中文題目：運用人工智慧及品質改善提升非計畫性拔管病人品質

英文題目：The continuous improvement among patients with unplanned extubation-the possible aids of artificial intelligence and quality improvement program

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Background: It has been considered as an important quality indicator of care in the intensive care unit (ICU) among patients with mechanical ventilator (MV) experienced unplanned extubation (UE). The application of effective strategy may improve the quality of MV and prevent the further morbidity and mortality of patients associated with UE.

Methods: A continuous quality improvement (CQI) concept had been promoted in reducing the incidence of UE since 2001 in a Medical center in Southern Taiwan. Furthermore, we started to use big data and artificial intelligence (AI)/machine learning technologies to establish new predictive models of the optimal timing to MV weaning in 2020. The CQI concept had initiated since year 2001 and was promoted in all 6 ICUs (96 beds) in Chi-Mei Medical center in southern Taiwan. The CQI concept, focusing on serial intervention tools including standardization of procedures, improvement of communication, revision of sedation and weaning protocols, changing strategy for physical restriction, establishment of task force for identification and management of high-risk patients, implementation of quality improvement models including Breakthrough Series (BTS) and Team Resource Management (TRM), was launched to reduce the incidence of UE in MV patients. The performance of AI also helped clinicians to shorten the MV duration.

Results: During a 20-year period, with the promotion of this CQI concept and AI program, the overall incidence rate of unplanned endotracheal extubation (defined as number of new UEs per total amount of MV patients during the same period) decreased gradually from 6.82% (188/2785) in 2001, 2.04% (58/2849) in 2010, and finally to 0.58% (13/2245) in 2020. With the intervention of AI in 2020, the MV time was shorter (153.5 hours vs. 172.0 hours), and a weaning rate was also better (96.5 vs. 95.7%) than those in 2019.

Conclusions: The integration of AI with CQI can effectively reduce the overall incidence of UE. We will apply the successful experiences to the other ICUs in our hospital, and may serve as a benchmarking for other hospitals in Taiwan.

關鍵字：unplanned extubation, ventilator, quality improvement, artificial intelligence