Clinical Trial Protocol Synopsis

Protocol title：

The impact of soiled airway management on CPR quality

Objectives：

To evaluate the influence of soiled airway management on the quality of CPR

Background：

Regurgitation is an adverse event common during cardiopulmonary resuscitation (CPR) and occurs in 20%-32% of patients experiencing out-of-hospital cardiac arrest (OHCA). It can impair ventilation, induce aspiration, and decrease survival to hospital discharge. Gastric fluid in the airway obscures the laryngeal view, thereby considerably decreasing the first-pass success of endotracheal intubation (ETI) by paramedics.

A human cadaver study reported that ETI outperforms other airway management devices, such as the i-gel, laryngeal mask, and laryngeal tube, in preventing aspiration when regurgitation occurs during CPR. However, ETI is also associated with multiple and prolonged CPR pauses.Compared with the use of supraglottic airway (SGA) devices, ETI results in more hands-off time during CPR. Recent randomised clinical trials have revealed that airway management with an SGA device provides superior outcomes to those of ETI in patients with OHCA. However, ETI remains the preferred management strategy for an airway affected by regurgitation in patients with OHCA.

Current guidelines focus on the quality of CPR because it is a key determinant of survival in patients with OHCA. However, evidence regarding the impact of regurgitation during ETI on CPR quality is limited. This manikin simulation study assessed CPR quality during ETI in airways with and without regurgitation.

Study Design：

A prospective compare study

Methods：

This is a prospective compare study. 54 EMT-Ps, are involved to evaluate the impact of airway management on CPR quality.

The Study uses SALAD training tool for training. The SALAD training tool include Nasco Intubation CPR manikin, which could vomit by pumping liquid into distal esophagus, and HQCPR feedback machine. Two scenarios were simulated. CPR and ETI in an airway with regurgitation (oropharyngeal regurgitation scenario) and CPR and ETI in an airway without regurgitation (clean airway scenario). All EMT-Ps were assigned to participate initially in one of the scenarios. After all EMT-Ps had finished the first scenario, they switched to the other. Three EMT-Ps formed a resuscitation team and played one of the following roles: airway manager, first compressor, or second compressor. In each scenario, each EMT-P was required to take a turn playing all three roles. During each simulation, the airway manager performed BVM ventilation, and the first and second compressors alternately provided chest compression for every five cycles of CPR, with a compression-to-ventilation ratio of 30:2.

After the first five cycles of CPR, the airway manager was asked to perform intubation during the ongoing chest compression to minimise intubation-associated interruption of chest compression. If necessary, the airway manager could request a pause of the ongoing chest compression. If intubation was not successful, the airway manager performed BVM ventilation twice and then reattempt intubation. After intubation, the airway manager used the BVM to check the lung distention to confirm successful intubation. Each simulation was ended after successful or failed intubation. Failed intubation was defined as either oesophageal intubation or three unsuccessful attempts.

The primary outcomes were CPR quality metrics, namely chest compression fraction (CCF), chest compression depth, chest compression rate, and longest interruption time. The secondary outcomes were the intubation success rate and intubation time.

Each CPR-intubation sequence comprised two segments: a compression segment and a hands-off segment. Presents the rules for determining the start and end of a CPR-intubation sequence. CCF was defined as the proportion of time spent on chest compression in each CPR-intubation sequence. The longest interruption time was defined as the longest hands-off duration in each sequence. An intubation attempt was defined as the insertion of the laryngoscope blade into the mouth and its subsequent withdrawal from the mouth. Intubation time was defined as the period between the start and the end of an intubation attempt. The time spent checking the endotracheal tube position by manual ventilation through the endotracheal tube was not included in the CPR-intubation sequence.

Two video cameras were setup to record the entire simulation process. Two observers reviewed the video records independently to identify the start and end of each CPR-intubation sequence, any intubation attempts, and the hands-off and compression segments of each sequence. Disagreements were resolved by reaching mutual consensus. The HQCPR application on an Android device recorded chest compression depth, rate, and interruptions (defined as no chest compression [hands off] for >1 s). The data from both the video recording and the HQCPR application were used in subsequent analysis.Continuous data are presented as medians with interquartile ranges, and categorical data are presented as frequency counts and percentages. The continuous data were compared using the Wilcoxon rank sum test in the first CPR-intubation sequence and the Mann-Whitney U test in the second and third sequences. The McNemar test was used to compare the intubation success rate in the first sequence, and Pearson's chi-square test was used for the second and third sequences. The continuous data from all three CPR-intubation sequences were compared using the Kruskal-Wallis test. Post hoc analysis was performed using Conover's test.

The association of CPR quality metrics with successful intubation was evaluated using a Cox proportional hazards regression model. The results of multivariate analyses are presented as hazard ratios (HRs) with corresponding 95% confidence intervals (CIs). A two-tailed $P < 0.05$ indicates statistical significance. MedCalc Statistical Software version 19.2. (MedCalc Software, Ostend, Belgium) was used for data analysis.

Effect：

understand the impact of airway vomitus on CPR quality and intubation quality

Key words：
Cardiopulmonary resuscitation, Airway decontamination, suction assisted, vomiting simulation