ICT-Medical convergence patient transfer assistant robot system

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Purpose With the rapid increase of the elderly, the demand for rehabilitation, disease prevention, and care services is increasing, and the need for caring robots is emerging to solve the problem of insufficient caring manpower. As a result of surveying 120 care workers, 63.8% of care workers lift and move patients every day, and as a result, 39.2% have musculoskeletal disorders. (Kyunghee University 2019). In this study, rehabilitation and care products were reviewed, and a "patient transport assistant robot" was developed to reduce the burden on the musculoskeletal system and provide safety and comfort to the patient, and the research results are presented. **Method** Dual arm assistant robot is designed to control with little force by applying counterbalance mechanism (CBM), called a passive gravity compensator (1,3). The smart sling was developed by applying the pneumatic growing mechanism, and it was possible to minimize the labor input of the caregivers by automating the sling insertion and retraction process while maintaining safety and comfort (2). Sensing and control technology is applied to enable intuitive control and two-degree-of-freedom electric driving and to prevent obstacle collisions. A small computer, Raspberry, was installed and Node-RED programming was used for system control and patient data base management. **Results and Discussion** In this study, rehabilitation and care products for the elderly were introduced and "patient transfer assistant robot" applying ICT technology was developed and the results were reviewed. As result proposed CBM-equipped mobile robot arm showed the torque reduction rates of 61~72% (1). The sling insertion time was 52.5(second), the robot's elevating time was 20 (seconds) and we checked it was improved data compared with present similar product. The research results of this R&D prototype reducing the physical burden of caregivers are presented by H.R. Shin (kyunghee univ).

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Evaluating the smart transfer assistive robot with dual arms in health care workers

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Purpose The care robots including transfer assistive robots have been developed to solve the shortage of health care workers has arisen by reducing their workload. The task of transferring and lifting older adults in facilities and hospitals is known to demanding physical work and it might be caused a musculoskeletal injury (Davis & Kotowski, 2015; Santaguida et al., 2005). Various transfer assistive equipment and devices have been developed including mechanical lifts and powered or robotic systems. However, not many equipment and devices were used in the Korean market due to inconvenience and dissatisfaction (Kim et al, 2022). The purpose of this study was to evaluate the transfer assistive robot based on the objective and subjective health care workers' health and perceptions in long-term care facilities and hospitals to provide a solution for labor shortage issues. **Method** Fifteen health care workers (long-term care workers) from long-term care facilities (n=15) and fifteen health care workers (nurses, nurse assistants, paid caregivers, and transferring assistants) from integrated nursing care service hospitals. (n=15) participated in the evaluation of the smart transfer assistive robot. We recruited those who physically transferred older adults or patients as their jobs over the 1 year. Our measurements are RPE (Rating of Perceived Exertion), NASA-TLX (NASA Task Load Index), and usability items including satisfaction, manipulability, and stability. **Results and Discussion** We found out the smart transfer assistive robot with dual arms had a better score with RPE, NASA-TLX, satisfaction, manipulability, and stability than the manual which means health care workers conducted transferring work with dummy without robots. The findings provide that the transfer assistive robots could be the solution to decrease the care work burden and increase the health of health care workers.

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SYMPOSIUM PRESENTATION 7: OTHERS

Technology applied recipe development to increase fruits intake of the elderlies with decreased chewing and swallowing function

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Purpose In order for the elderly to live a healthier and higher quality of life, balanced nutrition is a very important factor. The age-friendly food in Korea is divided into three stages (Step 1: Intake of teeth, Step 2: Intake of gums, Step 3: Intake of tongue) from a food tech perspective. The purpose of this study was to conduct sensory tests after consuming fruits according to function for the elderly in a nursing hospital with chewing and swallowing dysfunction, an appropriate fruit recipe and serving guidelines were developed. **Method** Fruits were served to a total of 35 elderly people according to their swallowing and chewing functions. The evaluation items were appropriateness of one serving portion and fruit preference (appearance, color, taste, aroma, flavor, aftertaste, texture, overall preference), recommendation intention, adequacy (convenience, safety (size, chewing, swallowing). Each item was evaluated on a 5-point scale and reflected in the results. (5 points: very much like, 4 points: good, 3 points: neither like nor dislike, 2 points: dislike, 1 point: very dislike) was tested. **Results and Discussion** We found that fruit recipes with gelling agents were more preferred depending on the type of fruit, contrary to the expectation that soft fruit would have a high intake preference. Locust bean gum, xanthan gum and carrageenan were used as gelling agents, and a recipe was developed with vitamin C powder added to prevent browning of fruits. It is expected that the development of safe fruit recipes for the elderly with swallowing and chewing dysfunction will help the elderly to satisfy their eating needs and balanced nutrition.

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SYMPOSIUM PRESENTATION 7: OTHERS

What bibliometric and scientometric analysis tells about the international research trends of smart home for older adults?

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Purpose An aging population increasing all over the world, including Korea, signifies the importance of smart homes equipped with appropriate technology for the safety and health of older adults. The percentage of people over 65 years old worldwide is expected to increase to 18.6% by 2067 from 9.1% in 2019. The situation in Korea is urgent—14.9% in 2019 to 46.5% in 2067 (Statistics Korea, 2019). The market for smart homes also grows: In Korea that market was expected to increase from 20.6 trillion won in 2020 to 22.3 trillion won in 2021 (National Information Society Agency, 2021). The worldwide smart home market was expected to grow to 123 billion dollars in 2021 (Strategy Analytics, 2021). Well-designed smart homes can increase the desire of older adults to age in place as well as bring economic benefits to the country by reducing budgets for care providers. Older adults can reside at home safely with health-, convenience-, and leisure-related smart home services. Thus, reviewing trends in international research on smart homes for older adults is a timely endeavor. The purpose of this research was to use bibliometric and scientometric analysis to investigate trends in international research on smart homes for older adults. **Method** This analysis method is appropriate at comprehensive "understanding and the evaluation of the literature in a given field" (Zhao et al., 2019, p. 3). We used the Web of Science Core Collection database, searching keywords "smart home*" "home automation," or "domotics" with terms related to older adults, resulting in a total of 1,408 documents. Data were analyzed in terms of frequency of country, organization, research area, most productive authors, and most cited documents. We conducted keyword co-occurrence and document co-citation analysis using VOS Viewer software. **Results and Discussion** The results showed that research on smart homes for older adults appeared from 1998 and increased steadily with a burst from 2015 forward. Countries most active in publication were the United States, China, and France in that order with South Korea in eighth place. The main research areas included computer science, engineering, and telecommunications; areas related to housing design were minimal as were environmental science ecology (21 publications), architecture (5), and art (2). Co-occurrence analysis showed that international studies on smart homes for older adults can be categorized as follows: (a) older adults and living venue, (b) technology for daily activity detection, (c) elements of smart home technology, and (d) disease and health status related to older adults. Co-citation analysis showed that core literature can be categorized as follows: (a) elements of smart home technology, (b) factors for the acceptance of smart technology by older adults, (c) the future and challenges of smart homes, and (d) ambient assisted living healthcare. The research shows that studies on smart homes for older adult have increased steadily with particular growth from 2015. The main research areas were technical fields, such as computer science and engineering, with minimal research in the humanities, social sciences, and design, indicating the necessity to expand research from a human-centered diverse perspective.

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