

BRONCHIAL TOILET

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Introduction

- Endotracheal suctioning is a routine procedure carried out on all patients with artificial airways
- One of the most frequently performed procedures in ICU
- **BUT** it is not always based on current research recommendations
- and practice is inconsistent.

Introduction

- Endotracheal suctioning is:
 - an invasive
 - potentially harmful procedure that
 - if performed incorrectly, may result in serious complications for patients



Introduction

Remember:

- The ultimate goal of nursing is to provide evidence-based care that promotes quality outcomes



Introduction

The results of a 2002 study indicated that:

- many nurses failed to demonstrate an acceptable theoretical knowledge
- or competence in practice regarding endotracheal suctioning

Introduction

- Many nurses were unaware of recommended practice
- and some demonstrated potentially unsafe practice

Risks And Complications

Endotracheal suctioning is associated with many risks and complications including:

- Bleeding
- Infection
- Atelectasis

*Thomson, 2000 in CM Pederson et al. Intensive and Critical Nursing. 2009. 25;21-30
Pierce.2007 Management of the Mechanically Ventilated Patient. 2nd Edition*

Risks And Complications

- Hypoxaemia
- Cardiovascular instability (hyper- or hypotension)
- Arrhythmias
- Vagal stimulation

Risks And Complications

- Raised intracranial pressure
- Tracheal mucosa trauma
- Loss of ciliary function
- Patient pain and discomfort, fear, anxiety
- Bronchospasm

Types Of Suction Systems

Two types of suction systems, namely

- the open-
- and closed system

Open System

- requires disconnection from the ventilator
- the introduction of a single use suction catheter into the endotracheal tube
- strict aseptic technique
- operators to adhere to measures to protect themselves from the patients' secretion

Closed System

- obviates disconnecting the patient from the ventilator
- employs a multi-use suction catheter



Closed System

- a plastic sleeve encloses the suction catheter which protects the operator and the patients from secretions

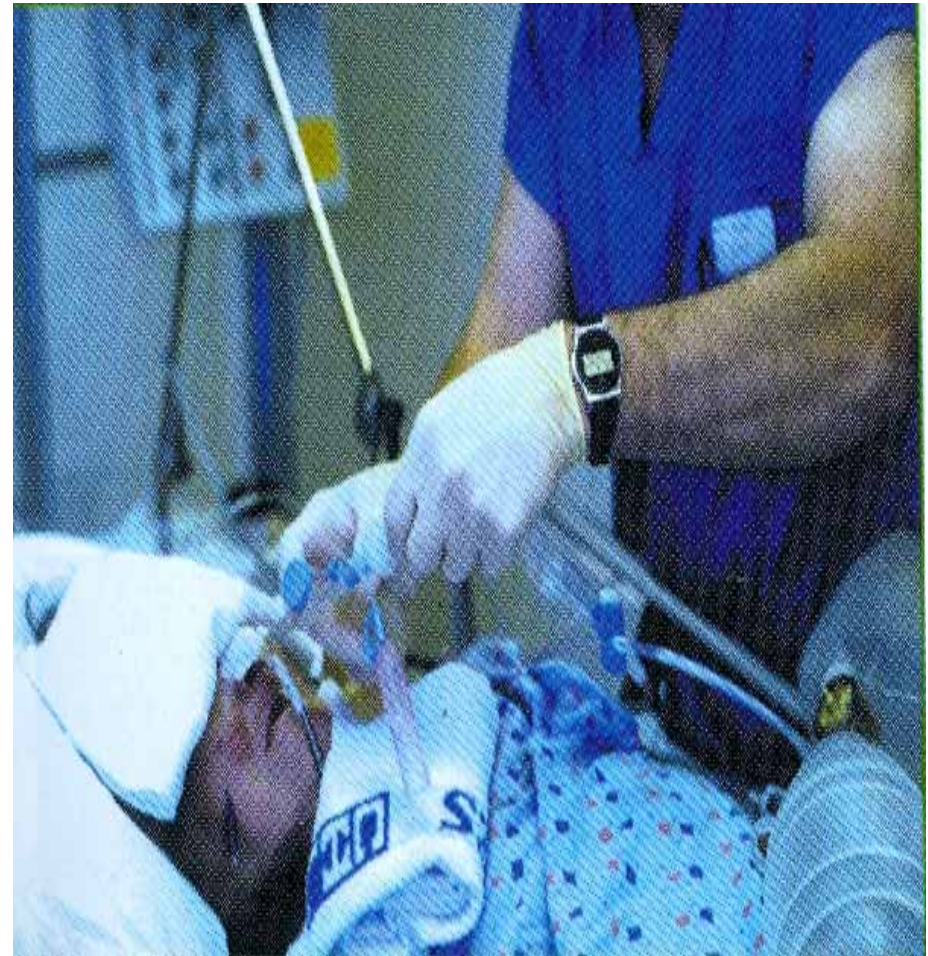


Benefits of Closed Suctioning System

- Decreased loss of PEEP or lung volume and therefore less de-recruitment and hypoxaemia
- No exogenous contamination of the inside of the endotracheal tube

Benefits Of Closed Suctioning System

- No barrier methods required
- Reduced potential for contamination of the HCP or environment with respiratory pathogens



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Drawbacks Of Closed Suctioning

- May be more expensive
- Increased colonisation of the suction catheter during multiple use, therefore there is contamination of the trachea with each use

Open /Closed?

- The evidence-based clinical practice guidelines state that there is no significant difference between open- or closed suctioning system regarding incidence of VAP
- a closed system is recommended to protect patients and HCPs from aerosolised secretions.

Changing Of Closed System Suctioning Catheters

- Although manufacturers have recommended that **in-line suction catheters** be changed every 24 hours, the Canadian Critical Care Trials Group conclude that scheduled daily changes or unscheduled changes of closed systems have no effect on the incidence of VAP.

Changing Of Closed System Suctioning Catheters

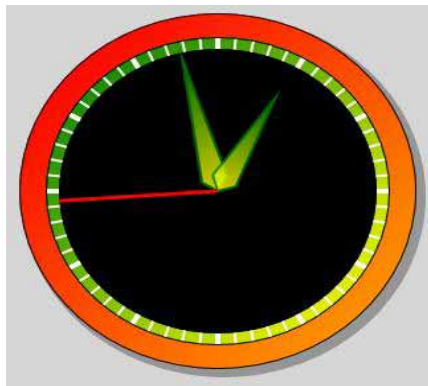
- They recommend that the system be changed for each patient as clinically indicated (e.g. soiled)



Muscedere et al,2008 Journal of Critical Care 23; 126 - 137

Frequency Of Suctioning

- Previously suctioning was carried out routinely every 1-2 hours
- Current recommendation is that patients should be suctioned only when necessary



Pederson et al. 2009 Intensive and Critical Nursing.25;21-30

Frequency Of Suctioning

Prospective randomised trial with 383 patients showed no significant difference in:

- ICU mortality
- respiratory infections
- duration of intubation
- or stay in the ICU in patients suctioned routinely or only when necessary.

Frequency Of Suctioning

- Suctioning prn does require the nurse to be able to determine the patient's need for suctioning

Pederson et al. 2009 Intensive and Critical Nursing.25;21-30

Grap and Glass. 1995 Ten tips for safer suctioning. 95 (5); 51-53

Day et al,2002 Intensive and Critical Care Nursing 18; 79 - 89

Frequency Of Suctioning



- Auscultation with a stethoscope should be part of the clinical assessment to establish need for suctioning

Frequency Of Suctioning

A minimum frequency of ET suctioning of 8 hourly has been recommended to:

- decrease the risk of not detecting retained secretions
- and of partial tube obstruction

Indications For Suctioning

- To maintain patency of the airway
- Suspected aspiration of gastric secretions
- To obtain a sample of pulmonary secretions

Indications For Suctioning

- Patient restless or anxious
- Course breath sounds on auscultation
- Absence of breath sounds on auscultation
- Patient spontaneously coughing



Indications For Suctioning

- Visible or audible secretions in the airway
- Deterioration of ABG without any other apparent reason

Carrol, 1993. Safe Suctioning. Registered Nurse 57(5) 32-36

Grap and Glass 1995. Ten tips for safer suctioning. 95(5) 51-53

Indications For Suctioning

- Increased peak inspiratory pressure on volume controlled ventilation
- A decrease in tidal volumes on pressure controlled ventilation

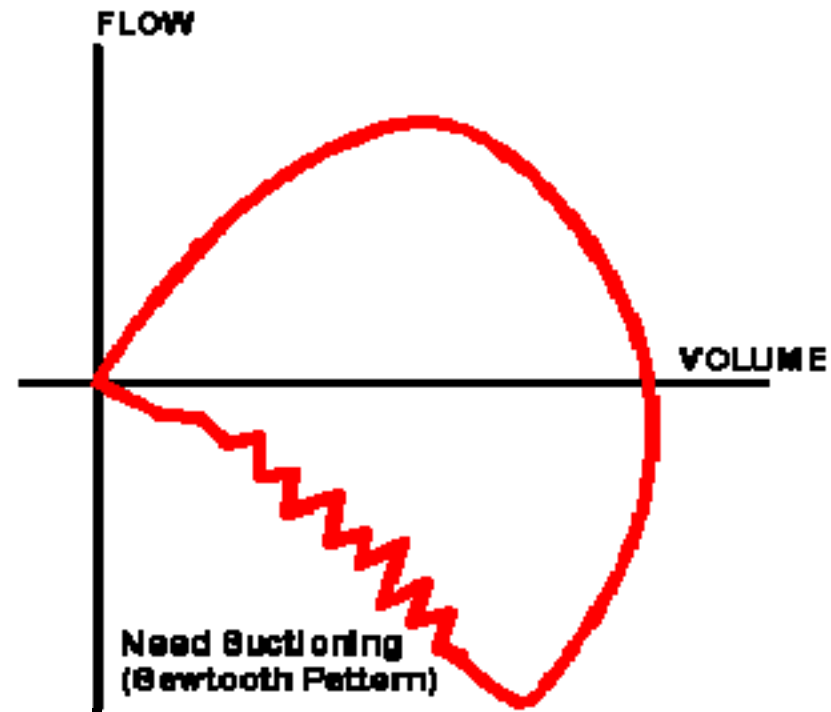
Carrol, 1993. Safe Suctioning. Registered Nurse 57(5) 32-3
Grap and Glass.1995 Ten tips for safer suctioning.95(5); 51-53

Indications For Suctioning

NB if high airway pressures or small tidal volumes persist, post suctioning the tube may be partially obstructed

Indications For Suctioning

- Retained secretions can be identified on a flow-volume loop on the ventilator screen (saw-tooth pattern)



Hyperoxygenation

- Involves the administration of oxygen at a greater percentage or fraction of inspired oxygen than the patient is currently receiving
- Hypoxaemia is the most common complication of suctioning

Pederson et al. 2009 Intensive and Critical Nursing. 25;21-30

Demir & Dramali. 2005 Journal of Advanced Nursing.. 51(3); 245 - 251

Hyperoxygenation

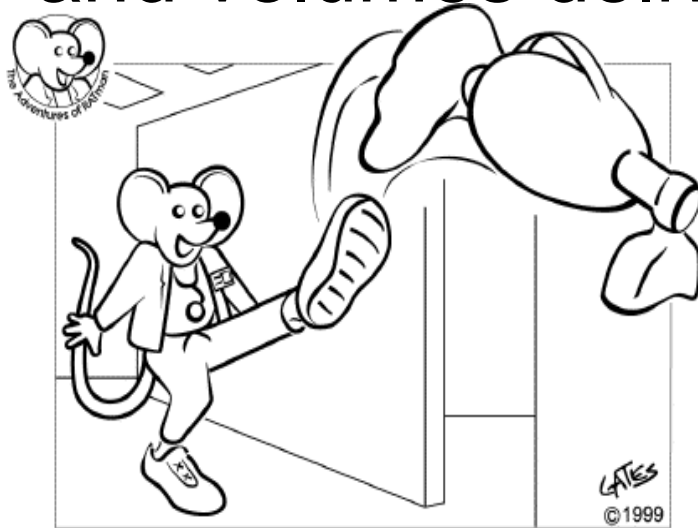
- Hyperoxygenation has been recommended to prevent hypoxaemia
- Usual recommendation is 100% oxygen
- O₂ concentration 20% above baseline may be as effective as 100%

Hyperoxygenation

- Hyperoxygenating for three to five minutes prior to suctioning should be adequate to prevent hypoxaemia
- Hyperoxygenation may be achieved via:
 - ventilator
 - manual resuscitation bag

Hyperoxygenation

- Hyperoxygenating via the ventilator may be better than via a manual resuscitation bag (due to unreliability of the pressures and volumes delivered via the MRB)



It must be football season!

Pedersen et al 2009 Intensive and Critical Care Nursing 25, 21-30

Wood 1998. Intensive and Critical Care Nursing 14, 24 – 136

Rogge, Heart Lung. 1989 Jan;18(1):64 -71

Infection Control

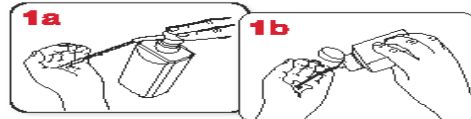
- Risk of infection must be minimised for both the patient and the nurse
- Is an invasive procedure associated with an increase risk of infection
- Aseptic technique is essential
- Aprons, goggles and sterile gloves should be worn

Infection Control

- Wearing gloves does not replace the need for hand washing
- Hands should be washed/decontaminated before and after the procedure

Hand Decontamination

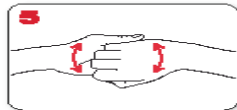
How to handrub? WITH ALCOHOL-BASED FORMULATION



Apply a palmful of the product in a cupped hand and cover all surfaces.



Rub hands palm to palm



backs of fingers to opposing palms with fingers interlocked



right palm over left dorsum with interlaced fingers and vice versa



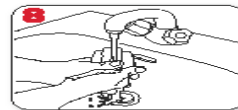
rotational rubbing of left thumb clasped in right palm and vice versa



palm to palm with fingers interlaced



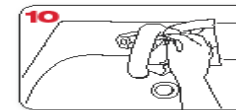
rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa



rinse hands with water



dry thoroughly with a single use towel



use towel to turn off faucet



20-30 sec



...once dry, your hands are safe.



40-60 sec



...and your hands are safe.



WHO acknowledges the Hôpitaux Universitaires de Genève (HUG), in particular the members of the Infection Control Programme, for their active participation in developing this material.



October 2006, version 1.

NACI Instillation

- Commonly performed procedure, but remains controversial
- Performed to dilute and mobilise pulmonary secretions and lubricates the ETT
- Little evidence that saline instillation has any effect on viscosity of secretions

NACI Instillation

- Saline instillation prior to suctioning dislodges more viable bacteria than suctioning without saline instillation which could lead to VAP
- Amount of saline instilled varies in the literature from as little as 2 mls to 20 mls per instillation

Day et al, 2002 Intensive and Critical Care Nursing 18; 79 – 89

Wood C. 1998. Intensive And Critical Care Nursing 14, 124 – 136

NACI Instillation

- Saline installation of 8mls before tracheal suctioning decreases the incidence of VAP

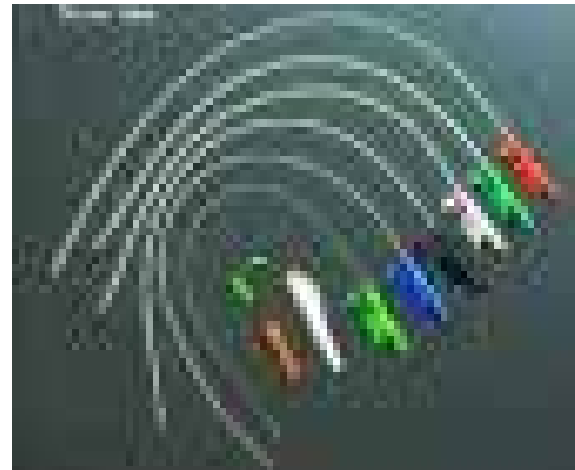
Caruso et al 2009. Crit Care Med 37(1):32-37

NaCl Installation

- Routine instillation of NaCl prior to suctioning is not recommended due to increased risk of infections and patient discomfort
- Only reliable effect of procedure is cough stimulation

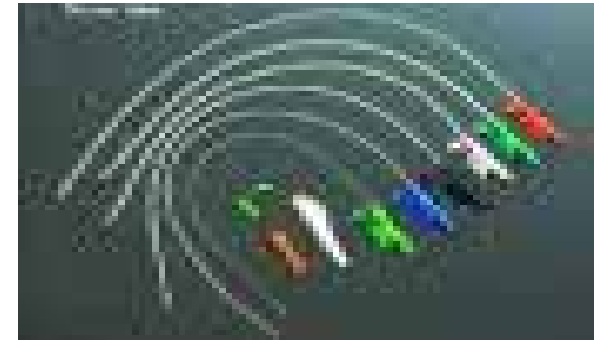
CATHETER SIZE

- Suction catheter should be no more than one half ($1/2$) the internal diameter of the artificial airway this allows air to enter the lungs during suctioning and helps protect against atelectasis and excessive negative pressure



Day et al, 2002. Intensive and Critical Care Nursing 18; 79 - 89

Catheter Size



- Two ways are advocated for calculating suitable catheter size:
 - size of tracheal tube – 2 x 2 e.g. Size 8 tube, $8 - 2 = 6$. $6 \times 2 = 12$.
 - tracheal tube size x 2. e.g. Size 8 tube, $8 \times 2 = 16$. Therefore a size 12-16 suction catheter should be used

Pedersen et al 2009 Intensive and Critical Care Nursing 25, 21-30
Day et al, 2002 Intensive and Critical Care Nursing 18; 79 - 89

Patient Preparation



Explain:

- Procedure to patient
- The procedure may be uncomfortable and that the patient may experience shortness of breath
- The patient's role in assisting with secretion removal by coughing during suctioning

AACN procedure manual, 2001

Kelleher et al. Journal of Clinical Nursing 2008. 17; 360 - 369

Patient Preparation



- If needed, analgesia should be administered prior to suctioning to ensure co-operation and allow adequate cough
- Sedation, if necessary, to reduce stress and anxiety
- Reassure patient continuously throughout procedure

Patient Preparation

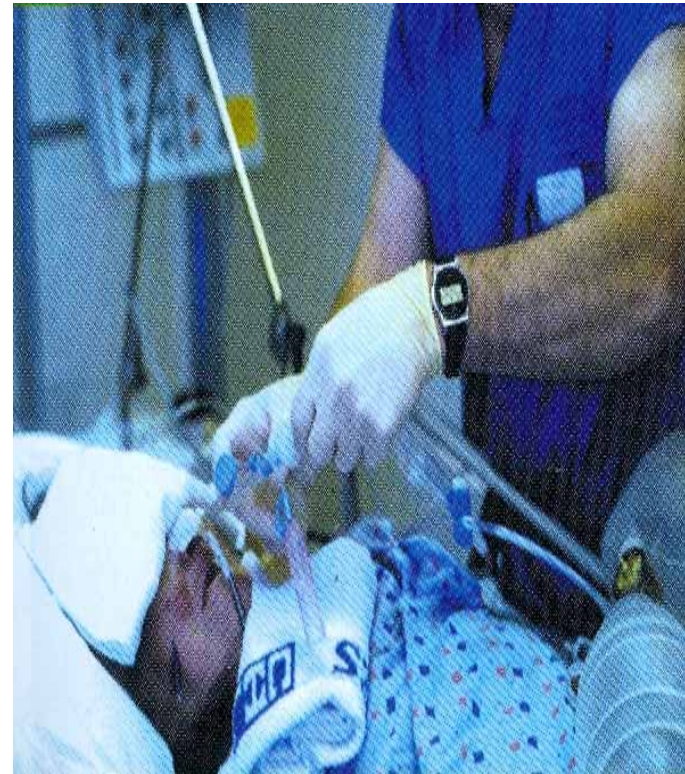


- Patient should preferably be in upright or semi-upright position (30-40°) in order to promote lung expansion and enable effective coughing

Technique

The catheter should be:

- Inserted smoothly and gently without applying suction
- Advanced until resistance is met (carina) then withdrawn about 1 cm before suction is applied



Technique

- Rotation of the catheter on withdrawal is controversial but may remove more secretions
- On withdrawal, continuous suctioning is recommended as intermittent suctioning may not be effective and does not reduce mucosal trauma

Pedersen et al 2009 Intensive and Critical Care Nursing 25, 21-30

Pierce.2007 Management of the Mechanically Ventilated Patient. 2nd Edition

Negative Pressure

Excessive negative pressure has been associated with:

- hypoxaemia and atelectasis causing
 - tracheal damage
 - ulceration
 - necrosis

Negative Pressure

The most commonly recommended negative pressure ranges from 9 -20 kPa or 70 – 150 mmHg



Day et al,2002 Intensive and Critical Care Nursing 18; 79 – 89
Wood, 1998 Intensive and Critical Care Nursing 14, 124 – 136

Number Of Passes

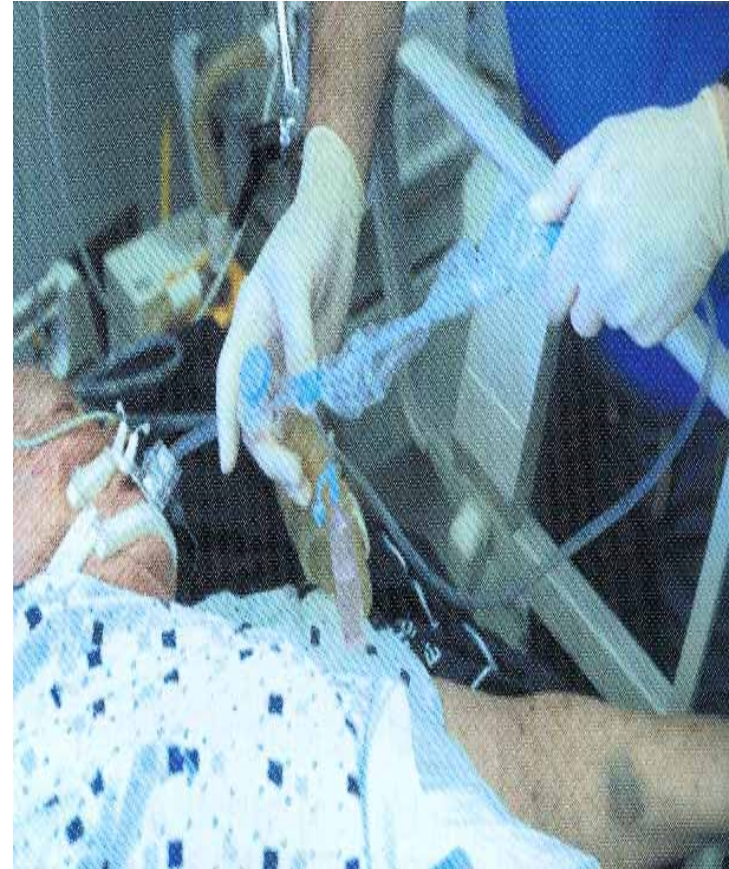
- Generally no more than three passes per suction session is recommended
- Saturation should return to pre-suction level before another catheter pass is attempted



Number Of Passes

- It has been suggested that there should be an interval of at least 30 seconds between each catheter pass

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Duration Of Suction Pass

- Increase duration of suctioning has been associated with hypoxaemia, cardiac arrhythmias and mucosal damage
- It has been recommended that a single catheter pass should be less than 10 – 15 seconds



Pedersen et al 2009 Intensive and Critical Care Nursing 25, 21-30

Dean, 1997 Accident and Emergency Nursing 1997 5: 92 - 98)

Cuff Pressure

- Cuff has two main functions:
 - it ensure air tightness
 - protects the lower airway from aspiration of infected oropharyngeal secretion

Cuff Pressure

- Normal intracuff pressure:
22-28cm H₂O
- Aim to prevent aspiration but not so high to impeded tracheal blood flow



Duguet2007 Intensive Care Med 33:128-132

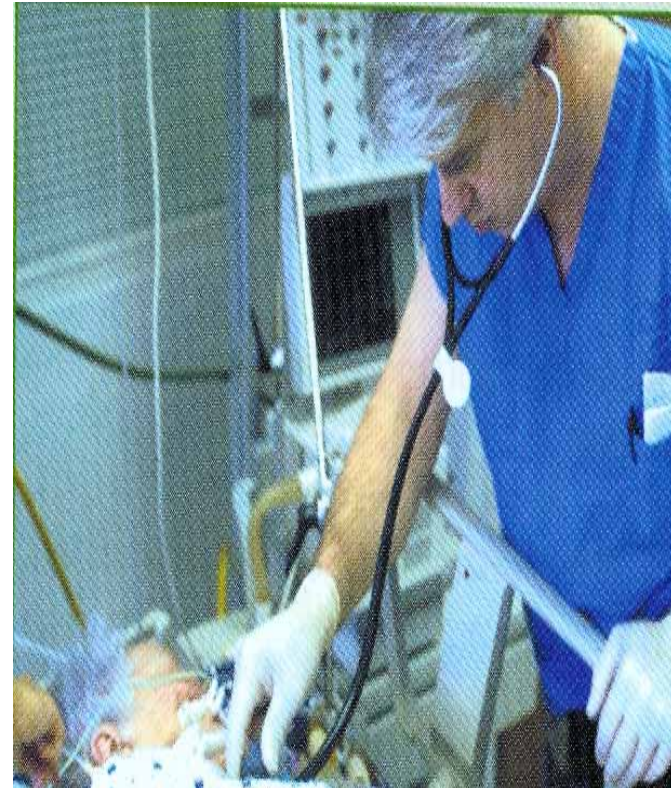
Stewart 2003 AANA Journal December (71(6):443-447

Post Suctioning

- Reassure the patient
- Return to pre-suctioning oxygen level
- Check ventilator parameters and alarm settings
- Chart procedure and any adverse event/s that may have occurred
- Chart secretions
 - colour
 - odour
 - amount
 - consistency

Post Suctioning

- Assess patient
 - vital signs
 - chest
 - auscultation
- Dispose of suction equipment
- Wash hands



*Day et al,2002 Intensive and Critical Care
Nursing 18; 79 – 89*

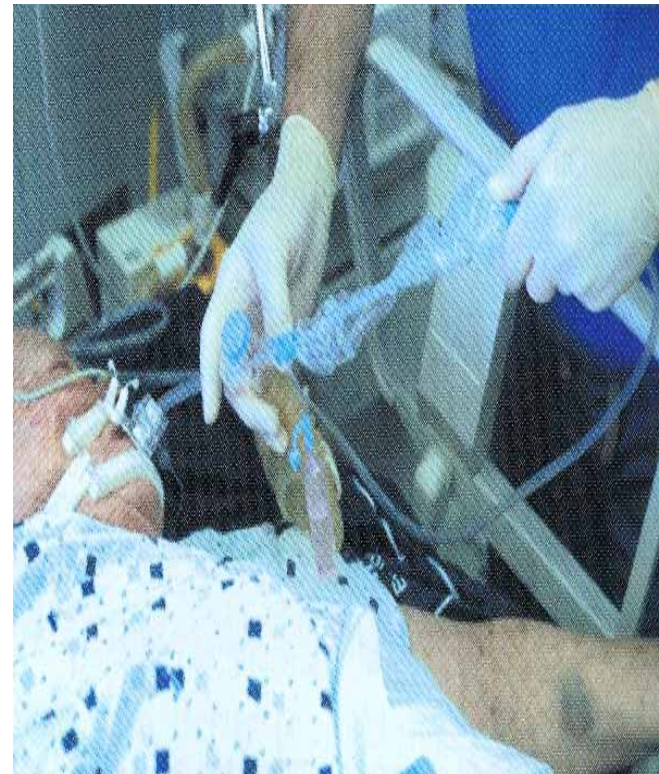
Post Suctioning

NB:

- If the patient is hypoxic post - suction a recruitment manoeuvre should be carried out (providing there are no contra-indications) by a doctor or nurse experienced with the technique

Post Suctioning

- In patients who desaturate following suctioning, use of a closed suctioning system may be advantageous



Conclusion

- Suctioning is one of the most frequently performed procedures in ICU
- Endotracheal suctioning practices vary widely
- Suctioning is associated with many risks and complications

Conclusion

- Responsibility for suctioning rests with the critical care nurse and any knowledge deficits may result in poor practice and dangerous suctioning techniques
- In order to be accountable for this basic ICU skill, nurses should be aware of the controversies and potential hazards, and be able to implement safe, evidence-based suctioning practices



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