



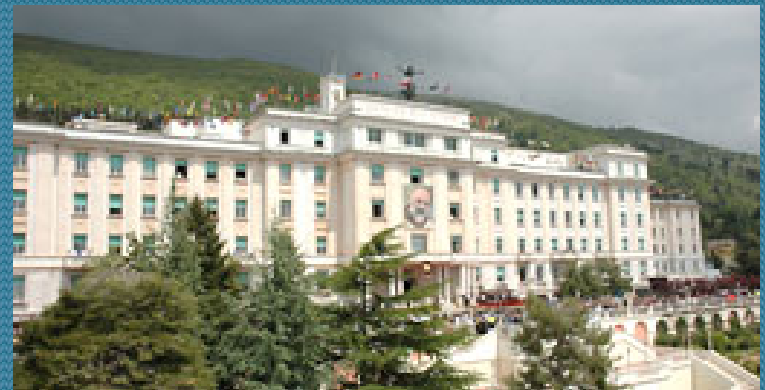
AAL FORUM 2016
— 26-28 SEPT ST. GALLEN, SWITZERLAND —



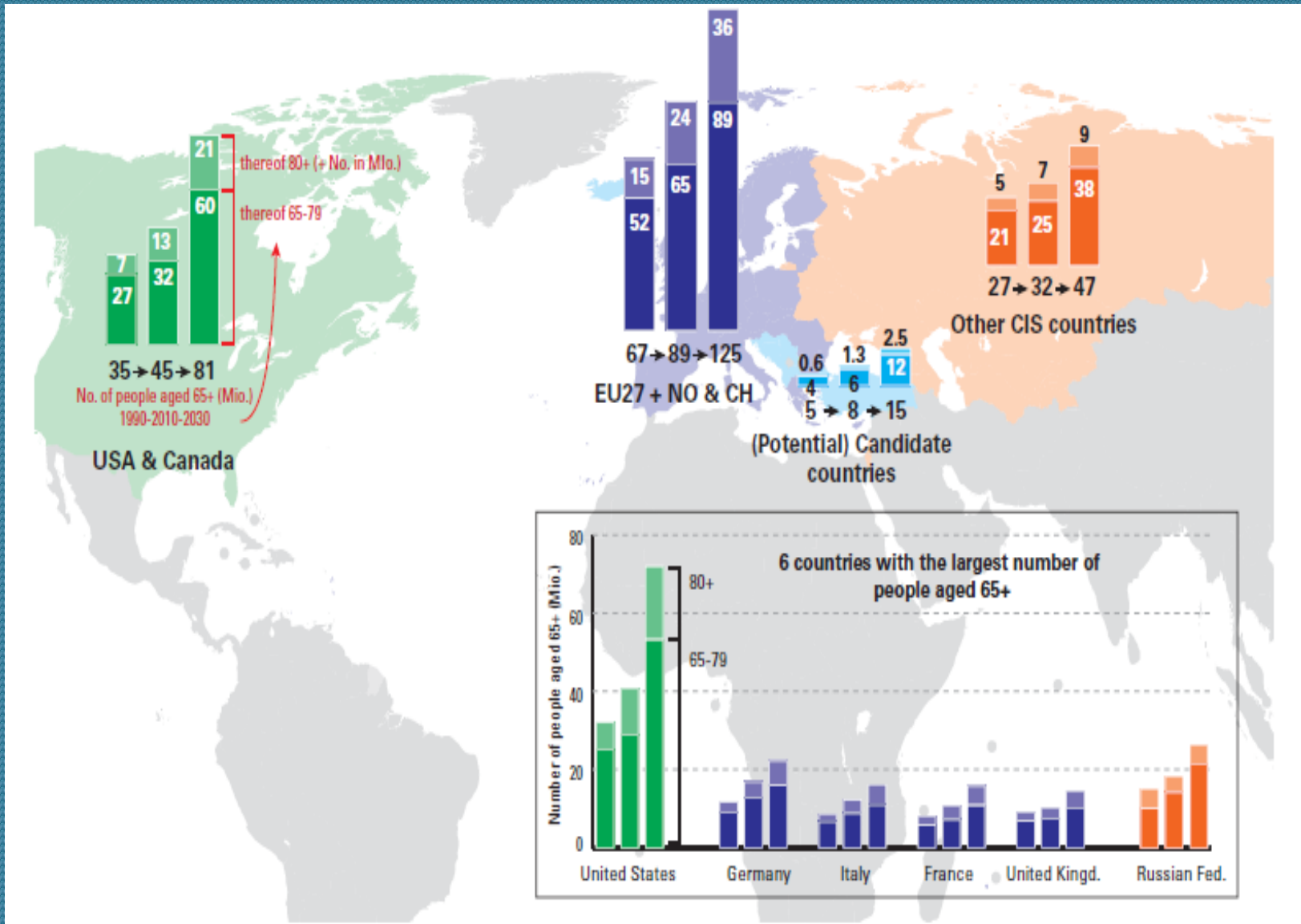
The usefulness of Domotics in the management of elderly patients with cognitive disorders

Daniele Sancarlo

UOC di Geriatria, IRCCS Casa Sollievo della Sofferenza, San Giovanni Rotondo (FG)



Demographic overview



INFOGRAPHIC

The global impact of dementia

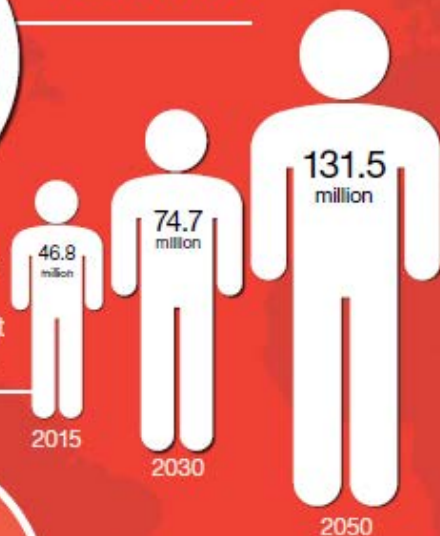


Around the world, there will be 9.9 million new cases of dementia in 2015.

one every 3 seconds

46.8 million people worldwide are living with dementia in 2015.

This number will almost double every 20 years.



Much of the increase will take place in low and middle income countries (LMICs): in 2015, 58% of all people with dementia live in LMICs, rising to 63% in 2030 and 68% in 2050.



The total estimated worldwide cost of dementia in 2015 is US\$ 818 billion.

By 2018, dementia will become a trillion dollar disease, rising to

US\$ 2 trillion by 2030

If global dementia care were a country, it would be the

18th largest economy

in the world exceeding the market values of companies such as Apple and Google



(source: Forbes 2015 ranking)



This map shows the estimated number of people living with dementia in each world region in 2015.

We must now involve more countries and regions in the global action on dementia.

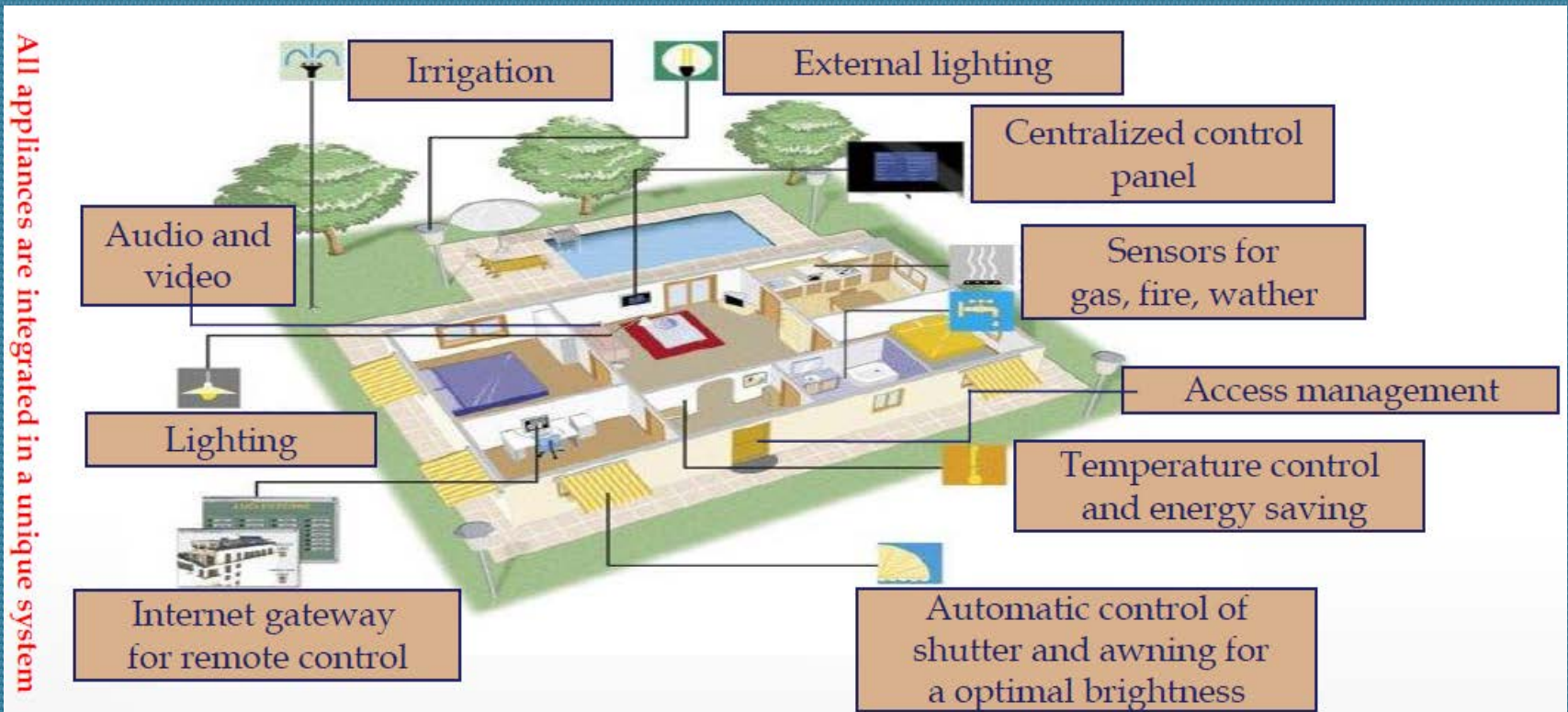
Dementia

- ▶ Another 20 people
- ▶ By 85 one person in every 3 will have dementia
- ▶ Dementia
 - ▶ worsens over time,
 - ▶ erodes your memory,
 - ▶ language,
 - ▶ communication,
 - ▶ changes your moods and personality.

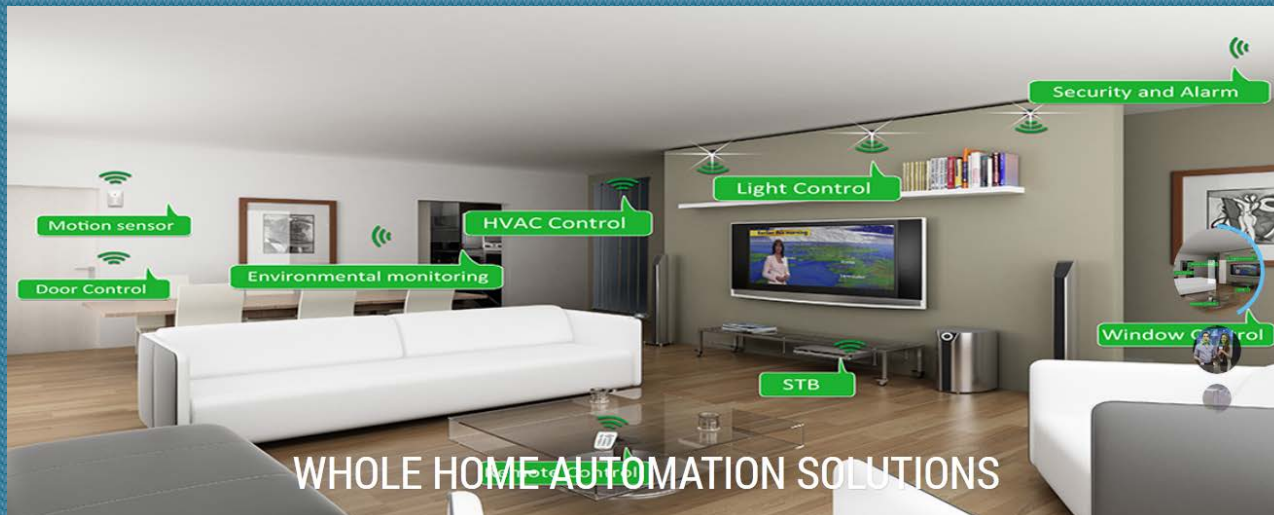


DOMOTICS

It is the application of ICT and Robotics to the home with the objective to improve confort, services and security



Market ready solution Smart Home Automation



Assistive Domotic

Application of the domotic technology in the assistance of elderly and disable people with the primary objectives to increase or mantain independency, secureness and quality of life at home avoiding institutionalization.

Gerontechnology

Interdisciplinary research field oriented to designing technology and environment for independent living and social participation of older persons in good health, comfort and safety.

Examples of assistive domotics applications

- House environment control using the user voice/mind/gestures;
- Integrate e-health devices with home appliances (e.g. pill dispenser that supply drugs according to user healthstate, medical care coordination);
- Safety (e.g. fall monitoring, eye sight and hearing alarms);
- Telecommunication platforms to keep in touch with family, friends and to participate actively to social life, from home (e.g. e-participation solutions to fight against loneliness and depression);
- Cognitive rehabilitation;
- Monitor user activities with reduced cognitive ability (e.g. prevent that user may leave the house

Domotics and Robotics

To reach its objectives, robotics, like domotics, needs of:

- semantic to contextualize the environment and the user. It must know and understand the environment and users;
- machine learning techniques to acquire experiences and to know how to use them.

Domotics and Robotics share similar issues and solutions.

These two technologies can cooperate to improve the home functions and to offer a better assistance especially for elderly and ill.

"There's No Place Like Home": A Scoping Review on the Impact of Homelike Residential Care Models on Resident-, Family-, and Staff-Related Outcomes.

[Ausserhofer D¹](#), [Deschodt M²](#), [De Geest S³](#), [van Achterberg T²](#), [Meyer G⁴](#), [Verbeek H⁵](#), [Sjetne IS⁶](#), [Malinowska-Lipień I⁷](#), [Griffiths P⁸](#), [Schlüter W⁹](#), [Ellen M¹⁰](#), [Engberg S¹¹](#).

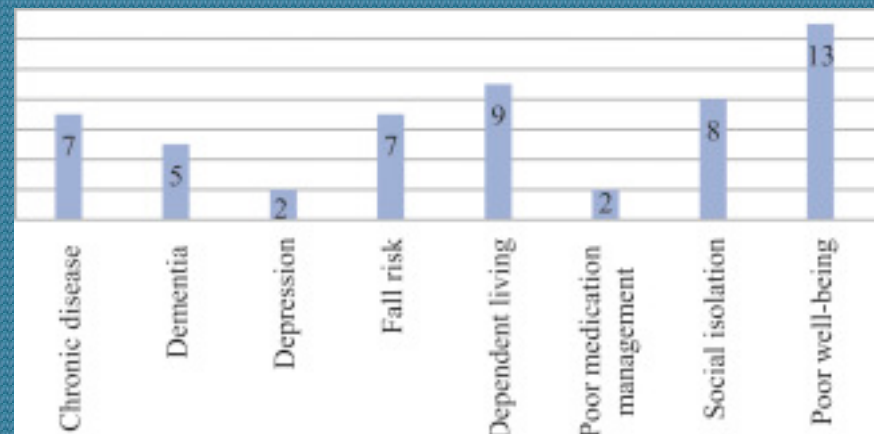
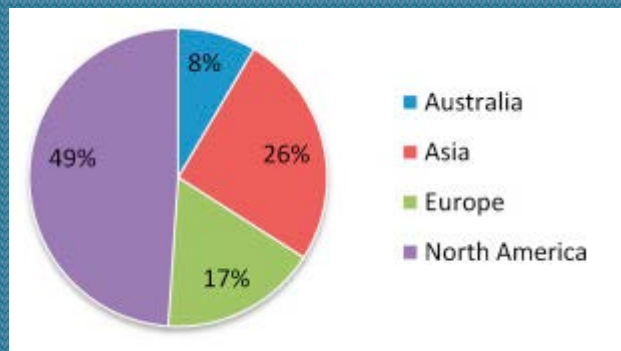
The current evidence on homelike residential care models is limited. Comparative-effectiveness research building on a clear theoretical framework and/or logic model and including a standardized set of resident-, family-, and staff-related outcomes, as well as cost evaluation, is needed to provide a stronger evidence base to justify the uptake of more homelike residential care models.

[Int J Med Inform.](#) 2016 Jan;85(1):17-26. doi: 10.1016/j.ijmedinf.2015.05.014. Epub 2015 Jun 11.

Investigating the effectiveness of technologies applied to assist seniors: A systematic literature review.

[Khosravi P¹](#), [Ghapanchi AH²](#).

Assistive technologies are a reality and can be applied to improve quality of life, especially among older age groups. This study identified various assistive technologies proposed by ICT researchers to assist the elderly. We also identified the effectiveness of the proposed technologies. This review shows that, although assistive technologies have been positively evaluated, more studies are needed regarding the outcome and effectiveness of these technologies.



Evidence

home-based consumer health technologies as a public health intervention for independent aging: A systematic review. international journal of medical informatics 82 (2013) 565–579.

This review identified and characterized three studies as effective (first tier) evidence for support of aging in place. One reason for the small number of included studies may be a gap in communication between technology and health sciences researchers in the area of health smart homes and home-based consumer health technology research. Another reason may be that research often fails to translate into practice because study designs do not address real-world context and what researchers consider to be evidence is often limited. Transferring technology into the home from organizational settings to support independent living in older adults presents contextual challenges due to the less controlled nature of the home setting.

SMART HOME TECHNOLOGIES FOR HEALTH AND SOCIAL CARE SUPPORT (REVIEW)



Main results

No studies were identified which met the inclusion criteria

Authors' conclusions

This review highlights the current lack of empirical evidence to support or refute the use of smart home technologies within health and social care, which is significant for practitioners and healthcare consumers.

Evidence

Steventon A. Effect of telecare on use of health and social care services: findings from the Whole Systems Demonstrator cluster randomised trial. Age Ageing.2013

2,600 people with social care needs were recruited from 217 general practices in three areas in England.

Telecare as implemented in the Whole Systems Demonstrator trial did not lead to significant reductions in service use, at least in terms of results assessed over 12 months.

The QALY gain by patients using telehealth in addition to usual care was similar to that by patients receiving usual care only, and total costs associated with the telehealth intervention were higher. Telehealth does not seem to be a cost effective addition to standard support and treatment.

Evidence

Home Telehealth for Patients With Chronic Obstructive Pulmonary Disease (COPD): An Evidence-Based Analysis. J. Franek. *Ontario Health Technology Assessment Series*; Vol. 12: No. 11, pp. 1–58, March 2012

No significantly reduction of outcomes considered. Trend show a reduction of hospitalization.

Evidence-Based Strategies for the Optimization of Pharmacotherapy in Older People. E. Topinkova *Drugs Aging* 2012; 29 (6): 477-494

There is sufficient evidence that implementation of computerized decision-making support programs can significantly but modestly reduce prescribing errors across multiple healthcare settings.

An Electronic System to Document Reasons for Medication Discontinuation and to Flag Unwanted Represcriptions in Geriatric Patients. Carolien M. J. *Drugs Aging* DOI 10.1007/s40266-012-0035-y

Encouraging data about automatic signalation of ADR and motivations.

Effect of a centralized prescription network on inappropriate prescriptions for opioid analgesics and benzodiazepines. Colin R. *CMAJ* November 6, 2012 vol. 184 no. 16 First published September 4, 2012, doi: 10.1503/cmaj.120465

40.1% and 42.4% relative reduction respectively in inappropriate prescriptions for opioids and benzodiazepines after PharmaNet was implemented

Evidence

Use of accelerometry to measure physical activity in adults and the elderly
Bento T. *Rev Saúde Pública.* 2011.

Smart Home Technologies for health and social care support. Martin et al, *The Cochrane Collaboration* 2009

Technology to enhance physical rehabilitation of critically ill patients. Needham DM. *Crit Care Med.* 2009 Oct;37(10 Suppl):S436-41.

Robot-assisted practice of gait and stair climbing in nonambulatory stroke patients. Hesse S, *J Rehabil Res Dev.* 2012;49(4):613-22.

Telehealth for persons with severe functional disabilities and their caregivers: facilitating self-care management in the home setting. Forducey PG. *Psychol Serv.* 2012 May;9(2):144-62.

An Automated Approach to Examining Conversational Dynamics between People with Dementia and Their Carers.

[PLoS One](#). 2015 Dec 10;10(12):e0144327. doi: 10.1371/journal.pone.0144327. eCollection 2015.

[Atay C](#)^{1,2}, [Conway ER](#)^{1,3}, [Angus D](#)^{4,2}, [Wiles J](#)², [Baker R](#)⁵, [Chenery HJ](#)^{1,6}.

Author information

The approach demonstrated in this study provides an empirical procedure for the detailed evaluation of content-based conversational engagement associated with specific communication behaviours.

[J Am Med Dir Assoc](#). 2015 Oct 1;16(10):867-73. doi: 10.1016/j.jamda.2015.05.002. Epub 2015 Jun 18.

Effects on Symptoms of Agitation and Depression in Persons With Dementia Participating in Robot-Assisted Activity: A Cluster-Randomized Controlled Trial.

[Iøranson N](#)¹, [Pedersen I](#)², [Rokstad AM](#)³, [Ihlebak C](#)⁴.

Author information

This study found a long-term effect on depression and agitation by using Paro in activity groups for elderly with dementia in nursing homes. Paro might be a suitable nonpharmacological treatment for neuropsychiatric symptoms and should be considered as a useful tool in clinical practice.

Format: Abstract

Send to

[Int Psychogeriatr](#). 2016 Sep 23;1-13. [Epub ahead of print]

Robots to assist daily activities: views of older adults with Alzheimer's disease and their caregivers.

[Wang RH](#)¹, [Sudhama A](#)², [Begum M](#)³, [Huq R](#)⁴, [Mihailidis A](#)¹.

Author information

Few studies have investigated in-depth perspectives of older adults with dementia and their caregivers following direct interaction with an assistive prompting robot. To fulfill the potential of robots, continued dialogue between users and developers, and consideration of robot design and caregiving relationship factors are necessary.

Robotics –Domotics Research Issues

- Importance of Multi-Disciplinary Approach
 - Engineering design with only able-bodied subjects can lead to unexpected results and a system not appropriate to the intended user population of persons with a disability.
 - Early integration with medical/rehab team shortens development time.
- Bring all professionals in at the beginning (actually, before the beginning) to instill sense of ownership
 - PIs from Medical and Engineering domains
 - Therapists as part of staffing of Center
 - Ergonomics experts on-call
 - People with disabilities as an integral part of project
- Ownership = championing of idea
- Conference presentations
- Publication in both clinical & engineering journals

Possible applications of domotics to patients with dementia

- biomedical parameters monitoring
- monitoring bed-rest and movements of the patient, such as integrated video/sound systems and imbalance sensors to reduce the risk of falls
- monitoring the medication use, such as pill dispenser and/or time schedule reminder system, to avoid errors in drug use by patient
- monitoring the ambient environmental conditions, (i.e. security systems to control temperature, gas-smoke, lights, humidity, entrance-exits of main doors etc.) to improve the safety and wellness of patient
- improving visual and sound direct communications between patient and relatives/carers and/or medical centre to carry out emergency communication/alert messages, improve the care provided (home-based physical and/or cognitive rehabilitation programs) of patient, develop specific interactive tailored prevention programs to reduce specific risks, i.e. incontinence, dehydration, panic attacks.
- morning alarm clock (to avoid in bed prolongation and to solicit to maintain the same daily bioritmis).
- electronic patch for emotion monitoring by skin (Goose Bump Detector)
- chromotherapy (lamp)
- music therapy
- low impact exercises (e.i. walking in the park, daily shopping, etc.)

Reduce isolation and loneliness

Improve symptoms

Reduce cognitive decline

Improve independence

Reduce health and social cost

Conclusion

The actual evidence seems to highlight that the time is ready to develop something of really usefull for persons with dementia due to the reducing technologies cost, the availability of tools probably effective and the appropriate knowledge.

The challenging is to work together through a multidisciplinary multidimensional approach trying to define a method to standardize the evaluation of interventions and converge efforts in commercial solutions readily available.

Thank you



- ✓ Aknowledgements

The research leading to these results has received funding from the European Union Horizons 2020 – the Framework Programme for Research and Innovation (2014-2020) under grant agreement 643808 Project MARIO “Managing active and healthy aging with use of caring service robots”

- ✓ Contact

<http://www.mario-project.eu/>