

Respond to actual needs with technology!

# Nursing Care and Robots

“It’s led us back to the starting point of what care is.” There is an increasing number of such voices emerging in line with progress being made with feasibility trial involving robot nursing care devices. So the question is: how will actual nursing care practices change with the innovation?

What impression do you get from the word “robot?” Some people may get a cold impression, while others may have a feeling of something adorable. Recently, robotic vacuum cleaners and unique androids are being created one after another, and there are more occasions in which we encounter robots in daily life.

## Development of the next-generation robots and the building of a coalition for the creation of new industry

Now, what is a robot, to begin with? The Ministry of Economy, Trade and Industry (METI) defines a robot as an intelligent mechanical system that incorporates three technological elements: sensing, intelligence and control, and drive. Robots are further categorized by their use into industrial robots, which are used in factories, and service robots, which are used in the areas of medical care and welfare, livelihood support, and amusement. Anticipating a reduction in Japan’s workforce due to the declining birthrate and aging population, and the improvement of the quality of products and services, METI is implementing various measures for the development of robot technologies of the next generation and for the creation of new industry.

**Voice of a robot developer**  
We hear opinions from various people actually using the robot, and are repeatedly making minor improvements.

Yuhei Yamaguchi  
Assistant Manager of the Product Planning Group, Planning & Administration Dept., Partner Robot Div. , Toyota Motor Corporation

**Voice of a caregiver**  
The sense of reassurance it gives you when trying it is surprising.

Ryosuke Okada  
Senior Care Personnel, Goodtime Living Chibaminato/Ekimaedori, ORIX Living Corporation

## Patient Transfer Assist ▶ Toyota Motor Corporation

This robot supports the movement of patients with an arm to support the patient’s body weight and a power-assisted wheeled platform. With automatic sensing via sensors, it lifts the patient up so gently that it gives the feeling of being enveloped in a big hug. Because the entire action can be completed with the push of a button, it can reduce the burden of the caregivers and reassure the patients.

CLICK! • Partner robots by Toyota

One such measure, for example, is the “Project to Promote the Development and Introduction of Robotic Devices for Nursing Care,” which will start from FY2013. The purpose of the project is to promote elderly people’s independence and to reduce the burden on caregivers. It is forecast that the percentage of the population of those aged 65 or above will reach 30.3% in 2025. While the workforce diminishes, the number of those who receive nursing care service will increase.

Therefore, the development of robotic devices for nursing care has been promoted to deal with this eventuality, with various institutions and groups taking the lead. In November 2012, METI and the Ministry of Health, Labour and Welfare (MHLW) collaborated to formulate the “Priority Areas to which Robot Technology is to be Introduced in Nursing Care of the Elderly.” The two ministries will cooperate and aim for the development and commercialization of robotic devices for nursing care, focusing on four areas: 1) lifting aids, 2) mobility aids, 3) toilets, and 4) monitoring systems for people with senile dementia.

## Encounter of the concept of “Genchi-Genbutsu (go and see)” and the perspectives of users

“Both developers and manufacturers strongly welcome collaboration with METI and MHLW,” says Akifumi Tamaoki, General Manager of the Partner Robot Division, Toyota Motor Corporation. In 2007, Toyota announced its “Partner Robot Development Vision,” which aims to support human activities. Projects for commercialization have been carried forward



It is also a great advantage that users can continue their conversations even when they are being moved.

since 2009. In November 2011, the company showcased four types of robots for nursing and healthcare support. Currently, it is engaged in joint feasibility trial of "patient transfer assist" with Goodtime Living retirement housing facilities operated by ORIX Living Corporation.

"Toyota has the culture of 'go and see', called 'Genchi-Genbutsu'." This means visiting actual sites, ascertaining specific needs, and incorporating those needs in the process of commercialization. Particularly, nursing care and welfare are areas unknown to us. Collaboration with people who are working actively in actual nursing care is very encouraging to us, also from the perspective of 'discussing together at the actual site.'

On the other hand, Etsuaki Morikawa, President of ORIX Living Corporation, which is now the development partner of Toyota, says:

"It was immediately after the showcasing of robots in November 2011 that we made a suggestion to Toyota that we could work together. I anticipated the introduction of new technology could change nursing care and welfare significantly. The lives of elderly people can be further enriched by adding the vitality of the private sector to collaboration with the government. New values can be created by connecting different factors. This is also the business philosophy of ORIX Group."

### New tools to develop the relationships

Sharing the occasion and creating something together – this idea of "partnership" can also trigger important innovations occasionally. While Tamaoki reveals that the collaboration is "a succession of surprises for developers," Morikawa also says that it is "really opening our eyes." It seems that Goodtime Living Chibaminato/Ekimaedori, where the feasibility trial is ongoing, is one of such places for discovery. One of the caregivers says, "The carrying of patients from a bed to a wheelchair or to the toilet is a heavy physical burden on care attendants (caregivers). It may also become a psychological burden for the guests (residents)."

The reality is that about 70% of caregivers complain of backaches. Transfer of patients is one of the issues with the most urgent need to be resolved at the actual site of nursing care. By utilizing devices to assist transfer care, all the caregivers need to do is lift up the upper body of the elderly person. Thereafter, nearly all of the transfer can be completed by pushing buttons.

"ORIX Living has been using lifting devices for such transfers for some time. It was popular among users and was also effective in improving the lives of the bed-ridden. Most of all, it left a strong impression that the expressions on the guests' faces became calmer, and the staff seemed to feel more relaxed. At actual nursing care facilities, experiences accumulated by many people have generated various kinds of knowledge and experience. By adding a new tool, a robot, to such experiences, even more safe and assured nursing care can be achieved. I believe there is a potential that the relationships between those who offer care services and those who receive such services can be deepened further." (President Morikawa).

We would like to provide a new styles of **nursing care** to the elderly.



#### Etsuaki Morikawa

Morikawa is the President of ORIX Living Corporation. He joined ORIX Corporation in 2000. After being dispatched to ORIX Real Estate Corporation, he became the Corporate Executive Vice President in 2006. He assumed his present post in 2005. He is also the Chairman of the Liaison Council of the Managers of Elderly Housing.

[CLICK!](#) ● ORIX Living Corporation



We aim for commercialization of **robots** based on needs, understood on site

#### Akifumi Tamaoki

Tamaoki is the General Manager of the Partner Robot Division, Toyota Motor Corporation. He joined Toyota Motor Corporation in 1985, and was engaged in the development planning of, among others, an internally-manufactured electronic unit. After becoming the Planning Management General Manager of Hirose Plant in 2003, he assumed his present post in 2011.

[CLICK!](#) ● Toyota Motor Corporation

### A nationwide survey showed that about 80% of people responded positively to the introduction of robots

On-site feasibility trials at actual nursing care homes seem to be offering new discoveries to General Manager Tamaoki, Toyota.

"We have a range of robot technologies that had been developed previously. Therefore, we started from combining our existing know-how. However, the needs of actual nursing care also required a new and different perspective. That is to say, what is required is not necessarily high-tech, but robotic systems that are uncompromisingly safe and easy-to-use." (General Manager Tamaoki)

Both Morikawa and Tamaoki point out the importance of "making mechanisms." How should the robotic devices for nursing care be utilized? They say that "the key to dissemination is to consider everything in terms of a package," including the method of nursing care and improvement of the environment, human resources education, certification systems, and systems that support introduction.

According to a nationwide survey implemented by our company, "about 80% of respondents gave positive responses to the introduction of robots." The top reason was "because they feel less hesitation towards robots." Of course, there are occasions where human warmth should be felt, and there are people who want such warmth. We should think about the introduction of robots from the perspective that doing so increases the number of available alternatives." (President Morikawa)

There is one more thing. Morikawa emphasizes the viewpoint of "how business management can be improved by introducing robotic devices for nursing care." This is a point that cannot be overlooked also from the perspective of the improvement of nursing care services. Tamaoki says that "it is indispensable to establish a business model not only for robotic devices for nursing care but also for the entire business, and also for the creation of a new industry."

METI estimates the market size of the entire robot industry as of 2035 to be 9.7 trillion yen, which is about ten times the current size. The main portion of the market, accounting for about a half of the total, will be service robots, which are closely related to our daily living.

"As a developer, I feel delighted seeing users are satisfied with using the robots, saying 'it is much easier' or 'it was very good.' It makes all the challenging efforts of development worthwhile. Our dream is to create a society where it is nothing special for people to live together with robots. Nursing care is one of the areas in such a society." (General Manager Tamaoki)

"I want to try introducing them with a progressive spirit. The expectations and responsibilities of elderly homes are increasing more and more, but the joy we get from the work is accordingly great. I feel there is something romantic about creating new lifestyles for elderly people." (President Morikawa)

They happened to mention words like "dream" and "romantic" when explaining their work. The words conveyed their strong enthusiasm to try to open up the potential in the area of nursing care.

#### Provides nursing and medical care, and has an indoor pool.

##### Goodtime Living Chibaminato/Ekimaedori

The upper part of the 16-story building consists of general apartment houses, and the lower floors are for the retirement housing. There is a clinic inside the building, and also an indoor pool. Nursing and medical care services collaborate to support the residents 24 hours a day. There are also cultural programs provided to the residents.



[CLICK!](#) ● Goodtime Living Chibaminato/Ekimaedori



Various activity programs are provided. The facility is also actively considering the introduction of robots for enriching the lives of residents.

# These are some of the promising technologies

Contribution to the actual work of nursing care and the creation of a new industry through robot technology, and the expansion of the peripheral services of medical care and nursing care, are all parts of an important growth strategy for Japan in the future. In order to accelerate such a movement, various kinds of development projects are in progress. Robotic devices for nursing care, which is a culmination of advanced technological efforts, can be useful in various occasions. Let's take a look at some of them here.

## Stride Management Assist

▶ Honda Motor Co., Ltd.

This device adjusts the length of a person's stride with the use of a motor and supports independent walking for the elderly

Stride Management Assist is a robot to support independent walking, developed to satisfy the wishes of people who want to walk by themselves no matter how old they get. The CPU (control unit) fixed on the waist automatically calculates the length of the stride and walking pattern that is best suited for the person, and the motor assists the swinging of the legs at the thigh. Usability is also pursued. The belt-type device fits various kinds of physical types, and it is small and light so that wearing it will not become a burden regardless of the strength of the patient.



It can also be used for walking training for rehabilitation.

CLICK! • Honda Motor Co., Ltd.

## ROBOHELPER SASUKE

▶ Muscle Corporation

Offering stylishness in nursing care

Tenderness, assurance, and also stylishness. That is the concept from which SASUKE, a transfer robot, was born. By using soft cloth, it provides an airy feeling when being held up. The compact and lightweight device can be moved smoothly. The sophisticated design by Toshiyuki Kita, a product designer, is also highly attractive. President Hirofumi Tamai expresses his enthusiasm, saying that "we want to make a breakthrough in this area by assembling a network of mid- and small-sized enterprises."



Existing motor technology is being utilized.

CLICK! • Muscle Corporation

## Smart Suit Lite

▶ Smart Support Corporation

The technology utilized for designing robots that protect your back with the power of rubber!

"Smart Suit Lite" is a hip supporter that alleviates fatigue by utilizing the tension of rubber bands. It alleviates strain on the back by helping the movement of lifting the upper part of the body from a semi-crouching position, and by tightening the body trunk. Although it was first developed as a robot suit with sensors, the electric components were eliminated in the course of pursuing characteristics such as "light to wear" and "fit for working." However, the achievements of robot design technology and simulation of musculo-skeletal dynamics were utilized, resulting in the current form.



This is designed focusing on "easy-to-use even when caregivers are busy."



CLICK! • Smart Support Corporation

## minelet SAWAYAKA

▶ NWIC

This is an automatic toilet care machine to ensure patients can comfortably relieve themselves in bed

"Minelet SAWAYAKA" is an automatic toilet care machine that can maintain a sanitary condition without needing to change diapers many times a day. To use it, the patient needs to simply wear the special cover in the shape of a paper diaper. The sensor works each time the patient egests, and the excreta are automatically aspirated. The inner side of the diaper is washed and dehydrated. Egestion care imposes heavy physical and mental burdens on the people who provide care, since it must be dealt with 24 hours a day. It is expected that the utilization of this product will generate "room" in caregivers' time and feelings.



Further improvements are being made such as making the machine more compact, and the incorporation of an automatic water supply and drainage system.

CLICK! • NWIC

**The introduction of robotic devices is being accelerated by formulating 4 Priority Areas**

**1 Lifting aids**

This area covers technologies using robot technology for occasions such as transferring patients from beds to wheelchairs, including (1) wearable devices using robot technology to provide power assistance to caregivers, and (2) non-wearable devices using robot technology providing power assistance to caregivers in lifting.

① Wearable device



② Non-wearable device



**2 Mobility aids**

In this area, the development of walking-aid devices using robot technology to support elderly people walking outdoors and to secure safe carrying of loads, that stimulates people's desire to walk using their own legs.



**3 Toilets**

This area covers adjustable-position toilets using robot technology for treating excrement. These can be installed in the rooms the patients live in or bedrooms, and assumes use by those who can defecate on their own.



**4 Monitoring systems for people with senile dementia**

This area covers monitoring system platforms consisting of devices with sensors and external communication functions using robot technology, used in nursing care facilities. One point is whether such systems have mechanisms to prevent incorrect reporting.



In November 2012, METI and MHLW formulated the "Priority Areas to which Robot Technology is to be Introduced in Nursing Care of the Elderly" policy to promote the introduction of robotic devices for nursing care in a full-fledged manner. Upon the determination of the four areas and five items as priority areas, namely 1) lifting aids, 2) mobility aids, 3) toilets, and 4) monitoring systems for people with senile dementia, the following ideas are considered to be the pillars of the policy: (1) devices that promote self-support of those who require nursing

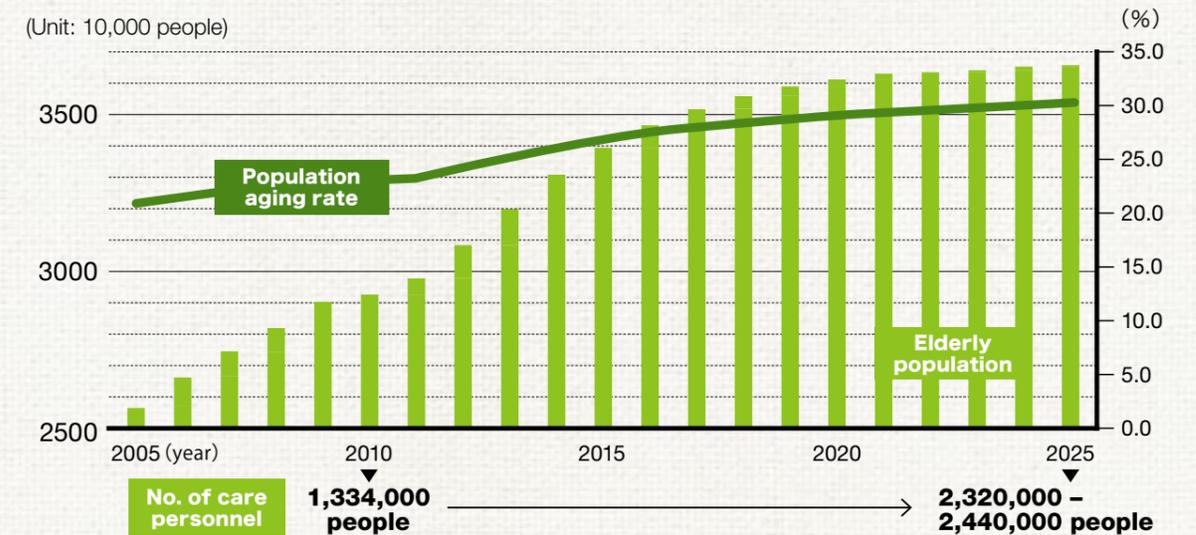
care and that reduce the burden of caregivers, (2) those areas that reflect strong needs and attract deep interest according to the results of various surveys, (3) those areas that are considered to have many potential users, and (4) the uses of robot technology in the areas considered rational. In order to support companies to develop and commercialize robotic devices for nursing care in the four areas, METI and the New Energy and Industrial Technology Development Organization (NEDO) launched a

Public Private Partnership (PPP) on the development of robotic devices for nursing care. This program invites companies that are actively engaged in the development of robotic devices for nursing care, and organizes partnerships consisting of the participating companies and relevant organizations. Under the program, the needs of users and caregivers will be understood, information from the administration side will be provided, and opinions for improving the measures will be collected.

# Reference Data

## Population aging and elderly population

The number of elderly people who are 65 years old or above, will increase by about 7.09 million in 15 years from 2010 to 2025. The population aging rate of the entire society will increase from 23% to 30%. Accordingly, the required number of caregivers will also increase by 50%, to about 2.32 – 2.44 million.



## Market of robotic devices for nursing care

The current robot industry is mainly producing industrial robots. However, it is forecasted that the area of nursing care and welfare will grow rapidly in the future. It is expected that the entire robot industry will increase significantly to a size as large as 9.7 trillion yen in 2035.

