



Description of the Challenge

The challenge put forward by IMQ Igurco is titled: ***“How can we reduce the risks associated with dysphagia through rehabilitation in addition to dietary adaptation guidelines?”***

The aim of the challenge is to answer the following questions, related to reducing the risks associated with dysphagia:

- How can we improve the quality of life of elderly people with dysphagia?
- How can we reduce or mitigate the risks for people with dysphagia?
- How can we optimise the nutritional status of people with dysphagia, avoid dehydration or reduce the risk of aspiration?
- How can we offer personalised action guidelines for each case?
- How can we treat those cases of dysphagia that are reversible?

Background

Life expectancy in the Basque Country is above the Spanish average, and is also the highest in the whole of the EU as far as women are concerned. It stands at 86.2 years for women and 80.3 years for men, according to statistics compiled by the Basque Statistics Institute (Eustat). One of the major consequences of the increase in life expectancy, together with the decrease in mortality, is the **ageing of the population**. The ageing of a population is understood to be the increase in the proportion of people over 65 years old in relation to the total population. Spain is undergoing an exponential ageing process, with 9 million people over 65 years old, 19% of the total population. It is also estimated that by 2050 the number of people over 65 years old in Spain will rise to 12 million, which will represent approximately 30% of the total population.

The Basque Country is one of the most aged autonomous communities, with a proportion of elderly people that exceeds 21%. It also has 66,500 users of the **dependency care system**. In other words, 66,500 people are in a particularly vulnerable situation and require support to carry out essential activities in their daily lives. Of these people, it is estimated that 55% are over 75 years old and another 18% are between 65 and 79 years old.

In 25 years, from 1994 to 2019, the number of **care homes** for the elderly has increased threefold, from 153 to 448 centres in the Basque Autonomous Community. With regard to day centres, the figure has increased by 45% and there are 514 centres. In 2019, 18,885 elderly people made use of the care homes and at least 50,000 people with degrees II and III of dependency live at **home** (according to the benefits received).

One of the most common difficulties in old age, affecting between 50% and 65% of institutionalised elderly people and between 30% and 40% of elderly people living independently, is **dysphagia**, which is described in detail below. This difficulty can, in the most severe cases, lead to problems such as malnutrition, respiratory infections and even death by choking, as well as undermining health and increasing the likelihood of other illnesses.

The causes of dysphagia can differ, but in the Basque Country, where there are some 6,000 stroke cases each year, more than half of patients have difficulty swallowing food and liquids during the first few days after a stroke, which usually subsides within the first few weeks. However, dysphagia may persist in up to 15% of patients.



These data confirm the need to develop social and healthcare resources and to work to create specialised care facilities for people with an acquired brain injury and their families, in order to achieve the highest level of autonomy for patients and improve their quality of life.

Additional information:

Definition

Dysphagia is a geriatric syndrome related to **difficulty in swallowing liquids and/or solids** due to the impairment of one or more phases of swallowing. The impairment may occur in the oral preparation of the bolus or in the movement of food from the mouth to the stomach.

As a consequence of dysphagia, penetration of food material into pathways other than the digestive tract can occur, sometimes causing overt episodes of **tracheal or bronchial aspiration** (through the passage of water or food into the trachea and bronchi) or **silent aspiration** (penetration of saliva or food below the vocal cords not accompanied by coughing or any noticeable signs of swallowing difficulty).

Normal chewing and swallowing activity is a rapid and complex process of voluntary and involuntary movements involving at least six cranial nerves, the first three segments of the cervical nerves and the 26 muscles of the mouth, pharynx, and oesophagus. Ageing by itself does not cause clinically evident dysphagia, although there are age-related changes that affect the different phases of swallowing.

Related complications

Complications of dysphagia in the elderly can be categorised as follows:

- Complications arising from the **presence of foreign material in the airway**: recurrent respiratory infections and aspiration pneumonia. Both conditions have high morbidity and mortality rates.
- **Malnutrition and dehydration** and their consequences: dependency, social isolation and increased burden of care, which may lead to institutionalisation. In some cases, they can lead to the need for artificial nutrition (nasogastric tube, gastrostomy) or physical restrictions to maintain the artificial enteral feeding system.

Prevalence and aetiology

People with **oropharyngeal dysphagia** generally report difficulty initiating swallowing or manipulating food in the mouth and increased difficulty in dealing with liquids. Other associated symptoms often appear such as nasal regurgitation, coughing during or immediately after swallowing, changes in the quality of speech, etc. In dysphagia of **oesophageal origin**, there is initially greater difficulty in swallowing solid foods.

There is a lot of variation in data on the prevalence of dysphagia in the elderly. However, the prevalence of dysphagia is especially important in older people with neurodegenerative and oncological conditions.

The prevalence of dysphagia in the elderly population by condition is shown below:

Condition	Frequency
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Cerebrovascular Accident (CVA)	43-60%
Parkinson's disease	35-50%
Alzheimer's disease	45-50%
Head and neck neoplasms	59%

Source: SEGG - Spanish Society of Geriatrics and Gerontology

As shown in the table above, dysphagia is a common problem after a CVA, where close monitoring of swallowing problems is very important, especially in the first week (a resolution rate of 45-70% is recorded in the first ten days).

People with neurodegenerative conditions are also a group at risk of suffering from dysphagia. In these cases, dysphagia leads to a very serious deterioration in the quality of life of the sufferer and often creates or increases dependence on other people and may even lead to institutionalisation.

Treatment

Current treatment of dysphagia is mainly based on **compensatory techniques**.

A treatment that provides safer swallowing for people with dysphagia is **dietary adaptation** by thickening liquids and modifying the texture of food. Modifications should be made on an individual basis according to the level of dysphagia, where 3 degrees of viscosity are covered: nectar, honey and pudding.

Furthermore, in order to achieve safe and effective swallowing, we must not only adapt the texture, but also take into account the amount offered in each spoonful and choose spoons of a size that is adapted to the affected person's degree of dysphagia.

Although dietary adaptation has become a central element in the current treatment of dysphagia, the efficacy of this approach has been questioned. Studies show that dietary modifications may be linked to:

- Dehydration
- Malnutrition
- Delayed absorption of medications
- Deterioration in quality of life

Another pillar of dysphagia treatment is **rehabilitative techniques**. People with a moderate degree of dysphagia require changes in food volume and viscosity. However, when more severe impairment is present, a number of exercises that train specific muscles or muscle groups are required to improve the function of the tongue and lip muscles, improving the formation of the bolus in the oral cavity just prior to swallowing.

In general, exercise-based techniques have been shown to improve functional swallowing, improve impaired swallowing physiology and reduce or avoid dysphagia-related comorbidities.

These techniques can be indirect (without food in the oral cavity) or direct (direct food swallowing manoeuvres) and require daily practice and need to be understood and learned by both the person with dysphagia and the caregiver.

Indirect techniques are based on a number of mobility, strength and precision exercises that strengthen the muscles and support the swallowing reflex and the glottic closure reflex, with the



aim of training the organs used for swallowing. Performing these exercises involves practising all the movements that lead to the manipulation of the food bolus in the oral cavity. In addition, direct techniques are manoeuvres that are carried out with food or liquids to help with swallowing. The aim of these techniques is for the person with dysphagia to regain, as much as possible, voluntary control over swallowing and for swallowing to be carried out safely and efficiently.

Although there are a number of common guidelines and treatments for dysphagia, they must be adapted to the specific characteristics of the person's condition, tailoring the action guidelines and adapting them according to their progress. For this reason, this range of techniques must be carried out under the supervision of specialised speech therapists. Furthermore, the exercises must be selected with multidisciplinary action in mind, seeking to improve the efficiency and safety of swallowing and preventing nutritional or respiratory complications that could endanger the life of the person with dysphagia.

We must also bear in mind that swallowing disorders behave dynamically and that this requires monitoring and re-evaluation, as dysphagia can improve or even worsen and we must adapt our approach according to how it develops.

The current challenge is to find an innovative solution that focuses on automating and customising dysphagia rehabilitation guidelines, so that both people with dysphagia and their caregivers can take action in the safest possible way, avoiding or delaying the risks and complications associated with this syndrome.

Interested parties

The main stakeholders involved in this challenge, and which therefore represent all of the interested parties to be taken into account when presenting the solution, are:

- IMQ Igurco, an organisation dedicated to improving the quality of life of the elderly and their families by providing the best health and social care services. It currently manages three care homes and ten day centres belonging to the network of social infrastructures of the Bizkaia Provincial Council, as well as three other health and social care centres located in Bizkaia and one in Araba.

The opportunity to address the current challenge would be very important both for people in care homes or day centres and for dependent people living at home. In the latter case, their entire support network would be affected, as the treatment and management of dysphagia often involves a major workload for the family, leading to early or unwanted institutionalisation.

Furthermore, IMQ Igurco has two Functional Recovery Units, specialised modules for people who are in the recovery phase after surgery for a broken bone, a cerebrovascular accident (CVA) or a long illness. The unit is designed to help people recover their mobility and autonomy, something they can seldom do at home or in a hospital.

- We should also not overlook those institutions that provide various services to people with different backgrounds and problems. Among them is the Department of Social Action of the Bizkaia Provincial Council, the main function of which is to provide services to all those people in Bizkaia who find it difficult to lead a full and dignified life, whether due to a personal, family or social situation.



- There are also the institutions that provide care services, whether public or private, both health and social care services. Healthcare institutions are the main players in the diagnosis, treatment guidelines and monitoring of dysphagia.
- Lastly, it is worth mentioning all those associations in the third sector that carry out social action projects, whether working with groups that deal with this problem on a daily basis, creating support networks or assisting in the recovery process.

Needs

The overarching need is to ensure that a person with dysphagia, whatever its cause, manages to improve their swallowing or even to eat again when the dysphagia is reversible. In both cases, the main objective would be to improve the quality of life of people with dysphagia by improving their swallowing.

Impaired swallowing efficiency results in dehydration and malnutrition, which compromise health in the medium to long term. Because of this, reducing the risks derived from dysphagia is one of the main aims of the challenge, having a direct impact on health.

It will also improve the quality of life of their immediate social network, more specifically the people responsible for their care, as it is a problem that clearly impacts their workload due to the strict control to which they must be subjected during feeding (calculation of volume, specific texture, postural control, etc.).

Dysphagia is currently an under-treated problem. An analysis of the situation shows that a specific development is needed to make the treatment of swallowing problems accessible to all those who are affected by it.

The current challenge **is to study and define a personalised treatment that can remedy swallowing problems beyond dietary adaptation, working on new techniques that can accompany existing treatments and also ensure a reduction or elimination of the risks arising from these treatments.**

The challenge therefore aims to offer a tool to identify, treat, and monitor the progress of patients with dysphagia at any level of healthcare. In other words, a practical tool that helps to improve and systematise the care received by patients with dysphagia, taking into account the scientific evidence currently available.

There are currently several lines of research focused on responding to the challenge of adapting diets for people with dysphagia. However, studies show that a combination of adapted diets and rehabilitation exercises is most effective for the optimal treatment of dysphagia.

One of the most widespread innovative solutions is texturisation, a technique that preserves the taste, smell and properties of food while ensuring it has a safe and appealing consistency for people with dysphagia. With texturisation, we can maintain the visual appearance of the food and reduce the risks associated with swallowing problems. In other words, a textured diet allows swallowing without chewing and helps to improve the well-being and nutritional status of people with dysphagia.

However, textured diets are not easily accessible. Knowing the amount of food required by each person is of vital importance to avoid malnutrition. For this reason, this type of diet requires specific personalisation for each case, as well as the appropriate monitoring.

Moreover, temperature also has a significant influence on the nature of the dishes, both during preparation and serving. The need to require controlled characteristics in many cases means that professional control and supervision is obligatory, potentially hindering its implementation at home.

Objectives

The solution that will address the current challenge will be used to carry out a pilot test with users of the services currently offered by IMQ Igurco, with the aim of complementing the nutritional guidelines to combat dysphagia and, if possible, avoid or delay the risks arising from it. It should act in a personalised way regarding the different risk factors in order to make the rehabilitation process faster and safer.

As a guideline, the following table includes the functional needs required, classified as a requirement or weighted according to their level of importance, with 3 being the lowest level and 9 the highest:

Variable	Functional need	Weight
1. The system is intuitive for the user	<i>It can be used by the elderly person's family</i>	<i>Requirement</i>
	<i>It can be used by an elderly person</i>	9
	<i>It can be used by a dependent elderly person</i>	6
2. The system can be used both in health and social care centres and at home	<i>It can be used by professionals at the centre</i>	<i>Requirement</i>
	<i>It can be used by people living at home and their family caregivers</i>	<i>Requirement</i>
	<i>It can be used by service users (residential, day centre)</i>	6
3. The system can be used for users with different conditions	<i>Application for patients with reversible dysphagia (caused by a CVA)</i>	<i>Requirement</i>
	<i>Application for people with non-reversible neurodegenerative diseases</i>	<i>Requirement</i>
4. The system allows for the personalisation of rehabilitation guidelines	<i>The guidelines can be modified by a professional</i>	<i>Requirement</i>
	<i>Provides personalised guidelines automatically, without the need of a professional</i>	6
5. Allows monitoring of the evolution of dysphagia and its associated risks	<i>Control of exercise/results history</i>	<i>Requirement</i>
	<i>Control of risks associated with dysphagia</i>	6
	<i>Alerts on the worsening of dysphagia and its risks</i>	6
	<i>Alerts on the need to modify exercise patterns</i>	3



6. Reduces the risks associated with dysphagia	<i>Rehabilitates the swallowing muscles in a way that shows a clear improvement in swallowing (e.g. transitioning from pudding to honey).</i>	<i>Requirement</i>
	<i>Prevents dehydration</i>	6
	<i>Reduces the risk of aspiration</i>	6
	<i>Improves nutritional status</i>	6
7. The system allows the person to remain at home	<i>Delays institutionalisation</i>	3
	<i>Reduces caregiver overload</i>	3

Scope

Although the content of the document has been deemed appropriate to demonstrate the whole of the current challenge posed by dysphagia, through the pilot developed by the winning company and IMQ Igurco, **the viability of the proposed solution will be validated in a real environment and with real users.** This pilot validation, the result of a collaboration for the design of a solution between user institutions and the winning company, **will also allow** said company **to tackle a problem that occurs in a large part of an ageing society that has a clear tendency to develop this condition.**

The company that wins the challenge will have the opportunity to validate its proposal from a care perspective, as it will be able to collaborate directly with the professionals in charge of working with dysphagia at IMQ Igurco centres (medical, nursing, physiotherapy and psychology professionals, among others). It will be these professionals who, through the requirements set by the winning company, will define the target population for the test.

Once the objectives of each participant have been identified, and after validation of the solution for the time considered necessary, the results will be observed and analysed, allowing decisions to be taken, improvements to be detected, and possibilities for potential further development to be considered. A collaboration between IMQ Igurco professionals and the winning company will be essential for a correct analysis of the data, which will allow us to be aware of the success rate in relation to the initially set objectives.

Through the current challenge, the necessary groundwork has been laid so that, once the solution has been validated, people suffering from dysphagia who are users of IMQ Igurco's services can undergo this innovative treatment that allows them to carry out controlled rehabilitation, offering complementary solutions to the current approach and facilitating the monitoring of their progress. In figures, this represents **40% of the 1,000 elderly people who are current residents or users of IMQ Igurco's day centres**, or any other social and healthcare resource. **7,554 elderly people have been diagnosed with dysphagia** out of the 18,885 people **currently institutionalised in the Basque Country.**

The pilot involves a minimum investment of €15,000 which, depending on the proposals for solutions received, could be increased to €20,000, and which may be carried out in IMQ Igurco's network of social and healthcare centres mentioned in the previous paragraph. That said, the solution has a large potential market due to an increasingly ageing society, both in the Basque Country and at a national and global level. Moreover, **the potential is greater because dysphagia**



remains underdiagnosed, suggesting that the percentage of those affected is higher than currently identified.

Example: use case

Person with a recent CVA

A person has suffered a cerebrovascular accident and, after being hospitalised for a week, has been discharged to continue rehabilitation at home.

Having suffered a CVA, the patient must follow a strict diet and maintain a good nutritional status. In these cases, inadequately treated dysphagia can ruin recovery, causing irreparable consequences for swallowing.

Through the solution proposed in this challenge, the patient will be able to continue working on his or her rehabilitation at home in a controlled manner. The patient must follow the already established modified dietary guidelines from home, but these guidelines will be complemented by personalised and controlled rehabilitation. The aim is to accelerate recovery or achieve full recovery, depending on the patient's capacity. Of course, rehabilitation should be adapted to realistic expectations in each case.

Person with an incipient neurodegenerative disease

An elderly couple who live alone in their usual home are visited every Sunday by their daughters. When eating, one of the daughters notices that her mother coughs when she swallows. Concerned, they go to the primary care doctor, where she is diagnosed with dysphagia. As treatment, she receives specific guidelines to adapt the texture of her meals and a number of postural recommendations.

Both partners are elderly and have incipient neurodegenerative diseases, possibly not yet identified. With the help of their daughters, the couple correctly follow the dietary adaptation prescribed by the primary care professional. However, the first analyses to monitor the development of the dysphagia show the beginnings of malnutrition, dehydration, and an increase in the severity of the dysphagia.

The main objective of this challenge is to have a system that monitors the development of dysphagia and works on the rehabilitation of swallowing in an easy way and that offers autonomy to elderly people who need it. Complementing it with the dietary adaptation prescribed by their doctor, this system will help the elderly person and their family environment to cope with this syndrome in the most appropriate way possible, with the aim of improving the nutrition and quality of life of the person with dysphagia and their family environment, as well as preventing the dysphagia from increasing as much as possible.

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