擴增實境(Augmented Realiry)輔助脊椎手術患者術前呼吸復健與術後下肢復健

骨科部 姚又誠醫師、酒小蕙督導長、魏碧青護理長、林曼玲護理長、李湘芫護理師

摘要

脊椎手術後，患者常因為全身麻醉後帶來的呼吸系統改變，與術後疼痛導致的肺部容積減少、呼吸肌功能影響、與肺擴張不全等因素，有1%-23%的機會發生術後肺部併發症。一旦發生肺部併發症，嚴重影響患者的預後、增加住院天數、增加醫療花費、延長手術恢復。

術前呼吸復健、呼吸肌訓練被發現對於降低術後肺部併發症是有效的。傳統訓練方式為呼吸治療師或復健師，透過一次到多次的一對一教導，讓患者回家自主訓練。然而患者在家自主訓練通常無人監督，其訓練頻率與成效都難掌控。

擴增實境(Augmented reality, AR)近年來已經被應用在許多疾病的復健應用，像是中風後復健、慢性呼吸道疾病患者的呼吸復健、老年患者的運動訓練、骨科人工關節置換與骨折術後患者。另外AR於護理照護，像是傷口護理、靜脈採血、病患下床指導、護理教育等也有諸多應用，有助於提升護理照護的品質與病患滿意度。惟尚未有AR應用在脊椎手術患者術前呼吸復健與術後復健的研究。

本研究應用AR醫療教學app，設計出適合脊椎手術患者的復健運動。透過互動遊戲、即時回饋、AR虛實相容等元素，提供健康照護者與患者，有效之心肺運動、肌力及行走訓練，可增加病患配合執行率、臨床服務成效與患者更好的滿意度。

Abstract

The postoperative pulmonary complications (PPCs) are commonly occurred in patients received spinal surgeries. The changes to the respiratory system occur after general anesthesia due to the alteration of respiratory muscle, lung volumes reduction and atelectasis due to postoperative pain. The incidence of PPCs in major surgery ranges from 1 to 23%. Patients' morbidity (length of hospital stay, cost, clinical outcome) and mortality are increased by PPCs.

Pulmonary prehabilitation and postoperative rehabilitation are effect in reducing PPCs. The conventional pulmonary therapy consisted of face to face instructions from respiratory therapist or physical therapist. The training is mostly home-based and unsupervised, rely on the cooperation of the patients and healthy care givers. The outcome is usually unpredictable.

Augmented reality (AR) assisted rehabilitation has gained importance and aroused growing interest in the last decades. The application of AR in rehabilitation included post-stroke rehabilitation, pulmonary rehabilitation for chronic respiratory disorder, post joint replacement and post orthopedic trauma surgeries. Besides, AR also used in nursing, like clinical techniques, patients care, and nursing education. The quality of nursing increased due to the application of AR and also achieved better patient satisfaction. However, there was no reports on the application of AR assisted rehabilitation in patients received spinal surgeries.

An AR medical rehabilitation app was designed by TPEVGH division of clinical skill training center. The content of the AR app included cardio-pulmonary exercise, upper extremities and lower extremities exercise. The exercise was designed to help in increased pulmonary capacity, muscle power, and walking ability of patients with chronic illness. The advantages of the AR app are the gamification of exercise, patient interaction and instantly feedback. The possible positive aspect of the AR app assisted rehabilitation is the direct interaction between the patient and the health care provider, which increased compliance to rehabilitation.

This study focus on the application of the AR app in pulmonary prehabilitation and postoperative rehabilitation in patients received spinal surgeries. The primary aim of the study is to compare the patient satisfaction in using the AR app in rehabilitation to conventional therapy. The secondary aim is to analyze the compliance, clinical outcome, PPCs, and the improvement in perceived exertion scale.