

A QUALITY IMPROVEMENT INITIATIVE TO REDUCE ACCIDENTAL SELF-EXTUBATION RATES USING ANCHORFAST ENDOTRACHEAL TUBE FASTENER IN AN ADULT INTENSIVE CARE UNIT AT A TERTIARY HOSPITAL IN MALAYSIA

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Background

Accidental self-extubation is a significant patient safety concern in mechanically ventilated patients and may lead to adverse outcomes, including respiratory compromise, reintubation, and prolonged Intensive Care Unit (ICU) stay. Effective endotracheal tube (ETT) securement is essential. The AnchorFast ETT fastener offers more stable fixation than conventional methods. However, real-world evidence remains limited.

Objectives

To evaluate the impact of AnchorFast ETT fastener implementation on self-extubation rates in an adult ICU.

Methods

A retrospective before-and-after quality improvement study was conducted in the adult ICU of Sunway Medical Centre Sdn. Bhd. All mechanically ventilated adult patients were included, excluding those with oro-facial or maxillary conditions and ventilated for < 24 hours. The pre-implementation period (2022) used conventional securement methods (Figure 1), while the post-implementation period (2023 -2025) adopted AnchorFast (Figure 2) supported by staff training and a standardised ETT securement protocol. Data were obtained from routine ICU records and incident reporting systems. The primary outcome was the self-extubation rate per 100 mechanically ventilated patients.

Patients assigned to the intervention group had their endotracheal tubes (ETTs) secured using the AnchorFast ETT holder (Figure 3). The device was selected to provide standardised tube fixation and reduce the risk of unplanned extubation, self-extubation, and tube migration during mechanical ventilation. The AnchorFast system consists of a tube-holding clamp attached to a movable shuttle mechanism and a hydrocolloid adhesive base that adheres to the patient's cheeks.

Prior to the implementation of the intervention, all ICU nurses participated in a structured educational program on the application and maintenance of the AnchorFast endotracheal tube (ETT) holder. The training was delivered by experienced clinical educators and consisted of theoretical instruction, review of a standardised tutorial video, device demonstrations, and supervised hands-on practice sessions using simulation models (Figure 4). Educational content covered the rationale for standardised ETT securement, prevention of unplanned extubation, indications and contraindications for device use, skin preparation techniques, application of the hydrocolloid adhesive base, ETT fixation using the locking clamp mechanism, use of the shuttle system for tube repositioning, and device replacement when required (Figure 5).



Figure 1

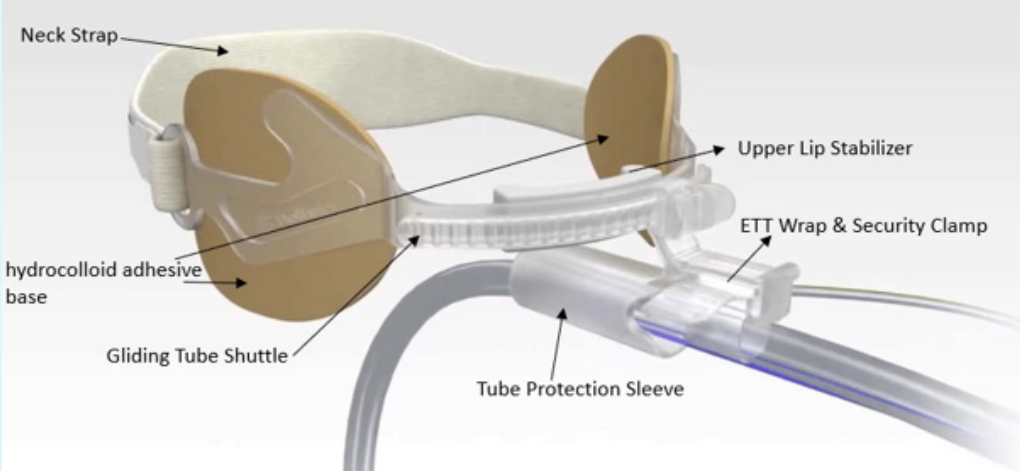


Figure 3



Figure 2



Figure 4

Application of AnchorFast

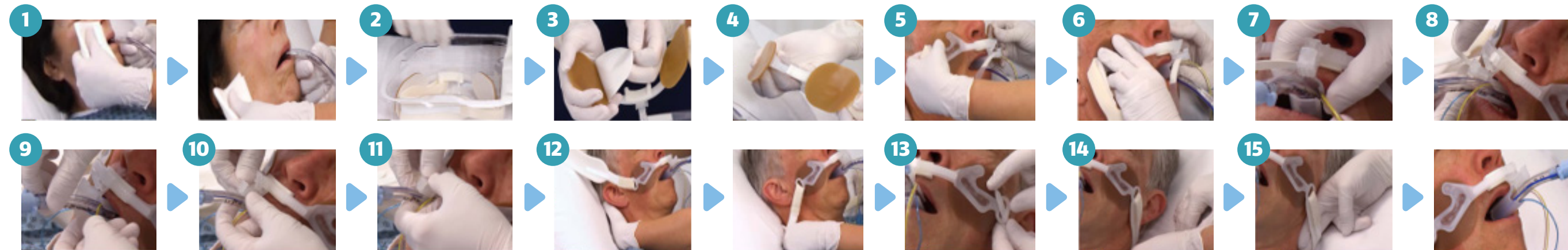


Figure 5

1. Before applying the device, the patient's skin should be clean, dry, and free of oily residue.

2. Remove the product from its packaging.

3. Remove the release liners from the skin barrier pads.

4. Pull back gently on the skin barrier pads so they are out of the way, preparing for application.

5. Centre the device on the patient's upper lip, ensuring the non-absorbent upper lip form lightly touches the skin.

6. Press the two skin barrier pads onto the patient's skin and hold them in place for approximately 30 seconds until they adhere well.

7. Squeeze the tabs on the sides of the gliding tube shuttle and move the clamp along the track to a location adjacent to the ETT.
8. Remove the release liner from the "ETT wrap", exposing the adhesive.

9. Position the ETT under the tube protection sleeve.

10. Loop the wrap tightly around the ETT, avoiding the tube within the wrap. Pull the remaining portion of the wrap through the security clamp.

11. Secure the wrap by snapping shut the one-click security clamp (an audible click will be heard).

12. Secure the neck strap by inserting the narrow end of the strap through the plastic loop on the track.

13. Fasten the narrow end of the strap using the hook-and-loop closure.

14. Adjust the straps on either side for added comfort and security. Do not overtighten.

15. Ensure a 2-finger width between the strap and the back of the patient's head.

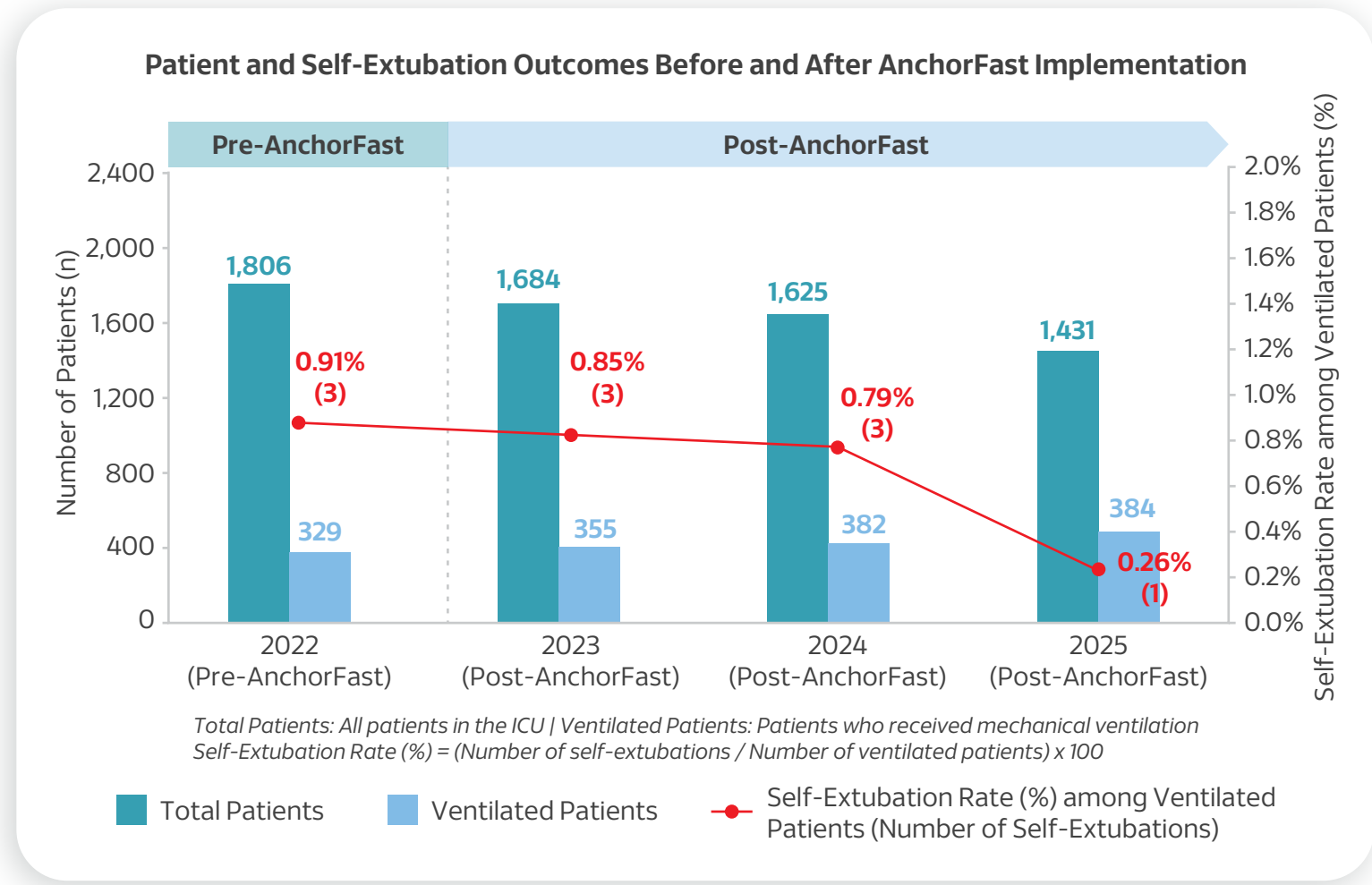
Participants were required to demonstrate competency in device placement, ETT securement, tube repositioning, skin assessment, oral care, and scheduled replacement procedures. Competency was assessed using a standardised skills checklist through return demonstration under educator supervision. Only nurses who successfully completed the competency assessment were authorised to apply and manage the device in clinical practice independently.

To support implementation fidelity, refresher training sessions and bedside coaching were provided throughout the study period. Adherence to the intervention protocol was monitored through routine clinical audits and direct observations conducted by the unit's quality improvement team.

The AnchorFast device was maintained throughout the duration of mechanical ventilation unless device replacement or discontinuation was clinically indicated. The hydrocolloid adhesive component was routinely replaced every five days to maintain adhesive integrity and reduce the risk of skin complications. Additional replacement was performed if the adhesive became loose, contaminated, damaged, or unable to provide adequate fixation. During each replacement, skin integrity was assessed and documented.

Results

Self-extubation rates decreased progressively over the study period. A modest reduction of 6.6% was observed between 2022 and 2023, followed by a further 7.1% reduction between 2023 and 2024. The most substantial improvement occurred between 2024 and 2025, when the rate declined from 0.79% to 0.26%, representing a 66.8% reduction. Overall, the self-extubation rate fell from 0.91% in 2022 to 0.26% in 2025, corresponding to a 71.4% reduction across the four-year period (Graph 1).



Graph 1

Limitations

This was a single-centre study, and AnchorFast reduces but does not completely prevent self-extubation. Patients who are delirious, agitated, inadequately sedated, or physically able to access the endotracheal tube may still self-extubate. Prevention of self-extubation requires a multifaceted bundle approach, including appropriate sedation and analgesia, regular assessment of tube security, close monitoring of high-risk patients, effective communication and reassurance, and use of mittens or restraints only when clinically indicated and in accordance with hospital policy. AnchorFast should therefore be considered as one component of an unplanned extubation prevention strategy rather than a standalone intervention.

Conclusion

Following the implementation of the AnchorFast ETT fastener, self-extubation rates in the adult ICU decreased substantially from 0.91% in 2022 to 0.26% in 2025, representing an overall reduction of 71.4%, despite an increasing mechanically ventilated patient population. These findings suggest that standardised ETT securement, supported by staff education, competency-based training, and ongoing adherence monitoring, may improve patient safety by reducing self-extubation events. Overall, AnchorFast should be considered as part of a comprehensive unplanned extubation prevention strategy rather than a standalone intervention.

Key Message

Standardised ETT securement using AnchorFast, combined with staff education and protocol-driven practice, was associated with a sustained 71.4% reduction in self-extubation rates over four years.