

Introducing Robots to Elderly Care Houses in Kitakyushu City

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Steering Committee Member of Center for Socio-Robotic Synthesis, Kyutech
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Working Group Member for the National Strategic Special Zone of Kitakyushu
Executive Board Member of the Robotics Society of Japan
Executive Board Member of Japanese Neural Network Society

Locations

Global Advanced Assistive Robotics Course
Wakamatsu Campus
➢ Graduate School of Life Science and Systems Engineering



Tobata Campus
➢ School of Engineering
➢ Graduate School of Engineering



Purpose of National Strategic Special Zones (Established Implement of Nursing care robot)

[Problem]

- Insufficient human resources to care for the elderly because of declining birth rate and aging population, and decreasing of productive-age population ratio
- High caregiver turnover rate because of work environment and conditions

[Potential of Kitakyushu]

- Experience and results of medicine, health & welfare parties in this city, in relation to policies on the elderly
- Development as the City of craftsmanship (high-level technology, corporate clusters, etc.)
- Clusters of academic research institute (UOEH, KNWU, KIT, Science City, etc.)

Utilization of National Strategy Zone System

Realization of Advanced Nursing

- Improved quality of nursing (Independence support for the residents)
- Reduced burden on the care staff
- Expansion of new employment opportunities for the elderly

Promoting local industries

- Promotion of nursing robotics industry

Creation and Transmission of successful models using nursing robots

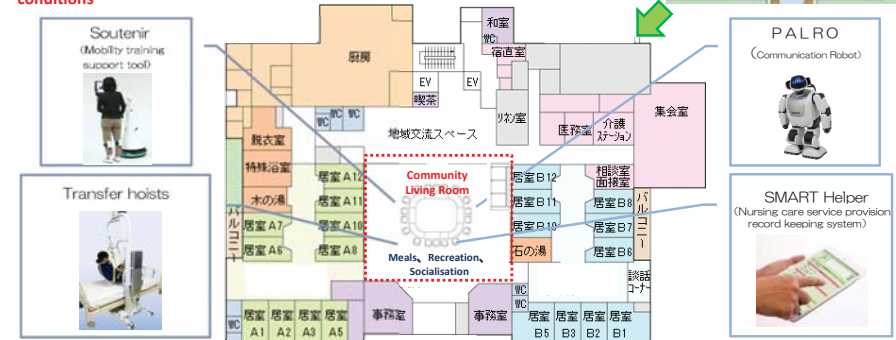
Special case of Using Community Living Room in a Unit-style Nursing Home

Actual implementation of nursing care robots using Community Living Room - Relaxing the "1 community living room per 1 unit" standards, integrating use of community living rooms of 2 adjacent units in demonstrating the use of nursing care robots (Act revised in June 2016)

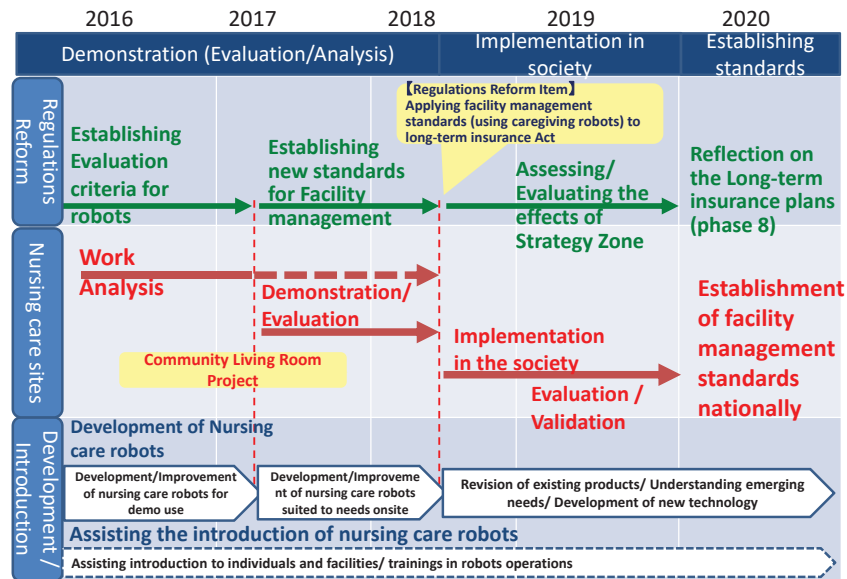
Considering the nursing care staff and residents' needs, demonstration aimed to address:

- ① **Feeding assistance**
- ② **Circle/ Recreation**
- ③ **Prevention of cognitive decline/ worsening of condition, maintaining physical conditions**

Facility Layout as before



"Advanced nursing care" using nursing care robots Demonstration/Implementation Yearly plan



Demonstration devices selected for 2016

In discussion with affiliated facilities,
Demo Robot Candidates chosen are:



Achievements

Effects of sharing two community living rooms

○Residents and Care staff have experienced various effects

(Residents)

- Walking training used to be held at rehabilitation room, but once the community living room can be used more spaciouly, there were more opportunities for walking training, and closer (to our rooms) too. Residents were more motivated.
- Changing recreation activities by units meant we can choose our favorite event in the community living room.

(Nursing Care Staff)

- When the number of staff are few during daytime because of shift work, it is psychologically easier to watch over 20 residents with 2 caregivers than 10 residents with 1.
- After we started working between the two units, I could learn not only residents' faces and names but also their personalities and likings. It also makes watching affairs easier.
- We get more chances to cooperate among caregivers beyond the unit, staff education wise it is effective

1 5. Past achievements

Demonstration of nursing care robot

○Comments after using the nursing care robot (as reported by the caregivers at the affiliation)

- There's no need to have one Parlo at each unit.
Even if there's just one Parlo, if used by both units as needed it would be effectively used.
- Residents moving between the two community living rooms meant more instances of bed-to-wheelchair-to-chair transfers, however the load on the staff have been reduced by the transfer assisting robots.
- We used to record personal care task at the unit and write on the desks however the recording support system is a tablet, which enables us to document in the resident's rooms while watching over them.
In addition to this, we don't have to move back to the desks, increasing the work efficiency.

Toward Realization of Advanced Caregiving using Robots

- ◇ **Making new rules of caregiving for practical use of Robots**
 - Trade-off between cost and benefit
 - Developing robots to work situation existing?
- ◇ **Developing in perspective of users and securing human resources**
 - Securing human resources and education in the nursing home
 - Active use of system integrator
- ◇ **Quantification of robot technologies**
 - Define the Robot in Long-Term Care Insurance Act

Evaluation of workload for appropriate support in elderly care

Introduction of our activities in the national strategic special zone in Kitakyushu focusing on nursing-care robots.

Dept. Of Ergonomics
University of Occupational and
Environmental Health, Japan
Hiroyuki Izumi



We think “easy-to-use in workplace” is more important rather than “high-functionality of robots”.

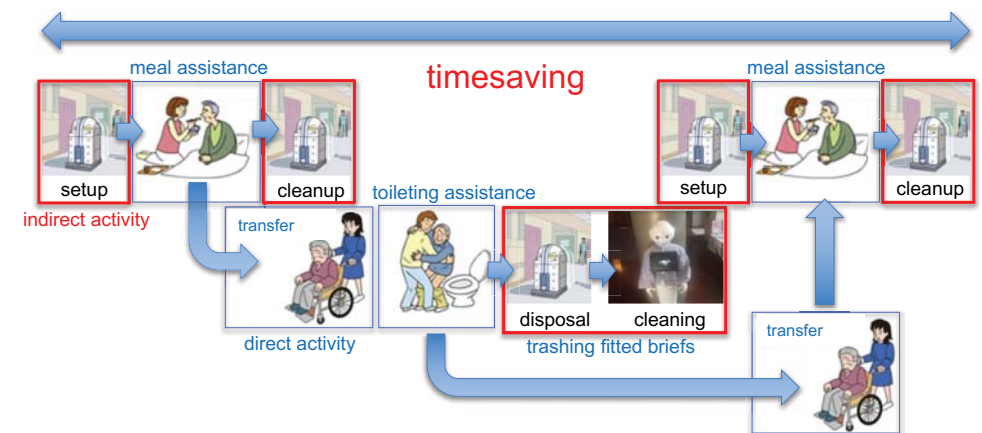
=> Matching effect between the functions of robot with job characteristics
=> What will be happened by matching? (How to evaluate the impact of robot?)

WHAT IS ADVANCED NURSING-CARE IN KITAKYUSHU SPECIAL ZONE PROJECT?

General Problems in Japanese nursing-care in nursing home for the elderly

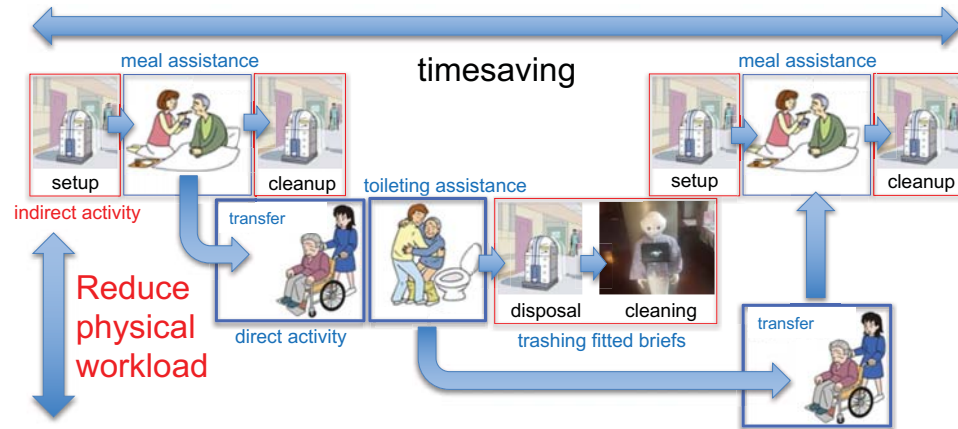
1. High physical workload of caregivers.
 - It causes WRMSDs and leaving a job
2. Too busy to take care satisfy oneself for elderly and themselves (temporal workload).
 - Caregiver needs enough time to have communication with elders.
 - Caregiver needs extra time to take action to defend themselves.
3. Unreasonable psychological demands (pressure) from the customer's relatives and caregiver's desire.
 - No fall down, Perfect care, No mistake

Basic concept for nursing-care with robot assist 1



Full automated assist (robot) introduction for indirect activity of nursing-care (for no care-receiver) to reduce the temporal workload (tight on time)

Basic concept for nursing-care with robot assist 2



Job redesign and standardization as robot-assisted nursing-care for direct activity of nursing-care (for care-receiver) to reduce physical workload

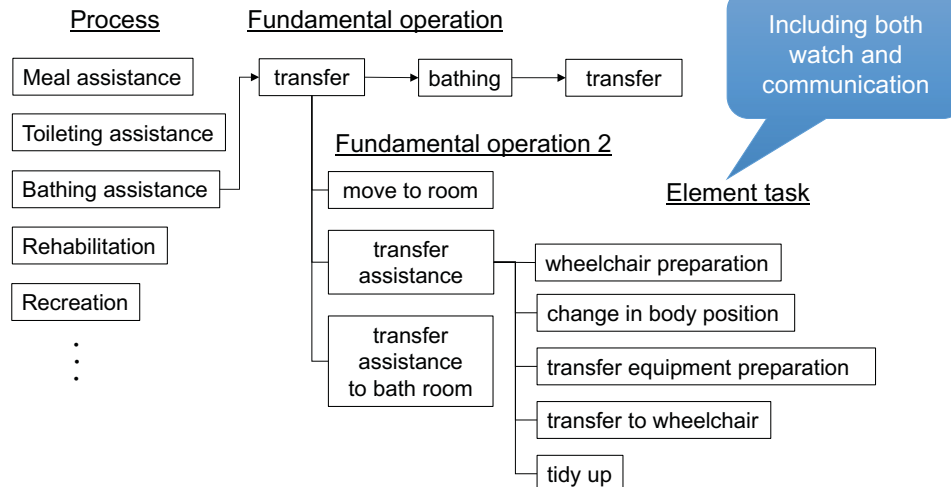


Job analysis is a tool for job visualization to extract overload/waste/uneven in work. In kitakyushu project, it is used for the evaluation of workload and the effect measurement of robot usage.

JOB ANALYSIS OF NURSING-CARE TO EVALUATE WORKLOAD

Job observation and analysis

Visualization of the care task outline at the level of element task by literature research and the interview a care-giver is important as preliminary work.



Timing measurement for each element task

7月20日 10:15		観察者名	介護者名
場所	利用者名	1人	2人 3人
移動	食事	トイレ	入浴
作業8	作業9	作業10	作業11
作業12	休憩	不明	
S・ボード	スタンディング	リフト	ロボットA
			ロボットB
<input type="checkbox"/> リフトの移動(準備) <input type="checkbox"/> ベッド操作 <input type="checkbox"/> 体位変換(仰臥→側臥) <input type="checkbox"/> スリングを敷く <input type="checkbox"/> 体位変換(側臥→仰臥) <input type="checkbox"/> スリングの位置確認 <input type="checkbox"/> リフトに、スリングのフックを掛ける <input type="checkbox"/> リフト操作(ベッド→車椅子) <input type="checkbox"/> 対象者の位置を調整 <input type="checkbox"/> スリングのフックを外す <input type="checkbox"/> フックを移動 <input type="checkbox"/> ... <input type="checkbox"/> ...		<input type="checkbox"/> 背中にクッションを入れる <input type="checkbox"/> 座位姿勢を安定させる <input type="checkbox"/> リフトの移動(片付け) <input type="checkbox"/> 不明 <input type="checkbox"/> ... <input type="checkbox"/> ... <input type="checkbox"/> ... <input type="checkbox"/> ... <input type="checkbox"/> ... <input type="checkbox"/> ... <input type="checkbox"/> ... <input type="checkbox"/> ...	
声かけ	確認		不明
Voice memo	Enter	Data list	

Count down timer: 18

Number of care-giver: 18

large category: 18

equipment: 18

small category: 18

Common action: 18

OWAS input window

trunk posture	arm posture	leg posture	hand force
?	?	?	?
?	?	?	?
?	?	?	?
?	?	?	?

Cancel Enter

Equipment for Job analysis

Observation of care-giver work in nursing-home for elderly

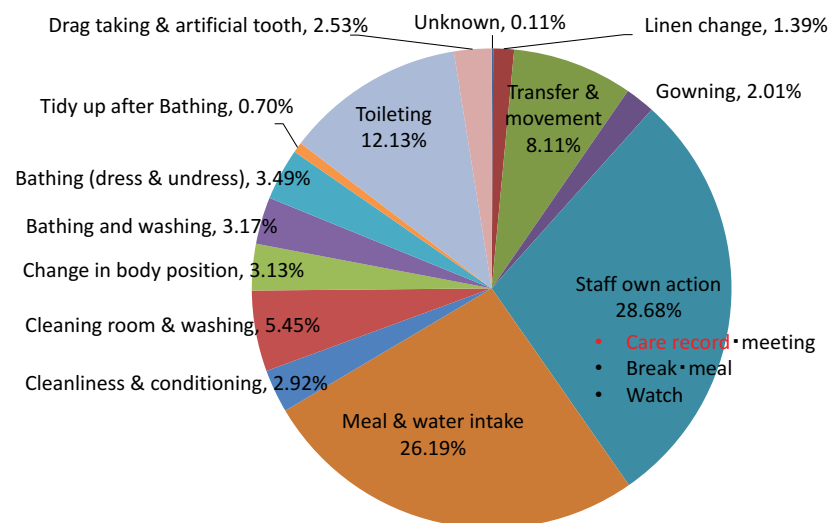


Duration of job observation

Work sampling every 30sec

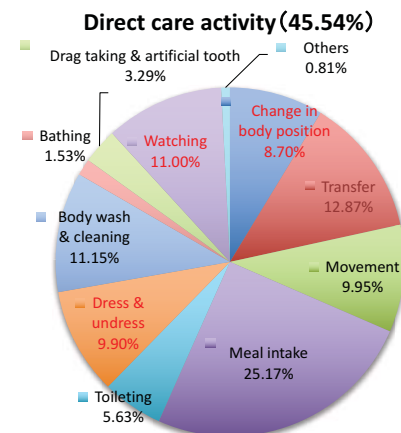
- Unit-care type nursing home for elderly
- Duration (329hr : 36,726 sample)
 - Facility A (8/29 - 9/2, total observation time : 129hr)
 - 7:00 - 16:00 (8hr) X 5 (bathing assistance)
 - 8:00 - 17:00 (8hr) X 3
 - 10:00 - 19:00 (8hr) X 5
 - 11:00 - 19:00 (7hr) X 2
 - 19:00 - 7:00 (11hr) X 1 (night shift)
 - Facility B (9/4 - 9/8, total observation time : 200hr)
 - 7:00 - 16:00 (8hr) X 10
 - 9:00 - 18:00 (8hr) X 10
 - 13:00 - 19:00 (6hr) X 4
 - 13:00 - 20:00 (8hr) X 1
 - 22:00 - 7:00 (8hr) X 1 (night shift)

Job classification ratio (%)

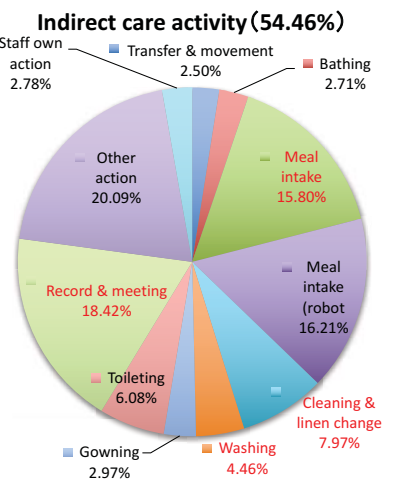


Direct activity and indirect activity (for care-receiver and for no care-receiver)

Robot for supporting nursing-care act



Robot working full automatically



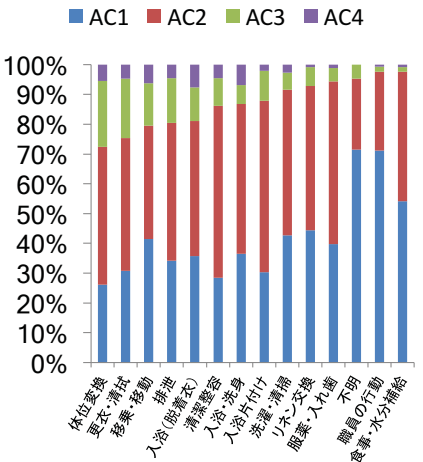
Working posture (workload)

Working posture analysis by OWAS method

OWAS method is a musculoskeletal disorder risk estimation tool from a combination of arm・leg・trunk・hand force

MSDs risk level (Action Category) by degree of demand to improve working posture

- AC1・・・No need to improve
- AC2・・・improve in near future
- AC3・・・improve as soon as possible
- AC4・・・improve right now



Elemental tasks with high risk posture

What kind supports are needed? (from the view point of work area and equipment)

Near the bed

Elemental task	ratio(%)
Change in body position	3.66
Transfer between bed and other	1.94
Watching	1.85
Nurse call check	0.56
Change the disposable diapers	1.37
Change the sheet	0.43
Total	9.81

* with poor working posture

Use of wheelchair

Elemental task	ratio(%)
Reseat on wheelchair	0.40
Transfer between wheelchair and other	2.43
Move by wheelchair	4.26
Total	7.09

independence support

Elemental task	ratio(%)
Standing and setting assistance	4.86

Summary

- We are trying to evaluate the effect of nursing-care robot usage on physical and temporal workload in nursing-care house for elderly.
- From the view point of physical workload, change a body position on a bed and standing/sitting should be supported.
- From the view point of temporal workload, recording of care act should be supported.
- In the next step of this project, the effect measurement of nursing-care robot usage will be demonstrated.
- Job analysis process will be automated near future.

Development of Robot Assist Walker RT.1 and RT.2

RT.WORKS

Company Profile: RT.WORKS CO., LTD.
Robotics Technology Works Company Limited

Corporate Overview Robotics Technology Works Company

RT. Works Co., LTD

CEO : Hitoshi Fujii

Address : 1-10-26, Nakamichi, Higashinari-ku,
Osaka, Japan

WEB : www.rtworks.co.jp

TEL : +81-6-6975-6650

FAX : +81-6-6975-6651

Design, develop, and manufacture new solutions for the aging with Robotics Technology

Focus on healthcare products with mechatronics, sensor technology, and the IoT. Provide after sales services, business support, and licensing.

Philosophy

Encore Smart

We believe you will age gracefully

We believe the next stage of your life will be filled with new encounters, new opportunities to grow, and new chances to contribute to society

We believe you will have a beaming smile

RT.Works will create the products to support such a wonderful "Encore Smart" life for you



Personal Care Robotics Development

The Japanese government has several programs that encourage industries to develop robotics and elder care products as illustrated below. RT.Works has been working with METI (The Ministry of Economy, Trade and Industry) and MHLW (Ministry of Health, Labor and Welfare) for the development of motor power assisted Walker for Outdoor use, Indoor use and clinic facilities. Actual user and professional staff testing was conducted in Japan in more than 50 facilities and 120 people verifying the products use and benefits



Robotics Assist Walker RT.1

" Like a Good pair of shoes, The RT.1 Will take you to good places"

Like your most comfortable pair of shoes, the RT.1 will encourage you to walk and stay mobile helping your balance and make you feel stable. Walking is so important to stay healthy in your mind body and spirit. The RT.1 Supports you being active while ensuring your walking safely. It keeps you vibrant and connected in your home and your community.



Designed to assist and inspire you to WALK

Motivate you to keep moving, stay active, and your desire to improve your physical and mental health on your own

Walking helps you stay strong and Independent

Utilizes the latest in new Robotics Technology, Mechatronics, and Sensors

Released in July 2015
for Japan market

RT.WORKS

Robotics Assist Walker RT.1

It's simple to use! All you have to do is to turn on the RT.1, put your hands on it, then walk. The RT.1 will lead you safely by automatically adjusting to the road conditions.

Utility

Cane and umbrella holders

Seat to Rest

Cargo basket

Sensing

Human sensor detecting your hands on grip and intention to walk

Environments sensor (6-dimension sensor)
Road condition, Motion, Slope detection, Slant, Tilt, and Weight detect

IOT

- Wireless mobile communication (3G) information service weather and warning
- Up-link the data to the cloud Position speed diagnostics, etc.

Control

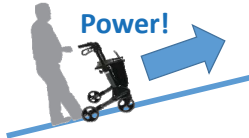
Automated Assist, Break system
Actuator real time control
Voice messages /voice cautions, Light caution

RT.WORKS

Automatic Power Assist and Braking

RT.WORKS

Smooth
Power!



Power assist helps you up climbing a slope

Very Accurate sensors and precise motor control gives you smooth yet powerful motorized assistance up a slope at the speed you intend to go.

Slow Down!



Braking assist helps you going down slope

The smart motor control will gently guide you down a slope at the speed you wish to walk. The Rollator will not run away from you. Additional Manual Hand brakes give you total control to safely walk downhill

Auto Brake!



Keeps you stable and helps prevent falls

Auto Brake helps you up and down a slope or if your standing still. The auto brake knows if you wish to move or not, it prevents the Rollator from going backwards or forwards when you don't intend to.

Optional IoT Networking features

■

Internet capability (IoT Option)

- Up Load traveling and User information
- Phone -Text- E-Mailing function for emergency and convenience
- Voice information Assistance
- Data, Communication, and wearable connectivity

■ Walking history

Track the walking history
On the map and control
healthcare data

■ Tracking- care assist

Using GPS and Map service
You can display information
on PC/ Smartphone

■ Alert notification

Communicate emergency or
key activities



RT.WORKS

Excellence Award

RT.1 Received certification, and Award of Excellence in the Governmental Care Robot Project. This award was granted to only 2 robots out of 40 robot entries in 2015 and over 90 robot's ever submitted for the project!



RT.1 Received the World's 1st Certification of ISO 13482 for Consumer Use- Outdoor Walking Product- Personal Care Robot for SERVICE ROBOT and CARE ROBOT

RT.WORKS

Robotic Assist Rollator RT 2

RT.WORKS

- * State of the art Robotics', Motor Technology, and sensors
- * Keeps you stable in a good upright position, helps prevent falls
- * Power assist helps you up a gentle slope
- * Breaking assist helps you going down slope



2017/2/27

RT.WORKS CONFIDENTIAL

Robotic Assist Rollator

RT.WORKS

Grip sensors

- Sensing if user has hands on handle-bar or not.
- Automatic braking function.

Assist motors

- Brushless DC motor x2
- Easy walking on upslope.
- Safety walking on downslope.
- Safety speed / acceleration limit.



Robotics Control module

- 6-axis motion sensor
- Battery management
- Protective stop function
- Dynamic braking

IoT Network (optional)

- BLE (connect with Smartphone)
- Activity monitoring
- Urgent messaging
- User information

Rainproof

Long Drive Battery

Foldable and Light

2017/2/27

Specification

RT.WORKS

	RT.1	RT.2
Handle bar	Straight	U-shaped
Handle height adjustment	29"-37"	32"-37"
Folding function	Yes	Yes
Baggage	Yes	Yes
Rest chair	Yes	Yes
Maximum user weight	220 lbs.	220 lbs. (TBD)
Slope	10 degrees	7 degrees
Battery (Continuous Walk)	4hour +	4hour +
Automatic Power Assist in Upslope	Yes	Yes
Automatic braking in downslope	Yes	Yes
Speed / acceleration limit	Yes	Yes
Grip sensor	Yes	Yes
Network	Yes (3G/GPS)	Optional
Dimension	W20"xL24"xH40"	W24"xL27"xH37"
Weight	34lb	20lb

2017/2/27

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Support robot Hug

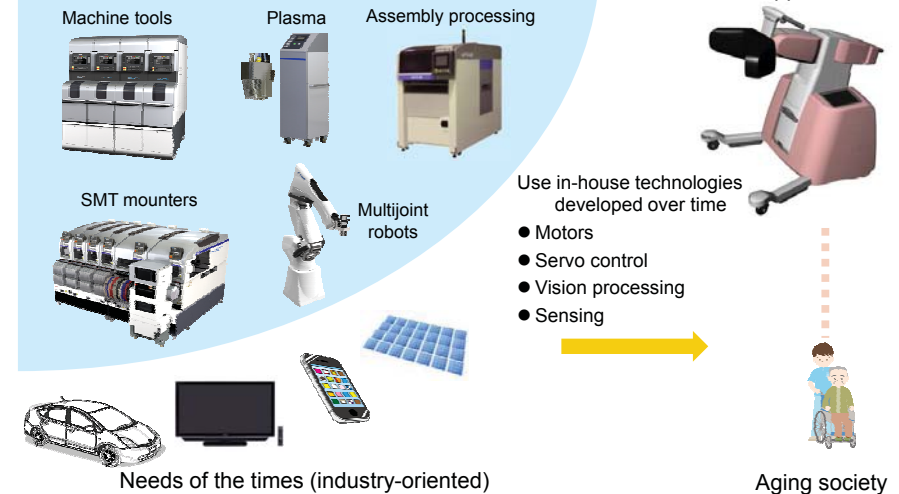


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March 2017
Fuji Machine Mfg. Co., Ltd.
Joji Isozumi

Development Background

Robotic technology from Fuji Machine Mfg. Co., Ltd.



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Concept and Features

Dignity as a person Proactive living



- ◆ Supports the use of one's own strength and mobility to move along natural lines
- ◆ No harnessing, less preparation time
- ◆ Simple operation, easy for anyone to use
- ◆ Compact. An effective tool for using the toilet, getting dressed and undressed, and bedside use



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Hug Usage Examples

Example 1

At first, refused the robot

→ Used for training motion just to stand up from their bed for 2 weeks.

They now always use Hug for standing and transfer to the bathroom for using the toilet.

They became reluctant to rely solely on the caregiver's assistance

Example 2

Large man who refused assistance from unfavored caregivers.
Refused male caregivers in particular.

→ Hug is used regularly **irrespective of caregiver preference.**

Acknowledged to be imperative for the facility.



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Hug Usage Examples

Example 3

Individual with sever bladder weakness requiring the assistance of 2 caregivers.

→ Used Hug for 1 month

Now able to use the toilet with the assistance of **1 caregiver.**

No incontinence products required. Improved quality of life was reported.

Stayed immobile on the bed, resulting in lack of attentiveness and vague communication

→ Increased motions to stand, **clearer communication with eye contact**

Free from laxatives which were also used regularly when the individual was using incontinence products. No more discomfort, and **increased appetite.**

Example 4

Because of their joint issues in their legs, this individual could not distribute their own weight, which made standing on their own difficult.

→ Used Hug primarily for the purpose of rehabilitation focusing on weight distribution, and after this period of use **regained the ability to stand.**

It takes time to become familiar with the Hug,
but caregivers and care receivers alike have found it to be beneficial



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Please take the time to try it for yourself



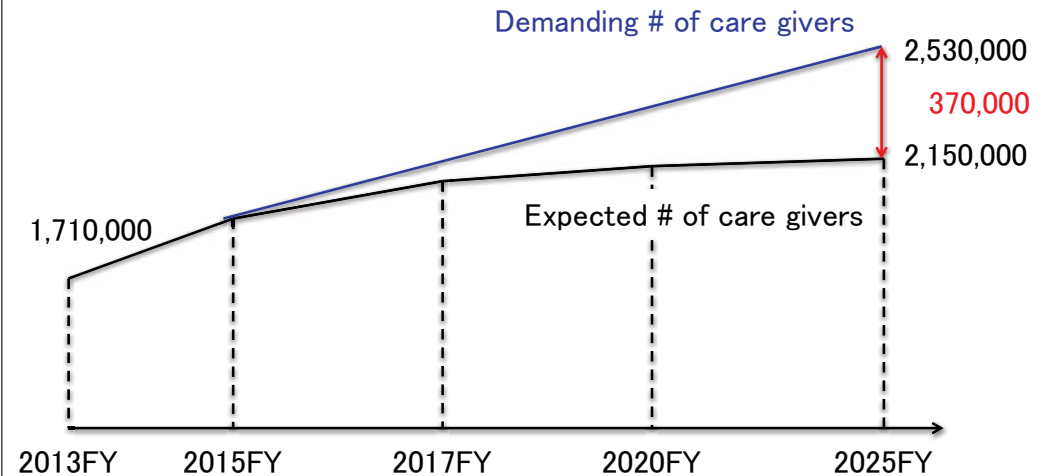
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Development of Robotic Devices for Elderly Care in Japan

Hirohisa Hirukawa
Director, Robot Innovation Research Center
AIST, Japan

1

Care Givers will be short in Japan



Ref. Ministry of Health, Labor and Welfare [2015]

2

Current States of Elderly Care in Japan

- Care receivers
 - Little participation and activity
 - Many accidents
- Care givers
 - High burden
 - Less sense of satisfaction
 - Low income
- Robotic device manufacturer
 - Little sales of the robotic devices
- Nursing service providers
 - Moderate profit
 - Lack of care givers
 - Many accidents
- Government
 - Increase of the cost
 - Lack of care givers

Why robotics for elderly care?

- Goal
 - Less burden for care givers?
 - More efficient care with less number of care givers?
 - More participation and activities of elderly persons?

Goal 1 : Less burden for care gives



- Care services with high burden
 - Transfer among bed, wheel chair and toilet
 - Safety surveillance of dementia patient especially in a night



- Applicable robotic devices
 - Transfer aid of wearable type
 - Transfer aid of non-wearable type
 - Safety surveillance sensors
 - Smart portable toilet



Robot Suit HAL for Care Assist
(Cyberdyne)



Muscle Suit for Care Assist
(Kikuchi)



Robotic Bed (Panasonic)



ROBOHELPER SASUKA (Muscle)



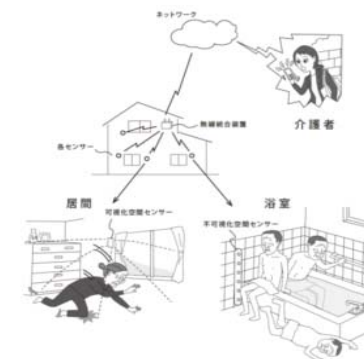
Transfer Assist Device (Fuji Machinery)



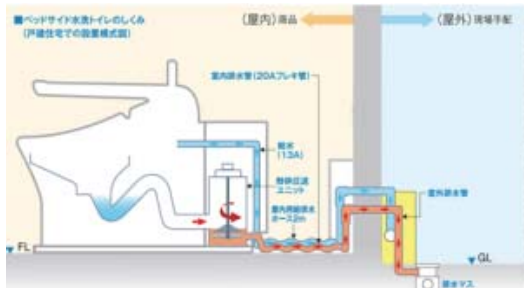
Transfer Support Device (Yaskawa)



Neos+Care
(Noritsu Precision)



Safety Surveillance Sensor for Home
(Kyokko Denki)



Portable Toilet with Wastes Processing (TOTO)



Portable Toilet with Water Washing (ARONKASEI)



Wells Aids for Bathing (Sekisui Home Techno)

The contribution of goal 1

- Care receivers
 - Little participation and activity
 - Less accidents
- Care givers
 - Less burden
 - Less sense of satisfaction
 - Low income
- Robotic device manufacturer
 - More sales of the robotic devices
- Nursing service providers
 - Less profit
 - Lack of care givers
 - Many accidents
- Government
 - Increase of the cost
 - Lack of care givers

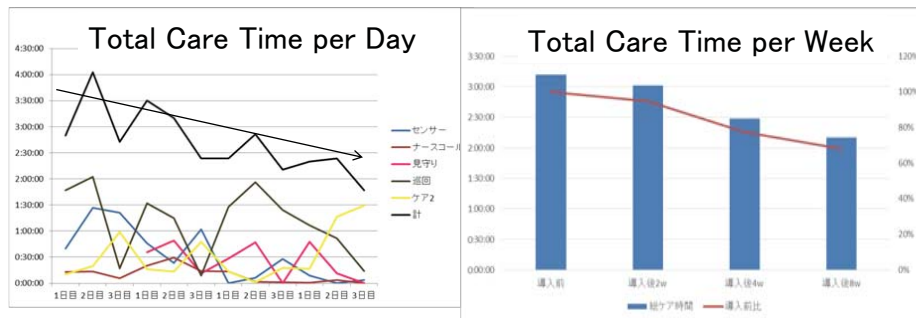
Goal 2 : More efficient care with less number of care givers



- Care services with low efficiency
 - Safety surveillance of dementia patients especially in a night
- Applicable robotic devices
 - Safety surveillance sensor for nursing home
 - Safety surveillance sensor for home
 - Safety surveillance sensor for outside

Total time for Care Services in a Night

Can be reduced by 20% after four weeks from the introduction, and By 30% after eight weeks.



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The contribution of goal 2

- Care receivers
 - Little participation and activity
 - Less accidents
- Care givers
 - Less burden
 - Less sense of satisfaction
 - Low income
- Robotic device manufacturer
 - More sales of the robotic devices
- Nursing service providers
 - More profit
 - Lack of care givers
 - Many accidents
- Government
 - Decrease of the cost
 - Lack of care givers

Goal 3: More participation and activities of elderly persons



- Normalization of elderly persons
 - Using toilet instead of diapers
 - Autonomous moving
 - Living at home
- Applicable robotic devices
 - Walking aid for outside
 - Walking aid in a domestic space
 - Aid for taking a bath
 - Autonomous wheel chair
 - Safety surveillance sensors

Mobility Aids for Walking Outside



RT.1 (RT Works)



Little Keepace (Kowa)



RT.2 (RT Works)



Walking Assist (Kawamura Cycle)



Walking Assist for Inside



自立支援型起立歩行アシストロボット(パナソニック)

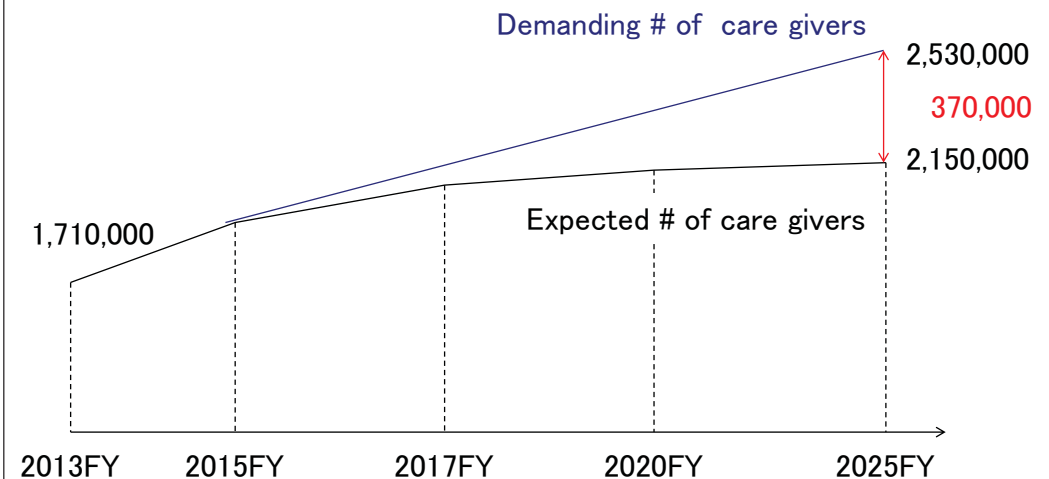


POPO(モリトー)

The contribution of goal 3

- Care receivers
 - More participation and activity
 - Less accidents
- Care givers
 - Less burden
 - More sense of satisfaction
 - Low income
- Robotic device manufacturer
 - More sales of the robotic devices
- Nursing service providers
 - More profit
 - More care givers
 - Many accidents
- Government
 - Decrease of the cost
 - More care givers

Goal 3 is likely to remove the gap



Ref. Ministry of Health, Labor and Welfare [2015]

Towards the Application of the Robotic Technology

- Evaluation of Risk
 - Safety Tests
 - Safety Certification by an Independent Agency
 - Evaluation of the Incidents/Accidents of Care Receivers
- Evaluation of Benefit
 - Change of the Care Level of Care Receivers
 - Change of the Burden of Care Receivers

<Objectives>

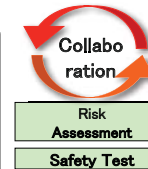
Project Leader: H.Hirukawa (AIST) Period: 2009FY-2013FY (five years)

1. Establishment of **safety standard, safety test methods and certification scheme** for service robots
2. Development of **safe service robots** based on the safety standard
3. Proposal of **the international safety standard** and creation of the test facility and certification body

<Organization>

Development of the Protocol for Evaluating the Safety of the Robots

- Establishing the Safety Standard
- Designing the evaluation protocol

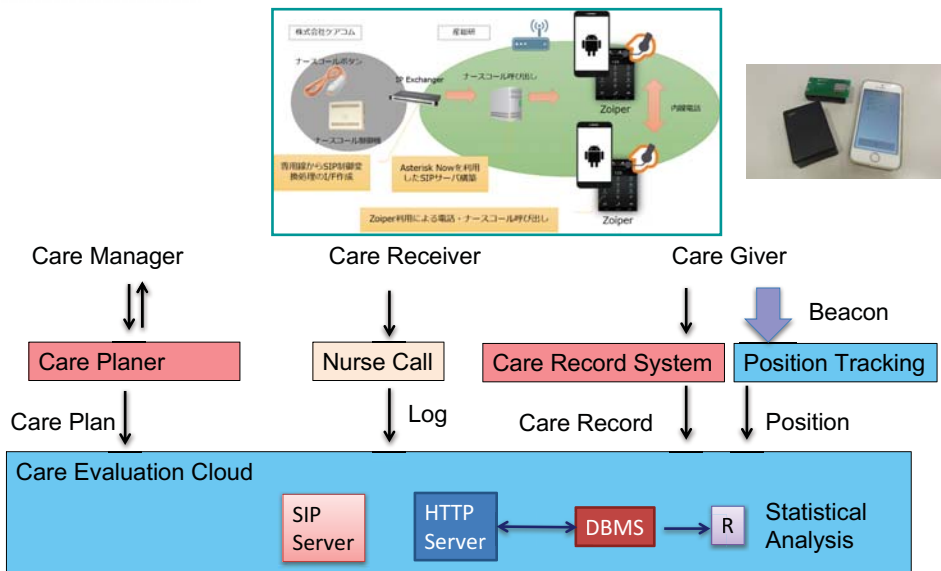


**Development of Safe Robots
(Mobile Servant, Powered Suits,
Personal Mobility)**

- Developing safe robots
- Evaluation of the safety



Evaluation of the Benefit: Evaluation of the Burden of Care Givers



Summary

- Goals of the Application of the Robotic Technology
 - 1. Less burden for care givers
 - 2. More efficient care with less number of care givers?
 - 3. More participation and activities of elderly persons?
- Towards the Applications of the Robotic Technology
 - Evaluation of the Risk
 - Evaluation of the Benefit



Health Services Research: Analysis of care service based on big data

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3/3(Fri) 2017

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Background



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Historical overview of Japanese health care and welfare policies for the older population in Japan



Period (Major policy issues)	% 65 or over	Year	Start and implementation of major policies
1960s (Beginning of health care and welfare policies)	5.7% (1960)	1963	1961 Medical Insurance with universal coverage (55 years !) * Set up of special nursing homes for the aged * Legislation for home helpers
1970s (Increase of medical cost among older population)	7.1% (1970)	1973	Free access to medical care for all older adults
1980s (social issues emerge e.g. socially-hospitalized and bed-ridden older adults)	9.1% (1980)	1982	Enforcement of Medical Service Act for the Aged * Introduction of a fixed copayment among older adults for medical care
		1989	Establishment of "Gold Plan" (a 10-year strategy for the promotion of health and welfare for the aged)
Early 1990s (Promotion of "Gold Plan")	12.0% (1990)		Establishment of "New Gold Plan"
		1994	* Focus on home care Government report issued from a working team for care and self-support of older adults
Late 1990s	14.5% (1995)		Agreement by the ruling three parties
		1996	* Memorandum for the foundation of Long-term care insurance system
(Preparation of introduction of LTCI)		1997	Enactment of Long-term Care Insurance Act
2000s (Implementation of LTCI)	17.3% (2000)	2000	Enforcement of Long-term Care Insurance Act
		2005	Amendment of Long-term Care Insurance Act

(Source: Ministry of Health, Labour and Welfare)

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Establishment of LTCI in 2000 Drastic change of the Japanese Long term care system



1. Revenue for care services

It shifted from taxes to insurance premiums.
(from Placement to Contract)

2. National standard + evaluation and modification → National claim data

Regulating the amount of care services under one system
(health care and welfare---- by care-level)

3. Family responsibility to Social responsibility

Encouraging the use of formal services to relieve family care → **no cash benefit**

4. The qualification of a care manager

The Japanese government established the figure of “Care Manager”
The Care Manager supports the choice of care services.

5. Various providers

The main providers are for-profit providers → **marketization** → **Quality of Care ?**

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Family settings under the LTC policy in Japan



- Drastic change from the policy: going from “Family should take care of the elderly” supported by a mean-tested welfare system to the “**Socialization of care**” starting in 2000 by LTCI (Long term care Insurance)
- No direct policy support for family caregivers **to encourage using formal support**. No cash benefits (encouraging service use only at the starting point, and no more discussions of other kinds of support, including cash benefits)
 - ⇔ Germany :Direct support for informal caregivers
(Cash benefit, pension, work insurance, etc.)
 - Only cash benefit in Korea, Taiwan as well.

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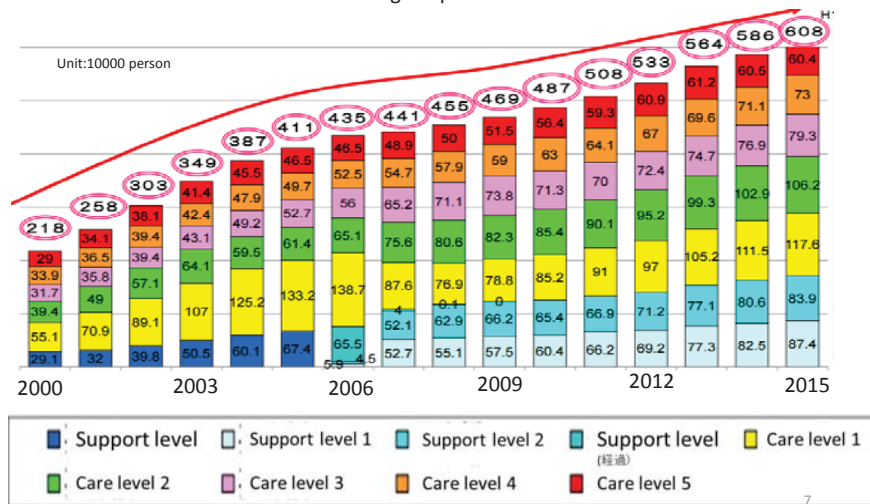
Trend of number of LTC users (2000-2015)



government statistics available

6 million users
17.9% of the over 65 y.o.
(⇔ German 10%, Korean 5%)

Total eligible person



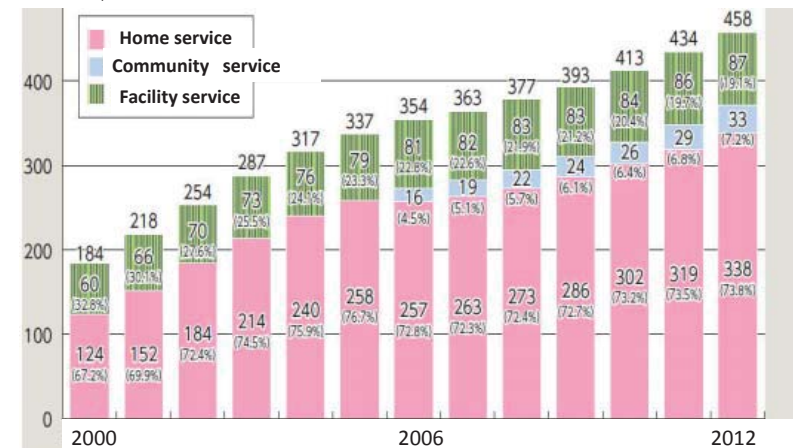
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Trend of number of LTC users (2000-2014)



government statistics available

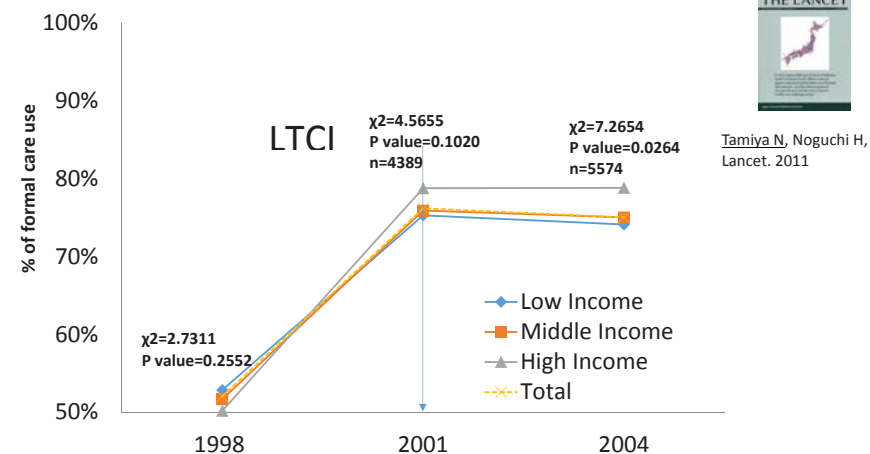
Unit:10000 person



Source: Ministry of Health, Labour and Welfare 2014

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Trends of formal care use by household income status -before and after the long-term care insurance in 2000



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Quality of care in Elder Care setting

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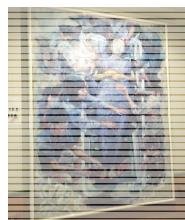
What is the factors for providing good quality of care?



Magnificent architecture with beautiful scenery



Lots of staff



Provide special service



Home and community based, relaxing environment



Improved health condition, Satisfied residents



Reduction of hospitalization

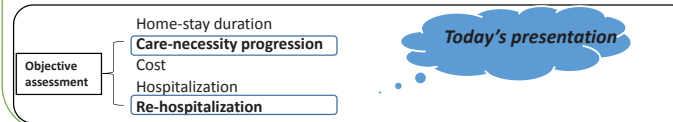
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Concepts of quality assessment in Elder Care setting

Objective assessment

Medical / clinical assessment

Advantage : Clinical outcome are considered stringent because deviations from appropriate care should influence residents' health outcome .(Donabedian,1988)
Disadvantage: Researchers believe that great strides have been made in developing objective measures of quality of care as evidenced by the Quality Indicators (QIs) based on the Minimum Data Set (MDS) in the nursing home industry. (Zimmerman&Bowers, 2000)



Subjective assessment

Psychometric evaluation. (customer perspective)

Advantage : As consumer-generated quality concerns, complaints were shown to be more timely than other quality indicators, and they had the potential to supplement quality reporting efforts.(Stevenson,2006)
Disadvantage: States such as Ohio include satisfaction indicators in their report cards. However, this approach is uncommon primarily due to the expense involved in collecting satisfaction information (Sangl et al., 2007).



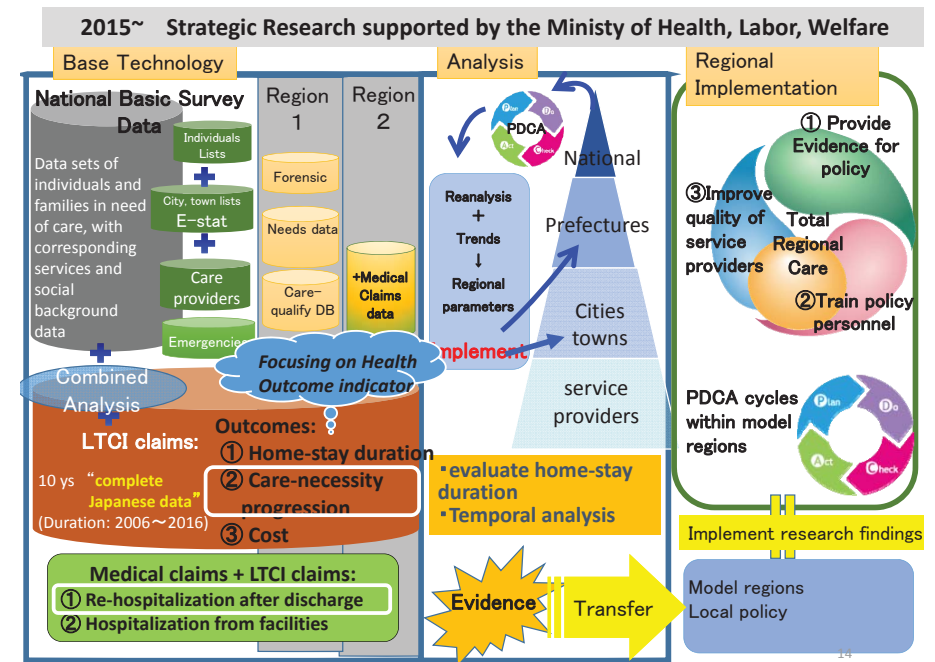
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Objective assessment

Strategic Research supported by the Ministry of Health, Labor, Welfare: Care service research using big data

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Nationwide studies using Long-term care insurance claims data

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Research example 1: Quality of Facility Care



Resident and facility characteristics associated with care-need level deterioration in long-term care welfare facilities in Japan

About data:

- National long-term care insurance claim data (individual level) merged with survey of institutions and establishments for long-term care (facility level).
- **Study period:** Oct.2012-Oct.2013(One year follow up)

Outcome variable:

- Divided care level change to two categories: deteriorated and not deteriorated.

Independent variables:

- Residents' level: Age, gender, Health status (care need-level)
- Facility level: Year in business, facility size, staffing level, percentage of private room, percentage of dementia room.

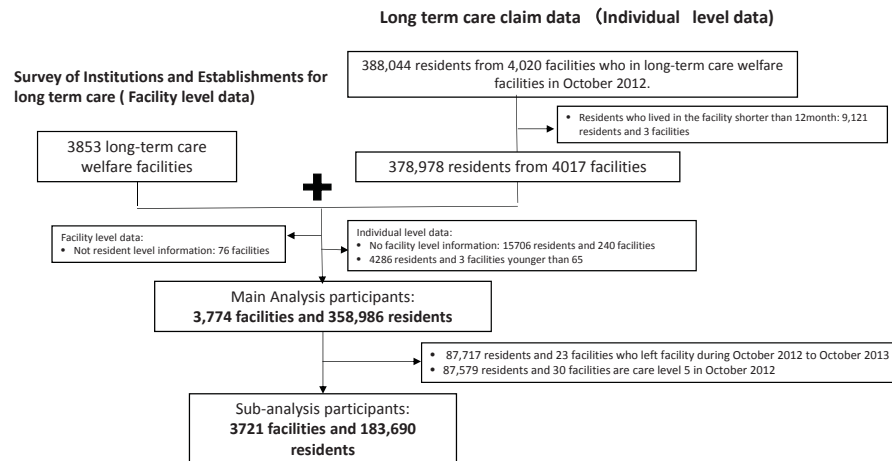
Data analysis:

- Descriptive analysis
- Multilevel logistic regression :
 1. correlated nature of data recorded on multiple residents from the same facility
 2. Enable to investigate both resident and facility characteristics correlates to care level deterioration.

(Jin, X., Tamiya, N. et al., in progress)

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Figure 1. Participant selectin flow diagram



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(Jin, X., Tamiya, N. et al., in progress)

Facility and residents characteristics associated with care-need level deterioration: results of multilevel logistic regression analysis.



		Include			Exclude		
		death and hospitalization			death and hospitalization		
		OR	95% CI	P-value	OR	95% CI	P-value
Resident Level		(n=358,986)			(n=183,690)		
Age group (ref.<75)							
	75-84	1.39	1.35-1.44	<0.001	1.21	1.15-1.27	<0.001
	>=85	2.17	2.10-2.24	<0.001	1.36	1.30-1.43	<0.001
sex(Male)		0.64	0.63-0.65	<0.001	1.13	1.09-1.16	<0.001
Care-need level (ref. care-need level 1)							
	care-need level 2	0.88	0.84-0.92	<0.001	0.79	0.75-0.83	<0.001
	care-need level 3	0.86	0.82-0.90	<0.001	0.66	0.63-0.69	<0.001
	care-need level 4	0.79	0.76-0.83	<0.001	0.39	0.37-0.41	<0.001
	care-need level 5	0.60	0.58-0.63	<0.001			
Facility Level		(N=3774)			(N=3721)		
Facility type (ref. Traditional)							
	Mixed (Traditional+ Unit)	0.94	0.90-0.97	0.001	0.93	0.88-0.98	0.010
	Unit	0.97	0.94-1.00	0.022	0.95	0.91-0.99	0.023
Metropolitan (ref. nonmetropolitan)		0.97	0.94-0.99	0.016	0.92	0.89-0.96	0.000
Year in business		1.002	1.00-1.00	0.016	1.002	1.00-1.00	0.013
RN/(RN+LPN)		0.94	0.90-0.98	0.002	0.98	0.92-1.05	0.572
Registered dietitian/ dietitians		0.99	0.95-1.02	0.368	0.94	0.90-0.99	0.018



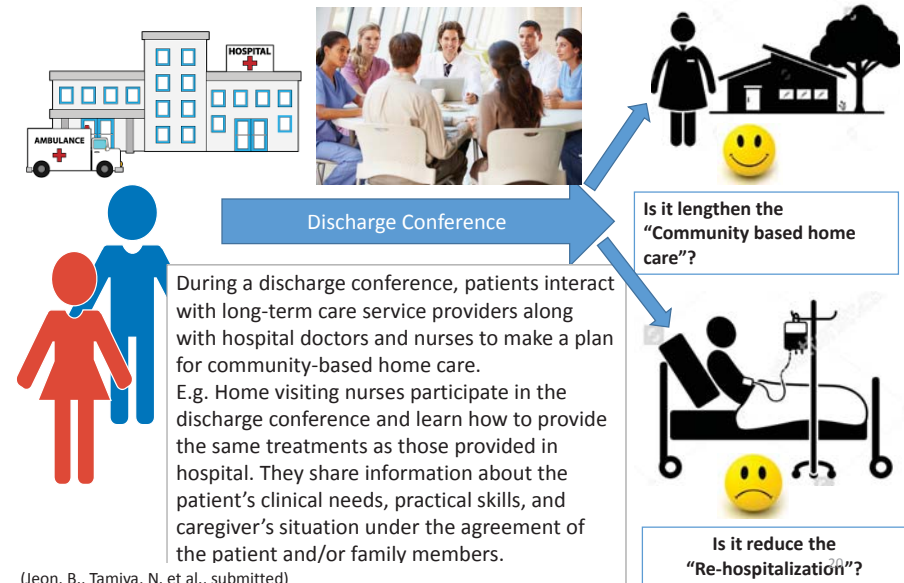
Unit facilities, Locating at metropolitan, shorter year in business, Higher proportion of registered nurse on nurse, Higher proportion of registered dietitian on dietitian.

(Jin, X., Tamiya, N. et al., in progress)

Regional studies using Medical insurance and Long-term care claims data

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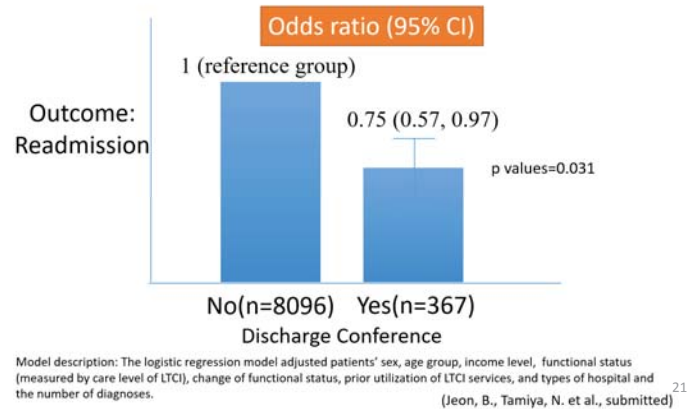
Research example 2: Evaluation of the effect of Discharge Services



Impact of a discharge conference on hospital readmission within 360 days



- **Data Sources/ Study Design:** Japanese national health and long-term care insurance claims data on elderly patients (age ≥75 years) in a suburban city, from April 2012 to September 2013. We included 8,096 individuals admitted to acute care hospitals. We identified readmission within 360 days of patient discharge from acute hospitals and estimated the impact of a discharge conference on the readmission using a multivariate logistic regression model.



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Subjective assessment

Satisfaction instrument: Resident's Satisfaction of nursing home care

Resident satisfaction survey in long-term care health facilities in Japan (11 domains)

(Pilot survey is in progress)



(1) Activities

E.g. Do you get enough information about the activities offered here?

(2) Choice

E.g. Are you free to come and go as you are able?

(3) Rehabilitation

E.g. Does the therapy help you?

(4) Employee Relations;

E.g. Are the employees courteous to you?

(5) Employee Responsiveness

E.g. During the weekdays, is a staff person available to help you if you need it?

(6) Communications

E.g. Do your problems get taken care of?

(7) Meals and Dining

E.g. Is the food here tasty?

(8) Bath

E.g. Is the number of times taking bath enough?

(9) Facility Environment

E.g. Is this place clean enough?

(10) Resident Environment

E.g. Do you think this is a pleasant place for people to visit?

(11) General Satisfaction.

E.g. Would you recommend this place to a family member or friend?

(Jin, X., Tamiya, N. et al., in progress)

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Conclusion and Suggestion

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Conclusion and Suggestion (1)

- Our study showed that diverse performance measure is possible using various outcome indicators
 - We considered both of “objective assessment and subjective assessment” to measure the quality of care
 - E.g. Care-level change, Hospitalization, Satisfaction, and etc.
- 1. We used Japanese national long-term care insurance claims data, which is useful for measuring the performance of long-term care services
- 2. We also used both of medical and long-term care claims data, under the concept of “Continuum of Care”
- 3. Finally, we also made “Satisfaction measurement” which is subjective outcomes of the older population (Consumer perspective)

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Conclusion and Suggestion (2)

- To make evidence-based policy making, using the measurement of quality of care in “Technologies for Elder Care Area”
 - The diverse outcome indicators and the scientific study methods can be applied to measure the impact of technology on the older person’s health and satisfaction.
- We can promote PDCA along with policy makers, HSR researchers, providers, technology (robot) industries, acute patients, LTC care-recipients and caregivers in the “Technologies for Elder Care Area”
 - A more open data base system, more statisticians and health services researchers are needed.

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Nursing homes + Day services in Japan- Example of showa Facility



Live with children



Fishing rehabilitation



Making rice cake rehabilitation



With skilled staff

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Thank you for listening

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Development of robotic care bed Resyone, Integrated care bed / wheelchair

Panasonic Corporation
Eco Solutions company
AGE-FREE Business Unit

2017.3.3.

Overview: Senior-care solution (AGE-FREE) business

2

Panasonic covers the entire spectrum of senior care business in Japan



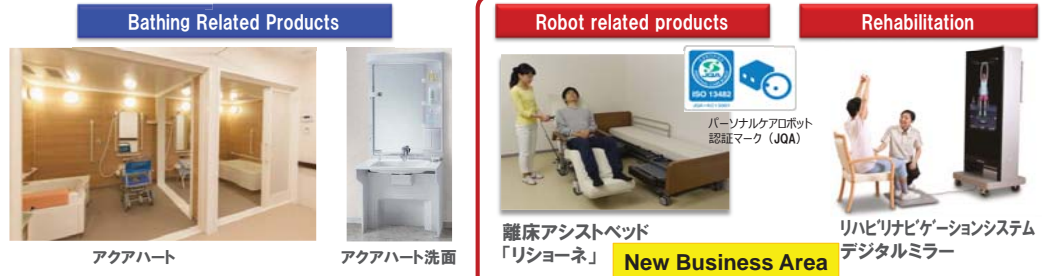
Assistive products in AGE-FREE BU

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Home use



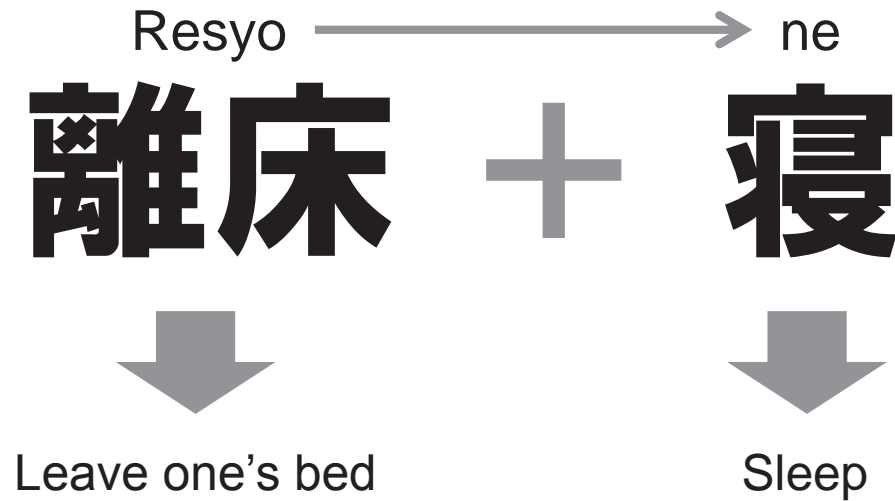
Facility use



“Resyone” Integrated care bed / wheelchair

Panasonic





Innovative senior care equipment integrating electric care bed with fully reclining wheelchair



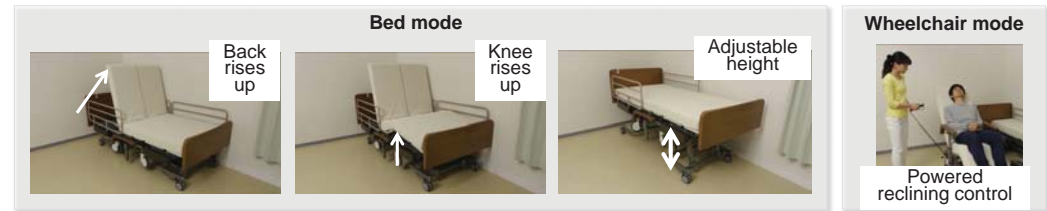
Bed mode
(equipped with 3 motors for reclining and height adjustment)



Wheelchair section separates from bed



Bed transforms into electric wheelchair



Easy, safe and smooth operation: Bed ⇔ wheelchair transfer for single staff operation

- Safety:** No need to lift care-dependent-senior out of bed, reducing not only risk of lower back pain for care-giver but also risk of falls for seniors.
- Security:** Reduce number of steps for operation, enabling care-giver to concentrate more on safety of care-dependent-seniors.
- Easy operation:** Achieved by one person. Simple operation provides reduction in the number of steps and less burden to the care-giver.



Disconnect wheel-chair from bed



Control of wheel-chair in sitting position



Wheel out patient

Resyone is faster, takes fewer steps & less space than bed hoist



	Resyone	Mobile hoist	Fixed hoist
Time required	77 sec.	186 sec.	166 sec.
Number of steps involved	26 steps	103 steps	98 steps
Physical burden on care worker (amount of work involving in bending down at 20 degrees or above)	32 sec.	176 sec.	133 sec.
Work space requirement Assessment was made by segmenting work space into 10 x 10 square cm sections and then recording the total number of segments where the head of care worker passes through and the total length of its trajectory of operation from start to finish.	30% (percentage out of the entire work)	95%	80%
	135 segments (1.35m ²)	310 segments	296 segments
	12.7 m (total length of motion trajectory)	39.7 m	39.8 m

Comparison of Performance → Transfer from bed to wheelchair (video)

Performance of Resyone is..

Time req. : up to 2.4 times faster
Number of steps : up to 4.0 times lower
Physical burden : up to 5.5 times lesser
Work space req. : up to 2.3 times lesser

Resyone in Action

Mobile hoist in Action

Fixed hoist in Action

Safety of Resyone

Resyone robotic care system becomes **world's first** to earn global safety certification

On February 17, 2014 Panasonic's Resyone robotic care bed/wheelchair system became the first in the world to be certified ISO 13482 compliant under the global safety standard for personal care robots. The certification was based on assessments conducted by the Japan Quality Assessment Organization (JQA).



Personal Care Robot Certificate (JQA)

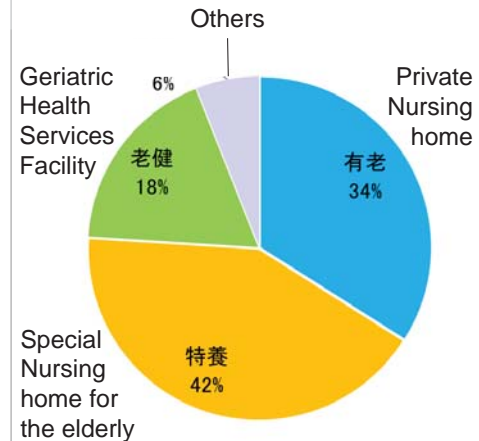


Use case of Resyone in Senior Care Setting Effectiveness of Resyone

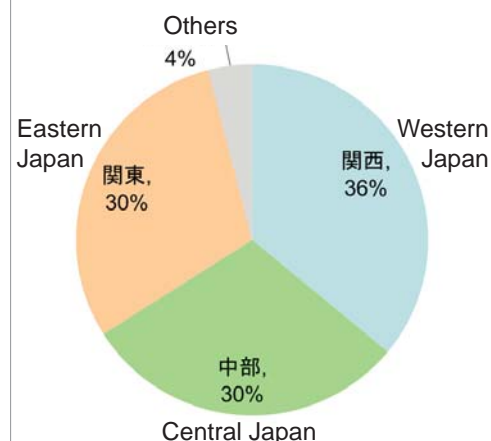
Senior Care Robot Promotion Project (2014)
Public Interest Inc. Foundation/Techno Aid Assoc. (METI)

June 2014 product launch→ Sales into senior care facilities

Placement of Resyone by Type of Facility



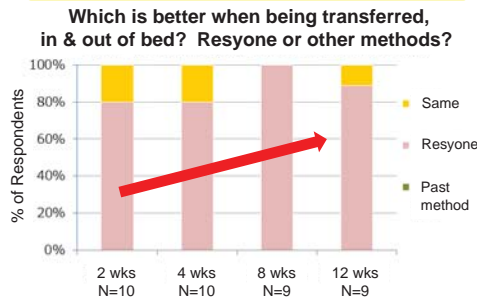
Regional Placement of Resyone



Participant: Senior Care Robot Promotion Project (FY2014) / METI / Techno Aid Assoc.

Clear improvement see by both senior users & staff after usage of Resyone

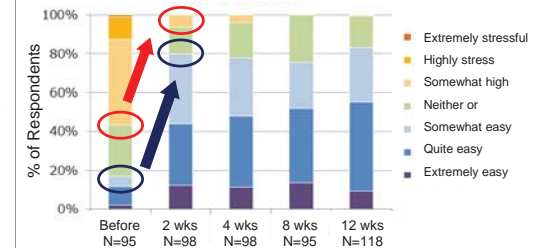
Senior User



Patient transfer evaluation was **improved by 80%** when initially using Resyone and level of satisfaction increased with further usage.

Staff

Assistance in transfer→ How is stress level on body?



Less burden on staff during transfer
(Initially, 60% felt stress→ down to 0% after use)
Majority felt their job became much easier.
Major increase seen for those answering "easy".

<Opinions>

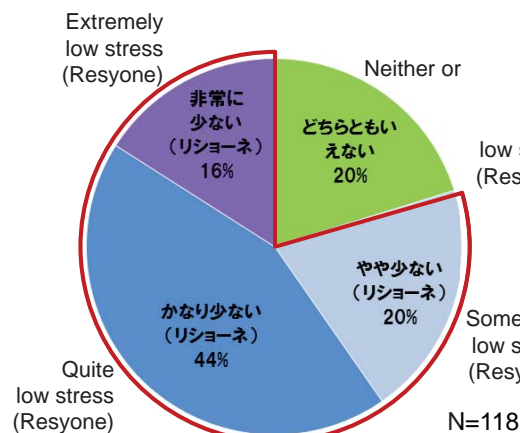
- "I was able to get out of bed without difficulty, it was very good!" (Nursing home A)
- "Overall, very good. Staff will not have back problems; want to expand usage" (Nursing home B)

Comparing Stress Levels Between Transfer Methods



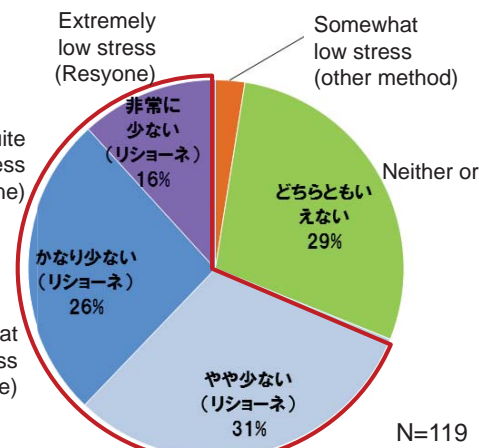
70-80% of staff commented that stress was reduced after using Resyone for 3 months

Physical stress (3 month later)



N=118

Mental stress (3 month later)



N=119

Present method has lower stress = 0%

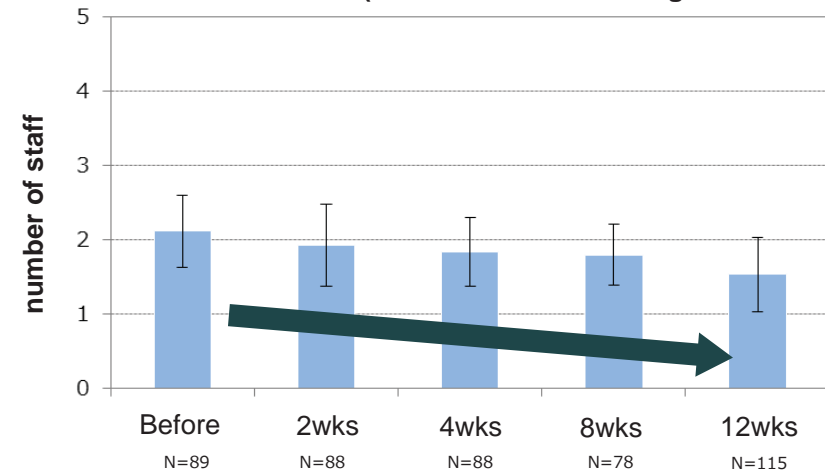
Somewhat low stress (Resyone)

Transition of Number of Staff Involved in Transferring



Number of staff involved in transfer work decreased after installation of Resyone

Transition of number of staff (involved in transferring a senior user)



Private Nursing Home (Chiba Pref.)



Easy transfer from bed to wheelchair



Transportation to cafeteria

Geriatric Health Services Facility (Nagasaki Pref.)



Use slide sheet to easily
transfer from bed to wheelchair



Incline wheelchair towards sitting posture and
use cushion to allow for smoother positioning



At a special nursing home for the elderly in Tokyo

Panasonic

A Better Life, A Better World

Development of “Watch Over Sensor” (Silhouette Image , Monitoring Sensor)

March 1, 2017
KING TSUSHIN KOGYO Co.,Ltd.



C41047(1.0)

Table of Contents

- Company information
- “General sensor system” in nursing care facilities
- Our solution ,”Watch Over Sensor”
- Operation image , “Watch Over Sensor”
- User’s impressions of Silhouette Monitoring Sensor

Company Information - 1

Registered Name	King Tsushin Kogyo Co., Ltd.
Head Office	2-6-6, Noge, Setagaya-ku, Tokyo 158-0092, Japan
Established	March 4th, 1968
Capital	Japanese Yen 397,215,000.-
President	Mr. Hidetoshi Shigeki
Employees	239 on average at age 40.9
Scope of Business	Design/ Development, Manufacturing and Distribution of the Security Systems, for instance, Remote Monitoring, Access Control, Key Management, Video Monitoring, Facility Management and RFID Application.
Bank of Account	The Bank of Tokyo-Mitsubishi UFJ Limited, Shibuya Chuo Branch/ Mizuho Bank Limited, Shibuya Chuo Branch/ Mitsubishi UFJ Trust and Banking Corporation, Central Office
Joined Organizations	Japan Security Systems Association The Tokyo Chamber of Commerce and Industry Central Station Alarm Association (U.S.A.)



Head Office



Yokohama Techno Center

Company Information - 2

Major Accounts

400 leading alarm service companies, 90 leading building maintenance service companies and any other public agencies, gas companies, oil companies, electric power companies, bank facilities, manufacturers, logistics companies, retailers and educational establishments.



Home Security System



Infrared security sensor



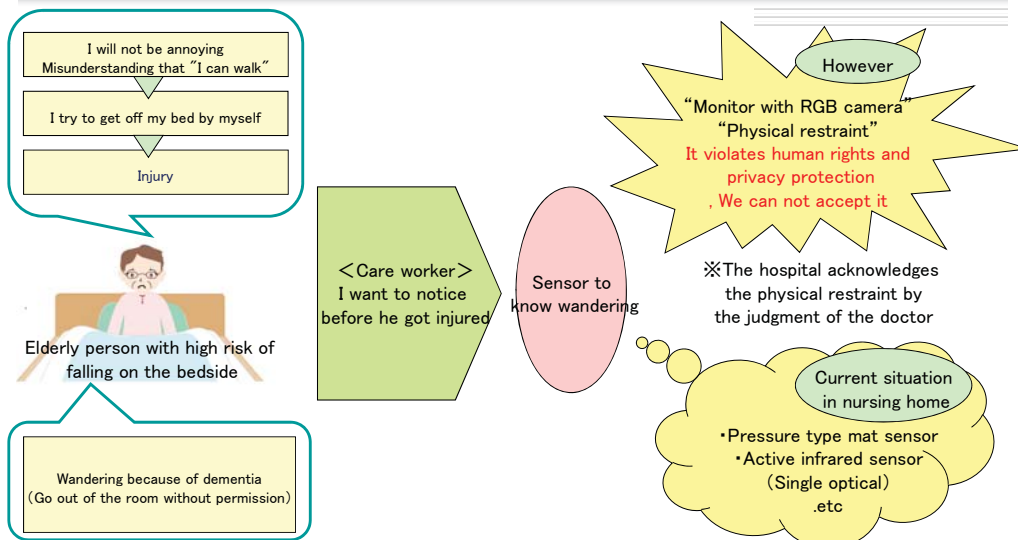
entry/exit control

F-10 2G Central Station

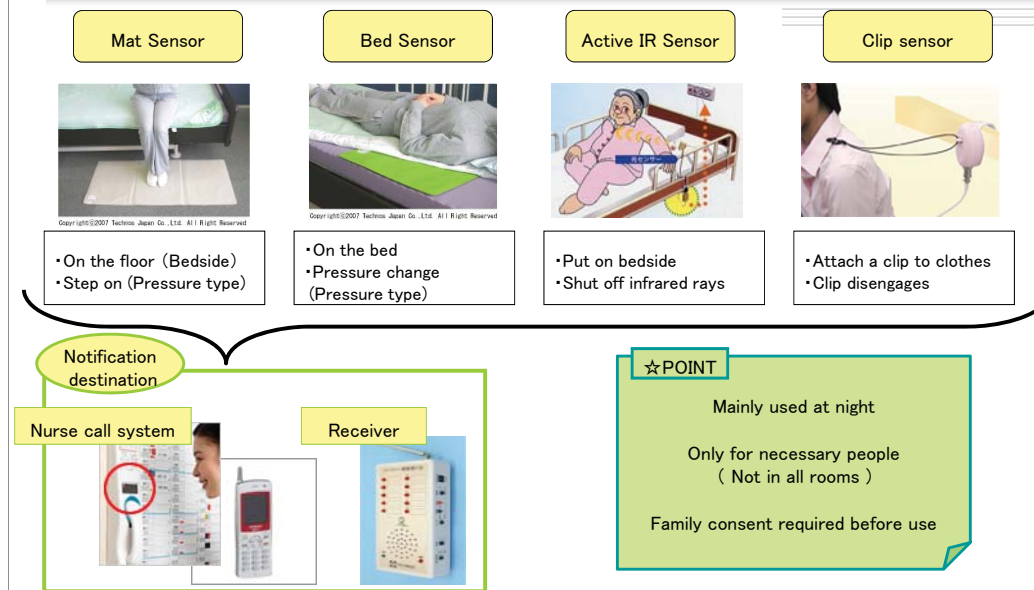


Camera System

“General sensor system” in nursing care facilities - 1



“General sensor system” in nursing care facilities - 2



Our solution , "Watch Over Sensor"

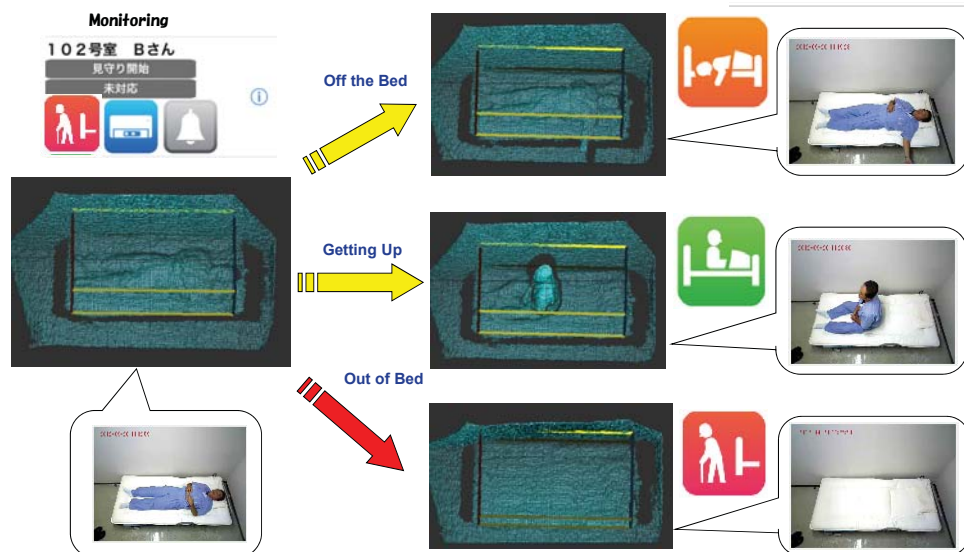


Features of "Watch Over Sensor"

- [Feature 1]
Detect behavior such as "Getting Up", "Off the Bed" and "Out of Bed"
- [Feature 2]
Monitoring by Silhouette Image
- [Feature 3]
Record and Replay Silhouette Images
- [Feature 4]
Easy Relocation with a mounting bracket



Feature 1 , Detect Behavior such as “Getting Up”, “Off the Bed” and “Out of Bed”



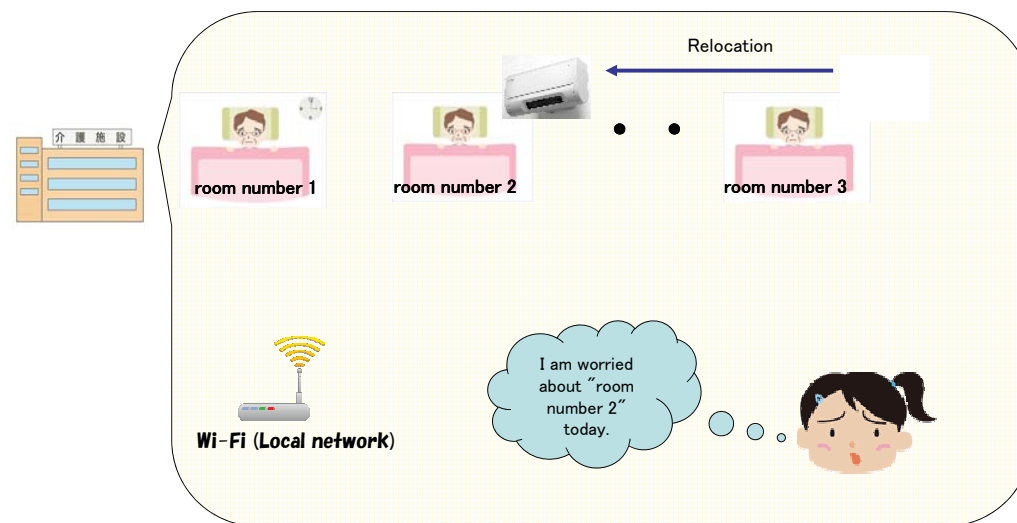
Feature 2 , Monitoring by Silhouette Image



Feature 3 , Record & Replay Silhouette Images



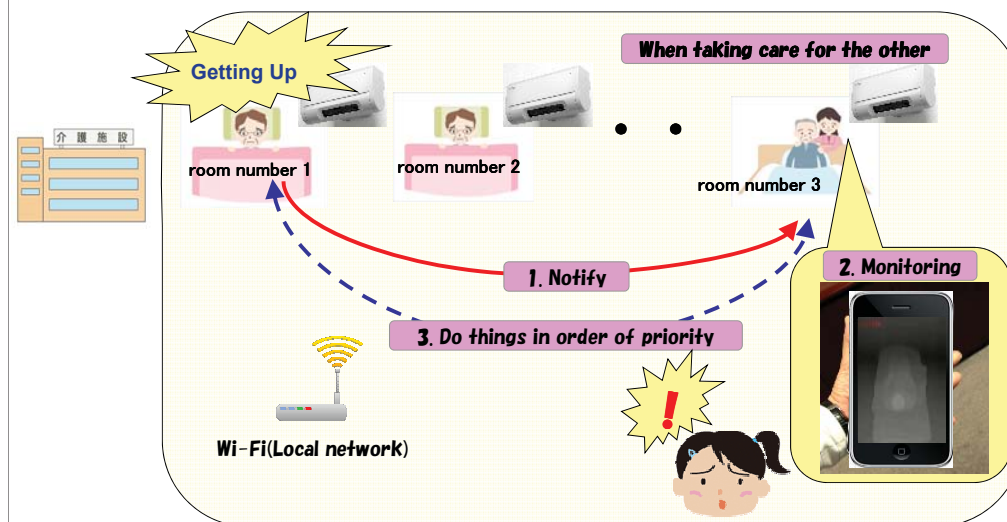
Feature 3 , Easy Relocation with a mounting bracket - 1



Feature 3 , Easy Relocation with a mounting bracket - 2



Operation Image , “Watch Over Sensor”



User's Reputation

Type of facilities for the elderly

“Tokuyoh” facilities

Rehabilitation facility

Respite care facility

High-quality facility

“Accidents have really decreased”

“Reduced anxiety or burden of our caregivers”

“It’s a safety tool for us and also for the user’s family”

caregiver speech

KINGSECURITY
キング通信工業株式会社

Thank you all for listening