The need for change in early care for the aging

The accelerated ageing of the world's population presents major challenges for society and the economy, particularly in terms of health and well-being. This phenomenon is closely linked to the increase in chronic and neurodegenerative diseases such as dementia, which affects more than 55 million people worldwide, with 10 million new cases diagnosed each year (WHO, n.d.). In Spain, the Spanish Neurological Society (SEN) estimates that more than 800,000 people suffer from Alzheimer's disease, the most common form of dementia, accounting for between 50% and 70% of cases. Worldwide, Alzheimer's disease accounts for 12% of the total number of years lived with disability due to the disease, demonstrating the strong impact it has on patients' quality of life (SEN, 2023). Early detection and implementation of appropriate interventions are key to improving the quality of life of older people and their families.

In this context, **Fundación INTRAS** plays a leading role in driving innovation in dementia prevention, early detection, and quality of life improvement for older adults. Established 30 years ago, INTRAS is a benchmark in Spain's social and healthcare ecosystem, managing more than **20 specialized centers**, providing care, research, and technology-based interventions for people with cognitive and mental health issues.

Each year, **INTRAS supports over 2,300 individuals** through rehabilitation programs, assisted living facilities, and technological innovation projects, firmly grounded in principles of inclusion, personalization, and dignity. Moreover, 5,500 patients were treated through technology (Gradior Cognitivo).

INTRAS is integrated into national and regional healthcare networks, contributing directly to the mental health and ageing care strategies through innovative models. In addition to service provision, INTRAS has achieved:

- Development of GRADIOR software for cognitive rehabilitation (used in Spain and Latin America).
- Leadership in European projects focused on social and technological innovation in elderly care.
- Strategic partnerships with international universities and Living Labs.

INTRAS Foundation is participating in the European project COMFORTage, part of the European Union's Horizon program, to develop models of comprehensive care for the prevention and treatment of cognitive impairment. Its pilot project, divided into two sub-studies, aims to integrate participatory methods and virtual reality tools to improve care and early diagnosis of dementia.

COMFORTage: an innovative project for prevention and personalized care

The COMFORTage project aims to develop a comprehensive care model that combines advanced clinical approaches, artificial intelligence and new technologies to deliver personalised interventions for older people at risk of cognitive decline. COMFORTage aims to overcome the fragmentation of health data and improve the integration of digital tools in healthcare.

Fundación INTRAS is leading COMFORTage pilot number 11, which emphasises the active participation of users in the development of innovative technologies specifically designed to improve the quality of life and well-being of older people. This participatory approach allows users themselves, together with carers and professionals, to co-create technological solutions tailored to their real needs and preferences, thus ensuring their effectiveness and ease of use.

In addition, this pilot project focuses on the validation of virtual reality tools such as GRADIOR DLA PREVENTION, which facilitates the early detection of cognitive impairment through advanced neuropsychological assessments in immersive environments. By combining participatory methods with cutting-edge technology, the INTRAS Foundation aims to develop a highly effective intervention model based on the early detection and prevention of cognitive impairment, thereby contributing to optimising clinical response and improving patients' quality of life.

Two substudies seek to transform health care about cognitive impairment

The INTRAS Foundation pilot project at COMFORTage is developing two complementary sub-studies with two main objectives:

1. Participatory intervention model: Technology and Quality of Life

The first sub-study focuses on the validation of an intervention model that promotes the active participation of older people in the design and development of technologies aimed at improving their quality of life. The central hypothesis is that the involvement of end-users in technological development favours the acceptance and use of digital tools, thus optimising their benefits.

In order to test this hypothesis, the substudy implements various strategies and methods, including:

- Participatory events or nudge strategies where end-users, carers and professionals develop strategies to improve technology adoption.
- Co-creation sessions between users and technology experts to adapt tools to the real needs of older adults.
- Implementation of innovative devices, such as the use of social robots and multi-sensory systems for cognitive and emotional stimulation.

The specific objectives of this pilot project are as follows:

1.   Evaluate the effectiveness of the impulse strategy to achieve greater user acceptance and positive user experience.

2.   To measure the impact of the use of these technologies on the quality of life of the participants.

Expected impact

The results of this study will allow the development of strategies to promote the use of assistive technologies in older people, thus promoting active, autonomous and healthy ageing. In addition, this intervention model will serve as a reference for future applications in clinical and community settings.

2. GRADIOR DLA PREVENTION: virtual reality for early detection of cognitive impairment

The second sub-study aims to longitudinally validate GRADIOR DLA PREVENTION, a virtual reality tool designed to detect early signs of cognitive impairment through immersive neuropsychological testing. This innovative solution allows the assessment of memory, executive function and spatial navigation through interactive virtual environments.

Study methodology

The study will be conducted over three and a half years with a sample of 100 participants over the age of 55, divided into three groups:

- People with no cognitive impairment or memory complaints
- People with subjective memory complaints.
- People with mild cognitive impairment.

Participants will be assessed annually using the GRADIOR DLA PREVENTION and traditional methods (paper and pencil test) to analyse the effectiveness of the tool in predicting the progression of cognitive impairment.

The specific aims of this study are to:

1.   To evaluate the predictive ability of the GRADIOR DLA PREVENTION memory, executive function and spatial navigation subtests in the development of cognitive impairment.

2.   To assess user acceptance and experience with the proposed virtual methodology.

Expected impact

The results of this study will contribute to the development of more efficient and accessible screening systems for the early detection of dementia, enabling more timely and personalised interventions. The use of GRADIOR DLA PREVENTION will not only allow early identification of possible cases of cognitive impairment, but will also improve diagnostic accuracy and reduce the burden of invasive testing.

Science, technology and person-centred care

The INTRAS Foundation's work within COMFORTage reflects an innovative approach to cognitive impairment care that combines advanced technology, active user participation and personalised intervention methods. This approach allows us to move towards more empowering, less risky and more effective models of care.

These studies not only provide innovative solutions for early detection of cognitive impairment, but also promote digital inclusion and autonomy for older people in making decisions about their health

and well-being. In addition, the integration of biomedical and neuropsychological data with artificial intelligence will help improve diagnostic accuracy and develop more effective therapeutic strategies.

Moreover, INTRAS significantly contributes to the COMFORTage VHP platform by providing both prospective and retrospective data:

- **Prospective data:** Collected from participants engaging with GRADIOR DLA PREVENTION over a 3.5-year longitudinal study. Variables include neuropsychological assessments, socio-demographics, quality of life, and technology interaction metrics.
- **Retrospective data:** Clinical records, enriching the AI-driven risk modeling.

This data is crucial for:

- Training predictive algorithms.
- Refining DSS (Decision Support Systems) services within COMFORTage.
- Improving early risk stratification for dementia.

COMFORTage Services: From Data to Decision Making

INTRAS plans to leverage COMFORTage service:

- Improve early identification of cognitive decline among its users.
- Guide personalized intervention planning based on predictive analytics.
- Integrate findings into daily clinical routines and Living Lab activities.

Moreover, technologies developed by INTRAS, such as **GRADIOR DLA PREVENTION**, are not only valuable for local use, but offer rich datasets that can be utilized by the broader COMFORTage platform to enhance diagnostic algorithms and contribute to AI models.

A call to action: Towards a more inclusive and technological future

Fundación INTRAS stands as a leading example of how innovation, technology, and a human centered approach can redefine cognitive healthcare. Through pioneering initiatives like COMFORTage, INTRAS is paving the way toward a future of healthcare that is predictive, participatory, and personalized — empowering older adults to live healthier, more connected, and fulfilling lives.

The adoption of tools such as GRADIOR DLA PREVENTION and the implementation of participatory intervention models are proving to be game-changers in the early detection, prevention, and management of dementia.

At Fundación INTRAS, we extend an open call to the scientific, clinical, and public communities to champion technology-driven, person-centered approaches. Together, we must build a future where elderly care is not only more effective but also more inclusive, compassionate, and anchored in evidence-based innovation — ultimately improving the quality of life for older generations.