

ORAL PAPER PRESENTATION 3: PHYSICAL AND MENTAL HEALTH

Usability evaluation of the excretion assist care robot for caregivers and experts

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Purpose According to a long-term care survey (Statistics Office., 2019), 78.7% of the recipients are unable to walk independently. In a study of falls in inpatients, falls in hospital rooms and toilets were the most prevalent and were reported to occur more frequently at night (Yoon et al., 2018). Diapers and excretion-assist care robots can be used to prevent falls caused by toilet movement. The excretion assist care robot can automatically treat excrement by using it instead of diapers at the bedside for the elderly or the people with disabled. Automatic excretion bidet functions include detection, inhalation, cleaning, and drying of excrement. The excretion assist care robot is in the early stages of development and use, and it is necessary to evaluate its usability, considering the characteristics of the product from the point of view of users and experts. In this study, we evaluate the usability of the excretion assist care robot, derive improvements, and use it in the development of care robots.

Method The excretory assist care robot used was the Curacare M1 product developed by Curaco. Evaluation indicators were developed to systematically evaluate usability. Indicator areas and items were derived through literature review and product analysis. To ensure the validity of the derived indicators, seven experts who could evaluate the product characteristics were selected, and a Delphi survey was conducted. The index consists of a total of six areas (Table 1) and 49 items, including 'operability area' (13 items), 'safety area' (ten items), 'effectiveness area' (five items), 'efficiency area' (four items), 'ability to acquire area' (two items) and 'satisfaction area' (15 items). A caregiver group and an expert observation group were recruited for the user-based evaluation, and an expert performance group was recruited for the inspection-based evaluation. 15 participants (five participants per group) who met the selection and exclusion criteria participated in the usability evaluation. The evaluation was conducted in the following order: pre-interview (semi-structured format); device use training (video and demonstration); practice, device use and evaluation (7-point scale evaluation paper); and post-interview (semi-structured format). **Results and Discussion** As a result of the usability assessment questionnaire, out of the six assessment areas (excluding the satisfaction area, which is a subjective assessment unknown to the expert observation group), the caregiver group rated the 'operability area' (60.2 ± 13.6), the expert observation group rated the 'ability to acquire area' (47.1 ± 14.8), and the expert performance group rated the 'safety area' (76.8 ± 7.0) as the lowest scores, respectively (Table 2). All 15 subjects responded that they required an excretion assist care robot. Reflecting the opinions of users and experts in this study, when developing the excretion assistance care robot, it is necessary to consider the ease of learning so that elderly caregivers who are not accustomed to using computers can easily learn. In addition, it is necessary to design it to reduce the physical burden, and devise a method for tailoring it to each individual. It is necessary to continuously promote safety and user friendliness.

References

Statistics Office. (2019). long-term care survey.

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Table 1. Definition by usability evaluation indicator area

Area	Definition
Operability	It should be easy to use and operate by the user.
Safety	Check the presence of elements that may cause injury or injury when used.
Effectiveness	The user should be able to perform the task accurately and completely according to the intended purpose.
Efficiency	The user should be able to perform tasks easily, quickly and efficiently.
Ability to acquire	The user should be able to learn easily how to use the product.
Satisfaction	The user should be satisfied with the result of the task subjectively when using it.

Table 2. Usability evaluation score by group

Area	Caregiver*	Expert observation*	Expert performance*
Operability	60.2 \pm 13.6	65.7 \pm 12.3	80.0 \pm 4.4
Safety	71.7 \pm 9.8	66.6 \pm 14.4	76.8 \pm 7.0
Effectiveness	76.0 \pm 15.6	81.1 \pm 5.2	89.1 \pm 12.2
Efficiency	65.7 \pm 15.1	68.6 \pm 17.7	82.9 \pm 10.8
Ability to acquire	68.6 \pm 12.0	47.1 \pm 14.8	78.6 \pm 7.1
Satisfaction	69.2 \pm 13.4	NA	78.2 \pm 4.4

*n=5