An Exploratory Study on Development Smart Cradle for Women with Spinal Cord Injury: Focus Group Interview

Jae-nam Kim[1], Ha-yeon Yang[2], Min-kyung Kim[2], Hyun-kyung Kim[2], Sun-hwa Shim[3], Eun-joo Kim[3], Wan-ho Jang[3(✉)], and Sun-young Jo[4]

[1] Health Science Research Institute, Jeonju University, Jeonju 55069, South Korea
[2] Department of Rehabilitation Science, Jeonju University, Jeonju 55069, South Korea
[3] Department of Occupational Therapy, Jeonju University, Jeonju 55069, South Korea
otjang@jj.ac.kr
[4] Department of Rehabilitation Medicine, Jeonbuk National University Hospital, Jeonju 54907, South Korea

Abstract. This study is preliminary research to develop a smart cradle for women with spinal cord injury. The purpose of this study was to investigate the needs for improvement of the product and important factors related to product development. A focus group interview was conducted with a total of 5 women with spinal cord injury who had experienced parenting after spinal cord injury. After recording all of the focus group interviews, researchers individually analyzed the content and integrated the results. Easy access cradle design for wheelchair users, attachment of wheelchair and cradle when moving at home, an open and lockable door one side of the cradle were required in cradle structures. Electronic height adjustment, bounce mode, children's motion sensor, and function linked with a smartphone should be reflected in the development of the cradle. This result is meaningful in that it suggests points to be considered in the process of developing an assistive device by reflecting the desire to understand the grievance women with spinal cord injury when parenting.

Keywords: Smart cradle · Spinal cord injury · Child care · Parenting · Focus group interview

1 Introduction

Parenting is one of the greatest challenges and joys adults can experience, and adults with spinal cord injury (SCI) who are physiologically capable of having children are no exception [1]. Women with SCI face various challenges in the process of conceiving, giving birth, and raising a child due to physical limitations [2, 3]. Mothers with SCI say they often see themselves as superhuman by performing parenting tasks that others would not be able to do because of their disability, or performing childcare tasks that are considered inappropriate compared to mothers with physical abilities [3–6]. Fears of being branded as inappropriate parents or of 'parenting' their children put some

H. Aloulou et al. (Eds.): ICOST 2022, LNCS 13287, pp. 211–216, 2022.
https://doi.org/10.1007/978-3-031-09593-1_16

parents under pressure to handle all parenting activities on their own, without the help of family or other support providers [7–11]. The use of assistive devices is a representative method that can help people with physical disabilities to solve difficulties and problems in the process of parenting. Assistive technology approaches such as assistive devices and social support play an important role in independently performing daily activities related to parenting. For example, a cradle designed for the physically disabled people can be used to care for child in the early stage of parenting, and has a great impact on the safety of a child. Therefore, the need for research on the development and effectiveness of assistive tools that are more ergonomic and functional and incorporate the latest technologies such as IoT systems has been raised. Along with this trend, the need for research that can elicit social support including financial support so that people with disabilities can practically use cutting-edge tools is also being emphasized [12]. The purpose of this qualitative study is to identify the needs related to the cradle of women with spinal cord injury, and to develop a smart cradle by reflecting the research results. Furthermore, it is expected to provide data that can elicit social support for assistive technology through the results of tracking research on the effectiveness, importance, and user satisfaction of the developed smart cradle.

2 Method

2.1 Focus Group Interview (FGI)

In this study, a Focus Group Interview (FGI) was conducted to in-depth exploration of users' needs. FGI was developed based on the method described by Krueger and Casey [13]. It is a qualitative research method that allows you to better understand the feelings and thoughts of the participants by forming a focus group with common characteristics, such as a study and procedure [14]. This study was conducted to reflect the considerations when developing the cradle by analyzing the experiences of women who have raised a child after spinal cord injury.

2.2 Participants

For one month in June 2021, research participants were recruited with help of the spinal cord injury association. The criteria for selection of participants in this study are as follows. First, women with spinal cord disorders who had experience raising a child after childbirth, second, those who were able to express their opinions sufficiently, and third, those who agreed to participate in the study after hearing the explanation of the purpose and method of the study. Total 5 subjects who met the selection criteria participated in this study (Table 1).

2.3 Research Questions

The focus group interview questionnaire used in this study was composed of open, introductory, key, and closing questions based on the method suggested by Kruger and Casey. The key questions of this interview were as follows: (Q1) have you ever used

Table 1. General characteristics of participants (n = 5)

No	Dx	Type of impairment (complete/incomplete)	Age (years)	Duration of disability (years)
A	SCI diplegia	Complete	40	19
B	SCI diplegia	Complete	58	21
C	SCI diplegia	Incomplete	52	30
D	SCI diplegia	Incomplete	51	25
E	SCI diplegia	Incomplete	41	14

a cradle? (Q2) what were the inconveniences when using a regular cradle? (Q3) how did you put your child on the bed?, how did you hold your child out of bed? (Q4) what aspects of the cradle would you like to improve considering your physical disabilities?

2.4 Data Collection & Analysis

We informed study participants about the interview contents and process before FGI. Interview was conducted through videoconference and participants feely expressed their experiences and thoughts for 2 h. All data were collected by recording interview video. Researchers categorized the recorded contents according to common themes using the technique suggested by Krueger [15]. Similar sentences, experiences were classified, and data were analyzed by grouping important themes and categories through continuous review. This qualitative research method focuses on revealing the essence of experience in the context of the participant's situations.

3 Results

3.1 Needs for Cradle Structures

Various needs were investigated for the structural design of the cradle desired by the participants in order to consider the efficiency of the cradle development. SCI patients spend most of their time at home in wheelchairs. Therefore, in order to take care of a child, lower part of the cradle must be manufactured so that there is a space for a wheelchair to enter. They also said that wheelchair should be able to move with a cradle attached (Fig. 1), there should be an open and lockable door one side of the cradle to pull a child up (Fig. 2).

"A wheelchair must be able to fit under the cradle because we need to take care of a child as close as possible" (Participant E).

"It would be nice if the wheelchair could fit in the cradle and move together" (Participant B).

"Cradle should have an open and lockable door for a child's safety and ease of use" (Participant A).

"Need a storage space around the cradle to put children's items" (Participant C).

Fig. 1. Attachment of cradle & wheelchair

Fig. 2. Open and lockable door on cradle

3.2 Needs for Cradle Functions

Participants said that they needed an electronic height adjustment function to change the position of the cradle. Motion sensor and a bouncing mode are needed to detect child's movements (Fig. 3). Finally, they argued that the development of a smart cradle based on artificial intelligence that can be linked with a smartphone is necessary to monitor child's health and surrounding environment (Fig. 4).

"Need a lift function that can adjust height of the cradle by pressing switch" (Participant C).

"It is necessary to be able to control the cradle and check the condition of a child with a smart phone." (Participant D).

"The electric bouncing function seems to be useful for caring for a child" (Participant B).

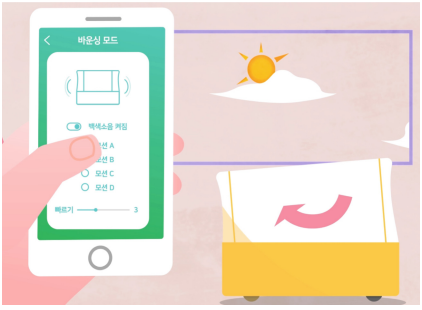

Fig. 3. Bouncing function using smartphone

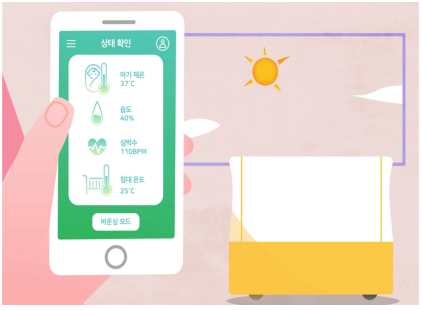

Fig. 4. Monitoring child's health & environment

4 Conclusion

We tried to find out important factors related to product development. A focus group interview was conducted with 5 women with spinal cord injury, and various opinions were derived. In terms of design and structure, it is important to easily access the cradle

in a wheelchair and attach the cradle to the wheelchair when moving. they also wanted to have a door that could be opened and locked on one side. Electric height adjustment and bouncing, as well as checking the health and environment of the child with a smart phone are necessary for the function. This study is meaningful in that it presented the difficulties that disabled with SCI may experience during childrearing as a factor to be considered in the development of assistive devices. It is hoped that it will be helpful in the development of parenting devices for the disabled people.

Acknowledgments. The research was supported by a grant of the Korea Health Technology R&D Project through the Korea Health Industry Development Institute (KHIDI), funded by the Ministry of Health & Welfare, Republic of Korea (grant number: HJ21C0014).

References

1. Kaiser, A., Reid, D., Boschen, K.A.: Experiences of parents with spinal cord injury. Sex Disabil. **30**(2), 123–137 (2012)
2. Preston, P., Jakobson, M.: Keeping our Families Together: A Report of the National Task Force on Parents with Disabilities and their Families. Through the Looking Glass, Oakland (1997)
3. McKeever, P., Angus, J., Miller, K.L., Reid, D.: It's more of a production: accomplishing mothering using a mobility device. Disabil. Soc. **18**, 179–197 (2003)
4. Carty, E.M.: Disability and childbirth: meeting the challenges. CMAJ **159**(4), 363–369 (1998)
5. Prilleltensky, O.: A ramp to motherhood: the experiences of mothers with physical disabilities. Sex Disabil. **21**(1), 21–47 (2003)
6. Shein, F., Nantais, T., Tonack, M.: An Information Resource Describing Consumer Experiences with Assistive Technology: Spinal Cord Injury Peer Information Library on Technology. Toronto Rehabilitation Institute, Toronto (2003)
7. Kirshbaum, M.: A disability culture perspective on early intervention with parents with physical or cognitive disabilities and their infants. Infants Young Child **13**(2), 9–20 (2000)
8. Frontera, W.R.: Delisa's Physical Medicine & Rehabilitation: Principles and Practice, 5th edn. Lippincott Williams & Wilkins, Philadelphia (2010)
9. Prilleltensky, O.: My child is not my carer: mothers with physical disabilities and the well-being of children. Disabil. Soc. **19**(3), 209–223 (2004)
10. Tulega, C., DeMoss, A.: Babycare assistive technology. Technol. Disabil. **11**, 71–78 (1999)
11. Olkin, R.: Are children of disabled parents at risk for parentification? Parent. Disabil. **8**(2), 8–9 (2000)
12. Gitlow, L., et al.: Parenting with a disability: exploring the satisfaction and efficacy of the PediaLift wheelchair accessible crib. Disabil. Rehabilitation: Assist. Technol. **16**(8), 902–909 (2021)
13. Krueger, R.A., Casey, M.A.: Focus Group: A Practical Guide for Applied Research. Sage, LosAngeles, CA (2009)
14. Krueger, R.A.: Focus Groups: A Practical Guide for Applied Research. Sage publications (2014)
15. Krueger, R.A.: Analyzing and Reporting Focus Group Results, vol. 6. Sage Publications, 2455 Teller Road, Thousand Oaks California 91320 United States (1998)