Swallowing assessment in a clinical context: artificial intelligence applications

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Introduction: Eating and swallowing are intricate actions comprehending both voluntary and reflexive movements, engaging over thirty nerves and muscles (1). Dysphagia occurs when the normal swallowing process is compromised, increasing the risk of the swallowed material entering the larynx, and causing complications for the patient (2). Cervical auscultation (CA) is a clinical method used to evaluate the pharyngeal phase of swallowing by listening to the sounds of swallowing-related respiration. However, the reliability of CA is susceptible to the subjectivity and experience of the speech therapist
(3). The application of artificial intelligence (AI) tools in healthcare has the potential to support healthcare workers with a variety of tasks. It can be used for disease prediction and diagnostics treatment, outcome prediction and prognosis evaluation (4). **Objectives:** Contribute to the development of an AI tool to aid speech therapists in their daily evaluation of deglutition in patients, applying machine learning algorithms to process and analyse the sound recorded during cervical auscultation. **Methods:** Using an electronic stethoscope, audio samples were recorded from individuals with and without pathology while they swallowed different liquid quantities (5 mL and 10 mL) and consistency (moderately thick and solid). The audio is divided into three sections (5) and pre- processed to remove unnecessary noise. Data is classified using machine learning algorithms and the models will be evaluated according to precision, accuracy, sensibility, confusion matrix and ROC curve. **Results:** Previous work in this field reported by Santoso et al. (6) using supervised machine learning algorithms obtained promising results in swallowing detection. In this study, our dataset is composed of 87 samples of patients, and similar results are to be expected. **Conclusions:** AI can offer an objective and quantitative analysis of swallowing sounds, potentially providing more accurate and consistent results compared to subjective assessments. Additionally, it can identify complex patterns in swallowing sounds that may be challenging for less experienced speech therapists to recognize.

Keywords: Deglutition, Dysphagia, Artificial Intelligence, Machine Learning

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