

## SYMPOSIUM PRESENTATION 3: PHYSICAL AND MENTAL HEALTH

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### **Multidisciplinary perspectives on care burden and social value of care robot**

G. R. S. Hong (Convener)

**Participants:** GRS. Hong, K. Park. MJ. Kim, W.J. Choi. Care providers who take care of the growing elderly population are also getting older, so the role of caring robots in care field is highly anticipated. To maintain good care to older adults and disabled, care burden of care providers and social value of care robots must be understood. **CONTENT** Our symposium is designed to bring together multidisciplinary perspectives, such as nursing, physical therapy, and economics, to understand the areas of care difficulty in ADLs, social value of care robot, and care burden using both in lab and care settings. **STRUCTURE** Hong and her colleagues first examine the level of difficulty in activities of daily living (ADLs) care and the functional level of care recipient's ADL in formal caregivers of older adults and disabled. Park and her colleagues investigate the social value of care robots, including publicity value for the older adults and persons with disability, through qualitative research. Kim and Shin present the effects of transfer assistive robots on care burden, burnout, and self-esteem in caregivers caring for the mobility-impaired older adults and severely disabled people. Finally, Choi and his colleagues present the biomechanical effects of a mechanical lift on the risk of low back injury during transfers from bed to wheelchair. **CONCLUSION** With multidisciplinary perspective, the knowledge related to care burden and social value of care robot will guide to the direction in developing the types of care robot, making policies at local and national level, furthermore sharing the ethical issues in care robots.

**Keywords:** caring robots, older adults, persons with disability, social value, care burden

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### Care difficulty of activities of daily living among formal caregivers: Suggestion for developing caring robot

G. R. S. Hong, E. M. Oh, D. Chung, R. N. Choi, S. H. Moon

**Purpose** Formal care providers who take care of the growing elderly population are also getting older, so the role of caring robots in care field is highly anticipated. However, we still do not know which caring area has the most difficulty when the caregivers provide care in the older adults and disabled. It is intended to suggest the direction of caring robot development by figuring out what the burden of care is. At present, Korean government and private companies are trying to develop several types of caring robot and caring objects. The purpose of the study was to examine the level of difficulty in activities of daily living (ADLs) care and the functional level of care recipient's ADL in formal caregivers of older adults and disabled in Korea. **Methods** A cross-sectional survey study design was used through either telephone interview or self-report using Google form with formal direct care-helper of older adults and disabled. Data were collected from July, 2021 to Feb. 2022 at care facilities located in Seoul, KyungKi-do, ChungChungBook-do and Jeollanam-do. A convenience sample of 444 direct care-helpers were included if they were giving care to older adults or disabled who were admitted to the facilities more than 1 month or were residing in community, and needed lots of help from others, demonstrating difficulties in performing ADLs by themselves. Barthel ADL Index (Collin et al., 1988, Kim et al., 2004) was used to measure ADLs. Data were analyzed using descriptive statistics and Pearson's correlation. **Results and Discussion** Mean age and education of the participants were 57.10 (SD 10.22) and 12.37 (SD 2.99), respectively. Top three order of caring difficulty in ADLs were followed: bathing, bowel and bladder care, and bed/chair transfer. Furthermore, among ten ADL items, mean score of bathing was the most dependent in all groups. In older adults residing in nursing homes and geriatric hospitals, eating food was the most independent, and ed/chair transfer was in disabled residing in facilities and community. Longer daily care time ( $r=.19, p<.01$ ), higher physical burden ( $r=.47, p<.01$ ), higher stress ( $r=.50, p<.01$ ) were related to higher care burden. Direction for future suggestion should be focused on developing in bathing care robot. In this sense, multi-disciplinary team approach including nurses, physical therapists, rehabilitation engineers, policy makers, social worker, and economist must be practiced and discussed together.

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**Keywords:** care burden, care attitude, older adults, persons with disability

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### Analysis of social value for nursing robots with the estimates of demand functions

K. Park, H. Ryu, J. Kim, J. Lee, Y. Lee

**Purpose** Care robots can be defined as "robots that assist the daily lives of persons with disability and the older adults" (Moon, 2020). Social value aims for the sustainable development of a community and focuses on the public rather than the individual (Kwon 2019). The increase in the number of people with disabilities and the older adults, as well as the aging of people with disabilities, is progressing at the fastest pace among OECD countries. By 2030, the population of older adults, aged 65 years and above, is expected to be 25.0% of the number of older adults (Statistics Korea 2020). It can, hence, be predicted that the demand for care robots will continue to increase. Most previous studies on caring robots have focused on verifying the statistical effectiveness of a robot's function and performance. Therefore, this study aims to investigate the social value of care robots, including publicity value for the older adults and persons with disability, through qualitative research. **Methods:** To obtain relevant segments from a demand-side approaches, we focus on deriving the demand schedule for caring robots within the framework of cost-benefit analysis (CBA). On the basis of key stakeholders and their potential needs derived from the analysis, this study was conducted with five older adults and four persons with disabilities, from January 12 to 24, 2022. Face-to-face interviews were conducted by dividing the participants into the older adult group and the persons with disability group, and it took 60 to 90 min. The interview results were analyzed by dividing them into four social values: labor, health, innovative, and economic social value. **Results and Discussion:** The CBA framework allows us to investigate the demand dynamics for caring robots. In particular, during the process of the demand schedule estimates, including sensitivity analysis, we can specify each demand group(stakeholder)'s potential needs and constraints. The FGI results then predicted that in labor and health values, the time and intensity of labor would decrease, and the shame of care recipient generated during caring would also decrease. In addition, equality of labor would occur effectively. These were the positive results that were derived. In terms of innovative value, a lack of technology for care robots and concerns about the risk of accident in safety were still present. However, medical costs were expected to decrease in terms of economic value. When comparing the two groups, the older adults valued reduced shame and efficacy of care, while the people with disabilities valued social communication to soothe loneliness. Care recipients had positive expectations in the four social aspects; therefore, it can be expected that the demand for care robots will be high in the future. Therefore, when developing and distributing care robots, it must be considered that the older adults value individual privacy, while people with disabilities value social communication to soothe loneliness. The results of this study can be used as elementary data for the future development and distribution of care robots.

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**Keywords:** caring robots, older adults, persons with disability, social value, focus interview

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### Effects of transfer assistive robots on care burden, burnout, and self-esteem in caregivers

M. J. Kim, Y. S. Shin

**Purpose** The purpose of this study was to find out the effects of transfer assistive robots on care burden, burnout, and self-esteem in caregivers caring for the mobility-impaired older adults and severely disabled people. **Method** A single-group pre-test post-test study design was used in this study. The participants were 30 caregivers caring for the institutionalized or community-dwelling care recipients. The caregivers used transfer assistive robots to move mobility-impaired older adults and severely disabled people from bed to chair or from chair to bed for a week. The care burden, burn out, and self-esteem were measured using a self-reported questionnaire. The care burden scale developed by zairt(1980), the burnout scale developed by Maslach and Jackson(1981), and the self esteem scale developed by Rosenberg(1965) were used. The data was collected between July 2021 to January 2022. The data analysis was performed using IBM SPSS statistics version 25.0 for window program and difference in outcome variables between pre and post was confirmed using the paired t-test. **Results and Discussion** Participants ranged in age from 38 to 76 years, with a mean of 57.6 ( $SD=7.07$ ). There were 28 female respondents (93.3%) and 2 male respondents (6.7%). Of those who participated, 13 (43.3%) were Korean geriatric care helpers, 8 (26.7%) were uncertified assistive personnel, 3 (10.0%) were family caregivers, 1 (3.3%) was the disabled activity supporter, and etc. There was statistically significant reduction in the care burden after the intervention ( $t=4.62, p<.001$ ). However, there was no significant difference in the burnout and self-esteem. The study suggests that transfer assistive robots were effective in decreasing the care burden in caregivers caring for the mobility-impaired older adults and severely disabled people.

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**Keywords:** transfer assistive robot, care burden, burnout, self-esteem, caregivers

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### **Biomechanical effects of a mechanical lift on the risk of low back injury during transfers from bed to wheelchair**

W. J. Choi, S. Lee, K. Lim

**Purpose** Low back injuries (i.e., intervertebral disc herniation, sprain or strain causing low back pain) are common in caregivers who deal with patients transfers from one place to another (i.e., from bed to wheelchair) (Waters, 2007; Coggon et al., 2013). While a mechanical lift (carerobot) is designed to help reduce physical loads occurring at low back during transfers, its biomechanical benefits have not been clearly documented. This symposium addresses this issue by discussing results of research studies. **Method** Fifteen individuals simulated patient transfers from bed to wheelchair with and without a mechanical lift. During trials, kinematics of an upper body has been recorded and analyzed to estimate a compressive force occurring between L5 and S1 (Lee et al., 2022). Sensor data of an upper body were also acquired from IMU sensors (Xsens Dot, Xsens Technologies, Enschede, Netherlands) placed on the body segments, including forearms, upper arms, thighs, shins and waist, and used to develop a classification model to differentiate injurious versus non-injurious transfers, where a National Institute for Occupational Safety and Health (NIOSH) criterion was used to define injurious (compressive force at L5/S1 greater than 3,400 N) versus non-injurious (less than 3,400 N) transfers (Lim et al., 2022; Waters et al., 1993). **Results and Discussion** The compressive force ranged between 1,900 N and 3,700 N during transfers. This confirms that the transferring activity involves moments where the compressive force exceeds the NIOSH safety criterion. Furthermore, when compared to manual transfers, the compressive force was about 30% smaller in transfers with a mechanical lift. This suggests that the risk of low back injury may be reduced with use of a mechanical lift. Collectively, our results support biomechanical benefits of a mechanical lift during patient transfers.

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