

Unplanned extubations in the adult intensive care units

Sushma TK

Email: drsushmagowda@gmail.com

Abstract

Patients require admission to intensive care unit with endotracheal intubation and mechanical ventilation for various reasons. It can last for a short duration or could be prolonged. The endotracheal tube is removed once the underlying problem is resolved and is called planned extubation. Sometimes extubation occurs unintentionally and is called unplanned extubation. Unplanned extubation could be accidental or self extubation. There is a potential risk of unplanned extubation as long as the patient remains intubated. As unplanned extubation can lead to catastrophic events, it is ideal to have a weaning protocol in place so that the patients are extubated as soon as they satisfy the extubation criteria. This CME article mainly focuses on the risk factors for unplanned extubation in the adult intensive care unit and the complications associated with it. The strategies for prevention of unplanned extubation has been highlighted at the end.

Keywords: Accidental extubation, complications, endotracheal tube, prevention, risk factors.

Introduction

Patients who require mechanical ventilation for a certain period of time get admitted to intensive care units. The period of requirement of respiratory support may be short or prolonged. The latter is defined as the need of respiratory support for twenty one days or more.¹ Normally, the endotracheal tube is removed once the patient satisfies all the criteria for extubation and is called planned extubation. Whereas extubation can occur unintentionally owing to attending personnel or patient's actions and is called unplanned extubation. The entire period of intubation with mechanical ventilation carries the potential risk of unplanned extubation. The longer the period of intubation with mechanical ventilation the greater the risk.

Unplanned extubation can be of two types: self extubation which refers to deliberate or purposeful removal of endotracheal tube by the patient and the second, is accidental extubation which occurs

secondary to nonpurposeful patient actions such as coughing, vomiting or retching and also because of improper handling of patient's airway during patient care. The former is the most common type of unplanned extubation.²

Incidence

The incidence of unplanned extubation varies from centre to centre owing to varied institutional policies and protocols for the management of patients on ventilator. The incidence usually ranges from 7% to 16% according to many studies.³⁻⁵ A study conducted by Boulain T *et al* which included 380 ventilated patients reported the incidence of unplanned extubation to be 10.8% and 1.1 to 2.1 per 100 ventilated days which is similar to the incidence quoted by various other studies.⁶

This article mainly focuses on the risk factors associated with unplanned extubations in the adult intensive care units with associated complications. Certain strategies to prevent unplanned extubations are highlighted at the end of the article.

Sushma TK, MD

Senior Resident, Department of Anaesthesiology
Kasturba Medical College, Manipal

How to cite this article: Sushma TK. Unplanned extubation in the intensive care unit. *Ind J Resp Care* 2017; 6(1): 773-76.

Risk factors and measures to prevent unplanned extubation

1. Routine sponge bath and changing the decubitus of the patient can be a risk factor for unplanned extubation if not done properly.⁷ Daily sponge bath is necessary to maintain the physical integrity of the skin and its thermal and vascular regulation. Though there is a high risk of unplanned extubation during bed care, the incidence has not been studied accurately. A study conducted by Yeh *et al* in 1176 patients found the incidence to rise when the nursing staff had less than 4 years of experience.⁸ da Silva and coworkers found that along with nursing inexperience, understaffing increases the risk of unplanned extubation.⁹

The risk of accidental or self extubation can be reduced by performing the bed care procedures in a stepwise manner with enough hands to hold the patient and the ventilator equipment. Sedation can be titrated to a Ramsay score of 5 to prevent agitation before giving bed care.

2. Bed side procedures such as portable roentgenogram, fiberoptic bronchoscopy, endoscopies, thoracocentesis carry a high risk of unplanned extubation. It can be prevented by ensuring adequate sedation, fixation of the endotracheal tubes and the ventilator circuits and proper positioning of the patient for the procedure.⁷
3. Unplanned extubations can occur during intra and interhospital transfer of patients which can be avoided by ensuring adequate level of sedation by administering a bolus of sedative and having enough personnel to transfer the patient on to the shifting trolley. It is necessary to have a good communication to avoid any adverse actions during shifting and reintubation equipment need to be carried while shifting.
4. Orotracheal intubation carries a higher risk than nasotracheal intubation as per the studies conducted by Coppolo and May³ and Repoll and colleagues¹⁰ as the nasotracheal tube is well tolerated by the patients when compared to

oro-tracheal tube. Oral tube is more mobile and can be pushed out with the patient's tongue. This is especially true in case of paediatrics. Though nasotracheal tube is well tolerated it can block the sinus openings and lead to sinusitis if kept for a long duration.

5. Chronic respiratory failure has been identified as one of the major risk factors for unplanned extubations in ICU partly in view of need of prolonged mechanical ventilation by Vassal and colleagues.⁴
6. Pharmacological v/s Physical restraints: Agitation and delirium is a major risk factor for unplanned extubation. There are various studies which prove that pharmacological restraints (sedatives, anxiolytics and antipsychotics) customised to patient needs and titrated to a particular sedation score during various times of the day depending on the level of stimulus can prevent unplanned extubation to a major extent.¹¹⁻¹² Tanois *et al* found that continuous sedation with daily interruptions was better than intermittent or no sedation in preventing unplanned extubation.¹³ No definite and clear evidence is available for the use of physical restraints to prevent unplanned extubation. Few researchers have found increased incidence of unplanned extubation when physical restraints are used and have recommended to use restraints judiciously only when clinically indicated.^{9,11} Thus the use of physical restraints still remains controversial.
7. Improper way of fixing and securing the endotracheal tubes compounded by the pull or drag of the ventilator circuit can lead to accidental extubation which can be prevented by reducing the weight of the breathing circuits and securing the endotracheal tubes.¹⁴
9. Nonpurposeful patient actions such as coughing, retching and vomiting can cause accidental extubation. Adequate sedation for tube tolerance and proper fixation of endotracheal tube helps prevent it.

Complications

Whether it is accidental or self extubation, the complications remain more or less the same with some of them leading to catastrophic events. The most common complication of unplanned extubation is hypoxia associated with cardiac arrest and death if not recognised and managed in time.

Other complications include haemodynamic changes, arrhythmias, airway obstruction, aspiration of gastric contents *via* the unprotected airway. As accidental or self extubation occurs with the endotracheal tube cuff inflated, it can result in trauma to the tracheal mucosa with a delayed complication of tracheal stenosis. Unplanned extubation can also lead to injury to the laryngeal mucosa, vocal cords, dislocation of arytenoids leading to stridor. Reintubation is required in majority of cases of unplanned extubation increasing the risk of ventilator associated pneumonia and prolonged ventilation.

Strategies to prevent unplanned extubation

1. A clear institution based protocol to be designed and the health care personnel involved in the care of patients on mechanical ventilation to be educated regarding the same.¹⁵
2. Ensure adequate depth of fixation of endotracheal tube.
3. Secure the tube properly for stabilisation. The plasters need to be checked every day and to be changed if wet or soiled by secretions or blood.
4. Ensure that the ventilator tubings are light weight and fixed properly so as to prevent undue dragging of the endotracheal tube.
5. Screen for delirium and customise sedation needs for every patient to prevent agitation.
6. Ensure a Ramsay sedation score of 5 by titrating the sedatives before handling the patient during sponge bath or change of decubitus and during bed side procedures.
7. Review the restraint policy daily. Judicious use of restraints helps to reduce agitation.
8. Daily weaning protocol to be in place to facilitate early extubation.¹⁶
9. Ensure that the nursing personnel are adequate in number and not overburdened.
10. An airway related accident report must be filled which helps in identifying the risk factors and cause of unplanned extubation based on which the existing policies can be amended and new protocols can be formed.

Conclusion

The potential risk of unplanned extubation exists as long as the patient is intubated. Hence extubate the patient as soon as the patient meets the extubation criteria with daily weaning protocols in place. The rate of unplanned extubations should be implemented as a marker of quality assurance in the intensive care unit.

References

1. Lone NI, Walsh TS. Prolonged mechanical ventilation in critically ill patients: epidemiology, outcomes and modeling the potential cost consequences of establishing a regional weaning unit. *Critical Care*. 2011;**15**(2):R102.
2. Kiekkas P, Aretha D, Panteli E, Baltopoulos GI, Filos KS. Unplanned extubation in critically ill adults: clinical review. *Nurs Crit Care* 2013;**18**(3):123-34.
3. Coppolo DP, May JJ. Self-extubation: a 12-month experience. *Chest* 1990;**98**:165-9.
4. Vassal T, Anh NGD, Gabillet JM, Guidet B, Staikowsky F, Offenstadt G. Prospective evaluation of self-extubation in a medical intensive care unit. *Intensive Care Med*. 1993;**19**:340-2.
5. Little LA, Koenig JC, Newth CJL. Factors affecting accidental extubations in neonatal and pediatric intensive care patients. *Crit. Care Med* 1990; **18**:163-5.
6. Boulain T. Unplanned extubations in the adult intensive care unit: a prospective multicenter study. Association des Réanimateurs du Centre-Ouest. *Am J Respir Crit Care Med* 1998;**157**:1131-7.
7. Ramalho Neto JM, Nascimento LB do, da Silva GNS *et al*. Accidental extubation and intensive care nursing. *J Nurs UFPE* 2014; **8**:3945-52.
8. Yeh SH, Lee LN, Ho TH, et al. Implications of nursing care in the occurrence and consequences

- of unplanned extubation in adult intensive care units. *Int J Nurs Stud* 2004;**41**:255–62.
9. da Silva PS, Fonseca MC. Unplanned endotracheal extubations in the intensive care unit: systematic review, critical appraisal, and evidence-based recommendations. *Anesth Analg* 2012;**114**:1003–14.
 10. Ripoll I, Lindholm CE, Carroll R, Grenvik A. Spontaneous dislocation of endotracheal tubes. *Anesthesiology* 1978; **49**:50–2.
 11. Curry K, Cobb S, Kutash M, Diggs C. Characteristics associated with unplanned extubations in a surgical intensive care unit. *Am J Crit Care* 2008;**17**:45–51.
 12. Hofso K, Coyer FM. Part 1: Chemical and physical restraints in the management of mechanically ventilated patients in the ICU: Contributing factors. *Intensive Crit Care Nurs* 2007; **23**:249–55.
 13. Tanios M, Epstein S, Grzeskowiak M, *et al.* Influence of sedation strategies on unplanned extubation in a mixed intensive care unit. *Am J Crit Care* 2014;**23**:306–14.
 14. Richmond AL, Jarog DL, Hanson VM. Unplanned extubation in adult critical care: Quality improvement and education payoff. *Crit Care Nurse* 2004;**24**:32–7.
 15. Yeh SH, Lee LN, Ho TH, *et al.* Implications of nursing care in the occurrence and consequences of unplanned extubation in adult intensive care units. *Int J Nurs Stud* 2004;**41**:255–62.
 16. Jarachovic M, Mason M, Kerber K, McNett M. The role of standardized protocols in unplanned extubations in a medical intensive care unit. *Am J Crit Care* 2011; **20**: 304–11.