Chapter 11
AI-Enhanced Assessment and Intervention Tools for Communication Disorders

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ABSTRACT

This chapter explores the potential of AI-enhanced tools in assessing and intervening in communication disorders within educational and clinical settings. AI-driven applications enable non-invasive screenings for speech, language, and social communication disorders, facilitating early identification and reducing delays in support. Using a literature-based methodology, this review examines key AI applications, evaluating their efficiency, diagnostic accuracy, and accessibility compared to traditional methods. Findings indicate that AI tools streamline assessments by analyzing speech patterns and integrating multimodal data, improving diagnostic precision and reducing evaluation time. However, ethical considerations, including data privacy, algorithm bias, and the need for practitioner training, present challenges to widespread adoption. Despite these concerns, AI has the potential to transform communication disorder assessment, emphasizing the importance of responsible implementation and ongoing research to enhance its applicability across diverse populations.

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INTRODUCTION

Communication disorders, including speech and language impairments, have profound effects on an individual's academic, social, and professional outcomes. The ability to communicate effectively is a fundamental human need, and when communication is impaired, it can lead to isolation, frustration, and significant barriers to education and employment.

Speech-language pathologists (SLPs) play a crucial role in assessing and treating individuals with communicative disorders. Their patients range from young children with articulatory errors to elderly individuals experiencing severe dysphagia and aphasia. These professionals diagnose communication difficulties arising from various etiologies, including craniofacial anomalies, cleft palate, autism spectrum disorders, Parkinson's disease, multiple sclerosis, Down syndrome, hearing loss, depression, and chronic pain, among others.

To identify and address these challenges, SLPs use a variety of assessment tools, including standardized test batteries and informal interview techniques. Interventions may involve both low- and high-tech augmentative and alternative communication (AAC) devices, such as picture symbol boards, AAC apps, and eye-gaze communication systems. Traditionally, these tools were developed, used, and funded independently, leading to fragmentation in service delivery and accessibility.

Given the importance of early identification and intervention, SLPs have historically relied on standardized tests, observational methods, and structured interactions to diagnose and treat communication disorders. However, while these traditional methods are clinically validated, they are often time-consuming, subjective, and dependent on the availability of trained professionals (Paul & Norbury, 2012)

Over the past two decades, however, the field of speech-language pathology has undergone a transformation, driven by advancements in artificial intelligence (AI). These innovations are reshaping the development of technological resources for SLPs, their clients, and their families, offering new opportunities to enhance assessment and intervention strategies.

AI has emerged as a revolutionary tool in healthcare, with its application in communication disorders gaining momentum. AI-powered assessment tools promise to transform how speech and language disorders are diagnosed and treated. By leveraging AI-driven technologies such as natural language processing (NLP), machine learning (ML), deep learning (DL), and automated speech recognition (ASR), clinicians can enhance diagnostic accuracy, streamline assessments, and deliver personalized interventions. AI's ability to process large datasets and detect subtle patterns in speech, language, and social communication behaviors makes it particularly valuable in screening and diagnosing conditions such as developmental