

Assistive Robots in Healthcare in Greece: Perspectives and Challenges¹

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Abstract: The rapid development of robotic technologies in recent years has created new opportunities in the field of healthcare. Beyond surgical robots, assistive robots play a significant role in supporting daily patient care, facilitating the transportation of materials, and improving the quality of life for vulnerable groups (Kachouie, Sedighadeli, Khosla, & Chu, 2014). In Greece, where the healthcare system faces challenges due to an ageing population (Eurostat, 2022), staff shortages, and limited resources (OECD, 2021), the integration of assistive robots has become particularly relevant. This article examines the types and applications of assistive robots, focusing on pilot initiatives in Greek hospitals (Papadopoulos & Kalogianni, 2019), their potential benefits, and the barriers hindering their implementation. Through a review of international and Greek literature, combined with an analysis of the current situation, the paper aims to outline the pathways for integrating robotic technologies into the Greek healthcare system with a human-centered approach (World Health Organization, 2021).

Keywords: Assistive robots, Healthcare, Hospitals, Greece, Robotic care, Artificial intelligence

Introduction

In recent years, robotics has been actively entering the field of healthcare, offering solutions that range from high-precision surgery to the support of patients' daily care. International literature reports a growing use of assistive robots—robotic systems that support medical and nursing staff, improve patients' quality of life, and facilitate hospital functioning (Broadbent, Stafford, & MacDonald, 2009; Chen, Jones, & Moyle, 2018).

In Greece, the need for innovative solutions in the healthcare sector is particularly pressing. The country is among the European states with the highest levels of population ageing (Eurostat, 2022), which increases the demand for care and support services. At the same time, the public healthcare system faces chronic problems of staff shortages and limited resources (OECD, 2021). In this context, assistive robots could function as valuable tools that strengthen the work of healthcare professionals and provide better quality care for patients (Papadopoulos, Kouloughlioti, Lazzarino, & Ali, 2020).

The aim of the present article is to present:

The types of assistive robots used internationally.

Their existing and potential applications in Greek hospitals.

The benefits that may result from their integration.

The challenges and limitations related to their implementation in the Greek context.

The analysis is based on a review of literature, international examples, and available data for Greece, with the goal of highlighting both the opportunities and constraints of using assistive robots in healthcare (WHO, 2021).

Types of Assistive Robots

Scientific literature distinguishes several main categories of assistive robots in healthcare, depending on their

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function and role (Sharkey & Sharkey, 2012; Kachouie, Sedighadeli, Khosla, & Chu, 2014):
Patient Care Robots

Designed to provide practical support to people with reduced mobility or chronic diseases.

Support daily autonomy through tasks such as walking assistance, help with eating, and medication reminders.

International studies show that such systems reduce dependence on staff and improve the quality of life of older adults (Broadbent, Stafford, & MacDonald, 2009).

Logistics and Material Support Robots

They take on tasks such as transporting medicines, laboratory samples, or medical supplies within the hospital.

They reduce the workload of nursing staff, allowing personnel to concentrate on their clinical responsibilities.

In the context of the COVID-19 pandemic, these robots were used for the safe delivery of materials in isolation wards, thereby reducing the risk of infection (Papadopoulos et al., 2020).

Robotic Rehabilitation Systems

These include exoskeletons and other devices that assist patients during physiotherapy and recovery after stroke or trauma.

Studies show significant improvements in motor function and patients' mental well-being (Louie & Eng, 2016).

This type of technology is already used in some European countries and is gradually entering Greek rehabilitation centers.

Social and Companion Robots

Their purpose is to provide emotional support and companionship to elderly people or patients with cognitive impairments.

One of the most well-known examples is the Paro robot, which is used to reduce anxiety and loneliness in people with dementia (Sharkey & Sharkey, 2012).

Social robots combine artificial intelligence and human-machine interaction to enhance psychological well-being and reduce social isolation (Chen, Jones, & Moyle, 2018).

Telepresence Robots

They enable remote monitoring of patients by medical professionals.

In Greece, they were experimentally used during the pandemic to provide remote consultations and communication between patients, doctors, and relatives (Papadopoulos & Kalogianni, 2019).

These systems can significantly improve access to healthcare services in remote regions.

The categorization of assistive robots shows that they cover a wide spectrum of needs—from practical support to social and emotional care. The next step is to examine their actual application in Greek hospitals.

Applications in Greek Hospitals

Although the use of assistive robots in Greek hospitals is still at an early stage, recent years have seen several pilot

initiatives highlighting the potential of robotics in healthcare (Papadopoulos & Kalogianni, 2019).
Pilot Programs during COVID-19

During the pandemic, several hospitals in Athens and Thessaloniki experimented with telepresence and logistics support robots. They were used for delivering medicines and materials in isolation wards, as well as for remote communication between patients and medical staff. Such solutions reduced infection risks and relieved the burden on nursing staff (Papadopoulos et al., 2020).

Collaboration with Research Institutes

The National Centre for Scientific Research “Demokritos,” Aristotle University of Thessaloniki, and the National and Kapodistrian University of Athens are developing projects to integrate social and rehabilitation robots into the healthcare system. These projects focus on using social robots to support older adults and patients with dementia, aiming to improve quality of life and reduce social isolation (Papadopoulos & Kalogianni, 2019; Chen et al., 2018).

Private Hospitals and Clinics

Several private healthcare institutions in Greece are already experimenting with the implementation of logistics and rehabilitation robotic systems. Such systems facilitate the transportation of materials and support physiotherapy programs for patients with motor impairments (Louie & Eng, 2016).

Challenges in the Public Sector

Despite these initiatives, the widespread adoption of assistive robots in public hospitals faces significant obstacles: limited funding, lack of trained personnel, and the need for infrastructure adaptation (OECD, 2021). Moreover, social acceptance and the willingness of patients and staff to interact with robots remain limited (Broadbent et al., 2009).

Despite these difficulties, the first initiatives show that assistive robots can become a valuable resource for Greek hospitals. With appropriate state support, European funding, and academic collaboration, Greece could gradually build a sustainable framework for integrating robotic technologies into the healthcare sector (World Health Organization, 2021).

Benefits and Opportunities

The integration of assistive robots into Greek hospitals could provide several significant benefits for the healthcare system, patients, and medical staff.

Reducing Staff Workload

In a context of chronic shortages of nurses and support staff in Greece, robots can take over routine tasks such as transporting materials, delivering medicines, and assisting with daily care. This allows healthcare professionals to focus on higher value-added clinical activities (Papadopoulos et al., 2020).

Enhancing Safety

Robots reduce the risk of errors and infections, especially in isolation wards and among highly contagious patients. During the COVID-19 period, such solutions proved effective in limiting the spread of infection (World Health Organization, 2021).

Improving Access to Care

Through telepresence and remote monitoring systems, access to specialized medical care is expanded, particularly in remote or underserved regions of Greece (Papadopoulos & Kalogianni, 2019).

Support for Elderly Patients

In a country with high levels of population ageing (Eurostat, 2022), social and companion robots can reduce feelings of loneliness and improve older adults' psychological well-being (Sharkey & Sharkey, 2012).

Continuity and Quality of Services

Robotic systems perform tasks consistently and reliably, without fatigue or emotional exhaustion. This enhances standardization and quality of care, which is critical for hospital structures (Chen et al., 2018).

Fostering Innovation

The implementation of assistive robots in Greek hospitals could stimulate academic collaboration, research initiatives, and the development of technological startups in the healthcare technology sector (Kachouie et al., 2014).

These benefits indicate that robots should not be viewed as a threat to jobs but as tools that support and optimize the healthcare system. When implemented correctly, they can create new opportunities for more efficient and human-centered care (Broadbent et al., 2009).

Discussion and Conclusions

The introduction of assistive robots into Greek hospitals represents both an opportunity and a challenge. On the one hand, these technologies have the potential to relieve the strained healthcare system, improve the quality of care provided, and offer new solutions in the context of an ageing population and chronic staff shortages (Eurostat, 2022; OECD, 2021). On the other hand, there are significant economic, social, and ethical barriers that hinder their widespread implementation (Sharkey & Sharkey, 2012).

The first pilot programs in Greece demonstrate that assistive robots can be a valuable resource, particularly in logistics, rehabilitation, and social support (Papadopoulos & Kalogianni, 2019). However, their sustainable adoption requires:

Strategic funding through state and European programs (World Health Organization, 2021);

Systematic training of medical staff to work with new technologies (Chen et al., 2018);

Development of academic–technological partnerships between universities, hospitals, and research centers (Kachouie et al., 2014);

The creation of a clear regulatory and ethical framework (Broadbent et al., 2009).

The most important factor remains a human-centered approach—robots should not be perceived as replacements for human care but as complementary tools that enhance it. The key lies in creating synergy between technological solutions and the human factor (Papadopoulos et al., 2020).

In conclusion, assistive robots are no longer a distant future but a reality that is gradually entering the Greek healthcare system. Their effective integration can contribute to the sustainable development of healthcare in the country, provided that targeted policies combining innovation, ethics, and humanity are applied.

Challenges and Limitations

Despite their potential benefits, the implementation of assistive robots in Greek hospitals is associated with several challenges and limitations that must be carefully considered.

High Financial Costs

The purchase, maintenance, and upgrading of robotic systems require significant investment. For hospitals with limited budgets, this represents a serious barrier to adoption (OECD, 2021).

Limited Technological Infrastructure

Many public hospitals in Greece still rely on outdated information systems and lack reliable digital infrastructure, which hinders the integration of robotic solutions (Papadopoulos & Kalogianni, 2019).

Shortage of Trained Personnel

The effective use of assistive robots requires well-trained healthcare professionals capable of working with new technologies. The absence of training programs slows the adaptation process (Chen, Jones, & Moyle, 2018).

Social Acceptance

Patients, particularly older adults, may show distrust or resistance to interacting with robots. Research indicates that social trust and positive attitudes are key for successful integration of such technologies (Broadbent et al., 2009).

Ethical and Legal Issues

The use of assistive robots raises concerns related to data protection, privacy, and the distribution of responsibility in case of errors (Sharkey & Sharkey, 2012). The lack of clear legislation in Greece complicates the definition of a regulatory framework.

Cultural Attitudes

In traditional Greek culture, “human care” is highly valued. This may lead to the perception of robots as depersonalizing medical services if a balance between technological solutions and the human factor is not achieved (Papadopoulos et al., 2020).

Assistive robots are increasingly recognized as tools that can reduce staff workload, improve patient safety, and enhance social well-being in healthcare systems. International research highlights their role in supporting psychological screening and specialized care (Lekova et al., 2024), as well as their potential adoption in higher education settings through the influence of moderating factors (Mitevaska et al., 2024a). Students’ perceptions and expectations are also shown to be decisive for the acceptance of socially assistive robots (Mitevaska et al., 2024b). These findings resonate with earlier studies on healthcare, where assistive robots were found to alleviate routine tasks and reduce feelings of loneliness among elderly patients (Broadbent et al., 2009; Sharkey & Sharkey, 2012). Nevertheless, challenges such as financial costs, lack of infrastructure, and issues of social acceptance remain significant (Papadopoulos et al., 2020; OECD, 2021).

When compared to the Bulgarian context, both similarities and differences emerge. Like Greece, Bulgaria faces demographic pressures due to rapid population ageing and a shortage of healthcare staff (Eurostat, 2022). However, while Greece has launched several pilot initiatives for robot-assisted healthcare (Papadopoulos & Kalogianni, 2019), in Bulgaria such projects are still at a very early stage, often confined to academic research or experimental prototypes rather than hospital integration. For example, universities such as Plovdiv University “Paisii Hilendarski” and Sofia University “St. Kliment Ohridski” have initiated interdisciplinary projects exploring the role of socially assistive robots in psychology, pedagogy, and healthcare training. The Technical University of Sofia and the Medical University of Varna have also engaged in robotics research, primarily focusing on rehabilitation exoskeletons and telemedicine solutions, but with limited direct hospital application so far.

Social attitudes in Bulgaria further complicate the process. The country traditionally relies on family-based care, and there is a strong cultural emphasis on personal, human-to-human caregiving. This creates resistance to the

integration of robotic systems in elderly care, as robots may be perceived as depersonalizing medical services. At the same time, pilot experiments in higher education suggest that Bulgarian students are open to the use of socially assistive robots in learning and communication, echoing international findings on the importance of perceptions and expectations (Mitevska et al., 2024b). Thus, although technological readiness in Bulgaria currently lags behind Greece, the academic sector provides a strong foundation for future development. With targeted state policies, EU structural funding, and academic–industry collaboration, Bulgaria could gradually move towards integrating robotic technologies into its healthcare system, aligning with the human-centered approach promoted by the WHO (2021).

These challenges highlight that the successful implementation of assistive robots is not merely a technological issue. It requires an integrated approach that includes financial support, staff training, the establishment of ethical standards, and active social engagement.

Comparative Perspective: Greece and Bulgaria

The integration of assistive robots into healthcare systems demonstrates both convergences and divergences between Greece and Bulgaria. Both countries face significant demographic challenges, characterized by rapid population ageing and persistent shortages of healthcare professionals (Eurostat, 2022; OECD, 2021). In both contexts, assistive robots are seen as a potential solution to alleviate the workload of medical staff, improve efficiency in healthcare delivery, and address the psychosocial needs of older adults (Broadbent et al., 2009; Sharkey & Sharkey, 2012).

Greece has already moved towards practical experimentation, with pilot projects in public hospitals, collaborations with research institutes such as the National Centre for Scientific Research “Demokritos,” and early integration of logistics, telepresence, and social robots (Papadopoulos & Kalogianni, 2019; Papadopoulos et al., 2020). These initiatives, although limited in scope, provide a foundation for scaling up through state support and European funding.

Bulgaria, by contrast, remains at the stage of academic research and experimental prototypes. Universities such as Plovdiv University “Paisii Hilendarski,” Sofia University “St. Kliment Ohridski,” and the Technical University of Sofia have developed projects focusing on the use of socially assistive robots in education, psychology, and rehabilitation. The Medical University of Varna has initiated studies related to robotic rehabilitation and telemedicine. However, there has been no large-scale implementation in hospitals, and infrastructural limitations remain a serious obstacle. Social attitudes also differ: while Greek patients have already been exposed to robots in clinical pilot settings, Bulgarian society maintains a strong reliance on family-based caregiving, which may slow down acceptance.

Despite these differences, both contexts share an increasing openness to exploring robotic solutions in higher education (Lekova et al., 2024; Mitevska et al., 2024a, 2024b). This suggests that universities could act as catalysts for broader adoption, building bridges between research, practice, and societal acceptance.

Conclusion

The study of assistive robots in healthcare highlights their transformative potential as tools that complement, rather than replace, human care. In Greece, pilot programs and collaborations with research institutions show promising pathways for integrating robotics into hospital systems, particularly in logistics, rehabilitation, and social support. Bulgaria, while lagging in practical implementation, demonstrates growing academic engagement and experimental initiatives that may pave the way for future adoption.

The comparison between the two countries underscores that successful implementation is not merely a technological challenge but a multidimensional process requiring financial investment, staff training, ethical frameworks, and active societal involvement (Papadopoulos et al., 2020; WHO, 2021). Both Greece and Bulgaria face cultural barriers rooted in the high value placed on human caregiving, but with the right policies, EU support, and academic–industry collaboration, assistive robots can become an integral part of sustainable, human-centered healthcare.

Ultimately, the effective integration of robotic technologies in Southeastern Europe will depend on the creation of synergies between innovation and tradition, ensuring that technological progress enhances — rather than diminishes — the quality of human care.

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