Success of A Respiratory Therapist-Driven Tracheostomy Decannulation Protocol

Richard MacGillivray BS,CRT, Lorraine Cullen RRT, Brett Gerstenhaber MD, Luis Teba MD    Gaylord Hospital, Wallingford, Connecticut

RATIONALE

In Long Term Acute Care Hospitals (LTACH), once patients are liberated from mechanical ventilation (MV), the next goal is tracheostomy tube (TT) removal. Little evidence is available to guide the decannulation process and optimal timing of TT removal. Some publications report a decannulation failure of up to 5% (1,2). Randomized controlled trials and well established guidelines to facilitate the decannulation process are lacking. At our LTACH, we instituted a respiratory therapist-driven decannulation protocol (DP), in order to determine readiness for decannulation. We present a summary of our DP and outcomes.

PROTOCOL SUMMARY

All patients undergoing decannulation will need to be evaluated by a Pulmonary or CCM consultant and determine if the patient is ready to be enrolled in the protocol. The protocol is incorporated in our clinical information system. Daily progress of the decannulation process will be documented by the Respiratory Care Practitioner (RCP). The RCP will maintain daily communication with the LIP and/or consultant regarding the progress of the decannulation process.

RESULTS:

A total of 59 patients with a mean age 64±16, 30 were women, completed the DP during a seven month period. Forty-eight patients completed the DP satisfactorily, were decannulated, and discharged from our hospital. Of the successful DP’s, 20 went home, 26 to skilled nursing facility (SNF), and one to acute care hospital. Of the 48 decannulated patients, only one had to be reintubated. Eleven patients had the DP terminated due to complications, therefore remained with TT, and were eventually discharged. Of those that remained with the TT, 4 went home (3 required home ventilator), 4 to SNF, and 3 returned to acute care hospital.
Patients liberated from MV support who tolerated tracheal collar ≥ 3 days and had a cuffless ≤#6 TT were considered for inclusion in the protocol. They had to be afebrile, hemodynamically stable, and have maximal expiratory peak flow ≥160 L/min; if lower, a pulmonologist’s waiver was required. In addition, the patients had to have minimal tracheal secretions, stable chest radiogram, low aspiration risk, no evidence of airway obstruction, able to tolerate a speaking valve ≥12 hours/day. O2 sat ≥ 92% on FiO2 ≤0.5, ETCO2 ≤50 mmHg, and serum HCO3 ≤30 mmol/L. In patients with compensated respiratory acidosis, the last two values could be higher if the condition was stable. The protocol began with continuous TT plugging for up to 12-16 hours/day. On days 1 through 2, the TT was left open overnight. On day 3, the TT was kept plugged overnight and nocturnal oximetry testing was recorded (NOT). At the end of the NOT, arterial blood gases were analyzed. Termination of the DP occurred if there were signs of: clinical instability, increased oxygen requirement during plugging, inability to clear secretions during plugging, significant desaturations during NOT (defined as <88% longer than five minutes), or significant respiratory acidosis following NOT.

All the enrollees must have all the following:

- Afebrile
- Hemodynamically stable
- Clear or stable Chest X-ray
- Controlled Secretions
- Peak Flow ≥160 L/min
- Satisfactory on-going nutrition (low risk of aspiration)
- No clinical evidence of tracheal obstruction
- Ability to tolerate a speaking valve

If unable to perform peak flow, patient must have a cough peak flow ≥60 L/min. Once above criteria have been met, the patient will start daily TT plugging trials.

Criteria to begin plugging trials:

- VS stable (within 15% of baseline)
- For patients with no underlying lung disease:
  - O2 Sat ≥ 92%
  - ET CO2 ≤ 50 mmHg
- For patients with underlying lung disease:
  - Stable Blood Gases
  - PaCO2≤50 mmHg
  - O2 saturation ≥ 92% on Room Air or Oxygen
  - Patient with history of sleep apnea and using home CPAP or BiPAP should be cleared by the consultant before undergoing overnight plug trial with nocturnal oximetry.

Decannulation Process:

**Day 1 and 2**

- Plug tracheostomy tube
- Monitor VS q 4 hours
- Monitor O2 Sat and ETCO2 q 4 hours
- Plug up to 12-16 hours, remove plug for sleep

Criteria for unplugging sooner than 12 hours:

- Any of the following:
  - Change in hemodynamics (BP 15% above or below baseline)
  - Increased RR (15% above baseline)
  - O2 Sat < 92%
  - Increase in ETCO2 of >10% over baseline
  - Increased HR (15% above baseline)
  - Fever ≥101.5°F

**Day 3**

If day 1 and 2 of the protocol are successful, on day 3 plug tracheostomy tube and leave it plugged for 24 hours and the patient will undergo a NOT study. Arterial blood gases will be obtained at the end of the NOT study. The above results will be read by a pulmonologist, and if these are appropriate, the patient will be decannulated and observed during the next 24 hours.

Successful tracheostomy tube removal was achieved in 98% of patients using a respiratory therapist-driven decannulation protocol. Patients failing the protocol were not able to be decannulated during their hospitalization.