:** Healthcare requirements have changed gradually from the primitive ages to this modern era. Information and communication technology has opened innovative techniques like home healthcare for patients through telehealth use. **Aims:** 1. To find out the usefulness and effectiveness of telehealth intervention on the daily living activities amongst children with disability in Saudi Arabia. 2. To find out the active engagement and self-management strategies that telehealth can provide for children with disability in Saudi Arabia. **Methods:** A literature review of 42 articles published in various databases was assessed. The articles having good scientific quality and explaining the usefulness and effectiveness of telehealth intervention on the daily living activities amongst children with disability were included. **Results and Discussion:** It is currently estimated that 3.73% of the population have functional disabilities which limit their independence. To address the disability issues, one must make use of the present information around the disability prevalence. The criterion for achieving a suitable balance of accommodation and support is a comprehensive assessment of the features of the technology, the relevant environments and the individual. **Conclusion:** Telehealth is an innovative substitute for managing the continuing care and recovery of patients including children who have severe disabilities and their caregivers.

**INTRODUCTION:** It is a well-known fact that children with disability particularly cerebral palsy regularly require continuous attention and healthcare support with regular or periodic medical consultations. Some support systems can be fixed at their home itself with different kinds of equipment, but this will make these homecare programs very costly as well as complex. In case of severe cases, the children will have to be shifted to hospitals or medical centers due to unavailability of proper home care services.

The management of disability often needs specialized medical, psychological, social, vocational, and other rehabilitative care <sup>1, 2, 3</sup>. The love and support of family is very crucial in taking care of the children with disability. This has unlocked the doors for the growth of telehealth services to care for the avalanche of patients who can take care at home in the coming years. Disability is a complex, influential, dynamic, multidimensional challenge, and it can substantially narrow down the daily life activities of people and their ability to homogenize with the society <sup>4</sup>.

As we all know, there is often a social stigma connected with any kind of disability. Disability can turn out to be a social and economic barrier to most people <sup>4</sup>. WHO estimates tell us that in 15% of world's population there exists some type of

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disability and 2 - 4% of them must experience severe difficulties in living. The data analysis presented by Global Burden of Diseases 2015 has divided the people based on the severity of their disability. We can find out that 15% out of the whole world population (over a billion people) experienced moderate or severe disability, 2.9% population (185 million people) had severe disabilities<sup>5</sup>.

In today's world, healthcare is very expensive and complex, and this has made it increasingly important for children living with severe functional disabilities like cerebral palsy and their care-givers or family members to foster self-management practices. This can be achieved by identifying, monitoring, and tracking health care outcomes of these children. There has been very little research relating to the effectiveness that telehealth can provide in refining the quality of life (QOL) of children with disability in Saudi Arabia. Some researchers tried to find out how disability can affect the life qualities of families who have children with disabilities<sup>6</sup>. It can save the time and the efforts spend by the patient in reaching the hospital or clinic for undergoing the treatment at home. The biggest effectiveness of telehealth will be in improving the quality of life of children with disability by using this technology. This will indirectly affect the quality of life of their parents as they are the primary unconditional caregivers<sup>6</sup>.

Telemedicine has become increasingly popular to provide health education and medical care to patients living in home care arrangement and rural areas. We can connect the children experiencing disability with a Rehabilitation therapist who can guide the children at their home explaining to him/her, the treatment which is proposed<sup>7,8</sup>.

Additionally, in the information and communication technology era, we can benefit a lot from advancements in health care and technology. telehealth and telemedicine can be useful in providing different services in healthcare for children with distinct needs like cerebral palsy. If a child can reduce his stay in the hospital and can gradually recover at home, it will reduce the burden on the child including his/her family to travel great distances, to save costs and time which they can spent on him to improve his life qualities.

Special needs like cerebral palsy in children present a complex array of healthcare issues that runs parallel with the age. These vary from chronic health infirmities (cystic fibrosis, diabetes and epilepsy), behavioral and developmental disorders (spina bifida, cerebral palsy, autism, attention deficit hyperactivity illness and mental retardation), and traumatic injuries (traumatic brain injury, spinal cord injury). These situations can and often derail the daily functioning of the child<sup>7,8</sup>.

**Background:** Healthcare requirements have changed gradually from the primitive ages to this modern era. Information and communication technology probably has opened innovative techniques like home healthcare for patients through telehealth use. Every society can have some children with disabilities. We can utilize these resources effectively to achieve the desired results. These children experience much difficulty in doing their day today activities. This review will enlighten us about the utilization of new intervention techniques like telehealth to improve their daily living activities. Disability of any form in children requires more love and support from caregivers or family members. Healthcare innovation integrated with superior technology can improve the quality of life of children through active engagement and self-management strategies.

### **Literature Review:**

**What are Telemedicine and Telehealth?** A classic example of telemedicine constitutes a patient in a healthcare facility at a rural or medically underserved place, where the required healthcare provider for the patient is not accessible. Such a capacity can be called a spoke site<sup>9</sup>. The spoke site having Information and Communication Technology, associates a hub site-where the consultation is provided<sup>10</sup>. Telemedicine incorporates ICT to provide health care services to people or patients who are situated far away or not present personally in the hospital or telemedicine center. A related term is telehealth<sup>11</sup>, which includes a broader definition of distant healthcare that comprises non-clinical services, such as patient education, self-management of the disease, and medical training for providers<sup>11</sup>.

Telemedicine and telehealth involve the utilization of ICT to provide a wide range of healthcare

services to patients without personally requiring the individual to interact face-to-face with the healthcare provider. Frequently used telehealth and telemedicine applications constitute video conferencing between a patient and his healthcare provider in case of further consultations or between patient groups patients or providers for education, support, and care coordination; data transmission, for example X-rays, videos, photographs, and audio files; remote monitoring of vital signs and other indicators of health; and various Internet applications used for patient education as well as disease management<sup>11,12</sup>.

### **What Technologies are found in Telehealth or Telemedicine?**<sup>11</sup>

While telemedicine relies on many technologies, telecommunications technology is imperative to allow communication among two or additional sites. Although Plain Old Telephone Service and Integrated Service Digital Network are sufficient for many telemedicine interactions, they lack the capacity to support telemedicine applications which are more complex, such as videoconferencing between multiple sections or sites requiring the transfer of medical photographs at the quality level needed for exact diagnoses. These applications bank on the high-speed connection of Internet or broadband<sup>11</sup>. For optimal telemedicine performance, the broadband connection ought to have good bandwidth to allow all connected points to receive and send large amounts and complex data sets at a fast speed with accuracy. Proper security restrictions must also be established for ensuring that the data are transferred only to the intended recipients, protecting patients' privacy<sup>11,12</sup>. Telemedicine makes use of an ever-growing list of technological devices and software, and comprises videoconferencing equipment; digital cameras; electronic clinical devices like digital stethoscopes. It also comprises health education software and managing of diseases software<sup>11,12</sup>.

### **Why does Telemedicine matter for Children?**<sup>11</sup>

Low-income children from remote areas, including rural and parts of urban areas, come across different geographic and monetary barriers to access proper healthcare<sup>11</sup>. Telemedicine is a tool to support obtaining care which would otherwise face great difficulty in accessibility. Extensive travel for getting healthcare can be arduous for

families with low-income. Apart from the difficulties caused, many families with low-income families don't have affordable transportation options.

### **Children having Special Healthcare Requirements:**

Children having special healthcare requirements, such as cerebral palsy, autism, genetic diseases, mental retardation, depression, anxiety, and behavioral problems<sup>12,13</sup> often require multiple and coordinated healthcare services on a regular mode from an integrative set of providers<sup>12</sup>. Telemedicine can be especially valuable for children having specialized healthcare requirements and who reside in a rural or areas where medical services are accessible because of lack of pediatric subspecialists in these areas<sup>13,14</sup>. Home Health Care telehealth technology has helped improve the lives of families of critically ailing children by permitting them to retain their children at home. Remote monitoring devices can alert parents and providers when a health indicator, such as heart rate, shows a significant change. Videoconferencing can allow providers to see their patients without much travelling for healthcare. This is especially valuable for persistently ill children who may need multiple contacts with their providers<sup>15</sup>.

### **What Are the Costs and Benefits of Telemedicine?**

As telemedicine usage has grown, researchers have started to estimate the contribution of telemedicine to healthcare systems and local economies, the health care quality it facilitates, and provider and patient satisfaction<sup>11</sup>. Much of what we know is based on small isolated studies. Longitudinal research on the future impact of telemedicine is needed. However, initial findings indicate that telemedicine has great potential to expand healthcare accessibility and quality, create efficiencies in healthcare systems, and benefit local communities when it is implemented and applied appropriately.

**Disability:** The definition given by World Health Organization says that disabilities are a holistic term, bringing together impairments which limit activity and participation<sup>16</sup>. Impairment is a trouble in the body structure or function; an activity restraint is a struggle faced by a person in completing an action or task; while a participation

constraint is a challenge or difficulty experienced by any individual which comprises of life situations<sup>16, 17</sup>. Disability is a phenomenon signifying an interaction among characteristics of a person's body and society in which he/she lives<sup>12, 17</sup>. Functional difficulties mean mental or physical circumstances, which impair, interfere with, or impede one, two or more of the person's important life activities of daily living<sup>8, 17</sup>. A severe disability will create difficulty in performing three or more of the functional capacities like communication, self-care, mobility, self-direction, interpersonal skills, work skills or work tolerance<sup>8</sup>. Children with infirmities or disabilities may attend school and experience limited opportunities for human capital formation and face reduced employment opportunities and decreased productivity in adulthood<sup>7, 18, 19</sup>.

Traditional service models include family and the child visiting multiple individuals in separate clinics or teams of professionals in clinics and the conversation of information in a typical written report, when it arrives. Much time, energy, often great distances, costs, long waits for appointments, and late communications characterize these classical evaluation and service systems for treatment<sup>7, 21</sup>. Researchers have explored the handling of telehealth technologies to provide self-care management, follow up and booster interventions<sup>22</sup>. It was shown that telehealth technologies which are home-based can be used to optimize different community integration ways or skills for adults facing severe kind of functional disabilities<sup>23</sup>.

However, the key issue is how best to implement these telehealth-based techniques for chronic disabled conditions and their caregivers in their homes<sup>8, 23</sup>. Since knowledge about technology and priorities tend to change, it is essential that telehealth investigators and providers of healthcare collaborate with patients having any kind of disability and the caregiver's family to make sure that the telehealth technologies are tailored to their specific needs<sup>22, 23</sup>.

**Telehealth for Children Experiencing Cerebral Palsy and Caregivers:** The incidence of neurological disorders in Saudi children was 45,682<sup>24</sup>. Of them, 313 had chronic neurologic disorder representing a prevalence rate of 68.5 per

10,000 children, which is the highest among all chronic diseases in children. Mental retardation is a common neurologic disorder with a prevalence rate of 26.3/10,000. The prevalence rate of cerebral palsy was 23.4/10,000. It is also found that the major neurologic disorders were most commonly pediatric chronic disorders in KSA<sup>24</sup>.

**Self-management:** Active engagement in self-management strategies and family participation are critical for the treatment and effective long-term care of chronic disabilities<sup>25, 26</sup>. Self-management which is effective not only promotes informed choice, but also in engaging persons with chronic diseases and the family caregivers in the development of problem-solving skills and managing strategies<sup>27</sup>. Key components self-management strategies include the improvement of the behavioral skills in carrying out the recommended optimal health strategies (*e.g.*, exercise, monitoring the blood pressure and problem-solving capabilities), negotiating with healthcare experts on effective methods of intervention along with adherence to diverse treatment regimens.

**Limitations in the Available Literature:** Review of available literature showed that disability needs continuing care and requires constant medical interventions either in the form of self-care or medications to manage with the challenges. But telehealth can play a bigger role to boost the qualities of life among children with disability and it is a topic of great research. The review of literature gave us an insight into the greater role played by ICT in the lives of disabled persons or children. There are areas where telehealth plays a dynamic role in serving disabled children integrate with the society and usher in normalcy and happiness in their lives. There are some studies which have attempted to use telehealth for disabled children but none of them has been carried out in Saudi Arabia. These studies also point out that disabilities like cerebral palsy when diagnosed in children can be treated with telehealth intervention<sup>8, 9, 11, 12</sup>.

#### **Aims:**

1. To find out the usefulness and effectiveness of telehealth intervention on the daily living activities amongst children with disability in Saudi Arabia.

2. To find out the active engagement and self-management strategies that telehealth can provide for children with disability in Saudi Arabia.

**Methods:** A literature review of 42 articles published during 1993 to 2017 in various databases was assessed. The criteria for inclusion in this study were to select articles of good scientific quality. The articles which were falling in line with the aim of the study, which was to find out the usefulness and effectiveness of telehealth intervention on the daily living activities amongst children with disability, were included. Items were excluded if they were irrelevant to the telehealth use for children with disability, redundant, and lacked scientific quality. The purpose of including articles with scientific quality (*i.e.* sound methodology) was to minimize the chances of bias and thereby to produce better results. A comprehensive exploration for published books and articles as well as various WHO reports was undertaken from across a wide-ranging choice of data sources for fulfilling the inter-disciplinary appeal of the present topic. Varied articles published in English were selected with observed boundaries in the scientific quality. A preliminary literature search was undertaken between October 2016 and August 2017 which was followed with an update search during the period November 2017 and December 2017.

**RESULTS AND DISCUSSION:** The effect of a technology-based intervention extends beyond the device itself and involves a personalized mix of supports, technology used, environmental accommodations and strategies, and significant support from others<sup>8</sup>. The criterion for achieving a suitable balance of accommodation and support is a comprehensive assessment of the features of the technology, the relevant environments and the individual that might affect the combination between the consumer and the assistive device<sup>8,24</sup>.

The topic of disability in the Kingdom is a significant societal issue. According to WHO statistics, disability rate in 2012 was 15% and it was projected that approximately 4,070,546 people in Saudi Arabia require rehabilitation services<sup>28,29</sup>. According to the definition used, it is currently estimated that 3.73% of the population have functional disabilities which limit their

independence. To address the disability issues, one must make best use of the present information around the disability prevalence. Further, it is essential to address the breaches in the existing knowledge base relating to the type of disability, and how to develop appropriate support programs to address those needs. In the Saudi society, there is incidence of many consanguineous (between the same blood relations) marriages. A study stated that the total prevalence of consanguinity was 56%, the percentage of consanguinity among first-degree cousins was 33.6% and it was more frequent than all other relations (22.4%)<sup>30</sup>. As a result, the risk of disabilities associated with genetic causes is also significant.

Further, the parents lack awareness of the inborn errors caused by metabolism<sup>31</sup>. Over 50% of the parents, who responded to a study questionnaire, literally had no idea of the causes of their children's diseases, their symptoms and their inheritance patterns. Saudi society's view of persons with disabilities is based on a simple notion of disability, comprising of helplessness, lacking independence, being home-bound, low life qualities and lack of productivity<sup>30,31</sup>.

To cope with these attitudes, various small-scale educational programs are provided for the guide of parents of those children with disabilities. Several programs are organized by charitable organizations supported by the Labor Ministry and Social Affairs. There are also a few programs on Saudi TV or radio for the children with disabilities and the care-takers<sup>33,34</sup>. How effective and helpful these educational programs are in minimizing the effect of disabilities on the family caregivers and community in addition to changing the present attitude of the community toward disabled people, are issues that are still answered. Therefore, prevalence studies, psychosocial aspects, characteristics, and the economic impact of these disabilities in Saudi Arabia would be a great boon to better guide policy and programmatic decisions to master the understanding of disability.

In a research study carried out in Qaseem in 1993, incidence of disability was estimated in about 13,841 children under the age group of 15 years. This study presented that the utmost common disability was physical disability and comprises

about 1.7% followed by mental retardation which comprises 1.4%<sup>35</sup>. The results of this study prompted the organization called the Disabled Children's Association to open a branch in Madina. Recently a national survey on disability showed that there are 3838 disabled children among the 60,630 children surveyed, representing 6.33%<sup>36, 37</sup>. The studies that investigated the occurrence of disability in children found out that there is a high fluctuation in the prevalence figures. This may be due either to different phases of medical and educational services offered among different regions or to the usage of various definitions of disability. Methodological flaws or high / low percent for consanguineous marriages in the different regions may be other factors for such variation in incidence of disability. So, any interpretation relating to these studies should be made with utmost caution.

The cost factor also can be taken into consideration. The poor or underprivileged patients may find it hard to afford the costs of purchasing computer equipment and monthly service provider costs for the internet<sup>38</sup>. However, in organizing such family caregiver interventions, providers should evaluate whether the environment at home will be suitable for telephonic intervention. Previous researches have documented the efficiency of different self-care management techniques for different chronic illnesses with varied results or outcomes, such as improved coping, improved life qualities and disease control<sup>39</sup>. Another reality is that most comprehensive rehabilitation services are typically available in towns or cities or at faraway places in times of need. As a result, persons with severe functional disabilities often travel great distances from the concentrated rehabilitation services that benefit them throughout the recovery process<sup>40, 41, 42</sup>.

**CONCLUSION:** Telehealth is an innovative and viable substitute for managing the continuing care and recovery of patients and children who have severe disabilities and the caregivers who reside in communities where there are scarce rehabilitation services or to even consumers who lack transportation to urban-based rehabilitation.

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## REFERENCES:

1. El-Hazmi MAF: Early recognition and intervention for prevention of disability and its complications. *Eastern Mediterranean Health Journal* 1997; 154-161.
2. Gill TM and Kurland B: The burden and patterns of disability in activities of daily living among community-living older persons. *J Gerontol Biol Sci Med Sci* 2003; 58: 70-75.
3. Gill TM and Kurland BF: Prognostic effect of prior disability episodes among nondisabled community-living older persons. *Am J Epidemiol* 2003; 158: 1090-1096. doi: 10.1093/aje/kwg237
4. Maher S. Al-Jadid. Disability in Saudi Arabia. *Saudi Med J* 2013; 34(5): 453-460.
5. Fact Sheet Disability and Health. Available from [www.who.int/mediacentre/factsheets/fs352/en/](http://www.who.int/mediacentre/factsheets/fs352/en/)
6. Abdulhade HI and Abu-Hawwash MR: Evaluating Quality of life of parents having a child with disability. *International Interdisciplinary Journal of Education* March 2012; 1(2): 1-2
7. Harper DC: Telemedicine for Children with Disabilities. *Children's Health Care*, 2006; 35(1): 11-27. doi: 10.1207/s15326888chc3501\_3
8. Forducey, Pamela G, Glueckauf, Robert L, Bergquist, Thomas F, Maheu, Marlene M and Maya Y: Telehealth for persons with severe functional disabilities and their caregivers: Facilitating self-care management in the home setting. *Psychological Services* 2012; 9(2): 144-162. doi: 10.1037/a0028112
9. About Telemedicine, American Telemedicine Association, 1 May 2007 (<http://www.atmeda.org/news/overview.html>)
10. California Telemedicine and eHealth Center, A Glossary of Telemedicine and eHealth (Sacramento, CA: California Telemedicine and eHealth Center, 2006).
11. Nesbitt TS: Meeting the Health Care Needs of California's Children: The Role of Telemedicine. Digital opportunity for Youth Issue Brief Number 3, 2<sup>nd</sup> Edition: March 2008.
12. Glueckauf RL and Ketterson TU: Telehealth interventions for individuals with chronic illness: Research review and implications for practice. *Professional Psychology: Research and Practice*. 2004; 35: 615-627. doi:10.1037/0735-7028.35.6.615
13. Glueckauf RL, Pickett TC, Ketterson TU, Nickelson DW and Loomis JS: Telehealth research and practice: Key issues and developments in research. In: Llewelyn, S.; Kennedy, P., editors. *Essentials of clinical health psychology*. Wiley; London: 2006; 305-331. doi: 10.1037/a0028112
14. Simacek J, Dimian AF and McComas JJ: J Autism Dev Disord 2017; 47: 744. <https://doi.org/10.1007/s10803-016-3006-z>
15. Dorstyn DS, Mathias JL and Denson LA: Psychosocial outcomes of telephone-based counseling for adults with an acquired physical disability: A meta-analysis.

- Rehabilitation Psychology. 2011; 56: 1-14. [PubMed: 21401281]doi: 10.1037/a0022249
16. World Health Organization. Disabilities. Geneva (CH): World Health Organization 2012.
  17. Glueckauf: Paul Rehabilitation Psychology 2002; 47(1): 49-72. Special Section: Telehealth and Chronic Disabilities.
  18. Filmer D: Disability, poverty and schooling in developing countries: results from 14 household surveys. The World Bank Economic Review 2008; 22: 141-163. doi: 10.1093/wber/lhm021
  19. Burchardt T: The education and employment of disabled young people: frustrated ambition. Bristol, Policy Press, 2005.
  20. Economic implications of chronic illness and disability in Eastern Europe and the Former Soviet Union. Washington, World Bank, 2008.
  21. Albus K: The Family Voices in SCHIP Telemedicine Report: Bridges, Not Boundaries: The Value and Use of Telemedicine for Children/Youth with Special Health Care Needs (Albuquerque, NM: Family Voices, 2003); 10-19.
  22. Research - Cost Analysis, Kansas University Medical Center, Center for Telemedicine and Telehealth 2007, (<http://www2.kumc.edu/telemedicine/research/costanalysis.html>)
  23. Forducey PG, Phillips V, Tisdell T, Dawson SJ, Heuser A and DuRoy D: Telerehabilitation vs. traditional home health: Physical and mental health outcomes following stroke. Presented at the American Telemedicine Association (ATA) 12<sup>th</sup> Annual International Meeting and Exposition; Nashville, Tennessee 2006.
  24. Al Salloum AA, El Mouzan MI, Al Omar AA, Al Herbish AS and Qurashi MM: The prevalence of neurological disorders in Saudi children: a community-based study. *J Child Neurol* 2011; 26: 21-24.
  25. Bodenheimer T, Lorig K, Holman H and Grumbach K: Patient self-management of chronic disease in primary care. *Journal of the American Medical Association*. 2002; 288: 2469-2475. [PubMed:12435261]
  26. Shearer M, Evans CC, Leverenz J, Stouter J, Irby JW, Lee JE and Yablon SA: Therapeutic alliance in post-acute brain injury rehabilitation: Predictors of strength of Alliance and impact of alliance on outcome. *Brain Injury*. 2007; 21: 663-672. [PubMed: 17653940]. Doi: 10.1080/02699050701481589
  27. Forducey PG: Bringing recovery home: Telehealth initiatives offer support and rehabilitation in remote locations. *American Psychological Association Monitor*. 2006; 32-34.
  28. Kingdom of Saudi Arabia Healthcare Overview. Available from URL: <http://www.colliers.com/~media/files/emea/emea/research/speciality/2012q1-saudi-arabia-healthcare-overview.aspx>
  29. El-Hazmi MAF and Warsy AS: Genetic disorders among Arab populations. *Saudi Med J*. 1996; 17: 108-123.
  30. El Mouzan MI, Al Salloum AA and Al Herbish AS: Consanguinity and major genetic disorders in Saudi children: a community based cross-sectional study. *Ann Saudi Med*. 2008; 28: 169-173.
  31. Al Essa M, Ozand PT and Al-Gain SI: Awareness of inborn errors of metabolism among parents in Saudi Arabia. *Ann Saudi Med* 1997; 17: 562-564.
  32. Al Salloum AA, El Mouzan MI, Al Omar AA, Al Herbish AS and Qurashi MM: The prevalence of neurological disorders in Saudi children: a community-based study. *J Child Neurol* 2011; 26: 21-24. doi: 10.1177/0883073810371510.
  33. <http://www.health.govt.nz/system/files/documents/publications/putting-people-first-review-of-disability-support-services-dec13.pdf>
  34. <http://www.pewresearch.org/2007/10/15/trends-in-attitudes-toward-religion-and-social-issues-19872007/>
  35. Alsekait M: The Incidence of disability in Al Qaseem. Prince Salman Centre for Disability Research, Riyadh Saudi Arabia 1993.
  36. Central Department of Statistics and Information. Latest Statistical Releases. Riyadh (KSA): Central Department of Statistics and Information 2011. Available from URL: <http://www.cdsi.gov.sa/english/>
  37. Japan International Cooperation Agency Planning and Evaluation Department. Country Profile on Disability, Kingdom of Saudi Arabia. Riyadh (KSA): Japan International Cooperation Agency Planning and Evaluation Department 2002.
  38. Lindgren S, Wacker D and Suess A: Telehealth and Autism: Treating Challenging Behavior at Lower Cost. *Pediatrics*. 2016; 137(Suppl 2): S167-S175. doi: 10.1542/peds.2015-28510.
  39. Oono IP, Honey EJ and McConachie H: Parent-mediated early intervention for young children with autism spectrum disorders (ASD). *Cochrane Database of Systematic Reviews* 2013; 4. Art. no.: CD009774. doi: 10.1002/14651858.CD009774.pub2.
  40. Scherer M, Sax C and Glueckauf R: Activities and participation: The need to include assistive technology in rehabilitation counselor education. *Rehabilitation Education*. 2005; 19: 177-190.
  41. Scherer MJ: Assistive technology: Matching device and consumer for successful rehabilitation. APA; Washington, DC 2002.
  42. Glueckauf RL and Ketterson TU: Telehealth interventions for individuals with chronic illness: Research review and implications for practice. *Professional Psychology: Research and Practice*. 2004; 35: 615-627. doi: 10.1037/0735-7028.35.6.615

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