ConnectBreathe: Multiplatform Biomedical System for Respiratory Physiotherapy With Gametherapy

Brechane da Silva, Ana Elisa (School: EE Prof Maria das Dores Ferreira Rocha)

According to the WHO, respiratory diseases are among the leading causes of mortality, and collectively, over one billion people suffer from acute or chronic respiratory conditions worldwide. Therefore, it was developed a multiplatform Biomedical System for respiratory physiotherapy called ConnectBreathe. It is capable of analyzing pulmonary musculature through digital manovacuometry and promoting the strengthening of respiratory muscles, combining exercises with engaging digital games. The system can assist in diagnosing and treating conditions such as asthma, bronchitis, emphysema, post-Covid syndrome, among others. Two respiratory trainers were developed to offer adjustable resistance to respiratory flow and strengthen pulmonary musculature. They underwent pressure curve analysis and statistical evaluation to verify if they behave as Pressure Threshold Devices, considered the most efficient. An app for mobile devices with themed digital games and a computer gametherapy platform were created to make respiratory exercises motivating, increasing treatment adherence and retention. To evaluate respiratory muscle strength, an interface for ConnectBreathe's digital manovacuometer through supervisory software was developed, enabling real-time analysis of respiratory maneuvers. To assess system functionalities, a usability survey with 19 physiotherapy professionals was conducted, using the System Usability Scale (SUS) methodology and a 10-question questionnaire. Through statistical analysis, the respiratory trainers exhibited Pressure Threshold Device behavior, with 96% accuracy. The usability evaluation scored 88.4 points, classified on the adjective scale as "Best Imaginable," meeting key usability attributes such as ease of learning, efficiency, and user satisfaction.

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