

M. Nagamachi. Ergonomic aspects for assisting facilities to elderly people (Keynote). *Gerontechnology* 2014;13(2):69; doi:10.4017/gt.2014.13.02.216.00 **Purpose** Japan has the highest number of residents over 65 years old of any country in the world. Robotics and mechanical engineering research has been contributing to the development of assistive devices for the country's aging society, but many current technological solutions are expensive to purchase and maintain. In addition, elderly people respond with fear to many assistive devices, due to their overly mechanical way of moving. A more humane approach to developing assistive devices can be found through greater attention to ergonomics. **In-house handrail design** (Figure 1) Japanese regulations recommend the size and setting rules for in-house handrails, but they are not adapted for use in small, Japanese style houses. We developed a thin and strong wooden bar with 35mmφ along with guidelines for ergonomic setup and use. **A new toilet** (Figure 2) We have developed a toilet designed to be maximally comfortable both in use and in standing up after use. We applied the Kansei ergonomics method to develop the toilet, and confirmed its comfort and effectiveness through ergonomic measurements. The EMG required for standing from a seated position on the toilet was reduced to 1/10th of the energy while using traditional toilets. **Bath support device** (Figure 3) Robotic and mechanical devices that assist in bathing often frighten elderly users with jarring mechanical movements, and require significant assistance from caregivers. We have developed a sitting shower system named 'The Shower', in where a caregiver is talking with an elderly person. The shower attains the same temperature as a traditional bath. **A new mattress** A new mattress to prevent the occurrence of pressure ulcers in elderly individuals, has been designed with polyester materials and uses a system of pipes to provide higher resilience and ventilation, as is appropriate to regulate blood flow. Users recovered from pressure ulcers after between one to several weeks of use. **An assisting mat system for wheel-chair** We started research to develop an ergonomic device to assist paralyzed users to keep their backbone in an almost straight position comfortably while sitting. The core of the device consists of a set of back, side, lumbar support cushions and a mat. We measured EMG from both muscles on the sides of the spine and found the device produced a balanced EMG. **Discussion** Robotic and mechanical approaches are useful as assistive instruments, and will continue to advance. Despite employing comparatively simple technology, ergonomic technologies are useful and effective in developing devices, because ergonomic approaches support the integration of human and machine (environment), with the aim of promoting user comfort and higher quality of life. If a unification of robotics and ergonomics can be realized, it will greatly improve the lives of the elderly, and help to create effective elder care in an aging society.

References

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Keywords: Kansei ergonomics, assistive devices, older adults

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Figure 1. In-house handrail design



Figure 2. A new toilet



Figure 3. Bath support device