



CENTER FOR
DIGITAL TECHNOLOGY
AND MANAGEMENT

A photograph of a young woman with her hair in a bun, wearing a brown sweater, leaning in and talking to an elderly woman with short, wavy grey hair. The elderly woman is wearing a light-colored, textured cardigan and a pearl necklace. They are outdoors, with trees and a bright sky in the background. The young woman has her hand on the elderly woman's shoulder.

THE FUTURE OF ELDERLY CARE IN NURSING HOMES

TREND REPORT SUMMER 2024

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ISBN: 978-84-09-65658-5



SOLIMAR
RESIDENCIAS de Mayores

**Kindly supported by
Solimar**

Geroresidenciales Solimar is a Valencian company dedicated to the comprehensive management of residential centers for the elderly, offering both publicly funded and private spaces. Solimar was founded and operated in the province of Valencia for years, but with the support of Vivalto Vie Spain, and in response to the growing need for residential spaces due to demographic aging in Spain, it is promoting the construction of new centers in other autonomous communities.

Currently, Vivaltovie Spain manages 1,397 beds in Spain, both private and publicly funded, across a total of 10 residential centers, many of which are located in the province of Valencia, including in Massanasa, Sollana, Guadassuar, Alzira, Tavernes de la Vallidigna, L'Olleria, Daimús, Xàtiva, the Villademar residence in the town of San Pedro del Pinatar (Murcia), and the Los Llanos Vital residence located in Alpedrete (Madrid). The company's headquarters are located at Paseo de la Alameda 56, 46023 Valencia.

As part of Vivaltovie Spain's growth plan, 9 new centers are being constructed in various provinces, including Valencia, Castellón, Alicante, Madrid, and Barcelona, which will be operational by 2026.



**A project of the Center for
Digital Technology and Management (CDTM)**

The Center for Digital Technology and Management (CDTM) offers the interdisciplinary add-on study program "Technology Management". Students from various study backgrounds with creative ideas, great motivation and an entrepreneurial mindset are offered the tools to put their ideas into practice. As a research institution, CDTM closely cooperates with the industry, start-ups and public sector concentrating on topics at the intersection of technology, innovation, and entrepreneurship.

The Center for Digital Technology Management (CDTM) is supported by Universitat de Valencia (UV) and Universitat Politècnica de València (UPV).

The entire trend report was written by CDTM students under the close guidance of CDTM's Management Team.

Visit www.cdtm.de for more information

PREFACE OF THE EDITORS

“Everybody can learn from the past. Today it is important to learn from the future!”

Herman Kahn. ”

As Herman Kahn, one of the founding fathers of modern scenario planning, nicely states, it is tremendously important for strategy and policymakers to get a deep understanding of possible future developments to be prepared for them.

The Center for Digital Technology and Management (CDTM) aims to connect, educate and empower the innovators of tomorrow. It is our mission to equip our students with the tools and knowledge they will need to become responsible leaders who actively shape their future environment rather than only react to changes.

This Trend Report is the result of the course Trend Seminar, which is part of the interdisciplinary add-on study program “Technology Management” at CDTM. 19 selected students of various disciplines, such as Business Administration, Computer Science, Biotechnology, Mathematics, Law, and others, work together on a relevant topic of our time. Over the course of six intense weeks of full-time work during their summer break, the participating students dive deeply into the topic of the Trend Seminar. Working in several interdisciplinary sub-teams, students apply the knowledge of their main studies and learn new perspectives from their team members. They conduct trend research, develop scenarios of the future, generate ideas for innovative products or services, and detail them out into concrete business concepts.

We would like to take the chance to thank everyone who contributed and made this CDTM Trend Report possible:

We want to thank Solimar for supporting this Trend Seminar. Particularly, we want to thank Guillermo Ramiro for his collaboration, valuable insights, and feedback throughout the whole project. We hope our findings support you in driving innovation in the context of the future of elderly care in nursing homes!

In addition, we very much thank all the expert collaborators, who shared their knowledge and largely contributed to this project’s success:

Paula Bañuls (Solimar)
Esperanza Oñate (Solimar)
Nieves Bosch (Solimar)
Mary Martinez (Savia)
Youssef Abdelilah (Resiplus)
Vicente Collado (ISECO)
Ramón Gimeno (Coliseé)
Pedro Sáez (CDTM)
Teresa Latorre (CDTM)
Dhani Spiller (UNDP)

Last but not least, we would like to thank the CDTM students of the class of Valencia 2024. They put great energy and enthusiasm into this project, which made it a pleasure for us to supervise the course and coach the individual teams.

Alicia Durán González and
Adrián Villanueva Martínez

Center for Digital Technology and Management
(CDTM)

PREFACE OF THE PROJECT PARTNER

Innovation in the care of elderly people in residential homes is an urgent need in the current context, marked by a growing aging population and the evolving expectations and needs of this demographic. To be an innovative management company in this field, it is crucial to start by understanding current market trends and adapting services to emerging demands, without losing sight of the quality of life and well-being of residents.

First and foremost, it is essential to recognize that the profile of elderly people has changed. Nowadays, residents in nursing homes are not only looking for basic care and safety but also an environment that allows them to maintain their autonomy, participate in meaningful activities, and live with dignity. This shift in expectations forces companies in the sector to rethink their care models, integrating more personalized and person-centered approaches.

One of the key trends in the current market is the use of technology to improve the quality of care. From telemedicine and remote monitoring devices to mobile health management apps, technology offers multiple tools that can make care more efficient and personalized.

Innovative management companies should explore and adopt these technological solutions to ensure that residents receive high-quality care, tailored to their individual needs and in real time. Additionally, the integration of artificial intelligence and data analytics in health management can enable better risk forecasting and early intervention, significantly improving health outcomes.

Another relevant trend is person-centered care, an approach that places the individual at the heart of all decisions related to their care. This means that nursing homes must offer services that adapt to the preferences, habits, and needs of each resident, rather than applying a one-size-fits-all approach. This model requires continuous staff training, re-designing spaces to make them more welcoming, and creating programs that promote autonomy and emotional well-being for the elderly.

Sustainability is another aspect gaining importance in elderly care. Residential homes should aim to be sustainable not only economically but also environmentally and socially. This involves adopting practices that reduce environmental impact, such as using renewable energy, efficient resource management, and creating healthy environments.

Furthermore, companies should consider social sustainability, which includes promoting inclusion, active participation of residents in the community, and creating a positive work environment for employees.

Finally, to be truly innovative, residential management companies must adopt a culture of continuous improvement, where creativity, trying new things, and constant learning are encouraged. This includes staying up to date with the latest research and advancements in geriatrics, participating in innovation and collaboration networks, and being willing to experiment with new approaches and technologies.

From this perspective, Solimar's collaboration with CDTM is a very important initiative on the company's path toward innovation in the management of residential centers, providing valuable information on the latest trends and concrete proposals for improvement that will allow us to advance sustainably toward excellence.

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METHODOLOGY

The objective of the Trend Seminar is to provide a methodological approach for diving into a specific subject or industry sector and contemplating its future trajectory.

The seminar guides its participants through three phases of trend research: trends, exploration, and ideation.

Following this approach, the seminar first analyzes current trends and developments using in-depth desk research, site visits, and interviews with experts to establish a shared industry understanding.

Next, participants identify areas within the sector where problems and opportunities will likely arise. In the final seminar phase, the students generate future-proof business ideas for products and services, addressing the identified problems and opportunities.

Nineteen students, supervised by two doctoral candidates, pursue the Trend Seminar for six weeks full-time during their summer break. The sector and framing for the seminar is provided by project partners from within the industry, who share their expertise and feedback, acting as sparring partners to the participants.

In each phase, interdisciplinary subteams are formed with students from business, technology, and other disciplines. This interdisciplinarity allows for novel ways of thinking and the development of non-obvious ideas as well as leverages the students' professional and personal growth throughout the course.

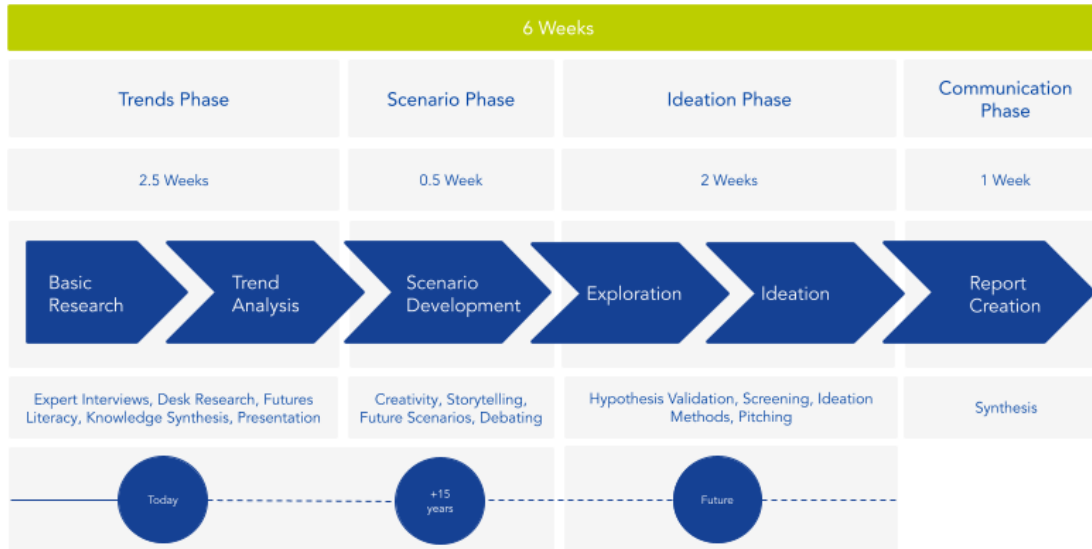
During the introduction week, the participants are prepared for the intense trend research ahead. First and foremost, the students are introduced to the specific industry the seminar is diving into. Project partners and industry experts present past and current industry developments from their individual stakeholder perspectives, engaging in open discussions with the students. Additionally, interactive sessions teach trend research methodologies and refine the participants' communication and teamwork skills.

Following the introduction, the trends phase of the seminar covers desk research and expert interviews, enabling the participants to dive deep into the topic at hand.

During the expert interviews, students are empowered to pose specific questions to challenge their initial assumptions on how the industry will develop. Beyond that, site visits at the project partners' facilities complement the students' body of research and allow for further verification of their hypotheses. The derived trends are extrapolated 15 years into the future, providing a long-term perspective.

The first half of the ideation phase is about exploring, future opportunities and problems are clustered into specific spaces based on the research done in the preceding phase. The students are reshuffled into new teams and explore these spaces by looking into existing companies and projects. Through coaching sessions, the teams validate their hypotheses to identify unmet needs and existing gaps in the industry landscape.

During the second half of the ideation phase, students brainstorm business solutions addressing the previously identified gaps. To facilitate the ideation process, structured and unstructured ideation methods are introduced to the students. This allows them to generate many ideas before consolidating them and building comprehensive business models. Finally, the research results and the business ideas are pitched to the project partner.



LIST OF ABBREVIATIONS

AI

Artificial Intelligence

XR

Extended Reality

VR

Virtual Reality

AR

Augmented Reality

MR

Mixed Reality

mhealth

Mobile health

EHRs

Electronic Health Records

IoT

Internet of Things

IT

Information Technology

US

United States

WHO

World Health Organisation

HIPAA

Health Insurance Portability and
Accountability Act

MSDs

Musculoskeletal disorders

USD

United States Dollars

CAGR

Compound Annual Growth Rate

FRT

Facial Recognition Technology

EU

European Union

GDP

Gross Domestic Product

OECD

The Organization for Economic
Cooperation and Development

UK

United Kingdom

LTC

Long Term Care

GDPR

General Data Protection Regulation

SDGs

Sustainable Development Goals

UN

United Nations

MRDOs

Multidrug-resistant Organisms

UNEP

United Nations Environmental Programme

PV

Photovoltaic

COVID-19

Coronavirus Disease 2019

CSRD

Corporate Sustainability Reporting Directive

MB

Megabyte

LOPDGDD

Organic Law on Protection of Personal Data and Guarantee of Digital Rights

IRA

Inflation Reduction Act

LCCTE

Climate Change and Energy Transition Law

EGD

European Green Deal

NICE

National Institute for Health and Care Excellence

A&E

Accident and Emergency

ECG

Electrocardiogram

TAM

Total Addressable Market

SAM

Serviceable Addressable Market

SOM

Serviceable Obtainable Market

VWA

Virtual Wellness Assistant

EUR

Euros

TRENDS

The following chapter lists current trends that have a strong influence on the development and long-term strategic orientation of The Future of Elderly Care in Nursing Homes. In accordance with the Trends Phase methodology, trends and related driving forces are structured into five areas: technology trends, societal and environmental trends, legal and political trends, economic trends, and business model trends.

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TECHNOLOGY TRENDS

IMPACTING THE FUTURE OF ELDERLY CARE

Extended Reality in Elderly Care
Advanced Monitoring Technologies
Automation of Nursing Administrative Tasks
Support Elderly Care with Robotics

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TECHNOLOGY TRENDS

Impacting the Future of Elderly Care

The elderly care industry is expanding rapidly due to the global increase in the aging population. As the demand for nursing services escalates annually, the shortage of professionals in the sector is already evident and is expected to become more pronounced in the future. Despite continuous technological advancements, this sector remains technologically outdated.

Regulatory requirements obligate caregivers to perform repetitive tasks, such as documenting daily activities. These tasks contribute to inefficiencies, as caregivers spend significant time on recurring responsibilities rather than focusing on individualized resident care needs. Technology can help nursing homes overcome these challenges. However, there is resistance due to the elderly's reluctance to adopt new technology and caregiver's lack of time to learn it.

Extended Reality (XR) offers numerous possibilities to enhance elderly care. Caregivers can use XR to boost efficiency by providing real-time guidance and detecting errors. Smart glasses, in particular, enable hands-free interaction and uninterrupted focus on tasks. Additionally, XR serves as a valuable tool to enhance nursing education by simulating realistic scenarios, thereby optimizing training outcomes.

Moreover, XR can significantly contribute to improving the well-being of the elderly. For instance, it can transform physical exercises into engaging experiences, such as virtual nature simulations.

When it comes to monitoring the elderly, we can utilize automatic monitoring devices such as sensors, wearable devices, and surveillance cameras. These technologies, working alongside caregivers, promise to detect potential health issues early and ensure the safety of residents by monitoring potential threats like falls. Despite these advantages, these technologies present various challenges, including adapting wearable devices to meet the unique needs and comfort of the elderly and implementing camera surveillance in a way that balances the need for elderly safety with their right to privacy and autonomy.

Regarding daily operations, we live in a world where caregivers take time to care for elders but also have to spend a significant amount of time on repetitive and automatable administrative tasks. With advancements in monitoring technologies using sensors that allow us to collect information automatically, along with Artificial Intelligence (AI), we can automate a large part of these administrative tasks, giving valuable time back to nurses so they can spend more quality time with the elders.

Caregivers often experience pain or suffer injuries from moving residents or are occupied with routine tasks such as delivering food, beverages, or medication. Automating some of these simpler tasks with robots could improve caregivers' physical health and free up valuable time for more meaningful interactions with residents. However, it is crucial to acknowledge the importance of human touch in the daily lives of the elderly. Additionally, limited resources mean that not every nursing home has the financial capability or time to implement these technologies.

With all these trends, we picture a future where technology can free up time for the nursing home staff to dedicate their time to more humane tasks that residents need. In this chapter, we invite you to learn more about these interesting technology trends in elderly care.

EXTENDED REALITY IN ELDERLY CARE

Using Extended Reality to Improve Well-Being and Efficiency in Elderly Care

XR is an umbrella term that encompasses various immersive technologies, including Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR). VR creates an entirely virtual environment, isolating users from the physical world. AR, on the other hand, overlays digital content onto the real world, enhancing the user's perception of their surroundings. MR combines elements of both VR and AR, allowing real and virtual objects to interact in real time [1].

XR has numerous possible applications in elderly care. On the one hand, caregivers and nurses can use it as a tool to improve patient care. Studies highlight the advantages of using smart glasses in scenarios where activities require timely information access, mobility, hands-free interaction, and continuous attention to tasks [2]. Hence, elderly care is a particularly promising field for the application of XR, as many tasks align well with these characteristics. Additionally, XR can be valuable in nursing education, offering interactive simulations and real-time feedback. On the other hand, XR can be used directly by the elderly for exercises, therapy, or to communicate with their families, thereby enhancing their overall quality of life.

Facts:

- The global XR market, valued at 142.39 billion United States Dollars (USD) in 2023, is projected to expand at a Compound Annual Growth Rate (CAGR) of 32.9%, reaching 1,069.27 billion USD by 2030 [3].
- AR systems in nursing homes have reduced medication sorting errors by over 60% through real-time visual guidance and instant error reporting [4].
- VR-augmented exercise bikes are preferred by 70% of retirement home residents over conventional methods, with 60% reporting increased motivation to exercise more frequently [5].

- XR therapy has reduced depressive symptoms in elderly women by 44.05%, compared to 13.81% with traditional techniques [6].
- AR communication for nursing home residents has indicated higher engagement than video calls, lasting on average 2.5 minutes longer [7].

Key Drivers:

- Leading technology companies like Meta, Microsoft, and Apple significantly invest in XR technologies, driving innovation and adoption across various industries [8].
- The integration of AI significantly enhances XR experiences by facilitating the creation and optimization of high-quality, immersive content through generative AI [9] and by improving efficiency and reducing errors in critical tasks like elderly care through real-time data analysis and pattern recognition [4].
- The growing shortage of skilled caregivers and nurses and the resulting higher workload of employees in nursing homes, especially within aging populations, necessitate assistance systems that enhance efficiency and reduce caregivers' cognitive and physical load [4, 10, 11].

Challenges:

- XR technologies raise ethical concerns like mental health risks, neglect of physical bodies and environments, privacy threats from data misuse, and reality-blurring that could manipulate beliefs, emotions, and behaviors [12, 13, 14].
- Many elderly individuals resist adopting intelligent information-based elderly care services mainly due to distrust of the technology and fear of information leakage [15].
- Age-related changes often lead to vision decline in older adults, impacting their ability to fully engage with XR technologies [16].
- Implementing XR technologies requires robust infrastructure, which many nursing homes lack, along with the necessary skilled professionals to support and maintain these advanced systems [10, 15].

Impact on the Future of Elderly Care:

The integration of XR technologies in elderly care will transform the landscape significantly. XR can enhance the efficiency of caregivers and nurses and reduce errors, which lowers the workload of staff and thus improves the overall quality of care [4, 10, 11]. In nursing education, XR can enhance teaching outcomes, resulting in better-skilled staff [17, 18, 19]. For residents, XR offers various possible applications that enhance physical, cognitive, and mental health, such as XR sports and rehabilitation exercises, cognitive training, and therapy [5, 6, 14, 20, 21, 22]. Furthermore, XR can alleviate loneliness by facilitating virtual social interactions and connecting with family and friends [7, 23].





ADVANCED MONITORING TECHNOLOGIES

Using Monitoring Technologies to Strengthen Care Quality

Monitoring refers to the systematic and continuous collection, analysis, and use of data to track the status of a process, system, or individual's condition over time. It involves continuous surveillance and analysis to detect and address potential health issues [24]. Healthcare monitoring has been transformed by technologies like Mobile Health (mHealth), emotion recognition, and wearable devices. mHealth uses mobile applications for medical practices, enabling remote patient monitoring, telehealth services, and personalized health management. Emotion recognition analyzes facial expressions, voice, and physiological responses to monitor mental health, providing insights and timely interventions.

Monitoring in elderly homes also uses advanced technologies to ensure residents' safety and well-being. This includes facial recognition, wearable devices, motion sensors, and automated fall detection systems [25]. Biometric and Facial Recognition Technology (FRT) enhance security by preventing unauthorized access and tracking residents' movements. Wearable devices monitor vital signs and alert caregivers in case of an emergency, particularly benefiting those at high risk of falling. Motion sensors and indoor location tracking detect unusual activities, while automated fall detection alerts caregivers to emergencies. These technologies address health declines, caregiver workloads, and nighttime vulnerabilities, improving the overall safety and care quality in elderly homes.

Facts:

- The global industry of elder care services market is projected to reach over 1.6 billion USD by the end of 2031 [43].
- The global emotion detection market is projected to reach 56 billion USD by 2024, up from 21.6 billion USD in 2019 [36].
- Many people experience white coat syndrome, where their blood pressure changes in clinical settings, potentially leading to incorrect diagnoses [37].

- Approximately one-third of the elderly population experiences health decline after a fall [31].
- The desire to use assistive technology increases when residents feel secure with the devices [30].
- A survey revealed that 74.53% were concerned about mealtime assistance, while 85.3% felt ready to use technology for it [26].

Key Drivers:

- The aging global population and rising prevalence of chronic diseases among the elderly necessitate regular health monitoring [38].
- Advancements in accessibility, Internet of Things (IoT) growth [39], public surveillance utilization [6], and smaller hardware integration have accelerated the development of monitoring technologies like FRT.
- Increased awareness of mental health and the importance of a holistic approach to health monitoring post Coronavirus Disease 2019 (COVID-19) [40].
- Care home residents often face significant declines in daily activities, as it is preferred for elderly individuals to live at home for as long as possible [25].
- Omissions in elder care are due to high workloads and a lack of nursing staff, especially at night [24, 25].

Challenges:

- Seamlessly integrating various technologies that provide a comprehensive monitoring solution without overwhelming users or caregivers [42].
- To increase the elderly's acceptance of mHealth, as 43% of seniors over 70 quit using them during the first 14 days [33].
- Different opinions and perceptions regarding technology vary across cultures and regions because of their diverse social practices and levels of technological development [29].
- Eldercare staff lack sufficient information, education, and support regarding using surveillance cameras [30].

Impact on the Future of Elderly Care:

Advanced monitoring technologies will revolutionize elderly care in nursing homes by enhancing care quality and ensuring resident safety [3]. These systems enable real-time health tracking and fall detection, substantially reducing emergency incidents and mitigating health declines. By alleviating caregiver workloads, these technologies facilitate personalized care plans, chronic disease management, early detection of health issues, and reducing stress for both caregivers and residents. Remote access to monitoring data and communication tools allows families to stay informed and involved in care decisions, reducing anxiety and uncertainty. These technologies promise to optimize healthcare delivery and improve overall resident well-being [40].

AUTOMATION OF NURSING ADMINISTRATIVE TASKS

Transforming Nursing Home Management with Advanced AI and Automation Solutions

The automation of administrative tasks in nursing homes through technologies such as AI and advanced sensors is set to transform the healthcare industry. AI, which simulates human intelligence in machines, can automate complex processes and decision-making. Advanced sensors collect real-time data from various health devices, enabling continuous monitoring. Interoperability, the ability of different systems to communicate and exchange data seamlessly, ensures smooth information flow between these technologies. This integration supports a centralized application for processing and report generation, streamlining operations and improving overall care quality.

AI applications can generate tailored reports for various audiences, including non-technical summaries for families, detailed technical reports for authorities and healthcare providers, and internal updates for nursing staff. This significantly enhances the efficiency of daily tasks, allowing nurses to focus on patient care rather than administrative duties [54]. Automated systems utilize real-time data from interconnected health devices and Electronic Health Records (EHRs) to create comprehensive reports, schedule staff, manage medication administration, and monitor patient health. This shift reduces the time nurses spend on paperwork, minimizes errors, and improves decision-making processes. Consequently, nurses can dedicate more time to direct patient care, leveraging their specialized skills to enhance patient outcomes. The integration of AI, IoT, and interoperability in nursing homes promises a future of more efficient, accurate, and patient-centered healthcare.

Facts:

- 90% of information-handling professionals, including Information Technology (IT) specialists, healthcare workers, and financial analysts, say automation has enhanced workplace life [54].

- 76% of United States (US) companies use automation for standardizing daily workflows, 58% for data reporting, and 36% for regulation and compliance [55].
- The global healthcare interoperability solutions market, valued at 3.42 billion USD in 2023, is expected to grow at a CAGR of 14.15%, reaching 8.57 billion USD by 2030 [3].
- As of 2022, the global Intelligent Process Automation market was estimated at 12,390.66 million USD and is anticipated to reach 25,321.85 million USD in 2028, [59].

Key Drivers:

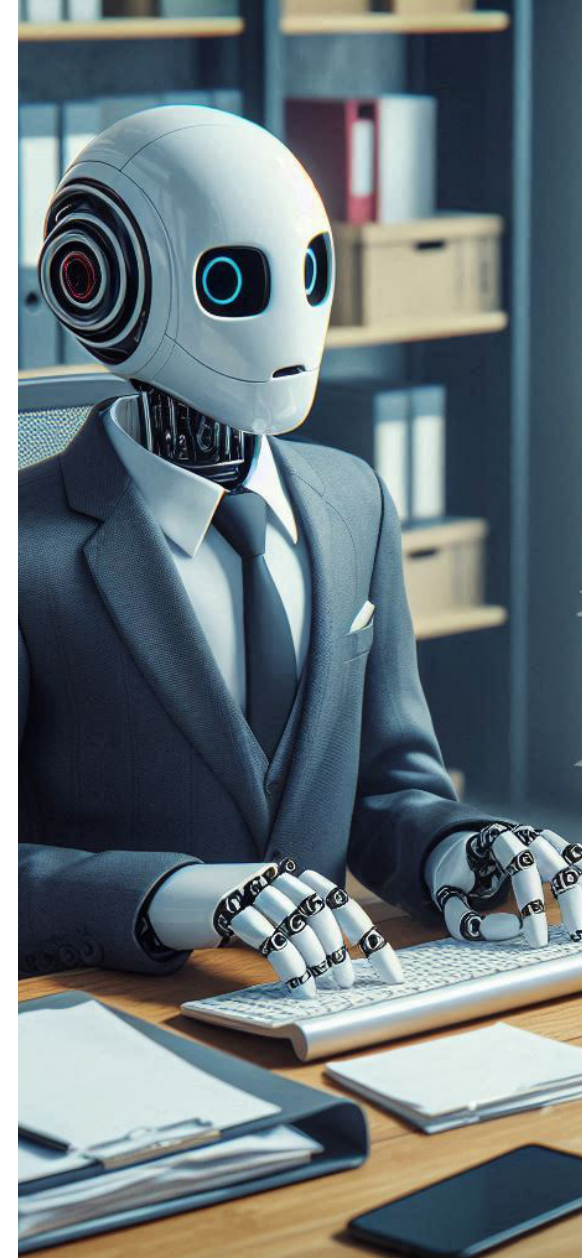
- 94% of workers say they perform repetitive, time-consuming tasks in their role [54].
- Rapid advancements in AI, machine learning, and sensor technologies provide new tools that make automation more feasible and effective in healthcare settings. These technologies enable more accurate data collection, analysis, and report generation [57].
- Automation and AI replace workers in tasks that they previously performed, creating a powerful displacement effect. This leads to increased productivity and efficiency in operations [50].
- The World Health Organization (WHO) estimates a projected shortfall of 10 million health workers by 2030, [58].

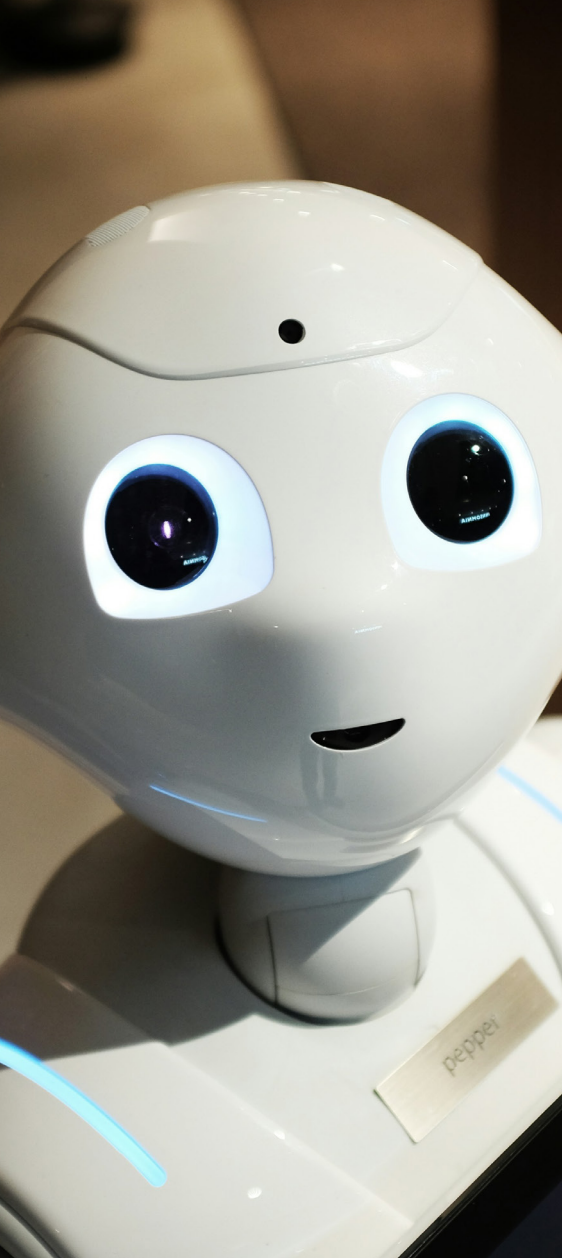
Challenges:

- Ensuring confidentiality, integrity, and availability of patient records while managing multiple instances across organizations is challenging [53].
- Integrating diverse health IT innovations, such as EHRs, wearable devices, and mobile health apps, requires seamless communication for coordinated care [47, 48, 49].
- Slow EHRs adoption in nursing homes hinders automation [51, 52].
- Initial costs for AI and sensor technologies can be high, posing financial challenges for small and mid-sized nursing homes.
- Adhering to healthcare regulations, like Health Insurance Portability and Accountability Act (HIPAA), is difficult. Compliance requirements must be meticulously managed to avoid legal issues [14].

Impact on the Future of Elderly Care:

The automation of administrative tasks in nursing homes will significantly enhance efficiency and care quality. By integrating AI and interoperable systems, these facilities can better manage residents' complex needs, reduce medical errors, and improve clinical decisions. Nurses will be able to focus more on direct patient care, leveraging their specialized skills and knowledge. This shift will lead to a higher standard of care, improved patient outcomes, and increased job satisfaction for nursing staff, ultimately transforming the operational landscape of nursing homes and enhancing the overall patient experience.





SUPPORT ELDERLY CARE WITH ROBOTICS

Robots Help Residents while Reducing Workflow for Caregivers

Robots are autonomous machines designed to assist people in their daily activities, providing personalized and continuous support. In the case of nursing homes, this eases the workload of caregivers and nurses. Unlike non-autonomous devices, stand-alone robots operate independently, performing specific tasks to enhance the quality of life for elderly residents.

These robots can be broadly categorized based on their primary functions: mobility aids, which include robotic wheelchairs and walkers that help seniors move around safely and comfortably with advanced navigation systems to avoid obstacles and ensure smooth mobility; manipulation aids, which assist with tasks requiring dexterity and precision, such as picking up objects, feeding, or helping with dressing, equipped with robotic arms or grippers for handling various items and performing delicate tasks; interaction robots, designed to engage with elderly individuals to provide companionship, cognitive stimulation, and reminders for medications or appointments, featuring conversational abilities and simple entertainment tasks to reduce loneliness and improve mental well-being; and integrated mobile manipulators, which combine mobility and manipulation capabilities, allowing them to navigate environments and perform complex tasks, such as wheel-based robots or humanoid robots with legs that assist with a wide range of activities from fetching items to assisting with personal care [60].

Facts:

- 90% of nursing home caregivers and residents accept service robots for delivering snacks and beverages in common areas, effectively reducing caregivers' workload while providing good assistance to residents [61].
- 93 out of 104 elderly individuals reported mental health benefits after interacting with conversational robots. These interactions provide crucial companionship and cognitive stimulation [62].

- A study in India showed that 37.4% of the elderly have mobility issues, increasing their risk of falls [63].
- Interruptions of the caregivers' tasks from elderly residents' demands increase stress and reduce caregivers' efficiency in their work. Frequent demands lead to higher stress and decreased productivity, impacting care quality [64].

Key Drivers:

- Since the elderly population is increasing rapidly [65] and there is a rising demand for elderly care, robots can help address the shortage of caregivers [66].
- Robotic technology has significantly improved over the last few decades. Advances in robotics have enhanced their functionality and reliability, making them more effective in elderly care settings [67].
- Robots for elderly care have experienced a surge in popularity. The growing acceptance and use of robots in elderly care are driven by their potential to improve care quality and efficiency [66].
- Caregivers often suffer from Musculoskeletal Disorders (MSDs) because of the excessive efforts done while moving elderly people [68]. The current trend involves using hydraulic-powered lifts [69] or robots like Robear [70].

Challenges:

- The high costs of purchasing and maintaining robotic systems represent a barrier. Securing adequate funding is crucial to support their development in healthcare settings, where budgets are often tight [71].
- Robots equipped with sensors and cameras significantly raise privacy concerns. Ensuring data security and protecting personal information is critical to gaining the trust of patients and healthcare providers [71].
- 78.9% of the elderly population does not accept robot companions for personal care. This resistance impacts the effective implementation and success of robotic solutions in elderly care.
- The quality of service could deteriorate as robots dehumanize the treatment of residents, where empathy and human understanding are crucial for the elderly [73].

Impact on the Future of Elderly Care:

The increasing elderly population and the shortage of workforce stress the need for innovative solutions in elderly care. The integration of robotics in nursing homes could present a mixed impact: On the one hand, its use would allow nurses and caregivers to have more time for direct patient care, improving attention, increasing their efficiency, and reducing burnout. On the other hand, its implementation should be done gently due to the initial resistance among elderly residents. Finally, substantial financial challenges arise from the high costs of implementing and maintaining robotic systems.



SOCIETAL & ENVIRONMENTAL TRENDS

IMPACTING THE FUTURE OF ELDERLY CARE

**Inversion of the Population Pyramid
Green Medical Waste Management Needed
Adaptation Challenges in Nursing Homes
Renewable Energy on the Rise**

Ana Clara Castanheira



Nathali Nazaryan



Vicent Torres



Cristina Albert



SOCIETAL & ENVIRONMENTAL TRENDS

Impacting the Future of Elderly Care

The landscape of elderly care is rapidly evolving, influenced by various societal and environmental trends. As the global population ages, understanding and adapting to these trends is essential for ensuring that elderly individuals receive the care they need and deserve.

By examining these trends, we aim to highlight the challenges and opportunities that lie ahead and how they can inform policies and practices in elderly care. The evolution of nursing homes reflects broader changes in society's approach to elderly care, marked by shifts in medical knowledge, societal attitudes, and economic conditions. Historically, elderly care was primarily a family responsibility, with extended families living together and younger generations caring for their aging relatives.

In the past decades, urbanization and migration to cities disrupted traditional family structures, necessitating alternative forms of elderly care. In the early 20th century, the rise of geriatric medicine emphasized tailored medical care for elders. The late 20th and early 21st centuries witnessed further advancements, with a growing emphasis on person-centered care that focuses on residents' needs and preferences, prioritizing the comfort for the residents [74].

In recent years, aging in place has gained popularity, reflecting a desire among many elderly individuals to remain in their own homes for as long as possible. This trend has led to more comprehensive home care services and assisted living facilities that offer a middle ground between independent living and traditional nursing homes. The changing social dynamics, including shifting family structures and evolving societal attitudes towards aging, significantly impact elderly care.

With more women entering the workforce and a growing emphasis on dual income households, the traditional role of family members as primary caregivers is diminishing. This change necessitates the development of alternative care arrangements, such as professional in-home care services and assisted living communities [75]. Additionally, societal attitudes towards aging are evolving, focusing more on active and healthy aging. This paradigm shift encourages integrating elderly individuals into the broader community, promoting social engagement and mental well-being. Creating age-friendly environments and inclusive social policies are crucial to addressing the social needs of elders. By staying informed and adaptable, we can ensure that elderly individuals receive the care and support they need to lead fulfilling lives.

Moreover, many environmental sustainability-related restrictions are being implemented nowadays. These new policies also affect the way nursing homes operate.

As the effects of climate change become more pronounced, there is a growing need to ensure that care facilities and services are resilient and sustainable; this includes designing energy-efficient care homes, utilizing renewable energy sources, and incorporating green spaces to enhance residents' physical and mental health. Additionally, sustainable practices such as waste reduction and clever management are becoming integral to the operation of care facilities. By adopting environmentally sustainable practices, the elderly care sector can contribute to broader efforts to mitigate climate change while providing a healthier and more comfortable living environment for elderly individuals.

INVERSION OF THE POPULATION PYRAMID

Increased Longevity and Decreased Birth Rates in the Future of Nursing Homes

Over the past years, the aging population has significantly increased due to advances in medical technology, improved healthcare, and better living conditions. As a result, more people live longer, leading to a growing number of elderly individuals needing Long-term Care (LTC). This trend has significantly impacted nursing homes, creating a higher demand for these facilities and their services. In addition to this demographic shift, many European countries are experiencing declining birth rates.

This trend leads to a smaller and younger population, which means fewer family members are available for caring for aging relatives. Consequently, this will likely increase the need for professional care facilities, such as nursing homes, as more elderly individuals will require assistance with daily activities and medical care. The combination of a growing elderly population and shrinking younger generations highlights the importance of developing and expanding LTC options to meet future demands.

This situation will cause far-reaching implications for healthcare systems, social services, and economic planning, as societies must adapt to an increasingly aging population with fewer younger people available to support them. Moreover, the financial burden on working-age individuals could intensify as they might face higher taxes and social security contributions to fund the growing needs of elders.

Facts:

- The proportion of people aged 70 and older compared to the working-age population (aged 16 to 67) is projected to grow by 20%, increasing from 24% to 43% over the next 25 years [77].
- Spain's birth rate has decreased yearly since 2020 by 1.5% [78].
- By 2050, Spain will have lost 11% of its population due to low birth rates [79].
- From 2004 to 2020, the centenarian population in Spain increased by 89% [80].
- Up to 1965, the global fertility rate was five children per woman, whereas now, it is less than 2.5 children per woman [81].

Key Drivers:

- Advancements in medical technology include improving diagnostic tools, treatments for complex diseases, and innovations in medical devices.
- Better healthcare programs incorporate successful vaccination programs, public health campaigns, increased availability of services, and preventive care.
- Growing awareness of healthy habits such as exercise and diet.
- Improving economic conditions and healthcare infrastructure.
- Socioeconomic factors influencing the increased participation of women in the workforce result in a reduced desire to have children. Additionally, the higher costs associated with raising children and the pursuit of higher levels of education lead women to focus more on their careers.
- Access to contraceptive methods.
- Increasing acceptance of diverse family structures.

Challenges:

- High initial financial investment due to the increased necessity for resources such as medical supplies, qualified employees, exceptional care, and expansion of the infrastructure of nursing homes. Also, prolonged life spans, often with chronic health issues, require more expensive treatments.
- As the population ages and fewer people enter the workforce, it becomes more difficult to find potential caregivers, leading to a staff shortage.
- Maintaining high standards of care for elders and dealing with mental health issues such as dementia, depression, and loneliness that come from the extended life expectancy.
- Covering the increasing demand for resident beds, medical equipment, and specialized care units.

Impact on the Future of Elderly Care:

The future of elderly care is poised to undergo significant changes driven by several factors. The need for infrastructure expansions will become more pressing as the number of elderly patients rises, leading to an increased workload for existing staff; this is compounded by the difficulty in hiring sufficient personnel due to a smaller working-age population. Consequently, higher costs for staff, medical care, services, and infrastructure maintenance are anticipated. However, longer life spans can boost the demand for nursing home services, potentially generating higher revenue. This growing need for elderly care may attract more funding to nursing homes and senior care while creating more job opportunities within the sector.





GREEN MEDICAL WASTE MANAGEMENT NEEDED

The Danger of Medical Waste and the Impact of Recycling It

The growing number of residents in nursing homes increases the amount of waste generated, including infectious, hazardous, and non-hazardous materials. This waste poses environmental and health risks if not managed correctly. Although nursing homes also produce domestic and recyclable waste, medical waste presents the greatest danger due to its significant impact and risks. Effective management of medical waste, which cannot be recycled through regular methods and must follow legal protocols, is crucial and often underestimated.

Eco-friendly medical waste management is becoming increasingly urgent as waste volumes rise. Recycling medical waste in nursing homes offers a promising solution to mitigate its negative impacts. Proper segregation and treatment of medical waste can help prevent the spread of infection and protect residents and staff health. Additionally, recycling helps recover valuable materials, contributing to resource conservation and sustainability within the healthcare sector.

Improperly managed medical waste can lead to serious health issues and environmental contamination. Exposure to infectious waste can spread diseases, while hazardous waste can harm wildlife and pollute water sources. Therefore, adopting eco-friendly waste management practices is essential for ensuring the safety and well-being of nursing home residents, staff, and the broader community.

Facts:

- Approximately 60% of the non-regulated waste in nursing homes is recyclable [82].
- Nursing home residents were often colonized with Multidrug-resistant Organisms (MRDOs) due to shared environments with other vulnerable residents that facilitate the transmission of MRDOs [83].
- About 15% of all nursing home residents acquire an infection that consequently results in a substantial health burden of morbidity and mortality [83].

- The United Nations Environmental Programme (UNEP) has established that 10% of healthcare waste is considered “potentially infectious”; this proportion can be reduced to 1-5% by applying adequate waste segregation practices [84].

Key Drivers:

- Environmental regulations mandate stringent protocols for medical waste disposal to prevent contamination and safeguard public health. These regulations also enforce measures for environmental protection, ensuring sustainability.
- A growing number of chronic patients use disposable materials and hazardous medical accessories, leading to more medical waste and heightened disposal needs.
- The need to maintain strict infection control to assure the safety of elders and employees from infectious waste and hazardous material.
- The adoption of new recycling technologies capable of processing all kinds of waste, including medical waste.

Challenges:

- Implementing correct medical waste segregation can be an intricate and demanding task, especially in the early stages.
- Ensuring the staff is thoroughly aware of the proper waste segregation methods and the correct disposal practices is essential.
- Keeping up with changes in regulations and laws on how to dispose of medical waste.
- Proper disposal of medical waste and implementation of new technologies can be expensive.
- Employees may have to be exposed to hazardous materials to recycle them, which can be seen as unsafe and risky.

Impact on the Future of Elderly Care:

Investing in new technologies for waste disposal in nursing homes necessitates specific training for employees on waste segregation and adaptation to evolving regulations. This transition can lead to a reduced risk of infection and improved safety for residents and staff, promoting a cleaner and safer environment. Moreover, sustainable growth is further supported through recycling efforts, reducing pollution, and enhancing the nursing home’s public image, thereby increasing trust among employees, family members, and residents. These investments contribute to a favorable reputation and demonstrate a commitment to environmental responsibility and safety.

ADAPTATION CHALLENGES IN NURSING HOMES

Most Residents Face Adaptation Issues When Moving to Nursing Homes

The transition of an older adult when moving to a nursing home is a significant milestone, often fraught with emotions and challenges for both the individual and their family. This process frequently involves leaving behind a familiar home filled with cherished memories and established routines, which can evoke feelings of loss, fear, and uncertainty. Such a move marks a profound life change, as the individual must adjust to a new environment and way of living.

However, this transition can also offer opportunities to improve their quality of life. Nursing homes provide access to professional care, ensuring that residents receive medical attention and assistance. Additionally, these facilities offer the chance to form new social relationships, which can help combat loneliness and isolation, fostering a sense of community among residents. Adapting to a nursing home involves more than just a change of residence; it is an integral transformation encompassing emotional, physical, and social aspects. The key to a successful transition is strong support from family members and nursing home staff [1]. This support can help ease the emotional burden, facilitating a smoother adjustment and promoting a more positive outlook on this new chapter of life. Indeed, while the transition can be challenging, it holds the potential to enhance overall well-being and create a fulfilling environment for elders.

Facts:

- Social support and life satisfaction positively impact the adaptation of older adults to nursing homes, while depression negatively affects their adaptation; self-care ability indirectly promotes adaptation through enhanced social support [88].
- Cultural factors significantly influence how elders adapt to nursing home facilities. The transition process is affected by cultural considerations, and several courses of action are involved: the decision-making process, the fluctuation process, the adjustment process, and the acceptance process [87].

- A lack of participation in decision-making and choice about the move to a nursing home can create a negative experience for some individuals, causing emotional disturbances such as feelings of anxiety, uncertainty, isolation, and personal loss [86].

Key Drivers:

- Feelings of helplessness that arise from the loss of autonomy and restrictive facility rules.
- Adverse psychological reactions, like depression, anxiety, and loneliness when adjusting to new roles and identities.
- Patients may have prejudice and negative perceptions or biases upon arriving at a residence that affect their predisposition toward integration.
- The inability to personalize living spaces and the facility's design impacts comfort.
- Health and functional status issues that are driven by chronic illnesses and mobility problems.
- Care quality and staff interactions, such as inconsistent care quality and staff shortages, negatively impact residents' well-being.

Challenges:

- Addressing emotional and psychological issues by providing adequate mental health support to manage anxiety, depression, and feelings of loss that new residents may experience.
- Effectively managing resistance to change by dealing with residents' reluctance to adapt to new routines, environments, and care practices.
- Changing society's perception of residences by transforming societal attitudes towards nursing homes and fostering a more positive view and greater acceptance.
- Maintaining high standards of care consistently across all staff members despite potential shortages and high turnover.
- Encouraging family involvement by establishing effective communication channels and practices between staff, family, and residents.

Impact on the Future of Elderly Care:

The prevalence of adaptation challenges in nursing homes significantly impacts the future of elderly care. As more elderly individuals face difficulties adapting, there is an increase in user needs, requiring more personalized and extensive support services; this, coupled with the persistent negative perception of nursing homes, can lead to a more problematic environment. The compounded effect of these issues not only strains the resources of nursing homes but also exacerbates the emotional and psychological challenges faced by residents, ultimately hindering their well-being and overall quality of life.



RENEWABLE ENERGY ON THE RISE

Feasibility of Incorporating Green Energy in Nursing Homes

Renewable energy integration trends involve adopting sustainable energy sources like solar, wind, and geothermal to reduce the carbon footprint. As the urgency to combat climate change grows, various sectors increasingly invest in these solutions to promote sustainability. Nursing homes are notable examples where the integration of renewable energy systems, such as solar panels, is becoming prevalent. Nursing homes can significantly reduce their environmental impact by utilizing green energy systems to generate electricity; this lowers energy bills and ensures a stable and environmentally friendly energy supply.

The adoption of renewable energy in these facilities underscores a commitment to sustainability, offering a model for other sectors to follow. Through such investments, nursing homes contribute to a broader effort to decrease reliance on fossil fuels, mitigate greenhouse gas emissions, and promote a healthier planet for future generations. Integrating renewable energy in nursing homes exemplifies how critical and impactful sustainable practices can be when applied to essential community services. Furthermore, the shift to renewable energy sources in nursing homes can enhance energy security, provide resilience against power outages, and improve residents' and staff's overall quality of life.

Facts:

- In 2023, the world saw a 50% increase in renewable energy capacity compared to the previous year, with solar Photovoltaic (PV) and wind power leading the growth [90].
- Solar PV and wind power are expected to account for 95% of the global renewable energy capacity additions over the next five years [89].
- Heating costs usually make up a large part of a nursing home's energy bills; this is because the ideal temperature of the building will be higher than regular households, as elders are much more sensitive to the cold [91].

Key Drivers:

- Growing environmental concerns and the need to mitigate climate change by reducing the carbon footprint and implementing eco-friendly practices.
- The need to enhance energy security and independence by reducing reliance on traditional fossil fuels and ensuring a stable energy supply.
- Cost savings through lower energy bills.
- Regulatory incentives, such as the US Inflation Reduction Act (IRA) and European Union (EU) targets, encourage the adoption of renewable energy by providing financial support.
- Increasing social responsibility by adopting renewable energy showcases the dedication to sustainability, attracting residents, staff, and stakeholders and improving reputation.
- The need to make nursing homes more attractive and cost-effective by leveraging technological advancements and decreasing costs in energy supply costs.

Challenges:

- High initial costs, including equipment, installation, and infrastructure upgrades, can be a significant barrier for nursing homes when fitting renewable energy systems.
- Intermittent energy supply from solar and wind sources can be unreliable for nursing homes needing constant, uninterrupted power for essential services and resident care.
- Maintenance and technical expertise are required for renewable energy systems, which many nursing homes lack, leading to potential operational issues and increased costs.
- Obtaining permits and navigating regulations can be lengthy and complicated, causing delays and increasing renewable energy project costs.

Impact on the Future of Elderly Care:

Implementing renewable energy in nursing homes can lead to substantial cost savings by reducing energy bills and ensuring long-term financial stability. It also offers significant environmental benefits by decreasing greenhouse gas emissions and aligning with broader sustainability goals, which enhances the company's reputation as an environmentally responsible organization. Similarly, adopting renewable energy can improve the public image of nursing homes, attracting more residents and community support. However, this transition requires a high initial financial investment, larger spaces for installations like solar panels or wind turbines, and the complex integration of new technologies with existing systems and infrastructure.

LEGAL & POLITICAL TRENDS

IMPACTING THE FUTURE OF ELDERLY CARE



Structural Changes in Pension Systems
Evolving Healthcare Data Protection
Increasing Safety Regulations
Advancing Environmental Protection Laws

Paula De Alfonso



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LEGAL & POLITICAL TRENDS

Impacting the Future of Elderly Care

The global demographic shift towards an aging population is driving a significant increase in the demand for healthcare services, particularly in nursing homes. As life expectancy rises and birth rates decline, regions like the EU and countries such as Spain are experiencing unprecedented growth in their elderly populations. This demographic transformation necessitates comprehensive regulatory frameworks addressing technological, social, and environmental aspects of elderly care to ensure the well-being of this vulnerable group.

The EU and Spanish government regularly update their regulatory frameworks to ensure they remain adequate and relevant. This includes adapting to new healthcare technologies, implementing stricter environmental standards, and enhancing social care protocols. The frequent changes in regulations are necessary to keep pace with rapid demographic shifts, technological innovations, and heightened awareness of sustainability and quality of care. These evolving regulations ensure that nursing homes and other elderly care facilities can provide high-quality, safe, and sustainable care, meeting the complex needs of an aging population while adhering to contemporary standards and practices.

One significant aspect of these evolving regulations is the emphasis on integrating advanced healthcare technologies. The adoption of EHRs and IoT devices has transformed elderly care, making it more efficient and accessible. However, this technological shift also necessitates stringent data protection and cybersecurity measures. Regulations such as the General Data Protection Regulation (GDPR) in the EU are critical in safeguarding sensitive health information and ensuring patient privacy. These laws are regularly updated to address new threats and vulnerabilities, reflecting the continuously dynamic nature of regulatory change in response to technological advancements.

Environmental sustainability is another area where regulations are increasingly stringent and subject to modifications. The European Green Deal (EGD) and Spain's Climate Change and Energy Transition Law (LCCTE) mandate significant reductions in greenhouse gas emissions and promote sustainable practices across all sectors, including elderly care. Nursing homes are now required to implement energy-efficient systems, waste reduction programs, and sustainable building practices. Additionally, the growing awareness of climate change has intensified the push for these regulations, highlighting the urgent need for action.

Social care issues have also seen substantial regulatory changes. The recent pandemic highlighted the need for rigorous health and safety standards in nursing homes, leading to new mandates focused on infection control, staff training, and emergency preparedness. These regulations are continually reviewed and revised based on lessons learned and evolving public health guidelines. Ensuring that care facilities can effectively respond to health emergencies and provide safe, high-quality care is a priority, and the regulatory landscape reflects this by being adaptable and responsive to new challenges.

The Sustainable Development Goals (SDGs) set by the United Nations (UN) provide a global framework that influences many of these regulatory changes. Regulations at both the EU and national levels are increasingly aligned with these goals, driving continuous improvements in care quality, sustainability, and social equity. This alignment ensures that the regulatory changes are not only responsive to immediate needs but also contribute to long-term global objectives for a more sustainable future.

STRUCTURAL CHANGES IN PENSION SYSTEMS

Growing Efforts to Preserve Pension Systems in an Aging Population

Regions like the EU are undergoing significant demographic changes, marked by a growing older population. Several factors, including higher life expectancy, lower birth rates, and advancements in healthcare, drive this increase. These shifts challenge current pension models that rely on intergenerational solidarity or public contributions.

In Spain, pensions accounted for 42% of the state's annual budget in 2023. Pension expenditures have risen substantially over the past seven years, growing by 41% from 132,429 million Euros (EUR) in 2016 to 187,195 million EUR in 2023 [5]. This significant rise in expenditure reflects the increasing financial burden on the working-age population, who must support a growing number of retirees.

Many European countries are implementing reforms to increase pension contributions and address these challenges. Moreover, several countries are considering adjustments to the retirement age. These measures are crucial to maintaining the financial viability of pension systems in the face of demographic shifts. Without such reforms, the strain on public finances could jeopardize the ability of governments to provide adequate support for their aging populations. Therefore, structural changes in pension systems are essential for ensuring long-term sustainability and social stability.

Facts:

- An upward trend in life expectancy is observed, contrasted by a downward trend in birth rates across most Western countries [94].
- Several European countries are implementing various reforms. For instance, Germany has gradually raised the retirement age to 67. Similarly, Italy has introduced a system where pension benefits are calculated based on lifetime contributions, incentivizing longer working lives [95].
- Pensions serve as the primary source of income for 83.9% of individuals aged 65 to 75 [96].

- The aging population increases the dependency ratio, placing additional pressure on the working-age population to sustain pension systems [97].

Key Drivers:

- An increasing life expectancy and declining birth rates lead to a more significant proportion of older individuals.
- Improved healthcare contributes to longer life expectancies, thereby increasing the number of retirees who rely on pension systems.
- As seen in countries like Spain, significant increases in pension costs highlight the growing financial burden on state budgets.
- Slow economic growth and high inflation exacerbate the financial challenges countries' economies face to sustain rising pension costs.
- The upcoming aging of the baby boom generation is anticipated to increase the number of retirees significantly [99].

Challenges:

- Political reluctance and a lack of consensus hinder the implementation of essential but potentially unpopular pension reforms.
- Young working-age individuals, particularly those with higher education, might consider moving to countries where the financial pressures on the working population are lower.
- Public resistance to changes in retirement age and contribution rates can slow the implementation of necessary pension reforms.
- Adapting existing pension infrastructure to new models and systems requires substantial investment and complex transitions.
- Balancing the short-term financial burdens of reforms with the long-term sustainability of pension systems is a critical challenge for policymakers.

Impact on the Future of Elderly Care:

An unstable pension system will create challenges in planning for nursing home use, as most residents primarily rely on pensions for their income. The financial strain on these systems could lead to greater dependence on family or public assistance for elderly care. Moreover, reforms such as increasing the retirement age could postpone the admission of potential clients into nursing homes. Additionally, the potential increased financial pressures on workers due to changes in the pension system may result in greater staff shortages as they relocate to countries that are more financially advantageous for working-age people.



EVOLVING HEALTH-CARE DATA PROTECTION

Navigating Legal Frameworks for Data Protection in the Healthcare Industry

We live in a data-saturated society where data generation is a fundamental aspect of daily life. With the increasing reliance on technology, ensuring the protection and security of data, particularly personal and medical information, has become paramount. The adoption of advanced data regulation in the healthcare industry is set to expand significantly over the next decade. With the increased reliance on EHRs and IoT devices, healthcare systems face growing cyberattack threats. Researchers project that technologies such as blockchain, AI, and quantum cryptography will become pivotal in securing patient data [104].

As healthcare providers digitize patient records and integrate connected medical devices, the complexity and volume of data they manage increase exponentially. This surge in digital information makes healthcare systems necessitate laws and regulations. To safeguard patients' data and ensure the integrity of healthcare systems globally, implementing robust cybersecurity measures is crucial. The evolution of data protection frameworks will shape the future of healthcare, emphasizing the need for continuous advancements in technology and regulatory practices to keep pace with emerging threats. Enhanced collaboration between technology developers, healthcare professionals, and policymakers will be essential to create a secure digital health ecosystem that benefits everyone.

Facts:

- Each person generates 1.7 Megabytes (MB) of data per second, contributing to the global data surge [100].
- Spain has nearly a hundred data centers, reflecting the need for extensive data management infrastructure [101].
- Since 2015, the healthcare sector has been one of the most targeted industries for cyberattacks, with significant data breaches compromising millions of patient records. Compared to other industries, the healthcare industry suffers a large number of data breaches, experiencing an average of 1.76 breaches per day [102, 104, 106].

- Investments in healthcare cybersecurity are projected to rise substantially, reflecting the growing need to protect sensitive health data from sophisticated cyber threats [102].

Key Drivers:

- The exponential increase in data generation necessitates robust data centers and stringent protection measures.
- Advances in technology drive the need for updated regulations to ensure safety and efficacy in medical devices.
- Ensuring the safety of data security is critical, especially in healthcare and elder care environments.
- Stricter regulations such as GDPR, Organic Law on Protection of Personal Data and Guarantee of Digital Rights (LOPDGDD), and HIPAA are driving the adoption of robust cybersecurity measures to ensure compliance and protect patient privacy [102, 103].
- The rising number of cyberattacks on healthcare institutions is prompting a stronger focus on cybersecurity to safeguard patient data and maintain trust in digital health systems [102, 103, 105].

Challenges:

- Organizations must navigate complex regulations and ensure compliance with standards like GDPR, HIPAA, and LOPDGDD. Maintaining evolving regulations and ensuring compliance with local and international laws is a continuous challenge [102].
- High costs associated with advanced cybersecurity measures can be a barrier for smaller healthcare providers, limiting access to essential protections [102].
- It is essential to ensure that healthcare staff are adequately trained to use data effectively and correctly.
- Many establishments struggle with implementing effective security controls, allowing hackers to threaten patient safety [102, 103, 105].

Impact on the Future of Elderly Care:

As technology continues to evolve, the focus on data protection, security, and regulatory compliance will shape the future of various sectors, particularly healthcare and elderly care. The integration of regulatory measures in nursing homes will significantly enhance the protection of sensitive patient data. Secure communication channels will prevent unauthorized access to health records, ensuring the privacy and safety of elderly patients. Data norms will facilitate the secure sharing of medical records between different care providers, improving the continuity and quality of care. Overall, data regulations will build trust in digital health solutions, encouraging their adoption in elderly care settings and improving patient outcomes, maximizing their benefits while minimizing risks.

INCREASING SAFETY REGULATIONS

Improving Safety in Nursing Homes Across the EU

Healthcare has slowly appeared on the EU's policy agenda since the 1990s. Despite its universal importance, the EU population has traditionally preferred to delegate health-related decision-making to national governments rather than the EU itself [108]. However, this perspective shifted significantly due to the launching of the European Charter of the Rights of Older People and the creation of the WeDO project, which were a response to the lack of quality long-term care in the Member States aimed to improve the quality of services and combat elder abuse [107]. Furthermore, the COVID-19 pandemic underscored the necessity of collective action, revealing the vulnerability of elderly residents and the critical need for robust safety and security measures.

Strengthening safety regulations and implementing comprehensive measures are crucial for enhancing residents' well-being and improving nursing homes' quality of care and operational efficiency. This trend indicates a future where elderly care will be significantly influenced by robust EU policies designed to create safer living environments and ensure better protection and quality of life for nursing home residents, especially in terms of falls and accidents that can lead to severe injuries, prolonged hospital stays, or even fatalities.

Facts:

- The Agreement of the Territorial Council of Social Services and the System for the Autonomy and Care for Dependency focuses on the size of the centers, the organization of their spaces, and the staffing levels [109].
- The incidence of falls in nursing homes is reported to be twice as high as in the community, with an estimated 1.7 falls per resident per year and ranging between three and thirteen falls per 1,000 beds per day [110, 111].
- Implementing comprehensive fall prevention strategies, including staff training and making environmental modifications, significantly reduces the incidence of falls and fractures [117].

Key Drivers:

- Falls are the result of two or more risk factors, such as cognitive impairment, muscle weakness, cardiovascular derangements, or environmental factors, among others [111].
- Fall prevention interventions are essential in maintaining the quality of care and ensuring the safety of older populations in institutional settings.
- Proper design coupled with ongoing maintenance, including regular inspections and repairs, mitigates potential hazards [110].
- According to the National Institute for Health and Care Excellence (NICE), thorough risk assessment is essential in identifying individuals at high risk of falls. This includes evaluating factors such as history of falls, medication usage, mobility issues, and cognitive impairment [118].

Challenges:

- Increasing safety regulations may lead to complex compliance requirements, burdening nursing homes with administrative overhead and potential legal challenges.
- The financial burden of upgrading infrastructure and implementing new safety measures may strain the budgets of nursing homes, particularly those with limited resources.
- Enhanced safety regulations may worsen existing staffing shortages by requiring more personnel or specialized training, impacting care quality and operational efficiency.
- Nursing homes may resist adopting new safety regulations due to inertia or perceived disruptions to established routines and practices.
- A focus on meeting regulatory requirements might overshadow other critical aspects of resident care, such as personalized support and emotional well-being.

Impact on the Future of Elderly Care:

It is anticipated that nursing homes, in terms of a legal framework, will be shaped by the lessons learned from the pandemic as well as the high incidence rates of falls and health emergencies. Regulations are expected to drive facilities to enhance infrastructure, implement comprehensive safety protocols, and prioritize resident well-being. In addition, there might be stricter regulations on staffing ratios to ensure that residents receive adequate care from well-trained personnel, along with regulatory structures that may encourage the adoption of technologies that support elderly care and improve the overall quality of life for residents.





ADVANCING ENVIRONMENTAL PROTECTION LAWS

A Reduction in Waste and Emissions Throughout All Industries

Climate change, driven by greenhouse gas emissions, presents serious threats to global ecosystems, economies, and societies [119]. As a result, we are experiencing rising temperatures, more extreme weather events, and significant biodiversity loss [120]. In response, governments worldwide are enacting stringent laws aimed at reducing carbon emissions, promoting renewable energy sources, and encouraging sustainable practices to combat these issues [121]. Nursing homes are increasingly part of this shift towards environmental responsibility. Facilities are adopting sustainable practices to enhance residents' quality of life and minimize their ecological footprint [122].

They are investing in energy-efficient systems, implementing waste reduction programs, and employing sustainable building practices. Many are aligning with regulations such as the EGD and Spain's LCCTE [123]. These initiatives reflect a growing commitment to sustainability and its significance for future generations [124]. By integrating these practices, nursing homes not only contribute to broader environmental goals but also create healthier living environments for their residents. This represents a key intersection of regulatory compliance and proactive ecological stewardship within elderly care, demonstrating how such institutions are embracing environmental responsibility in their operations [125].

Facts:

- The law on waste and contaminated soils for a circular economy regulates waste management and promotes recycling and waste reduction, compelling nursing homes to adopt sustainable waste management programs [126].
- The LCCTE influences nursing homes to reduce their environmental footprint and to contribute to national goals of sustainability and climate resilience [127].
- Under the European Climate Law, the EU has committed to reducing its net greenhouse gas emissions by at least 55% by 2030 [128].

- The EGD aims to make Europe the first climate-neutral continent by 2050, setting a global example for other regions [128].

Key Drivers:

- As time passes, climate change demands urgent collective action, and adults feel a moral obligation to secure a better future for new generations. Individual efforts alone are insufficient; politicians need to take responsibility to protect the environment and address the economic system's vulnerabilities [129].
- The increasing recognition of climate change as a critical global issue has been a significant driver of environmental legislation [130].
- Increasing demand from nursing home residents and their families for environmentally responsible living environments pushes facilities to adopt greener practices.
- Elderly individuals in long-term care facilities are particularly vulnerable to environmental hazards due to their weakened immune systems and preexisting health conditions [131].

Challenges:

- LTC facilities often operate in older buildings that were not originally designed with energy efficiency in mind. As a result, these facilities tend to have high energy consumption and, consequently, higher carbon emissions.
- Disparities in implementation and enforcement practices across member states can lead to inconsistent progress in achieving sustainability goals [132].
- Securing sufficient funding and financial resources is essential to support sustainable initiatives and infrastructure projects effectively [133].
- It is crucial to ensure that sustainability initiatives do not compromise the quality of care or comfort for residents with specific medical or personal needs.

Impact on the Future of Elderly Care:


Nursing homes are increasingly embracing stringent environmental regulations to mitigate their carbon footprint and enhance sustainability. By adopting energy-efficient systems, waste reduction initiatives, and sustainable building practices mandated by laws such as the EGD and Spain's LCCTE, these facilities are aligning with global environmental goals and supporting a healthier future. This trend underscores a commitment to proactive ecological stewardship in elderly care, promoting healthier living environments while complying with evolving regulatory standards. Furthermore, these practices might not only benefit the environment but also improve operational efficiency and reduce costs in the long-term, providing a dual advantage [134].



ECONOMIC TRENDS

IMPACTING THE FUTURE OF ELDERLY CARE

Shortage of Healthcare Workforce
Rising Real Estate Prices
Higher Expenditure on Healthcare
Higher Government Debt Levels

Marc Frasquet 

Silvia Mirasol 

Amina Abed 

Ismael Noverges 

ECONOMIC TRENDS

Impacting the Future of Elderly Care

The economy significantly influences the nursing home sector, shaping the environment in which care facilities operate and provide essential services to the aging population. As the demand for nursing home care rises, driven by factors such as demographic shifts and lifestyle changes, various economic trends present challenges and opportunities for the sector, necessitating strategic adaptation to sustain quality care and operational efficiency.

One prominent issue is the difficulty in maintaining a sufficient workforce, aggravated by the increasing demand for nursing home services. The caregiving roles in nursing homes are physically and emotionally demanding, leading to high turnover rates and burnout among staff. Additionally, competition from other healthcare sectors, coupled with an aging workforce, exacerbates the problem. Addressing this challenge is vital for ensuring that nursing homes can maintain high standards of healthcare quality and guarantee the well-being of both residents and employees.

Another significant factor influencing the nursing home sector is the financial burden related to real estate. As property prices continue to escalate, the cost of expanding or upgrading facilities becomes increasingly prohibitive. This trend forces operators to carefully balance between purchasing and renting options while making an efficient use of resources. When making decisions, nursing home operators must consider that rising property costs not only increase initial capital outlay but also affect ongoing operational expenses, such as higher mortgage payments or rental rates.

The increase in healthcare spending reflects a broader trend of prioritizing health and an aging population, with greater investment from both governments and private parties. Furthermore, since healthcare is considered a normal good, higher income leads to higher expenditure. Thus, as incomes rise and populations age, there is a significant increase in demand for medical services. This trend is further accelerated by technological advancements and the heightened awareness of health issues following the COVID-19 pandemic.

Moreover, the fiscal reality of high government debt levels presents another layer of complexity for the nursing home sector. As governments face financial challenges, funding for public healthcare, including nursing home subsidies, may be restricted. In addition, businesses may face higher taxes to compensate for increased expenditures. This situation requires strategic planning to minimize financial risks from potential government policies, such as delayed payments and subsidy cuts.

In summary, the nursing home sector is influenced by various economic trends that shape its operations and future. Workforce challenges, financial burdens related to real estate, complexities in meeting future demand, and the fiscal reality of government debts all play significant roles in determining the viability and quality of nursing home care. This section delves into the implications of these economic factors on the future of elderly care, highlighting the need for strategic adaptation to meet the demands of an aging population while maintaining financial and operational stability.

SHORTAGE OF HEALTHCARE WORKFORCE

Fewer Professionals in a Mistreated Career

A potential shortage of healthcare specialists is expected to increase unmet health needs worldwide. Understaffing generates alarming costs for firms, especially the hidden ones. To illustrate, this lack of workers entails an increased workload on nurses that subsequently leads to a decline in the quality of nursing care, therefore jeopardizing patient safety and satisfaction. In addition, due to understaffing, nurses and other healthcare professionals are growingly facing severe issues regarding their job conditions, such as stress, burnout, and exhaustion that are negatively impacting their workplace well-being, increasing the sense of inadequate compensation, diminishing their work engagement, and pushing them out of the labor market, which is particularly concerning for younger professionals.

These ongoing workforce factors, along with an aging medical labor force and educational barriers for future professionals, trigger an employee shortage, escalating turnover costs in coming years. Furthermore, low and middle-income countries are encountering an extra difficulty: medical talent is being drained due to the temporality of health jobs, lower wages, and worse working conditions. These sector characteristics, united with a future more significant demand for skilled workers, will strengthen competition for attracting talent among firms in the healthcare sector and national health systems, resulting in the higher bargaining power of professionals when selecting an adequate employer and lower decision power of employers.

Facts:

- It is forecasted to have a deficit of 10 million healthcare professionals by 2030 [58].
- The number of nurses leaving Spain for other countries is rising, increasing from 572 in 2021 to 1,100 in 2022 [135].
- 85% of nurses in Spain have experienced mental health effects caused by the pandemic, and 46.5% are considering leaving the profession [136].
- A significant correlation was found between stress, burnout, and the intention to resign [137].

- 83% of Gen Z workers are open to job-hopping, with 75% ready to quit without another job secured [138].
- Nurse turnover rates lead to financial losses between 5.2 million USD and 9 million USD annually in the US average hospital [139].

Key Drivers:

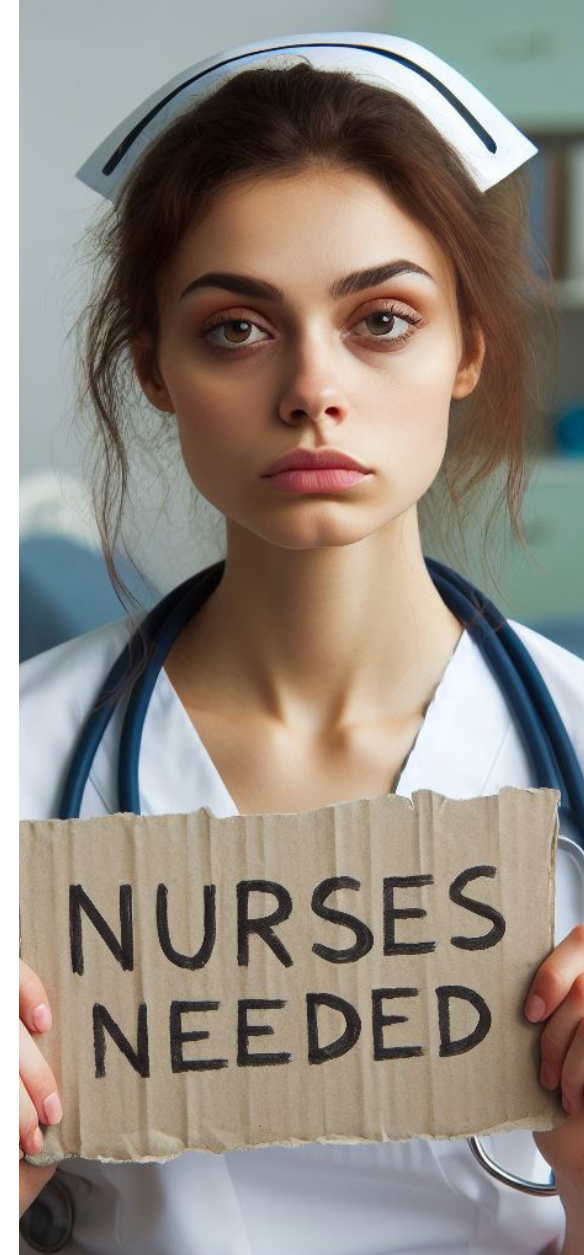
- An aging population, with an increasing number of elderly individuals, requires more healthcare services, intensifying the demand for healthcare professionals.
- Poor working conditions, such as low wages, long hours, and high stress, lead to job dissatisfaction and burnout, deterring potential new entrants and driving current workers out of the profession.
- The rigidity of state budgets and the limited government funding restrict the expansion of professional training programs and compensation for services provided by nursing homes.
- Unforeseen circumstances like pandemics (e.g., COVID-19) and other unexpected events put additional pressure on healthcare systems, exacerbating staffing shortages and impacting workers' mental health and job satisfaction.

Challenges:

- Reduced service quality is worsened by understaffing, leading to increased workloads for existing staff and resulting in burnout and reduced quality of care, jeopardizing patient safety and satisfaction.
- Rising labor costs and a shortage of healthcare professionals, coupled with the precarious job conditions and perceptions of the new generations, will drive up wages, raise turnover rates, and lower productivity.
- Increasing competition for employees pushes organizations to offer better salaries and benefits to attract and retain staff, which can be challenging for private nursing homes with fewer financial resources.
- Due to the high turnover rates and burnout, healthcare organizations need to invest in improving workplace well-being, requiring significant investment and commitment.

Impact on the Future of Elderly Care:

Private nursing homes will face tougher competition for staff against the less financially constrained national health system, complicating employee attraction, retention, and increasing staffing costs. Moreover, employees, especially the novel ones, would be more willing to quit the labor market if their expectations are not fulfilled. Therefore, staff retention would be highly challenging and costly for newcomers. Besides that, nursing homes may face challenges in maintaining legally required staff levels due to unexpected departures, potentially leading to sanctions and delays. Finally, labor costs will rise because of the high expenses of replacing staff and the need to compete with both local and international employers.





RISING REAL ESTATE PRICES

Long-term Rental and Ownership Analyses to Maximize Return on Investment.

The rising demand for nursing home services is driven by an aging population and difficulties with family conciliation, which are pushing elders to seek stable care solutions. For nursing home operators, this translates into higher occupancy rates and greater demand for their services, which are highly dependent on the real estate landscape. Therefore, operators must make strategic decisions regarding expansion. Renting new properties offers the advantage of lower initial capital expenditure and flexibility to adjust operations as market conditions change. However, it can result in higher long-term costs due to rental rate increases and less control over property modifications. In Spain, this issue is compounded by rising rental rates, driven by increasing demand and limited supply, especially in big cities and tourist areas.

Furthermore, purchasing properties offers the potential for long-term profitability and greater operational control, but it demands substantial upfront capital and exposes operators to market fluctuations. In Spain, the challenge is heightened by the rapidly escalating real estate prices, making substantial initial investments even more forbidding. A mixed approach may be beneficial, such as renting in high-demand areas to quickly scale operations while investing in strategic locations for long-term stability. Exploring public-private partnerships can also provide financial incentives and support for expanding facilities, such as tax breaks, grants, or subsidized loans, which can reduce the financial burden on nursing home operators.

Facts:

- Home prices are expected to rise by 2.5% in 2025 compared to 2024 [140].
- Bankinter forecasts the Euribor at 3.5% for 2024, 3% for 2025, and 3.25% for 2026 [141].
- Euroval expects Spanish property prices to increase by 6%, averaging 1,809 EUR/m² by 2025, up 103 EUR/m² from 2022 [142].
- In 2023, residential investment in Spain was 5.7% of Gross Domestic Product (GDP), lower than the 6.1% in the Eurozone [143].
- In Barcelona, rent is forecasted to rise by up to 4%, while in Madrid, it could reach 5% in 2024. In tourist areas, rent increases could be even more, by up to 6% or even 7% [144].

Key Drivers:

- The rising demand for housing, especially in large cities and tourist hotspots, is driven by population growth and migration flows, leading to more individuals seeking accommodation.
- It is anticipated that interest rates will reach a stable level, yet they remain elevated and restricting.
- The decrease in new construction prompted by high construction costs and regulatory barriers limit new development, increasing demand for existing properties.
- The escalating market prices of housing are leading to more restrictive property purchases due to the increasing total costs, as rising property prices inflate the percentage-based tax, making the overall purchase more expensive.

Challenges:

- The government's overindebtedness heightens the likelihood of higher taxes on the housing sector, which can add financial pressure to property investments.
- Rising real estate prices are a significant determinant of property acquisition decision-making.
- The higher cost of real estate limits the number of transactions, making expansion through purchase challenging. Thus reinforcing expansion through renting.
- Western countries like Spain are increasingly in need of more nursing homes due to an aging population.
- Ensuring high occupancy rates is crucial to maintaining profitability in the face of rising property costs, as vacant rooms represent significant lost revenue opportunities.

Impact on the Future of Elderly Care:

Higher real estate prices in the nursing home sector will discourage investors, limiting growth and the availability of new facilities. Decreased purchasing power may favor renting over buying, influencing preferences in the senior living sector towards rental options. These dynamics could pressure resources, foster market consolidation, and impact care quality in nursing homes. Additionally, rising interest rates and borrowing costs exacerbate these challenges. A strategic approach, balancing rental and purchase options and leveraging public-private partnerships, can help mitigate these challenges and capitalize on growth opportunities, ensuring sustainability and quality care for residents.

HIGHER EXPENDITURE ON HEALTHCARE

Amplified Spending for a Crucial Matter

Globally, the growth in healthcare spending has generally surpassed the GDP growth. Hence, its significance in the context of the GDP is intensifying. In addition, the rise in spending is leaning towards public expenditure, as its portion of the total health expenditure is expanding. Shortly, this trend is expected to remain notorious, especially in the case of low and middle-income countries. As healthcare is considered a normal good, people's expenditure on medical services tends to increase as their income rises. This means that as individuals or households earn more, they are more likely to spend a significant portion of their income on healthcare services and products. Furthermore, with the population aging in many Western economies, there will be an increased need for extended healthcare services.

Additionally, the surge in healthcare costs can be linked to lifestyle changes related to the increased emphasis on health during the COVID-19 outbreak. In other words, the pandemic has led to a heightened focus on health, particularly among women and those over the age of 55. Besides this, advancements in technology within the sector will likely expand the existing range of medical services by introducing more complex procedures, potentially increasing costs rather than containing them.

Facts:

- The Organization for Economic Cooperation and Development (OECD) forecasts suggest health spending per capita will grow faster than GDP, averaging 2.7% annually versus 2.1% for GDP, raising health's GDP share from 8.8% to 10.2% by 2030 [145].
- Health spending grows faster in low and middle-income countries at 6%, compared to 4% in high-income nations [145].
- Public health spending has risen significantly in absolute terms and as a share of worldwide health expenditure [145].
- US health spending per person is set to rise to 4.8% annually from 2022 to 2031, above the pre-pandemic average of 3.9% [146].
- The silver economy's share of health spending is forecasted to increase to 60% in 2025 [147].

- Post-COVID-19, 26% of Americans and roughly 5.4 million United Kingdom (UK) residents have shifted their focus to health, especially women (55%) and the elderly (63%) in the UK [148] [149].

Key Drivers:

- Demographic shifts are impacting Western economies, with an expectation that the population over 65 years old will increase by 11.8% in 2030 in Europe 2023 [6]. Specifically, in 2030, more than 10 million people in Spain will be 65 years old or older [151].
- The rise in income will boost the sector, as higher incomes correlate with increased healthcare expenditure [152].
- Technological advances and innovations drive expansion in medical services, potentially raising costs.
- The COVID-19 pandemic has led to lifestyle changes, emphasizing health prioritization and impacting spending patterns.

Challenges:

- Aligning supply and demand by meeting healthcare needs is challenging amidst rising demand, limited government budgets and restricted private resources.
- Democratizing the use of new technologies and innovations in the healthcare sector, which often increase costs, thereby improving the affordability of access to new medical technologies.
- Balancing public and private revenue share by navigating the increasing public health spending trend while engaging the typically more profitable private sector.
- Defending from new market entrants attracted by the industry's growth, particularly the innovative challengers disrupting the conventional healthcare industry.

Impact on the Future of Elderly Care:

Due to the potential rise in income and the increased priority of healthcare for citizens, the sector is expected to experience an increased need for health services that industry enterprises should adequately meet. Moreover, the public sector may bear higher relevance regarding firms' revenue sources from the industry, which can alter corporate finances. Also, interns are expected to stay longer in nursing homes and since earlier stages, thus boosting revenue and ensuring constant income flows. Finally, due to the increasing attractiveness of the sector, new entrants may appear, threatening current market shares and challenging the traditional actors.





HIGHER GOVERNMENT DEBT LEVELS

Public Debt Remains Excessive Despite Marginal Drops

For numerous countries worldwide, not only are liabilities in government accounts on the rise, but more critically, the cost of borrowing is also escalating. In Spain, this situation is particularly concerning because, having experienced a significant economic downturn following the COVID-19 pandemic, the Spanish government, among many others, now finds itself with expenditures exceeding revenues, leading to a substantial rise in debt levels. Furthermore, projections for future economic growth are not optimistic. Despite some recovery, the growth rates appear inadequate to address the financial challenges effectively.

The cost of borrowing long-term debt is also expected to rise due to increased term premiums, adding further pressure. This escalation in borrowing costs complicates the country's ability to fulfill its financial obligations and maintain public services. Additionally, countries like Spain face structural economic issues such as high unemployment rates and low productivity growth, further hindering economic recovery by diminishing potential government revenues. Consequently, these financial strains could lead to reduced government subsidies, support, and spending, increased taxes, and uncertainty in investment, all of which have significant implications for sectors like healthcare and nursing homes.

Facts:

- The lower level of primary balances, lower real growth of the economy, higher real interest rates, and higher debt levels negatively affect public debt sustainability [153].
- From 2022 to 2029, advanced economies' debt-to-GDP ratio is set to rise from 111.2% to 115.1%, while Spain's is projected to fall from 106.3% to 104.2%, and the EU's from 83.6% to 82.9% [154].
- Global real GDP growth is expected to decline slightly over four years, staying below past boom levels [155].
- Despite stable, low short-term rates, long-term borrowing costs are climbing due to rising term premiums [153].
- In 2022, a hostile government primary balance, also known as a deficit, was experienced by 95 out of a total of 143 countries [156].

Key Drivers:

- Structural economic issues such as high unemployment rates and low productivity growth hinder economic recovery and exacerbate debt levels.
- The high-risk premium raises borrowing costs, especially for long-term debt, increases financial burdens on governments, and diminishes their borrowing capacity.
- The delayed and ineffective fiscal reforms, which result in a slow implementation of necessary budget adjustments, hampers debt management efforts.
- The overspending and inefficient management of national resources, which result in budget deficits, amplify the debt load and drastically increase risk premiums.

Challenges:

- Reduced government subsidies and support due to elevated debt may force governments to cut subsidies and expenditures, impacting various sectors, including nursing homes.
- Investment uncertainty prompted by economic instability and high debt, affecting capital inflows into the nursing home sector.
- Delayed payments and higher government default risk, as authorities might face challenges in fulfilling their financial obligations promptly, and there's even a risk of defaulting and not making the required payments.
- Tax increases, as governments may raise taxes to manage debt, reduce disposable income, and potentially increase operational costs for nursing homes.

Impact on the Future of Elderly Care:

High government debt levels significantly impact the nursing home sector. Reduced government subsidies, decreased fees paid by public authorities for the services provided, and increased taxes may result in higher operational costs for nursing homes. Additionally, due to over-indebtedness, uncertainty in investment can hamper the expansion and improvement of nursing home facilities, affecting the quality provided. Along with that, governments might encounter challenges in settling the fees, including potential payment delays. As a result, nursing homes may need to explore alternative revenue sources to ensure sustainability and continued income inflows. In conclusion, the high levels of government debt and associated challenges necessitate strategic planning within the nursing home sector to maintain and improve the quality of care.



BUSINESS MODEL TRENDS

IMPACTING THE FUTURE OF ELDERLY CARE

Service Personalization
Sustainability Business & Circular Economy
Improving Service Quality Through Digital Transformation
Data-driven Decision Making

Trend

Exploration

Ideation

Andrés Ospina



Ainoa Palomino



Marina Ramírez Escrivá



Houman Rezakhanlou



BUSINESS MODEL TRENDS

Impacting the Future of Elderly Care

The landscape of elderly care is undergoing significant transformations driven by demographic shifts and technological advancements. This evolution can be comprehensively analyzed from both economic and strategic perspectives. From a financial point of view, the focus is on optimizing revenue and managing costs effectively. The growing elderly population, with an increasing life expectancy, presents a substantial market opportunity for elderly care services. However, it also demands efficient financial and business strategies in order to ensure sustainability and affordability.

Strategically, the primary focus is on creating value and re-imagining the value chain architecture. Innovative business models are at the forefront of this transformation, reshaping how care is delivered and managed. The integration of advanced technologies such as AI, big data analytics, and IoT devices enhances personalized care and operational efficiency. These technologies enable real-time monitoring of residents' health, predictive analytics for proactive care, and improved communication between caregivers and families. Consequently, this leads to better health outcomes and higher satisfaction levels among residents and their families. Another strategic element is the creation of value networks and partnerships.

Nursing homes are increasingly collaborating with various stakeholders, which is becoming crucial for delivering comprehensive and integrated care services that address all aspects of elderly residents' well-being.

Quality and sustainability are also central to the strategic re-imagining of elderly care in nursing homes. Regulatory frameworks and quality standards are continually evolving to ensure the highest levels of care quality and safety for residents. Sustainable business models that emphasize environmental responsibility and efficient resource utilization are becoming more prevalent as they add extra value for stakeholders.

Developing business models that address the specific and unique needs of the elderly is crucial. One essential area is personalized healthcare. Hyper-personalization in elderly care involves shifting from generic services to more tailored products and services that cater to individual preferences and health requirements. This approach benefits both customers and businesses by increasing satisfaction and revenue while reducing churn rates. The key to these personalized offerings lies in the collection, analysis, and transformation of customer data into actionable insights about individual needs and preferences.

Moreover, data-driven business models leverage insights from digital tools and predictive analytics to enable care providers to offer more accurate and timely services based on real-time data.

The evolution of elderly care in nursing homes is a multifaceted process influenced by both economic and strategic factors. By optimizing revenue and cost streams, adopting innovative business models, and emphasizing quality and sustainability, nursing homes are well-positioned to meet the growing and diverse needs of the elderly population. This comprehensive approach ensures that elderly care remains responsive, efficient, and humane in the face of ongoing demographic and technological changes.

SERVICE PERSONALIZATION

Tailoring Services to Resident Needs

Service personalization is a significant global trend, emphasizing the customization of services to meet individual needs and preferences [176]. Driven by technological advancements and a customer-centric approach, this trend spans various sectors, enhancing satisfaction and loyalty [182]. In nursing homes, personalization focuses on customizing care and services to meet each resident's unique needs and preferences [177]. Tailoring services improve resident satisfaction and quality of life, offering flexible, on-demand care that allows for real-time adjustments to care [179].

Personalized services transform nursing homes from institutional settings to homelike environments, attracting a broader range of clients, including those not primarily dependent on elder care [171]. This approach not only addresses individual needs but also offers a more appealing and adaptable living environment, enhancing comfort, engagement, and health outcomes [178]. Servitization models, which combine services with products, can reduce operational costs by optimizing resource use [180].

Clients primarily cover personalized service costs through premium fees, ensuring profitability for nursing homes by charging appropriate rates [172]. Tailored services provide opportunities to charge higher rates, boosting revenue streams [173]. Target markets include elderly residents seeking customized care, families wanting advanced facilities, and healthcare providers integrating advanced technologies [174]. Effective cost management and service personalization can enhance care quality while ensuring profitability for nursing homes [175].

Facts:

- Tailored living environments significantly enhance comfort and overall satisfaction among residents. Personalized spaces make nursing homes feel more like home, promoting a sense of belonging and well-being [157].
- Activity programs aligned with resident interests boost engagement and happiness [169].
- Customizing dietary plans based on individual health needs and preferences improves overall health outcomes. Personalized nutrition supports better health management and enhances residents' quality of life [170].

- On-demand services include healthcare, personal care, and social activities tailored to individual needs, improving resident autonomy and satisfaction [158, 159].
- Integrating servitization models, which combine services with products, can optimize resource use and reduce operational costs [171].

Key Drivers:

- There is an increasing emphasis on resident-centric care models that prioritize personalized care to improve outcomes. This approach is driven by a growing recognition of the importance of addressing individual needs and preferences [157, 160].
- Advances in technology enable more detailed resident profiling and service customization, such as emotional AI and smart home technology [161].
- Increased competition among nursing homes to provide superior personalized services, driving the need for differentiation [162].
- Technological advancements are facilitating real-time service delivery and monitoring. This capability allows for immediate adjustments to care plans based on current needs, enhancing responsiveness and effectiveness [163].
- Competitive pressure to differentiate nursing home offerings [164].

Challenges:

- Balancing personalization with operational efficiency ensures that individual care plans do not overly strain resources [165].
- Maintaining consistency and quality in personalized services across all residents requires comprehensive staff training and effective management. Ensuring that every resident receives high-quality care tailored to their needs is a complex but necessary task [166].
- Managing the costs associated with individualized care plans, particularly regarding technology and staff needed to implement these services [157].
- Integrating various on-demand services into a cohesive system that works seamlessly for residents and staff [161].
- Training staff to manage and deliver flexible, resident-centric care while maintaining high standards of care across different service types [167].

Impact on the Future of Elderly Care:

Personalized care will transform nursing homes by significantly enhancing the resident experience. The integration of on-demand services will enhance operational efficiency and resource management, making personalized care more sustainable and effective by streamlining operations and focusing resources where they are most needed. This evolution toward personalized care models will redefine the standards of elder care, making nursing homes more responsive, adaptive, and resident-focused [168].





SUSTAINABILITY BUSINESS AND CIRCULAR ECONOMY

Implementing Sustainable Practices in Business

Sustainability has evolved into a crucial and innovative strategy for present-day businesses. Corporate sustainability entails an integrated approach that aligns company objectives with various stakeholders, including suppliers, customers, employees, the environment, the community, and the UN SDGs [183]. Academic and empirical studies increasingly emphasize the potential of corporate sustainability in enhancing business competitiveness, supporting the idea that creating societal value reinforces economic value and productivity [184].

Sustainability is becoming a key factor for customers choosing one nursing home over another. They increasingly demand extra values like eco-friendly practices and responsible sourcing. Companies that prioritize sustainability can differentiate themselves in the market, attracting more conscious consumers. This commitment not only enhances the nursing home's reputation but also aligns with a growing consumer vision for a greener future, creating a compelling value proposition. As a result, companies are more inclined to meet the ecological needs of this population, which is shifting from eco-consciousness to eco-consumption [193].

The circular economy aims to prolong the lifespan of products and resources through closed-loop systems, thereby reducing pollution and resource waste while fostering economic growth [185, 186]. It integrates environmental well-being with financial activities, emphasizing regenerative processes and sustainable nutrient cycles [187, 188].

Facts:

- In 2022, humans consumed resources at a rate 75% higher than the Earth's capacity for regeneration [188].
- Implementing circular economy practices in the EU has the potential to yield annual savings of 600 billion EUR for companies and create 580,000 job opportunities [188].
- Adopting the circular economy could lead to significant annual net material cost savings for EU companies, between 250 and 465 billion USD, representing 12% to 23% of their total material costs [188].

- The aging population represents a fundamental socio-economic shift in the twenty-first century, posing significant policy challenges and requiring substantial adaptations across various sectors [190].

Key Drivers:

- The recent implementation of the EU Corporate Sustainability Reporting Directive (CSRD) requires over 50,000 companies in the EU to report on their sustainability performance within the next 1 to 5 years [189].
- The crucial matter is to reduce waste, enhance sustainability, and reuse non-renewable products [188].
- There is a need for long-term cost savings and the availability of innovative products without incurring additional economic and environmental costs [189].
- A circular economy drives economic growth, enhances competitiveness, and encourages innovation, all while maintaining sustainability and profitability, creating a balanced approach to development and resource management [189].

Challenges:

- A lack of standardization and inadequate guidance hinder the effective implementation of circular economy practices [188].
- Barriers such as transition costs and the lower price of virgin materials compared to recovered or recycled materials [189].
- Certain materials have limited recyclability because they cannot be recycled indefinitely, facing constraints in the number of times they can be reprocessed and reused [188].
- While eco-friendly products offer numerous advantages, many countries still struggle to meet the environmental concerns of consumers [193].
- Resource recovery through global recycling networks is regarded as a dirty and illegal trade [185].

Impact on the Future of Elderly Care:

Integrating smart care technologies and sustainable practices minimizes environmental impacts and enhances care quality, which promotes economic growth. Circular economies reduce costs by optimizing resource use and increasing efficiency, while sustainability attracts eco-conscious customers and investors, enhancing profitability. Emphasizing technological innovation and social inclusiveness improves care quality. This aligns with broader sustainable development goals, offering a promising business model for the elderly care sector, taking advantage of government subsidies to companies that develop sustainable related actions [185, 186, 190, 191]. Moreover, for some clients that might be looking for sustainable alternatives since it is widespread nowadays to have an environmentally friendly focus [192], being eco-friendly adds an on-demand value.

IMPROVING SERVICE QUALITY THROUGH DIGITAL TRANSFORMATION

Integrating Technology for Better Elder Care

Digital transformation in nursing homes involves adopting new technologies such as EHRs, telemedicine, IoT devices, and AI to enhance care delivery and operational processes. This shift allows for more efficient data management, remote health monitoring, and improved communication among caregivers and stakeholders, leading to higher quality care and better resident outcomes [203, 211]. By integrating these advanced technologies, nursing homes can streamline administrative tasks, reduce paperwork, and provide caregivers with more time to focus on direct patient care.

Profitability mainly stems from improved service quality, attracting residents, and reducing costs through preventive care measures, operational efficiencies, and optimized resource allocation. Enhanced data analytics facilitate better decision-making and personalized care plans, contributing to overall resident well-being. Additionally, digital transformation can improve the quality of care by incorporating feedback systems (like patient and family surveys), ensuring operational transparency, and supporting regulatory compliance. These systems enable nursing homes to quickly identify and address areas needing improvement, thus maintaining high standards of care.

This approach positions nursing homes to adapt to global healthcare trends, fostering sustainability, maintaining a solid reputation, and improving resident satisfaction. As healthcare continues to evolve, embracing digital transformation will be crucial for nursing homes to remain competitive, meet the rising expectations of residents and their families, and achieve long-term success.

Facts:

- EHRs streamline information management and sharing, improving care coordination and reducing administrative costs [194, 212].
- Telemedicine provides remote consultations, reducing the need for in-person visits and transportation costs, therefore making healthcare more accessible and convenient [194, 196].

- IoT devices monitor vital signs and activities, enhancing safety and providing real-time health data for proactive care [195, 211, 213].
- AI-driven predictive analytics can forecast health issues before they become critical, thereby optimizing care plans and enabling preventive measures [198, 203, 213].
- Digital platforms and technologies facilitate better communication among caregivers, residents, and families, improving the overall quality of care and engagement [199].

Key Drivers:

- Advances in healthcare technology and digital tools that enable more precise and personalized treatments [168, 200].
- Increased demand for efficient and high-quality care, driven by an aging population and rising patient expectations [201, 202].
- The need to reduce healthcare costs and improve resource management to ensure sustainability and accessibility for all patients [195, 203].
- Regulatory requirements that push for better data management and care standards that ensure patient information is secure and care quality is consistently high [204].
- The increasing role of data in driving health outcomes and operational efficiency, as analytics are vital for improving patient care and optimizing healthcare processes [205].

Challenges:

- High costs associated with implementing new technologies can be a significant barrier for many organizations, requiring substantial financial investment [196].
- Ensuring staff are adequately trained to use new systems is crucial for successful implementation, necessitating comprehensive training programs and ongoing support [206].
- Integrating various technologies into existing workflows can be challenging, requiring careful planning and coordination to avoid disruptions and ensure seamless operation [208].
- Resistance to change among staff and residents can hinder the adoption of new technologies and processes, requiring effective communication and change management strategies [209].

Impact on the Future of Elderly Care:

The digital transformation of nursing homes promises to enhance the quality of care and reduce costs significantly [168, 194, 203]. Technologies like EHRs, IoT devices, and AI enable better data management, remote health monitoring, and streamlined communication, which leads to improved preventive care and reduced costs through an optimized allocation of resources. By adopting these innovations, nursing homes can meet global healthcare trends, maintain a strong reputation, and increase resident satisfaction. This ensures sustainability and regulatory compliance in an evolving healthcare landscape while fostering a more personalized and efficient care environment for residents [203, 210].





DATA-DRIVEN DECISION MAKING

Make Use of Data for Improved Outcomes

Data-driven decision-making in business models is revolutionizing industries by exploiting data with tools such as advanced analytics and machine learning to drive decision-making processes. These models are particularly transformative in the elderly care sector, where data insights can significantly improve service delivery, patient outcomes, and operational efficiencies. Data-driven approaches facilitate the development of personalized care plans, predictive analytics for health deterioration, and optimized resource allocation, ultimately leading to enhanced quality of care and reduced costs [214, 216].

Data-driven decision-making in nursing homes involves using data analytics and advanced algorithms to optimize resident care and operational efficiency. Nursing homes can identify patterns and make informed decisions that enhance the quality of care by collecting and analyzing data on resident health, staff performance, and facility operations. This approach shifts from reactive to proactive care, anticipating resident needs and preventing issues before they arise.

Furthermore, data analytics can support using resources such as medication, medical supplies, and equipment. This helps reduce waste and ensure that resources are used effectively, contributing to cost savings. By continuously collecting and analyzing data, nursing homes can also stay compliant with regulatory requirements, ensuring high standards of care and safety.

Facts:

- The global market for healthcare analytics is expected to reach 50.5 billion USD by 2024, compelling companies to integrate data analytics tools to stay with a valuable competitive advantage and meet market demands [214].
- Implementing digital monitoring technology in nursing homes has shown a 15% reduction in fall incidents and a 20% increase in operational efficiency, necessitating the adoption of digital solutions [216].
- Data-driven strategies have led to a 25% improvement in patient adherence to treatment plans in elderly care facilities, forcing companies to leverage data to improve patient engagement, satisfaction, and outcomes [216].

Key Drivers:

- The increasing availability and sophistication of healthcare data enable more precise and actionable insights, driving the adoption of data-driven models. These advancements are crucial for tailoring treatments and interventions to individual patient needs and improving overall care quality [214].
- Technological advancements are facilitating real-time data analysis and predictive analytics, which are crucial for proactive elderly care management [215].
- Regulatory requirements and the push for value-based care encourage healthcare providers to adopt data-driven approaches to improve outcomes and reduce costs. Data-driven strategies help meet compliance standards, optimize resource utilization, and achieve cost efficiencies while maintaining high-quality patient care [217].

Challenges:

- Ensuring data accuracy and completeness remains a significant challenge, necessitating robust data collection and management systems. Precise data is critical for making informed decisions in healthcare. Implementing advanced data management systems, along with regular audits and validations, is essential to maintain data integrity [216].
- Overcoming resistance to change among staff accustomed to traditional methods requires comprehensive training and change management strategies. Effective training programs are crucial to equip staff with the necessary knowledge to utilize data analytics tools. Additionally, change management strategies, including clear communication, leadership support, and involving staff in the transition process, can foster a culture of continuous improvement within the organization [217].

Impact on the Future of Elderly Care:

Implementing data-driven solutions such as predictive analytics and digital monitoring reduces unnecessary hospital visits and optimizes resource allocation, leading to significant cost savings by an appropriate use of resources [216]. Utilizing advanced data analytics to provide personalized care solutions enhances patient satisfaction and outcomes, positioning elderly care facilities as multi-service providers and attracting diverse customers [216]. Continuous investment in data-driven technologies and tools ensures that elderly care facilities remain at the forefront of innovation, sustaining economic growth and profitability [215]. By optimizing resource allocation and reviewing operations, looking for a more efficient way to work significantly reduces costs and improves efficiency in nursing homes [218, 219].

EXPLORATION

In the upcoming chapter, the outcomes of the process for validating market hypotheses and problem statements are explored. This phase primarily revolves around the discovery of white spaces and opportunity areas in the established sector of nursing homes. Through the clustering of the topic, findings are distilled into four key opportunity spaces, and the most critical problems and opportunities within the chosen domain are identified. The exploration phase places a priority on the testing and re-evaluation of hypotheses, alongside an examination of the existing landscape to pinpoint key market players.

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BOOSTING EFFICIENCY THROUGH TASK OPTIMIZATION

MAXIMIZING PRODUCTIVITY BY STREAMLINING WORKFLOWS

To Do List:

Efficiency Enhancement Through Robotics

Informed Decision-Making Enhances Outcomes

Automation of Nursing Administrative Tasks

Javier Reig 

Ainoa Palomino 

Juan Pablo Arano 

Nathali Nazaryan 

Marc Frasquet 

BOOSTING EFFICIENCY THROUGH TASK OPTIMIZATION

Maximizing Productivity by Streamlining Workflows

The evolving landscape of elderly care necessitates innovative solutions to improve nursing homes' efficiency, quality of care, and staff satisfaction. One critical challenge this sector faces is managing the demanding physical and administrative tasks that can lead to caregiver burnout and reduced quality of care. The administrative workload in nursing homes is substantial, encompassing extensive paperwork, compliance with safety regulations, and the need for meticulous record-keeping. This bureaucratic burden often detracts from caregivers' time directly with residents, further exacerbating stress and burnout. Addressing this challenge involves leveraging advanced technologies such as robotic automation, data-driven decision-making, and AI integration. These innovations are interconnected solutions transforming the nursing home environment into a more efficient and supportive space.

Robotic automation plays a pivotal role in alleviating the physical burdens on caregivers. Tasks like lifting, transferring, and repositioning residents are physically demanding and pose significant injury risks to staff. By integrating robots designed for physical support, nursing homes can reduce the physical strain on caregivers, minimize the risk of musculoskeletal injuries, and ensure safer handling of residents. This technological shift allows caregivers to focus more on personalized, human-centered aspects of care, thereby enhancing job satisfaction and retention rates [220].

In parallel, using data-driven decision-making processes can significantly enhance the quality and efficiency of care delivery while reducing costs. Through collecting and analyzing extensive data produced by nursing homes and employing analytical methods like descriptive statistics, predictive modeling, and natural language processing, valuable insights can be obtained regarding the resident's and staff's preferences and requirements. This strategic use of data transforms decision-making processes, reduces operational risks, and improves care responsiveness [221].

One major challenge is balancing administrative work with compassionate care, often leading to caregiver burnout and reduced care quality. The bureaucracy and extensive paperwork required for safety compliance are usually seen as barriers to providing high-quality, personalized care. Automation and AI can address this by recording data automatically and providing real-time updates, allowing caregivers to focus on residents. These technologies promise to revolutionize nursing home operations by freeing time for personalized care, enhancing job satisfaction, and improving efficiency. Hence, automation could pave the way for a more efficient and compassionate elderly care system. The interconnected nature of these technological advancements presents a comprehensive solution to the challenges nursing homes face.

Robotic automation, data-driven decision-making, and AI integration collectively enhance the operational landscape, ensuring safer, more efficient, patient-centered healthcare [223]. Despite challenges such as providing data security, managing initial costs, and adhering to regulations, the long-term benefits include improved care quality and increased caregiver satisfaction.

In conclusion, integrating advanced technologies in nursing homes offers a transformative approach to managing tasks and improving care quality. By leveraging robotic automation, data analytics, and AI, nursing homes can create a more efficient and supportive environment, ultimately enhancing the well-being of residents and the satisfaction of caregivers. As a result, the current issues nursing homes face, such as inefficient operations, physical exhaustion, and job dissatisfaction, could be significantly alleviated. These innovations represent a significant step forward in modernizing elderly care, making it more responsive, efficient, and humane [223].



Boosting Efficiency Through Task Optimization

ROBOTICS FOR IMPROVED EFFICIENCY

Robotic Automation Enhances Efficiency and Care in Nursing Homes

Maintaining high-quality care in nursing homes involves tackling various time-consuming and physically demanding tasks. These include lifting, transferring, repositioning residents, and performing routine duties. These tasks can lead to physical injuries, burnout, and reduced time available for personalized care. Integrating robots into nursing homes can significantly enhance efficiency and quality of care by taking over these repetitive and labor-intensive tasks and minimizing human error.

Robots designed for physical support can reduce the strain on caregivers by handling tasks that involve heavy lifting and repetitive motions. Robots can assist with lifting and moving residents safely, thereby minimizing the risk of physical injuries among staff [220, 227]. This technology protects caregivers and ensures safer, more comfortable handling of residents. Additionally, robots can handle routine tasks such as delivering meals and monitoring patient vitals, providing safer and more efficient care delivery [224, 228].

By automating these tasks, robots allow caregivers to focus on the more personalized, human-centered aspects of care, such as interacting with residents and addressing their emotional and social needs. This shift can improve job satisfaction and staff retention rates [225]. Although the initial implementation of robotic systems may increase caregiver workload due to the need for training and adaptation, the long-term benefits include reduced physical strain, enhanced care quality, and more time for direct patient care [226, 229].

“Robotic technology has the potential to enable high levels of patient care, clinical productivity and safety for both patients and healthcare workers.”

David Silvera-Tawil at Commonwealth Scientific and Industrial Research Organisation

Selected Players:

INTUITIVE
SURGICAL®

KOMPAI
robotics

BEAR
ROBOTICS

ENHANCING OUTCOMES THROUGH DATA-DRIVEN DECISION-MAKING

Informed Decision-Making Delivers a Strategic Advantage

Healthcare inefficiencies can result in billions of USD in losses due to excess services and medication misuse [230]. Amidst these issues, nursing homes produce a vast amount of data that can be utilized, namely internal data. Furthermore, they can make use of external data to improve their decision-making. Therefore, they can utilize information from EHRs, sensors, wearable devices, surveys, and state health agencies. By meticulously analyzing this information, they can improve care quality and meet the needs of residents and staff more effectively.

Leveraging data will offer managers and caregivers valuable insights that are easy to understand, thereby optimizing decision-making processes [231]. Descriptive statistics may be used to check critical indicators and identify trends, such as how satisfaction rates evolve after applying a specific measure. Moreover, methods like predictive modeling (i.e., forecasting upcoming events by examining historical data) and natural language processing (i.e., transforming unstructured human language into comprehensible data) are beneficial for preventing adverse situations and for the early detection of needs [232].

Utilizing this data will significantly transform the nursing home sector. Companies that adopt these practices will be able to reduce operational risks through preventive measures, track the success of strategies and interventions, and identify issues faced by patients and staff early on, thereby minimizing response times and costs [232]. "Data-driven decision-making is the cornerstone of transforming nursing home care, driving efficiency, and improving patient outcomes."

"Data beats emotions."
Sean Rad, co-founder at Tinder

Selected Players:





Boosting Efficiency Through Task Optimization

AUTOMATION OF NURSING ADMINISTRATIVE TASKS

Transforming Healthcare Management with AI and Real-Time Data Integration

The elderly care sector is undergoing a significant transformation due to the adoption of new technologies like AI and advanced sensors. Currently, nurses spend a substantial amount of their time on administrative tasks, such as manually writing routine reports for residents, which detracts from their ability to provide quality care. Automating these tasks through AI can greatly enhance efficiency, as AI can handle complex processes and decision-making. Advanced sensors can collect real-time data from health devices for continuous monitoring and ensure seamless communication between technologies through interoperability. This integration reduces the administrative burden on nursing staff, allowing them to focus more on patient care, thus improving the overall quality of services in nursing homes.

Leveraging advanced automation technologies enhances economic management, real-time monitoring, and comprehensive care planning in nursing homes. These tools facilitate precise report generation, better staff scheduling, and improved medication administration. Automation improves operational efficiency and addresses the projected shortfall of 10 million health workers by 2030 [233]. Despite challenges like ensuring data security [234], managing initial costs, and adhering to regulations [235], the integration of AI and IoT devices in nursing homes promises a future of more efficient, accurate, and resident-centered care, transforming the operational landscape and enhancing resident experiences [50].

“By combining AI’s thinking and IoT’s connectivity, healthcare becomes more personalized and effective.”

Fariz Jafarov, Executive Director at Center for Analysis and Coordination of the Fourth Industrial Revolution

Selected Players:





ENHANCING THE WELL-BEING OF THE ELDERLY

OPPORTUNITIES TO IMPROVE LIFE QUALITY IN NURSING HOMES

Tackling Mental Health Issues

Innovation to Foster Mobility

Crucial Response and Rapid Response in Elderly Care

Amina Abed



Luca Pizzoni



Paula De Alfonso



Vicent Torres



ENHANCING THE WELL-BEING OF THE ELDERLY

Opportunities to Improve Life Quality in Nursing Homes

As the global population ages, the demand for high-quality elder care is set to rise sharply. This demographic shift is a challenge and a significant factor in shaping the industry's future. Nursing homes and elder care facilities are faced with the urgent need to adapt and innovate to meet the evolving needs of an increasingly elderly population. Therefore, it entails addressing current issues and developing future-proof solutions to ensure effectiveness in elder care.

Transitioning to a nursing home often involves profound changes that can impact mental health. Residents may face a loss of autonomy and personal choice, experience grief from losing loved ones, and struggle with homesickness and disconnection from familiar surroundings. These factors contribute to feelings of confusion, loneliness, and a lack of purpose, which can lead to significant declines in cognitive function and overall well-being. The isolation leads to mental health issues among many residents in nursing homes. The lack of regular interaction with family and friends and a limited number of social activities exacerbates the feeling of abandonment. This isolation can also intensify grief and emotional distress, making it difficult for residents to cope with their new environment. Moreover, the transition to a nursing home often means relinquishing control over daily routines and personal choices, which can be a profound psychological blow to once-independent individuals. The loss of familiar surroundings and personal belongings further contributes to a sense of disorientation and emotional distress.

Additionally, physical health issues such as mobility limitations and a high risk of falls significantly impact nursing home residents. Reduced mobility, often due to age-related muscle deterioration or chronic conditions, leads to sedentary lifestyles that increase the prevalence of chronic diseases like cardiovascular conditions and diabetes. This inactivity increases existing health issues and impairs overall functional ability and independence. Health emergencies and urgent situations are also common due to the delicate health condition of the residents. The speed with which these issues are detected and addressed is crucial.

The lack of effective monitoring means these critical moments might be missed, leading to delayed interventions and worsened outcomes.

Despite these challenges, there are substantial opportunities for innovation and improvement in elder care. Advanced monitoring technologies, such as wearable health trackers and smart devices, offer the potential to revolutionize health emergency detection and management. Integrating technology to encourage physical activity through VR exercise programs and interactive fitness platforms can make staying active more engaging and accessible. Furthermore, enhancing mental health support through tailored programs that address specific emotional needs such as creating environments that foster social connections, providing grief counseling, and maintaining a sense of autonomy can significantly improve residents' overall well-being.

These areas have been explored, focusing on the transformative potential of advanced monitoring technologies, innovative approaches to promoting physical activity, and comprehensive strategies for supporting mental health. Addressing these critical aspects aims to significantly enhance the quality of life for elderly individuals, ensuring a healthier and more fulfilling future for this growing demographic.

TACKLING MENTAL HEALTH ISSUES

Supporting Emotional Well-Being with Modern Approaches

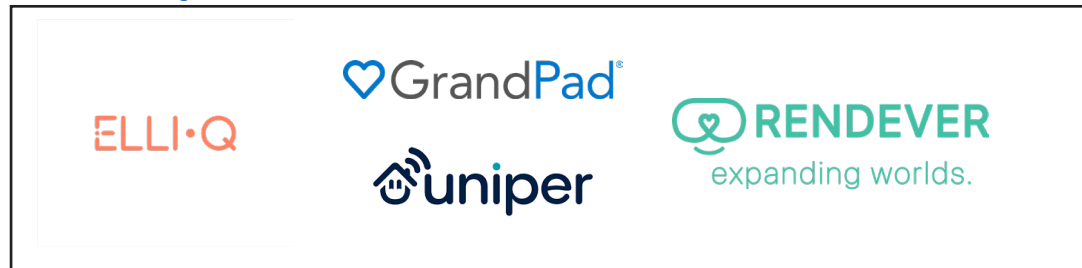
The transition to nursing homes can be a challenging experience for elderly individuals, often marked by feelings of loneliness and disconnection in an unfamiliar environment [87]. Upon arrival, many seniors face significant mental health challenges, including depression and anxiety, which can worsen their overall well-being. Unfortunately, these issues often go unaddressed in traditional care settings, leading to a deterioration in the quality of life for residents. The increasing aging population combined with a shortage of mental health resources highlights the urgent need for innovative solutions. Studies indicate that many seniors feel isolated and disconnected, with many nursing homes lacking tailored programs to promote social engagement [86]. As the demand for elder care grows, the focus on mental health will become more prominent, emphasizing the necessity of addressing these issues to improve the overall care experience.

Leveraging technology presents a tremendous opportunity to enhance the mental health of the elderly. VR can facilitate social interactions by connecting seniors with their loved ones, while mental wellness apps can offer personalized activities promoting cognitive engagement. Additionally, incorporating hands-on therapeutic activities like pet therapy can provide companionship and comfort. Integrating technological tools alongside therapeutic practices can create a holistic approach to improve mental well-being and ensure that elderly individuals lead fulfilling and connected lives.

“In their present life situation, loneliness, despair and depressive thoughts are prominent, and they express several attempts to endure their situation.”

Suffering and mental health among older people living in nursing homes—a mixed-methods study.
Jorunn Drageset.

Selected Players:





Enhancing The Well-Being of The Elderly

INNOVATION TO FOSTER MOBILITY

Leveraging Technology to Promote Physical Activity

Maintaining physical health is a significant challenge for the elderly, often hindered by limited mobility, social isolation, and a lack of motivation. As people age, they frequently experience a decline in physical activity levels. This issue persists due to limited accessible exercise options and inadequate encouragement to stay active.

The impact of a lack of physical activity among the elderly is severe, as it is a primary cause of numerous chronic diseases such as cardiovascular diseases, diabetes, and musculoskeletal disorders [236]. Additionally, insufficient exercise can lead to cognitive decline [237]. As the global population ages, the urgency to address these health concerns grows, making it imperative to find practical solutions to motivate and engage elderly individuals in regular physical activity.

Technology presents a promising solution to this problem. Innovations such as wearable fitness trackers, interactive exercise platforms, and VR exercise programs can provide personalized, engaging, and accessible ways for the elderly to remain active [238, 5]. These technologies offer real-time feedback, enhance exercise routines, and facilitate social interaction, significantly enhancing motivation and commitment to regular exercise. By leveraging these advancements, we can improve the physical health and overall well-being of the elderly.

“Physical activity intervention utilizing technology yielded positive results in terms of enhancing physical activity levels and enhancing mental health”

Liu, Y., Zhang, H. & Xu, R. The impact of technology on promoting physical activities and mental health

Selected Players:



CRUCIAL PREVENTION AND RAPID RESPONSE IN ELDERLY CARE

Prevention and Premature Detection of Incidents through Advanced Monitoring Technologies

Health emergencies are common in care homes due to residents' fragile health. Quick detection and response are crucial to prevent serious incidents. For instance, treating a heart attack within the first hour, known as the "Golden Hour," reduces heart damage and increases survival rates [239]. Studies show that about one-third of elderly individuals in institutional care fall each year, a figure that increases with age and frailty [240]. Rapid fall detection allows immediate medical intervention, significantly reducing complications [241].

Delayed detection of health issues can lead to severe emergencies that require urgent intervention. Furthermore, residents often face disorientation and sudden movements, which can be hazardous if they enter unsafe areas. Therefore, continuous location tracking of residents is crucial for preventing such situations.

Implementing advanced monitoring technology in care homes is highly beneficial. Digital remote monitoring technology in care homes has reduced hospital Accident and Emergency (A&E) attendances by 11% and emergency admissions by 25% [242]. Therefore, it is crucial to detect and monitor patients' metrics and conditions, such as heart rate, Electrocardiogram (ECG), and blood pressure, and to detect situations like falls or disorientation. Effective incident reporting software for nursing homes is vital for ensuring the safety and well-being of residents [243].

"Prevention holds the promise of maintaining good health by testing, diagnosing and treating conditions before they cause symptoms."

Sei J. Lee, MD MAS and Christine M. Kim, Individualizing Prevention for Older Adults.

Selected Players:





ENHANCING WORK- FORCE DEVELOPMENT & SATISFACTION

STRENGTHENING WORKFORCE ENGAGEMENT
THROUGH INNOVATION AND INCENTIVES

Tech-Driven Training

Attracting Workforce


Benefits & Bonuses for Worker Satisfaction

Marina Ramírez Escrivá 

Ismael Noverges 

Ana Clara Castanheira 

Jaume Ivars 

Houman Darío Rezakhanlou 

ENHANCING WORKFORCE DEVELOPMENT & SATISFACTION

Strengthening Workforce Engagement through Innovation and Incentives

The workforce in nursing homes plays a critical role in ensuring residents' well-being and quality of life. However, the increasing demands on healthcare services and the growing elderly population have exacerbated a significant shortage of skilled nursing staff. This shortage affects the current quality of care and poses a severe threat to future service standards if not addressed promptly. The gap between the demand for nursing home placements and the supply of qualified staff is widening, creating a crisis that impacts resident care and organizational effectiveness. Overburdened staff often need help to keep up with the workload, leading to burnout and high turnover rates.

This situation compromises residents' personalized care, resulting in decreased satisfaction and potential deterioration in their health outcomes. Moreover, the inability to maintain adequate staffing levels has led to a negative perception of nursing homes, making it even more challenging to attract new employees and exacerbating the staffing crisis. Families may hesitate to place their loved ones in nursing homes perceived as understaffed and unable to provide proper care, further straining the system. The problem is poised to worsen as the elderly population continues to grow. Projections indicate that the number of individuals requiring long-term care will increase significantly in the coming years. With sufficient staff, nursing homes will be able to meet primary care standards and provide the high-quality, compassionate care that residents need and deserve. The consequences of inaction are dire: reduced quality of life for residents, increased strain on remaining staff, and a continuing cycle of negative perceptions and staffing shortages.

To address this critical issue, several strategies have been studied and proposed. Potential solutions include improving staff education through advanced technology, creating appealing internships with real-world experience, and offering comprehensive compensation packages. While these measures hold considerable promise, they must be part of a broader, multi-faceted effort to ensure long-term effectiveness and sustainability. This comprehensive approach is essential to overcoming the workforce challenges and enhancing the quality of care in nursing homes.

In summary, the shortage of skilled nursing staff in nursing homes is a growing problem threatening the quality of care for the elderly. Without immediate and sustained efforts to attract, develop, and retain skilled staff, the situation will continue to deteriorate, further compromising the well-being of residents and the viability of nursing homes. Implementing innovative strategies to enhance education, create appealing internships, and offer competitive compensation is crucial for addressing this crisis. However, more than these steps is required. A comprehensive and sustained approach is essential to creating a more supportive and rewarding work environment, ultimately ensuring that residents receive the high-quality care they deserve and need.

ATTRACTING WORKFORCE

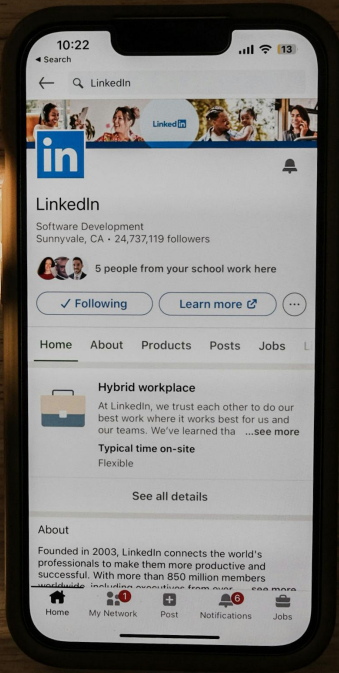
Bringing Talent from Other Countries to Address the Shortage of Workers

The nursing home sector has a problem of a lack of qualified and motivated personnel to care for the elderly [247]. It leads to a decline in service quality due to the heavy workload placed on nurses, impeding them from dedicating enough time to each resident causing stress and exhaustion. Due to this, many workers decide not to continue working in the residences, causing an increase in turnover costs and forcing companies to devote many resources to this area.

Employees seek improved working conditions and security, and thereby, international job opportunities are increasingly attracting the workforce despite the cultural challenges and bureaucracy [248]. Even though attracting qualified professionals from abroad provides a direct alternative to tackle the shortage of professionals in the healthcare sector and others, this process can be significantly laborious for the company. The selection process for international talent can be long and involves administrative procedures and documentation issues. For this reason, various companies might feel restrained when hiring a workforce from abroad. However, new technologies can be implemented to make this quicker and more accessible, automatizing the recognition of documents and improving communication among employees and companies.

"We can anticipate that there will be a migration tsunami as more than ever before, countries around the world turn to the international nursing supply to meet their workforce needs."

Dr Franklin A. Shaffer, President and Chief Executive Officer at CGFNS International Inc.



Selected Players:



BENEFITS AND BONUSES FOR WORKER SATISFACTION

Creating a Dedicated Care Team through Competitive Wages and Attractive Benefits

Due to the high turnover rates in the nursing home sector [249, 250, 251, 252], attracting and retaining a dedicated workforce is paramount to providing high-quality care for the elderly. Ensuring competitive wages and benefits compared to other sectors, companies, and institutions is critical. By offering comprehensive benefits packages that include health insurance, retirement plans, and paid time off, companies can provide a secure and supportive environment for their employees. These benefits improve the staff's financial well-being and increase their job satisfaction and loyalty [253, 254, 255].

Additionally, implementing performance-based bonuses, longevity bonuses, and other financial incentives is crucial in motivating and rewarding employees for their hard work and dedication. Performance-based bonuses recognize and incentivize exceptional care and service, while longevity bonuses reward commitment and reduce turnover rates. Other financial incentives can include referral bonuses and continuing education stipends, further enhancing the professional growth and satisfaction of the staff. Companies can create a more stable and motivated workforce by investing in competitive wages, comprehensive benefits, and attractive incentives [253, 254, 255]. It improves employee retention and elevates the standard of care provided to elderly residents, ensuring they receive the required attention.

“Leveraging VR to expedite and augment nursing orientation can creatively address nursing shortages and their health equity impacts”

PwC: Audit and assurance, consulting and tax services

Selected Players:





Enhancing Workforce Development & Satisfaction

TECH-DRIVEN TRAINING

Improving Staff's Education through XR

The implementation of XR in staff education for elderly care represents a transformative opportunity to address existing challenges in workforce training methods and quality of care, which often lack immersive, hands-on experiences that are crucial for caregiver professionals.

Conventional training practices prioritize theoretical knowledge over practical skills, resulting in poor preparation of caregivers to handle the psychological, emotional, and physical needs of patients [246]. Therefore, XR can simulate real-life scenarios, allowing professionals from this sector to practice complex procedures and develop critical skills in a controlled and risk-free environment [244].

Advancements in XR technology will make it more accessible and cost-effective in the future, incentivizing the adoption of this technology across the healthcare sector. The modern devices available on this market are often portable and robust, making them practical for various settings and enabling multiple users to share a single device throughout the day, making it an affordable option [245].

Enhanced realism and variety in training modules will further improve caregiver and nurse's competence and confidence in their work. As the demand for elderly care services increases with the aging population, XR can help build a more skilled workforce, ultimately improving care quality and safety. Consequently, XR is now becoming an accessible and attractive training tool for companies in the healthcare industry.

"Retention bonuses can be an effective tool to retain valuable and experienced professionals, ensuring continuity of care and maintaining patient relationships, which can be crucial in healthcare setting."

Cristy Good, Senior Industry Advisor at MGMA

Selected Players:



eloomi

GigXR

RELIAS

ENHANCING FACILITIES & SERVICES

IMPROVING ELDERLY CARE WITH BETTER FACILITIES AND SERVICES

Tailored Care Solutions

Experience Designs for Nursing Homes

Reshape the Image of Elderly Care

Yusef Ahsini 

Assumpta Martinez - Mora 

Silvia Mirasol 

Andrés Ospina 

Cristina Albert 

ENHANCING FACILITIES & SERVICES

Improving Elderly Care with Better Facilities and Services

The demographic shift toward an aging population creates an unprecedented demand for high-quality elderly care facilities. Over the next three decades, the number of older people worldwide is projected to more than double, reaching over 1.5 billion in 2050 [256]. As life expectancy increases, so does the need for nursing homes that offer not only appropriate medical care but also environments that promote overall well-being and a good quality of life. However, traditional nursing homes often suffer from negative perceptions, being seen as uninspiring, impersonal, and isolating. Negative aspects of living in nursing homes are usually highlighted among the elderly population [257]. The push towards improving the future of elderly care is additionally supported by the changing expectations among the population about quality of life, which are also based on technological advancements that offer new ways to enhance the value of the care received.

A crucial approach to covering the needs of elderly care is the offering of personalized services. Tailored healthcare plans, individualized activities, and personalized social services ensure that each resident receives care that addresses their unique requirements. This approach can be provided by using different innovative technologies and could lead to better health outcomes and higher satisfaction levels. By focusing on individual preferences and needs, personalized services enhance the overall well-being and happiness of residents [257].

Residents' satisfaction can also be improved by creating modern, aesthetically pleasing, and well-designed living spaces that would not only provide comfort and a sense of home but also significantly uplift the residents' overall quality of life by including green spaces and a nature-related atmosphere. An environmental modification can be more beneficial than intervening directly with mental or physical practices. By incorporating elements that reinforce immersive activities, these spaces can foster a positive and engaging space where patients may enjoy a fulfilling experience. This transformation helps counteract negative stereotypes, making nursing homes desirable and innovative places for aging gracefully.

Furthermore, creating opportunities for social interaction and community engagement within and outside the facilities helps combat isolation and fosters a sense of belonging. Enhancing communication not only improves mental health but also may affect the way people perceive elderly care centers. By promoting social connections, nursing homes can create a more lively and supportive community for their residents. Therefore, the perception of nursing homes in society would change by becoming more appealing.

Modern elderly care facilities have the chance to redefine the landscape by transforming it into vibrant, welcoming, and personalized spaces.

The goal is to create environments where residents feel at home, supported, and socially connected, thus addressing physical and emotional needs. Enhancing the appeal of nursing homes by including new technologies for creating innovative facilities and offering personalized services, together with smart communication strategies, will significantly improve the social acceptance of these institutions and meet the growing expectations of the elderly and their families.

TAILORED CARE SOLUTIONS

Improving Elderly Care with Better Facilities and Services

The elderly care industry faces the challenge of addressing complex healthcare needs. Companies can capitalize on this area by developing solutions that offer personalized services tailored to the unique needs of each senior. Personalized services for elderly care exist to address the unique and evolving needs of seniors, which are often overlooked by one-size-fits-all solutions.

The concept of tailored care solutions supports integrating diverse services and tools customized to individual needs, enhancing the quality of life by considering each elder's lifestyle and preferences [259]. The opportunity space will likely involve adopting smart tools systems and interoperable networks that provide holistic and dynamic care, reflecting technological advancements and responding to the increasing demands for individualized healthcare services [261]. For instance, technology could be used to implement activities related to social engagement or adaptive physical activity programs.

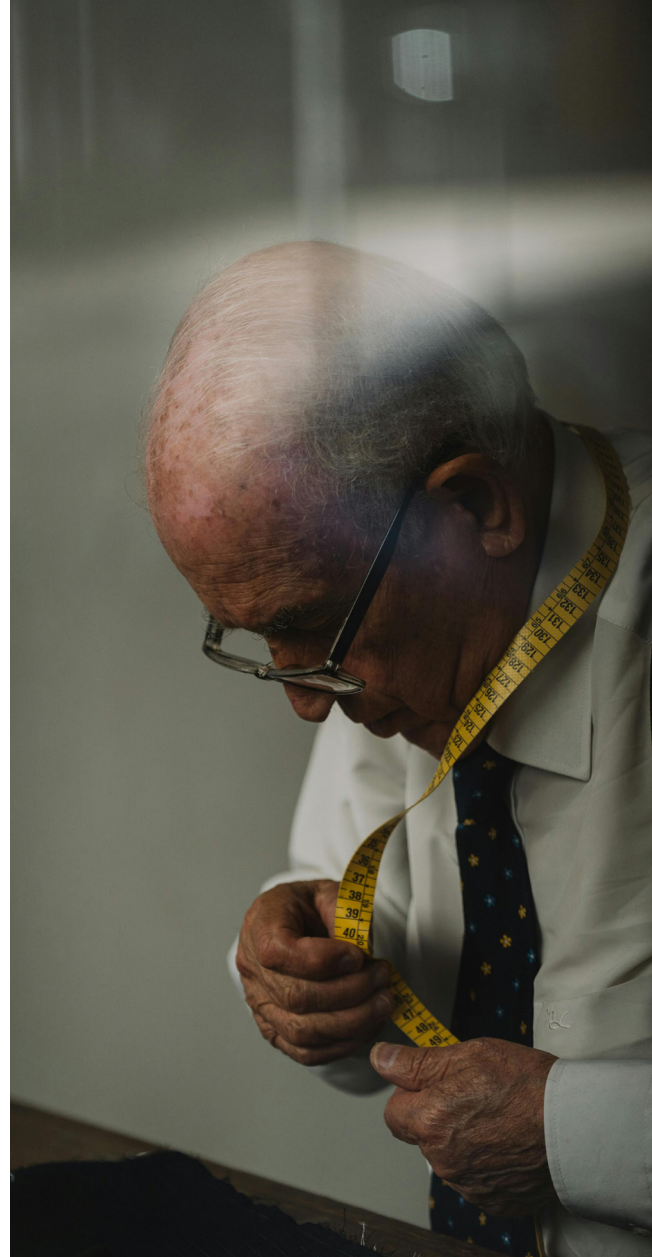
This space represents a significant opportunity as personalized care can lead to better health outcomes, higher patient satisfaction, and reduced healthcare costs by preventing unnecessary activities and ensuring appropriate follow-up care [260]. Moreover, promoting free will and decision-making in elderly care settings can significantly improve ethical care quality. This involves addressing barriers such as organizational constraints and emphasizing the importance of respecting seniors' autonomy [262].

“Consumers are also open to innovative care models that would allow them to receive personalized and holistic care.”

Jessica Buchter, Jenny Cordina and Jillian Eckroate in McKinsey & Company

Selected Players:

The image shows a collection of logos for various companies in the elderly care space. The logos are arranged in two rows. The first row includes Philips Lifeline, Abbott, and Livongo by Teladoc Health. The second row includes fitbit, a stylized heart icon, CarePredic, and the Apple logo.



EXPERIENCE DESIGNS FOR NURSING HOMES

Enhancing Resident Well-Being and Quality of Life through Immersive Experience Design.

Designing nursing homes to feel like home is essential for enhancing residents' well-being. Elders are more willing to move if appealing services and facilities are provided [267]. Future designs will integrate immersive technologies to create engaging, customizable features that improve life satisfaction and social interaction. By incorporating adaptable spaces for immersive experiences, nursing homes can address physical and spatial constraints, fostering a supportive atmosphere that enhances well-being and makes residents feel valued and connected [264].

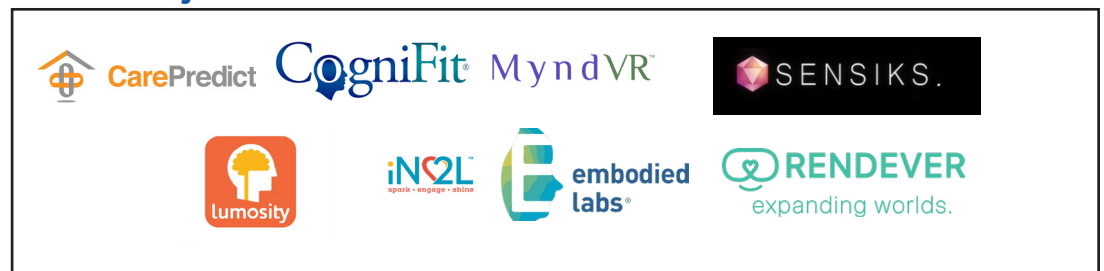
Creating an immersive, multimodal environment and sharing these experiences with other elderly communities can significantly improve quality of life. Immersive technologies can evoke emotions like joy, pleasure, and nostalgia. For instance, a virtual reality garden can offer residents who cannot go outside the experience of nature [266]. This would help them to reduce their heart rates and not only remember their past but also improve their life satisfaction [265].

Despite varied reactions, immersive experience services show significant potential to boost the quality of life in elderly care settings. These technologies offer engaging, customized environments that support the health and well-being of residents without cognitive impairment, promoting a more fulfilling and connected lifestyle in residential aged care.

“Immersive experiences, such as sensory gardens and virtual reality, significantly improve the well-being of nursing home residents.”

Helen Holloway, Brenda Conroy, Stephen Isbel and Nathan M D’Cunha in Digital Health

Selected Players:



RESHAPE THE IMAGE OF ELDERLY CARE

Social Barriers as a Root Cause for Hesitation and Depression

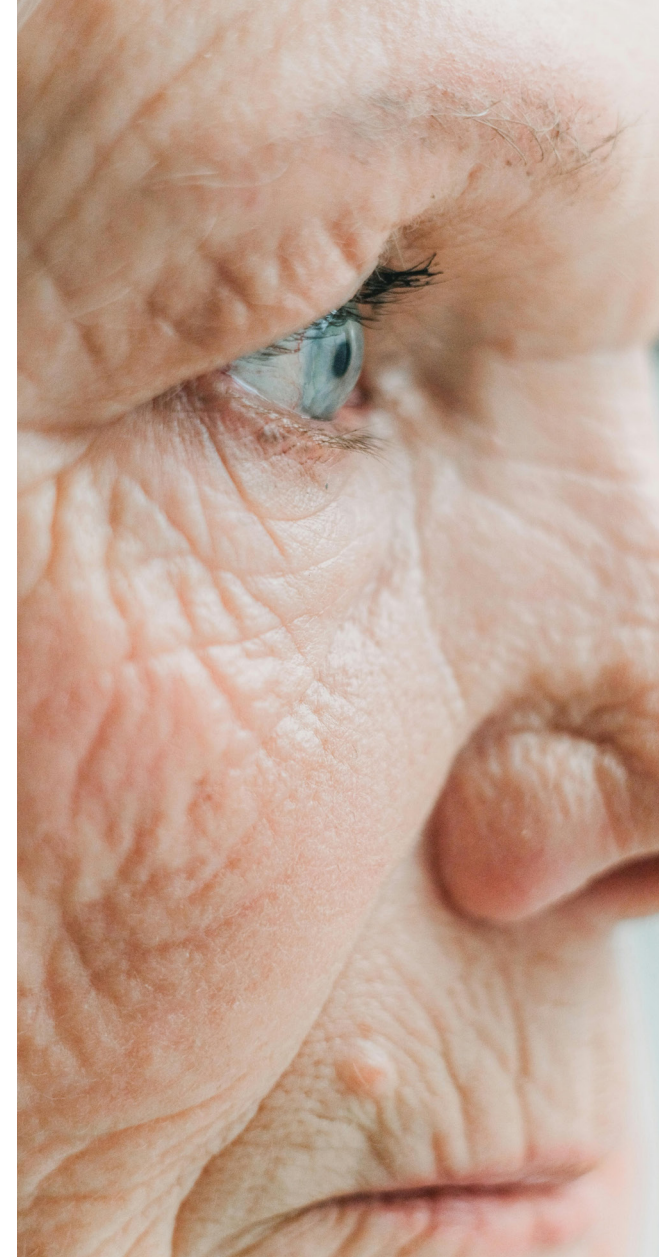
Negative perceptions of elderly homes arise from societal stereotypes. The fear of losing autonomy and control leads elders to a lack of psychological acceptance [268, 269]. Individuals with low change acceptance generally experience a lower quality of life [269]. Social support is a crucial factor for self-acceptance among elders living in these homes, helping to mitigate feelings of stress and loss of identity [270]. This reluctance is evident, with only 20% of elderly participants in a study willing to enter elderly homes [267] and higher depression levels among residents (36.93% in nursing homes versus 25.62% at home) [268]. Improving the facilities and services in elderly homes can significantly enhance residents' willingness to enter those centers [267].

Educating the public about aging and the positive aspects of elderly homes will help change perceptions and attract more residents [269, 267, 271]. For this reason, an effective communication strategy can further shift societal perceptions [272]. Utilizing all available channels and reaching elders and their families to highlight the benefits of elderly homes via social media activities, community workshops, local media partnerships, and strategically designed marketing campaigns can play a crucial role in improving society's perception and reducing the fear of moving to nursing homes [272].

“Social support is the essential factor in self-acceptance in older adults living in nursing homes.”

Dessy Syahfitri Pohan, Elida Ulfiana, Ariina Qona'ah in Indonesian Journal of Community Health Nursing

Selected Players:



IDEATION

The following chapter describes four novel business models that are of great relevance for The Future of Elderly Care in Nursing Homes, especially in view of the identified future trends. Each of the business models are developed to solve a specific problem in the identified problem spaces.


VITALINK	63	INTERCARE	71
FITO	67	INSENSE	75

Javier Reig 

Ainoa Palomino 

Juan Pablo Arano 

Nathali Nazaryan 

Marc Frasquet 



VITALINK

Recovering Human Connections Using Technology

The healthcare industry is increasingly dealing with many challenges related to escalating workloads and extensive documentation. Healthcare providers' time on these tasks is constrained, preventing them from focusing on essential human interactions with patients. Traditional recording and updating patient information methods often involve cumbersome and time-consuming processes, leading to inefficiencies and potential errors. These outdated practices not only burden healthcare providers but also detract from the quality of patient care.

In recent years, intelligent monitoring devices have presented a significant opportunity to enhance patient care. These devices can provide continuous, real-time data about a patient's health status and activity levels. However, integrating this data into existing healthcare systems is far from straightforward. The challenge lies in seamlessly incorporating data from various monitoring devices into EHR systems, ensuring this valuable information is readily accessible and actionable. Vitalink addresses these pressing issues with its innovative digital middleware. This solution is meticulously designed to bridge the gap between advanced tracking devices and EHR systems.

Vitalink ensures that healthcare providers have immediate access to accurate and comprehensive patient information. This uninterrupted flow of data supports more informed and timely decision-making. Furthermore, it streamlines administrative tasks, reducing the reliance on manual data entry, which minimizes the risk of errors and enhances overall operational efficiency.

As healthcare facilities increasingly adopt sophisticated technologies, the need for interoperability between various systems becomes more crucial. Vitalink's solution is engineered to integrate seamlessly with a wide range of EHR systems and software platforms. It ensures that data from diverse sources can be aggregated and utilized effectively, enhancing health monitoring accuracy and efficiency across different healthcare environments. Additionally, Vitalink employs advanced artificial intelligence (AI) to analyze the incoming health data. This analysis generates timely alerts for detected anomalies, supporting proactive and preventive patient care and automatically creating comprehensive health reports that caregivers would typically compile manually.

This automation further reduces the administrative burden on caregivers, allowing them to focus more on direct patient care.

In summary, Vitalink represents a significant advancement in healthcare technology. It improves the efficient management of patient data and enhances overall care delivery through sophisticated integration and real-time data accessibility. By addressing the critical need for interoperability and providing tools for advanced data analysis, Vitalink helps healthcare providers deliver higher-quality care more efficiently and accurately, thus transforming the healthcare landscape.

Problem:

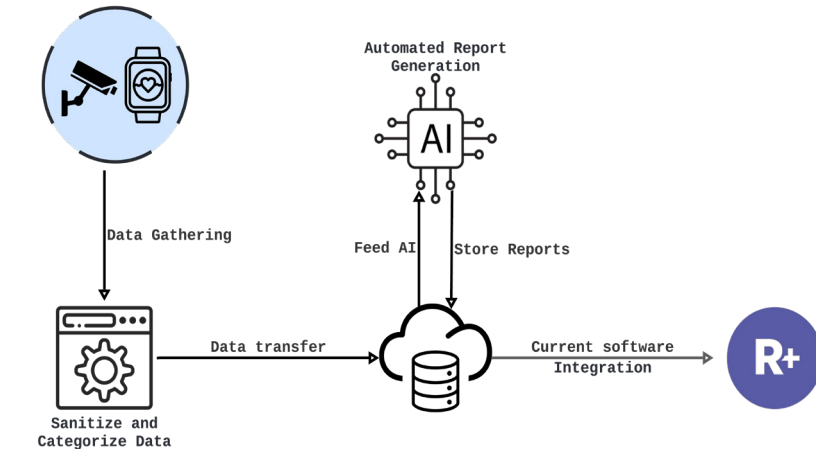
- Nurses and caregivers face many administrative tasks, including manual data handling, documentation, and record-keeping. This workload demands considerable time and effort, which detracts from their primary focus: the humane aspects of the job [273]. Moreover, this shift reduces their ability to engage deeply with patients and provide personalized attention, which is the most rewarding part of their profession [274].
- The administrative burden leads to diminished job satisfaction [273].
- The repetitive and time-consuming nature of administrative tasks contributes to cognitive fatigue. It impairs the ability to maintain accurate and up-to-date patient records, complicating patient management and reducing the quality of care [275].
- Financially, caregivers lose over 300 hours annually to administrative duties, translating into productivity losses and financial costs for organizations [276].
- Studies found that documentation time on electronic and paper charts ranged from 19% to 35% of nurses' total activities [277].

Excessive administrative tasks strip nurses of valuable time for compassionate patient care, impacting job satisfaction and care quality.



Solution:

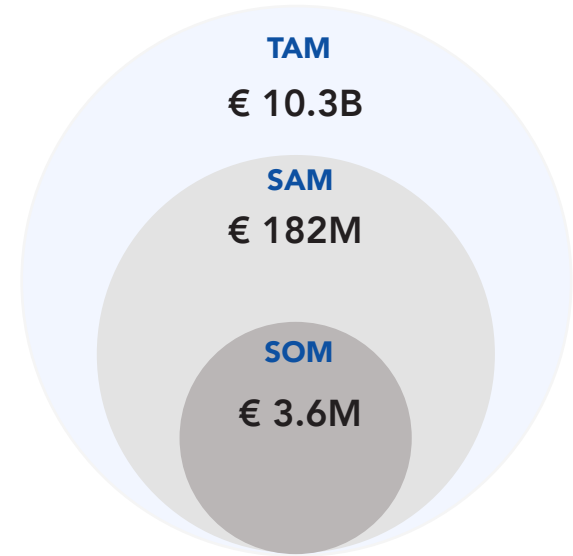
- VitaLink responds to the necessity for a new data recording system that enhances workflow, minimizes human workload, and amplifies the accessible patient data.
- By creating an interconnected network of non-invasive data-gathering devices that automatically log information into their management software, we can significantly reduce caregivers' task time, letting them focus more on personal and humane activities.
- Adhering to the highest security standards, we focus on capturing biomedical data, activity levels, social interactions, and security information, providing caregivers with real-time insights and reports.
- Using AI models, VitaLink accurately detects human activities and transforms raw data into valuable reports customized for various stakeholders, including caregivers, the management team, and families.
- VitaLink ensures a seamless installation process and provides all necessary data-tracking devices, integrating smoothly with their management software. Starting with modular services, VitaLink aims to develop a holistic system that minimizes caregiver registration tasks



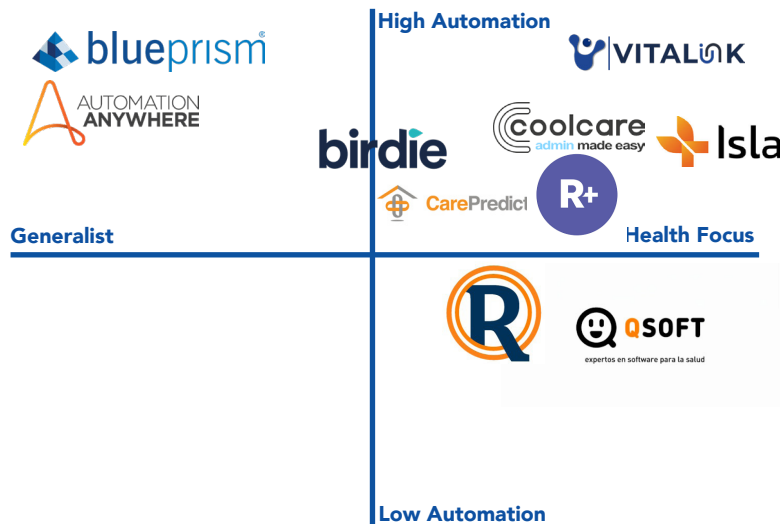
VitaLink uses technology to enhance human connections, empowering caregivers to focus on meaningful interactions.

Market:

- Vitalink targets the nursing homes and caregiver facilities market in the short term, with plans to expand into hospitals in the long term.
- Vitalink charges healthcare facilities a monthly subscription fee of 20 EUR per patient for automated reporting and real-time monitoring, translating to an average of 240 EUR per patient annually. An average size of 120 patients per nursing home in Spain results in an annual recurring revenue of 28,800 EUR per facility.
- The global market has approximately 165,000 hospitals and 191,395 nursing homes, resulting in a Total Addressable Market (TAM) of 356,395 potential facilities. It translates to a massive potential annual revenue stream, assuming widespread adoption of our solution.
- Spain has 776 hospitals and 5,542 nursing homes, resulting in 6,318 potential facilities in the Serviceable Addressable Market (SAM).
- By capturing 2% of this market over the first year, we expect to secure 126 customers in the Serviceable Obtainable Market (SOM), representing an annual revenue of approximately 3.6 million EUR.



Vitalink pioneers automated healthcare monitoring, targeting nursing homes and expanding into hospitals, capitalizing on a rapidly growing global market.



Competition:

- Existing market players need help in delivering the holistic solution that VitaLink offers. Our distinctive, all-encompassing approach differentiates us by providing a comprehensive service currently unmatched by competitors.
- Manufacturers of wearable devices often limit their offerings to single-device solutions and typically do not integrate with software like Resiplus. Even if they did, their integration capabilities differ from ours, as we provide complete solutions.
- EHR software providers might enhance their solutions to integrate more effectively with wearable devices and design automatic data-gathering gadgets.
- Companies that focus on process automation in industries like manufacturing may explore opportunities in the healthcare sector.
- VitaLink must focus on leveraging gaps in the market and highlighting its unique strengths, including seamless integration, comprehensive real-time data handling, and advanced AI analytics. Therefore, it aims to conduct the service as a whole and not as a fragment to automate administrative tasks.

VitaLink: Delivering a seamless integration of biomedical and activity data and EHR systems with real-time AI insights unmatched by other market players

Business Model:





FITO

Enhancing Elderly Well-Being Through Interactive Fitness

FITO is an innovative Virtual Wellness Assistant (VWA) designed to enhance the well-being of elderly residents in nursing homes by seamlessly integrating physical activity with social interaction. This advanced system combines cutting-edge software and hardware to deliver a unique, engaging, and interactive exercise experience explicitly tailored for elders. The VWA's software component provides personalized encouragement and entertainment through a virtual assistant, adapting to each individual's progress and preferences. Complementing this is the hardware, a neckband speaker with a microphone and biometric sensors, that effortlessly facilitates group exercises and social interactions.

FITO addresses critical challenges in elderly care by ensuring physical activity programs that are engaging and adaptable to diverse resident needs. Unlike traditional physical therapy programs, which can lack long-term engagement, FITO maintains interest with its interactive and motivational approach. While valid for data collection, wearable fitness trackers do not offer the same level of interactive motivation and social engagement that FITO provides. On the other hand, social engagement platforms connect users but do not integrate physical activity, missing an essential element of elderly well-being.

By incorporating three central values known as the ABC values -adaptation, bonding, and courage- FITO guarantees its solution is customized to elderly users, ensures social interactions, and is captivating. This comprehensive approach not only boosts resident engagement but also alleviates the motivational burden on physiotherapists, enabling them to focus on specialized care. Healthier residents contribute to a more efficient and positive environment within nursing homes, benefiting staff and residents.

Moreover, the ease of use and adaptability of FITO makes it accessible to a wide range of users, regardless of their technological proficiency. The intuitive design ensures that residents can easily interact with the virtual assistant and participate in group activities without feeling overwhelmed or intimidated by the technology. This accessibility guarantees widespread adoption and sustained use within nursing home settings. FITO also opens up possibilities for continuous improvement and scalability. With the ability to collect and analyze resident activity and engagement data, the system can continually refine its algorithms and adapt to changing needs and preferences.

In conclusion, FITO represents a significant advancement in elderly care, offering a multifaceted solution that integrates physical activity, social interaction, and personalized motivation. By addressing the limitations of traditional care methods and leveraging modern technology, FITO ensures that elderly residents can enjoy a higher quality of life characterized by active engagement, strong social connections, and improved overall health.

Problem:

- Elderly residents often face profound challenges stemming from a lack of physical activity [278]. One significant consequence of this is a noticeable decline in mobility. As residents become less active, their ability to move freely and perform daily tasks can diminish significantly, affecting their physical health and their mental and emotional well-being.
- The exercise programs currently implemented in nursing homes often lack the necessary engagement to maintain residents' interest [279]. Many residents find these programs monotonous and uninspiring, leading to decreased motivation to participate.
- Many exercise sessions do not cater to the individual needs of residents. This lack of personalization makes it difficult for residents to see the benefits of participation, leading to low participation rates [280].
- Physiotherapists in nursing homes often find themselves spending a considerable amount of time on motivational efforts. Instead of focusing on providing specialized care, they grapple with encouraging residents to engage in physical activities.

Elderly nursing home residents lose mobility from impersonal exercise programs, requiring physiotherapists to prioritize motivation over specialized care.



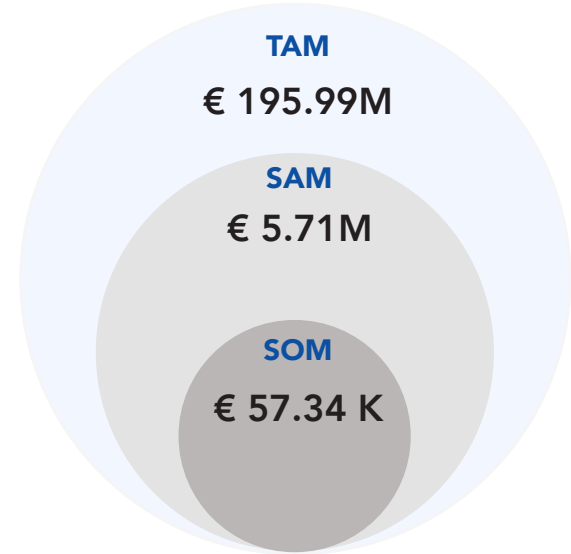
Solution:

- The proposed solution is a sophisticated virtual assistant tailored specially to the needs of elderly residents in nursing homes. FITO addresses these challenges by offering a comprehensive solution integrating personalized motivation and social engagement during physical activities.
- The software provides real-time feedback and encouragement based on each individual's performance, using pulse sensors to gauge activity levels. The neckband speaker with a microphone enables seamless communication, allowing users to engage in group exercises and social games like trivia or conversation starters.
- This innovative approach promotes physical health and fosters meaningful connections among residents, enhancing their overall well-being. By reducing the burden on physiotherapists, FITO enables them to focus on residents needing specialized care, improving their workplace satisfaction and effectiveness. Healthier residents also reduce the overall workload for all staff, contributing to a more efficient and positive working environment.

VitaLink uses technology to enhance human connections, empowering caregivers to focus on meaningful interactions.

Market:

- FITO targets the nursing home sector, focusing initially on the Spanish market, which hosts 5,573 nursing homes [281], with plans for future global expansion. The TAM for FITO is approximately 195.99 million EUR, reflecting the global market potential, while the SAM is about 5.71 million EUR, based on the Spanish market.
- The pricing strategy involves charging 1,024 EUR per year for the basic package, which includes the software and three leased neckbands. Additional functionalities or hardware will be available for an extra fee.
- The company anticipates reaching 1% of the Spanish market (56 nursing homes) in the first year, translating to a SOM of 57,340 EUR. In the second year, targeting 5% of the market (279 nursing homes) will expand the SOM to 285,700 EUR.
- With 191,395 nursing homes globally [282], the potential for scaling the solution is significant. Additionally, offering more advanced functionalities that enhance the user experience and integrating the system seamlessly with other software within nursing homes further amplifies growth opportunities.



FITO launches an advanced, scalable technology for Spain's nursing homes, with plans for global growth, enhancing residents' physical activity.



Competition:

- Traditional physical therapy programs are quite effective in improving the physical health of elderly individuals, but they often lack engaging elements that motivate and excite participants about their exercises.
- Highly engaging platforms like Peloton, FitXR, Zwift, RingFit Adventure, Apple Fitness+, and Lululemon Studio offer interactive and motivational experiences. Nevertheless, these platforms cater to the general population and are not explicitly designed to address the unique needs of elderly users.
- Programs like SilverSneakers and Go4Life specifically target elderly users and promote physical activity. However, they often offer minimal engagement compared to more modern and interactive platforms, which can result in lower participation and motivation.
- Recognizing this gap, FITO intends to fit into this blank space by delivering a highly engaging product tailored to the older demographic's unique physical and emotional needs.

Bridging the gap in elderly care with a unique blend of physical activity, personalized motivation, and social engagement.

Business Model:

Key Partners

- Hardware manufacturers for neckband speakers with microphones
- Pulse sensor technology providers
- Nursing homes and assisted living facilities
- Health and wellness experts and consultants

Key Activities

- Development and maintenance of virtual assistant software.
- Integration of pulse sensors and hardware
- Providing customer support and training
- Marketing and sales to nursing homes and related institutions
- Continuous product improvement

Key Resources

- Virtual assistant software with integrated pulse sensor monitoring
- Neckband speaker hardware
- Technical and support teams for software and hardware
- Strategic partnerships with nursing homes and healthcare providers

Value Propositions

- Enhanced physical and social well-being for elderly residents
- Personalized motivation and real-time feedback tailored for individual needs.
- Engaging group activities and social interactions facilitated through technology
- Easy integration with existing nursing home infrastructure and routines

Customer Relationships

- Dedicated customer support services
- Comprehensive training and onboarding for nursing home staff
- Regular updates and enhancements based on feedback and research
- Ongoing engagement to ensure customer satisfaction and product effectiveness

Channels

- Direct sales to nursing homes and assisted living facilities
- Partnerships with senior care organizations and industry associations
- Online marketing and product demonstrations
- Presence at trade shows, industry conferences and senior care expos

Customer Segments

- Nursing homes seeking to improve resident care and engagement
- Assisted living facilities aiming to enhance physical and mental well-being of residents
- Home care agencies looking for innovative solutions to support elderly clients
- Retirement communities interested in technology-driven engagement solutions

Cost Structure

- Research and development for software and hardware components
- Production and procurement costs for neckband speakers and pulse sensors
- Marketing and sales expenses, including customer acquisition and retention efforts
- Operational costs for customer support and training services

Revenue Streams

- Subscription fees for access to virtual assistant software
- Sales revenue from neckband speaker hardware
- Licensing fees for technology integration with partner solutions
- Revenue from customization and consulting services for nursing homes

Eco Social Costs

- Environmental impact of manufacturing hardware components
- Energy consumption associated with the use of electronic devices
- Social implications of integrating technology into elderly care routines

Eco Social Benefits

- Improved quality of life for elderly residents
- Reduction in social isolation and associated mental health issues among the elderly
- Positive impact on community and social dynamics within nursing homes
- Support for nursing home staff

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INTERCARE

Enhancing Elderly Well-Being Through Interactive Fitness

InterCare is an innovative digital platform that attracts professional caregivers from Spanish-speaking countries to work in nursing homes across Spain. The platform aims to address the growing demand for skilled caregiving professionals in the elderly care sector by providing a streamlined and supportive pathway for international caregivers to secure rewarding employment opportunities in Spain. Given the aging population and the lack of staff the sector is facing, there is an increasing need for experienced caregivers to provide high-quality care to the elderly.

One of the essential features of InterCare is its ability to facilitate the connection between caregivers and nursing homes, ensuring a smooth and efficient recruitment process. The platform offers a comprehensive suite of services that includes evaluating and preselecting candidates, thus saving time and resources for nursing homes. By leveraging advanced technologies, InterCare ensures that the candidates presented to employers are qualified and meet the nursing homes' requirements. In addition to connecting caregivers with employers, InterCare provides valuable support.

The platform offers resources and guidance to help them navigate the application process, obtain necessary work permit appointments, and adapt to Spain's cultural and professional environment. This support is crucial in assisting international caregivers to integrate into their new roles and communities.

Moreover, InterCare employs AI to enhance its recruitment process. Particularly, the platform uses AI algorithms to preselect résumés, ensuring that the most suitable candidates are identified and matched with the right job opportunities. This technology-driven approach increases the efficiency and accuracy of the recruitment process, benefiting both the caregivers and the hiring companies.

The AI system considers experience, qualifications, language proficiency, and specific skill sets to provide a highly personalized and effective matching process.

InterCare offers a premium service for registered companies that goes beyond standard recruitment.

This service includes detailed candidate profiling, personalized recommendations, and continuous support throughout the hiring process. By providing these additional services, InterCare ensures that companies find the best qualified candidates who are aligned with the organizational culture and values.

In summary, InterCare serves as a vital bridge between Spanish-speaking caregivers and nursing homes in Spain, addressing the critical shortage of professionals in the elderly care sector. Through its innovative use of technology and comprehensive support services, InterCare is transforming how caregiving professionals are recruited and employed in Spain, benefiting caregivers and the elderly population they serve.

Problem:

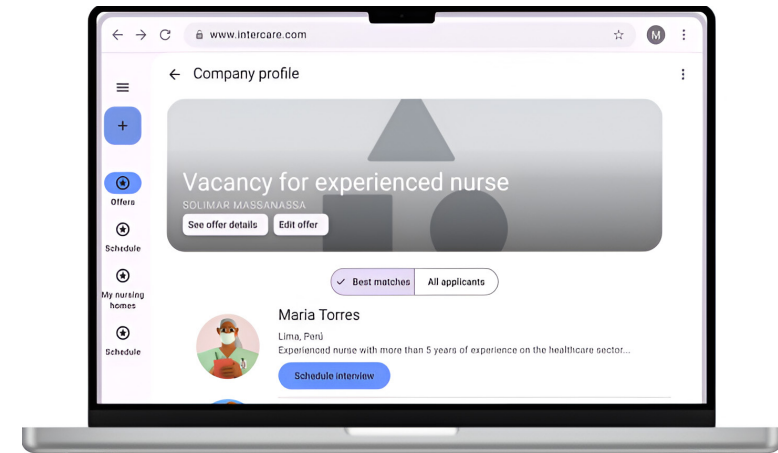
- The nursing home sector is experiencing a significant shortage of caregivers, a problem that has profound implications for the care quality provided to the elderly and their satisfaction [291]. The need for more caregivers can also increase stress and burnout among existing staff, exacerbating the turnover rate.
- Overworked caregivers are more likely to make mistakes, which can have severe consequences for the health and well-being of residents. These elders may experience longer wait times for assistance, reduced personal interaction, and overall lower satisfaction with their care [291].
- From a business standpoint, nursing homes may face increased operational costs due to the need for temporary staffing solutions and higher recruitment expenses.
- This shortage is generally driven by multiple factors: the aging population, workforce deterioration, inadequate compensation, and undervaluation of the profession [292, 293].
- As the global population ages, the demand for skilled caregivers outpaces the supply, leading to critical challenges that need immediate and innovative solutions [293].

The acute shortage of caregivers in nursing homes, fueled by low wages and high burnout, strains staff and compromises care quality.



Solution:

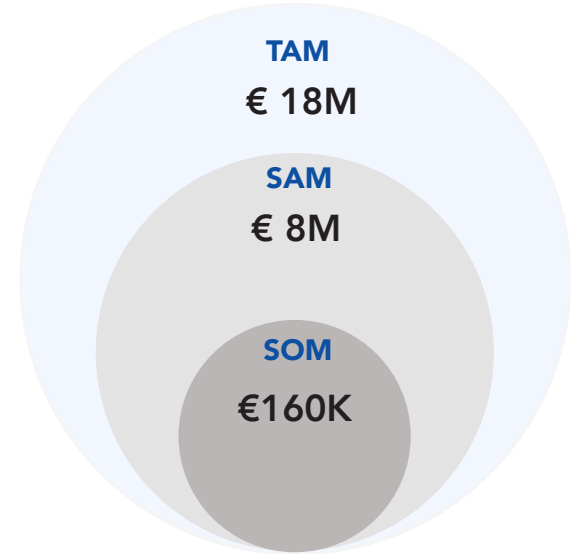
- A multifaceted approach is essential to address Spain's caregiver shortage, involving enhanced recruitment for nursing homes, competitive pay, career development, better working conditions for potential workers, and leveraging technology.
- The proposed initiative, InterCare, features a platform connecting healthcare professionals from Spanish-speaking countries with Spanish nursing homes to fill job offers.
- InterCare provides complementary services, such as visa and work permit processing, and creates a supportive environment to ensure smooth integration for foreign professionals.
- Registered nursing homes benefit from an AI-driven service that preselects résumés, ensuring that only the most qualified candidates are presented to the companies.
- Nursing homes can better manage the caregiver shortage by attracting and retaining skilled workers, streamlining the preselection process, ensuring high-quality elderly care, and maintaining operational efficiency.



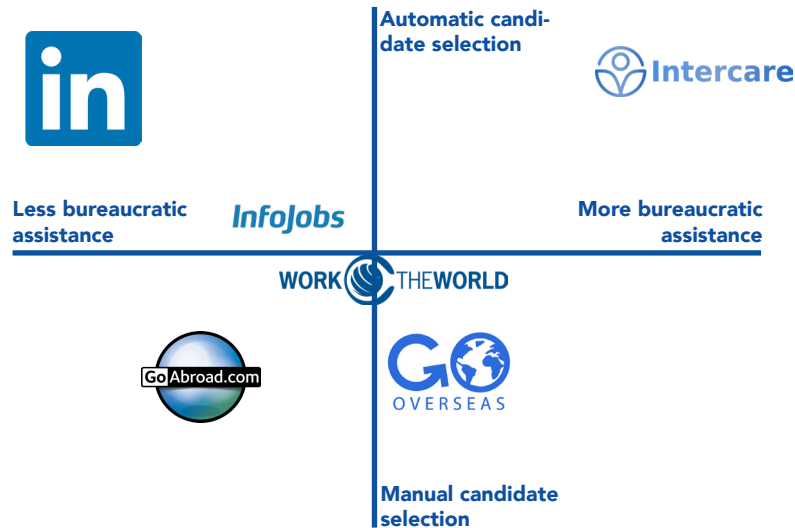
Attract and integrate caregivers through a platform to optimize Spanish nursing home's recruitment processes and operational efficiency.

Market:

- The proposed product’s price has been determined by calculating annual costs, which vary with traffic and client volume, assuming we reach 2% of Spain’s nursing homes (111) [288] and 2% of the 1.54 million nursing and care professionals in Latin America (30,800) [289, 290], the annual cost of the project will be 152,600 EUR.
- By charging a 1,440 EUR yearly subscription fee to each of the 111 reachable nursing homes in Spain, the project’s income will be 160,502 EUR.
- The Total Addressable Market (TAM) has been calculated based on our product price (a subscription of 1,440 EUR per year per nursing home) and the number of nursing homes in Spanish-speaking countries, which is approximately 12,535 [294, 295, 296, 297, 298], with this the calculated TAM is 18 million EUR.
- The Serviceable Available Market (SAM) includes Spain, with 5,573 nursing homes [288], translating to a SAM of 8 million EUR. Assuming the Serviceable Obtainable Market (SOM) is 2% of the SAM, the SOM size is 160,000 EUR.



Reaching 2% of nursing homes and 2% of Spanish-speaking nurses with a subscription of 120 EUR per month per residence can yield a 5.2% profit margin.



Competition:

- Independent job placement platforms exist, such as Go Overseas [283], Work the World [284], and Go Abroad [285]. These platforms specialize in international job placements, offering opportunities in various countries and industries.
- InfoJobs [287], a general job posting platform, can be seen as a competitor since it aims to provide a similar service. However, it does not offer any automatic candidate selection.
- LinkedIn [286] and similar platforms use the large amount of data they process to automate the selection process more easily by filtering candidates and suggesting them to the hiring party.
- Competitors in the sector focus their activities exclusively on connecting companies and workers. Still, they do not provide any bureaucratic assistance in helping the worker with the processing and issuing of work permits. Additionally, InterCare simplifies the selection process for nursing homes by offering them automatic candidate filtering and matching.

InterCare specializes in matching skilled caregivers with nursing homes, offering tailored solutions for the elderly care sector.

Business Model:



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INSENSE

Providing Individualized Care through Immersive Environments

Nursing homes often suffer from a negative perception in society, primarily due to concerns about the quality of care and the lack of personalized, engaging activities for residents. In Spain, family members consider the family the best provider of care for older people, and institutionalization is the last option for them [299]. Moreover, in elderly care centers, cognitive decline among residents is a significant issue, and current approaches in many facilities do not adequately address the need for mental stimulation tailored to individual needs. The subsequent decrease in autonomy has been associated with a lower quality of life [301]. Developing interventions that slow down cognitive decline would greatly benefit the autonomy of the elderly [300]. An innovative approach to accomplish this goal could be using immersive environments to improve cognitive conditions. It has been proved that immersive experiences can boost the success of interventions by increasing the feeling of being completely involved, also called flow, motivation, and sense of presence [300].

InSense is a new project that could revolutionize this landscape by offering a state-of-the-art software solution designed to create personalized, immersive experiences for nursing home residents. It could also be applied in the healthcare sector in general, as well as in education centers.

Our platform leverages medical and personal data from each user to generate customized environments and activities using generative AI. If a facility already has gadgets and technologies such as projectors, 3D sound speakers, scent generators, VR glasses, haptic gloves, or controllers, the experiences can be seamlessly integrated with them. Otherwise, they can be purchased.

This innovative software designs immersive experiences to enhance cognitive function and overall well-being. By tailoring activities to each user's unique preferences and medical conditions, it creates engaging and therapeutic environments that stimulate the mind and senses. For instance, residents could find themselves virtually walking through a serene forest, feeling the texture of leaves through haptic gloves, hearing birds chirping through 3D sound speakers, and smelling fresh pine from a diffuser. Many different activities, such as interactive puzzles or memory games, are provided. These experiences can be adapted in real time, ensuring they remain relevant and engaging. By providing such personalized and immersive experiences, InSense improves cognitive health and enhances nursing home residents' overall quality of life.

InSense is committed to changing the perception of these institutions by demonstrating that with innovative technologies, facilities like nursing homes can become places of enrichment, engagement, and joy. The mission is to provide residents with the best possible experiences, ensuring that they feel valued, stimulated, and connected. InSense is paving the way for a brighter future in the different care sectors, one immersive experience at a time.

Problem:

- Society frequently views nursing homes as uninspiring, depressive, and impersonal places.
- Nursing homes often struggle to provide activities that cater to each resident's individual needs and interests. For this reason, activities in nursing homes can be monotonous and may fail to captivate residents, leading to boredom and disengagement.
- Cognitive decline is a prevalent issue in nursing homes, often due to insufficient mental stimulation. An estimated 50 to 66% of nursing home residents have some type of mental or behavioral condition [302, 303].
- Dementia is the second largest cause of disability in individuals over 70 years of age and is associated with a diminished quality of life [304]. Furthermore, this decline can be partly caused by the environment, staff attitudes, and limited relationships [305]. Performing basic activities of daily living is one of the major difficulties encountered in dementia, which translates into a loss of autonomy [301].

Nursing homes must focus on enhancing cognitive function to improve patients' quality of life and society's perception of nursing homes.



Solution:

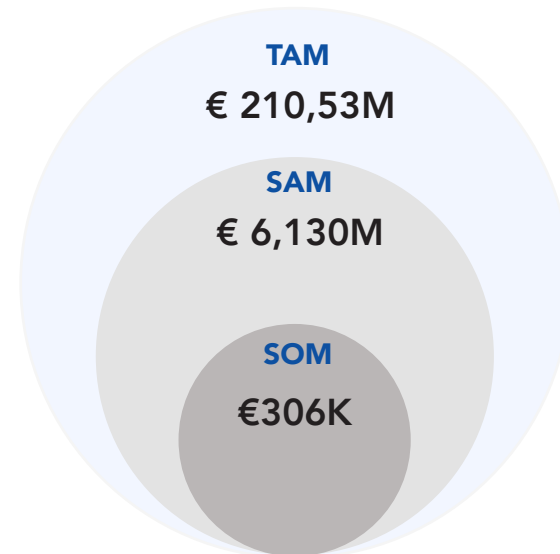
- InSense is an advanced software and AI platform that provides deeply immersive reality experiences. These experiences are generated using text to video generative AI technology, creating videos and sound meticulously tailored to match the user's unique tastes and preferences or to recreate defined scenarios. Using state-of-the-art AI, InSense can offer a highly personalized and engaging sensory experience that feels incredibly real and profoundly personal.
- One of the key benefits is that the experience can be provided across various hardware platforms, such as immersive projection and VR glasses, and is compatible with haptic gloves and scent generators.
- InSense includes a variety of base experiences and allows the creation of new experiences through manual input to customize the environment, for example, to perform specific cognitive activities.
- The user profile is crafted using their medical history and added inputs about interests or significant aspects of their life. When multiple users interact simultaneously, the experience adapts to their shared tastes.

InSense defines a new generation of cognitive improvement, taking advantage of the power of generative AI and immersive experiences.

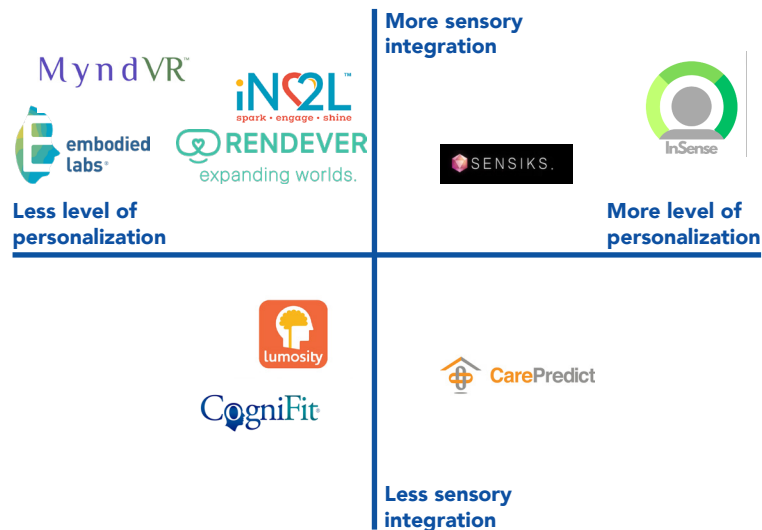


Market:

- Advancements in VR and AI are revolutionizing industries by merging the real world with digital and virtual environments. These innovations position immersion technology as a vital economic asset, creating significant global business opportunities [306].
- The global nursing care market has the potential to generate approximately 210.53 million EUR in revenue, based on the presence of 191,395 nursing homes worldwide and the annual cost of 1,100 EUR per software license [307].
- InSense is strategically targeting the Spanish nursing home market, where the revenue potential is estimated at around 6.13 million EUR, based on the presence of 5,573 nursing homes [308].
- With the goal to capture 5% of the Spanish nursing home market within the first year, InSense aims to generate potential annual revenues of up to 306,900 EUR [308].
- In the long term, InSense has significant opportunities to apply its immersive technologies across nursing homes, where interactive experiences are crucial for enhancing resident engagement and overall well-being.



InSense is revolutionizing the nursing home care market with immersive experiences, bridging cutting-edge technology and senior care services.



Competition:

- CogniFit and Lumosity offer digital cognitive training with scientifically backed programs but lack the immersive and personalized aspects that InSense offers.
- Rendever and Embodied Labs create VR experiences for senior care and caregiver training but do not directly address the personalized cognitive stimulation of residents. We can see quite the same for MyndVR, which provides VR experiences but lacks multisensory integration.
- Sensiks combines sensory reality pods with AI to create immersive environments for mental and emotional well-being. However, their solution is more generalized and less tailored to the specific needs of nursing home residents.
- PointClickCare and CarePredict monitor cognitive health, and iN2L provides interactive multimedia activities. These platforms offer valuable data and analytics but do not focus on immersive, multisensory experiences for cognitive stimulation.
- Combining generative AI and multisensory technology, InSense creates personalized, immersive environments that fully engage residents' senses, enhancing cognitive function and quality of life.

InSense stands out by addressing the core needs of cognitive health and personalized care through innovative technology.

Business Model:

Key Partners

- Hospitals & nursing homes
- Hardware manufacturers (BenQ for immersive projection & Sony for spatial sound)
- Partnerships for elderly care & cognitive stimulation

Key Activities

- Development & maintenance of an interactive platform for the elderly
- Collaboration with healthcare providers, tech partners & content creators
- Promotion & sales to healthcare institutions

Key Resources

- Software developers, UX designers, healthcare professionals & content creators
- Software & content tools
- Funding for development, marketing & partnerships

Value Propositions

Value for institutions & users:

- Institutions:**
- Data collection
 - Sensorial experiences
 - Personalized services & activities
 - Cutting-edge immersive experiences

- Users:**
- Improve their cognitive capacities
 - **Individual experiences**

Customer Relationships

- Personalized assessments with generative AI
- Customer service & technical support
- Frequent updates & new content for continued engagement

Customer Segments

- Nursing homes
- Hospitals
- Psychiatrist
- Education centers

Channels

- Webpage with the information
- Presencial sales with inhouse visit
- Demo
- Post purchase customer support

Cost Structure

- Software licenses
- Research & development expenses for creating & improving the software Cloud services
- Marketing costs for promoting it

Revenue Streams

- Annual subscriptions for healthcare providers
- Installation & training of the hardware
- Partnership revenue comes from commissions recieved from the hardware company

Eco Social Costs

- Energy usage of cloud services
- Privacy & security of data
- Technological waste
- Access disparities

Eco Social Benefits

- Increase elderly well-being
- Improve social acceptance of elderly care
- Optimization of resources
- Enhance operational efficiency

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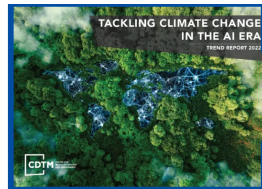
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Publisher Center for Digital Technology and Management (CDTM) in Valencia
La Harinera. Joan Verdeger 116, 46024 Valencia, Spain

E-Mail: valencia@cdtm.de
www.cdtm.de

Editors Alicia Durán González, Adrián Villanueva Martínez

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With support from the entire class Valencia 2024

Printed Copies 100

Printing Company Encuadernaciones Aguilar
Calle Albalat dels Tarongers 38 bajo
46021 Valencia

Photos Pexels
Pixabay
Unsplash
Microsoft Copilot

Year of Publication 2024

THE FUTURE OF ELDERLY CARE IN NURSING HOMES

As global demographics shift towards an aging population, the care of the elderly in nursing homes faces unprecedented challenges and opportunities. In the context of evolving healthcare technologies, socio-economic transformations, and increasing demand for compassionate, personalized care, we explore the future landscape of elderly care in nursing homes. Can nursing homes adapt to meet the complex needs of future generations? And how do advancements in technology and shifts in societal values influence this sector?

This report delves into these pivotal questions, providing a comprehensive analysis of the future of elderly care in nursing homes over the next two decades. It examines key trends across political, economic, social and environmental, business modeling and technological dimensions, identifying current and emerging challenges within this essential industry. Structured into three sections—Trends, Exploration, and Ideation—the report begins by presenting significant trends affecting the sector. It then clusters and explores major challenges and opportunities.

The final section introduces four pioneering business ideas, ranging from automating administrative tasks in nursing homes, a digital personal trainer to improve engagement in physical exercises and socializing, a platform to attract a bigger pool of potential nurses all over the world, or a software to create personalized immersive experiences to improve the daily care of our elders.



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