ALS: Empowering Lives with Assistive Technology

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Received: 01-Jul-2025; **Accepted:** 08-Aug-2025; **Published:** 08-Aug-2025

Introduction

Research highlights the critical role of various assistive technologies (AT) in maintaining communication and mobility for individuals with ALS. It covers a spectrum of devices from low-tech communication boards to sophisticated eye-tracking systems and powered wheelchairs, emphasizing their importance for quality of life as the disease progresses [1].

One area of focus discusses the practical application and benefits of eye-tracking technology for ALS patients, enabling them to communicate and control their environment despite severe motor impairment. It covers the clinical workflow for implementation, training, and troubleshooting, offering a valuable perspective for healthcare professionals [2].

An in-depth look reveals the current status of Brain-Computer Interfaces (BCIs) as assistive technologies for communication and control, particularly for individuals with severe motor disabilities like those with ALS. It explores different BCI modalities, their applications, challenges, and future directions in enhancing independence [3].

Another area of exploration involves the potential of smart home technology and sensor-based monitoring systems to improve the safety, independence, and quality of life for individuals with ALS. It highlights how these technologies can assist with daily activities, provide remote care, and facilitate data collection for disease management [4].

Comprehensive guidance is available on message banking and voice banking techniques, crucial assistive strategies for individuals with ALS to preserve their unique voice and frequently used phrases before speech declines. It outlines the processes, benefits, and practical considerations for implementation [5].

Examining the growing field of robotic assistive devices designed to support individuals with ALS, various types of robots are covered, from manipulators for daily tasks to exoskeletons for mobility. It discusses their current capabilities, technological challenges, and future potential in improving independence and care [6].

A recent case series explores the combined use of Brain-Computer Interfaces (BCI) and Virtual Reality (VR) for upper limb motor rehabilitation in ALS patients. It demonstrates the feasibility and potential benefits of these innovative assistive and therapeutic technologies in maintaining or improving motor function and engagement [7].

An updated perspective is offered on non-invasive ventilation (NIV) as a crucial assistive technology for managing respiratory insufficiency in ALS patients. It discusses the evolving understanding of NIV's role, its impact on quality of life and survival, and best practices for implementation and patient selection [8].

The application of remote monitoring and eHealth solutions for ALS patients is examined, highlighting their potential to improve access to care, facilitate proactive disease management, and collect valuable data from patients' homes. It discusses various technologies and their impact on patient care and research [9].

It emphasizes the synergistic relationship between technology, effective communication strategies, and multidisciplinary care teams in managing ALS. It discusses how integrated technological solutions facilitate communication, support patient autonomy, and enhance the overall approach to personalized ALS care [10].

Description

Assistive technologies (AT) are essential for maintaining communication and mobility in individuals with Amyotrophic Lateral Sclerosis (ALS), significantly enhancing their quality of life as the disease progresses [1]. Eye-tracking technology stands out as a practical application, enabling patients to communicate and control their environment despite severe motor impairment. Clinical workflows for implementing, training, and troubleshooting these systems are well-defined, providing valuable insights for healthcare professionals [2]. Furthermore, Brain-Computer Interfaces (BCIs) represent a state-of-the-art solution for communication and control, particularly for those with profound motor disabilities, exploring various modalities and future directions for greater independence [3].

Smart home technology and sensor-based monitoring systems offer substantial potential to improve the safety, independence, and overall quality of life for ALS patients. These systems assist with daily activities, facilitate remote care, and enable crucial data collection for disease management [4]. A key strategy for preserving communication involves message banking and voice banking techniques. These provide comprehensive guidance for individuals with ALS to store their unique voice and frequently used phrases before speech decline, outlining the processes, benefits, and prac-

Cite this article: McAllister F,(2025) ALS: *Empowering Lives with Assistive Technology. nnr* 07: 163. DOI: 1037532.nnr.2025.7.3.163

tical considerations for effective implementation [5].

The evolving field of robotic assistive devices shows great promise in supporting individuals with ALS. Reviews highlight various types of robots, from manipulators for daily tasks to exoskeletons for mobility, discussing their current capabilities, inherent technological challenges, and future potential in boosting independence and care provision [6]. In related advancements, a case series demonstrates the feasibility and potential benefits of combining Brain-Computer Interfaces (BCI) with Virtual Reality (VR) for upper limb motor rehabilitation in ALS patients, aiming to maintain or improve motor function and engagement through innovative assistive and therapeutic technologies [7].

Non-invasive ventilation (NIV) remains a crucial assistive technology for effectively managing respiratory insufficiency in ALS patients. Contemporary reviews provide updated perspectives on NIV's evolving role, its significant impact on quality of life and survival, and best practices for implementation and patient selection [8]. Complementing this, remote monitoring and eHealth solutions are increasingly applied to ALS patient care. These technologies improve access to care, facilitate proactive disease management, and enable the collection of valuable data directly from patients' homes, influencing both patient care and research efforts [9].

Underlying these specific technological advancements is the critical understanding of the synergistic relationship between technology, effective communication strategies, and dedicated multidisciplinary care teams in managing ALS. Integrated technological solutions are vital for facilitating communication, actively supporting patient autonomy, and ultimately enhancing the overall approach to personalized ALS care [10]. This comprehensive perspective ensures that patients receive holistic support, leveraging all available resources to optimize their well-being.

Conclusion

Assistive technologies (AT) are crucial for individuals with Amyotrophic Lateral Sclerosis (ALS), significantly enhancing communication, mobility, and overall quality of life as the disease progresses. This spectrum ranges from essential low-tech communication boards to sophisticated eye-tracking systems for environmental control, allowing patients to interact despite severe motor impairment. Advanced solutions like Brain-Computer Interfaces (BCIs) offer new avenues for communication and control, promoting greater independence. Robotic assistive devices are also emerging, providing support for daily tasks and improved mobility. Smart home technology and sensor-based monitoring systems are vital for improving safety, fostering independence, and facilitating remote care and data collection. Moreover, techniques such as message banking and voice banking are crucial for preserving patients' unique voices and frequently used phrases before speech decline. Non-invasive ventilation (NIV) remains a critical assistive technology for managing respiratory insufficiency, profoundly impacting both quality of life and survival. Remote monitoring and eHealth solutions further improve access to care and enable proactive disease management from home, collecting valuable patient data. The synergistic integration of these diverse technological solutions with effective communication strategies and comprehensive multidisciplinary care teams is paramount for personalized ALS management, ultimately fostering greater patient autonomy and well-being.

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