Tracheostomy

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Tracheostomy:

- Definition
- History
- Epidemiology
- Indications
- Contraindications
- Tracheal Anatomy
- Timing

- Advantages
- Disadvantage
- **Types**
- **Sizes**
- **MATERIAL**

Definition :

Tracheostomy is the creation of an opening in the anterior neck into the trachea with insertion of an indwelling tube to facilitate airflow or evacuation of secretions.

History:

- The first description of tracheostomy goes back nearly 6000 years.
- The word “trachea” is derived from the Greek term trakheia arteria (rough artery), or “windpipe,” as the ancient Greeks thought the arteries were filled with air.
- Tracheostomy refers to a permanent opening, whereas tracheotomy refers specifically to an incision in the trachea.
- One of **the most frequently** performed procedures in critically ill patients.
- (PDT) using the Seldinger technique, most notably by Ciaglia and colleagues in 1985.

Epidemiology:

- More than 100,000 tracheostomies are performed in the United States every year.
- It is estimated that 10% of patients receiving mechanical ventilation for at least 3 days eventually need tracheostomy

Indications:

• BOX 14.1 Indications for Tracheostomy

1. Prolonged mechanical ventilation
2. Failure of extubation
3. Inability to clear secretions/pulmonary toiletry
4. Severe traumatic brain or cervical spine injury
5. Upper airway obstruction

Emergent tracheostomy:

- Patients with acute upper airway obstruction who failed intubation with an endotracheal tube or in whom an endotracheal tube cannot be placed (eg, obstructing edema or mass)
- Patients who have undergone an emergency cricothyrotomy
- Patients with select fractures of the face and neck (eg, LeFort III fracture of the mid face)
- Patients with penetrating laryngeal trauma

Elective Patients:

- Patients with severe obstructive sleep apnea who are refractory to other therapies.
- Patients with severe subglottic stenosis unresponsive to conventional therapies
- Patients with severe vocal cord paralysis who are refractory to other therapies.

Contraindications:

• BOX 14.2 Contraindications for Tracheostomy

Absolute

1. Inexperienced operator
2. Infected insertion site
3. Uncorrected coagulopathy
4. No informed consent

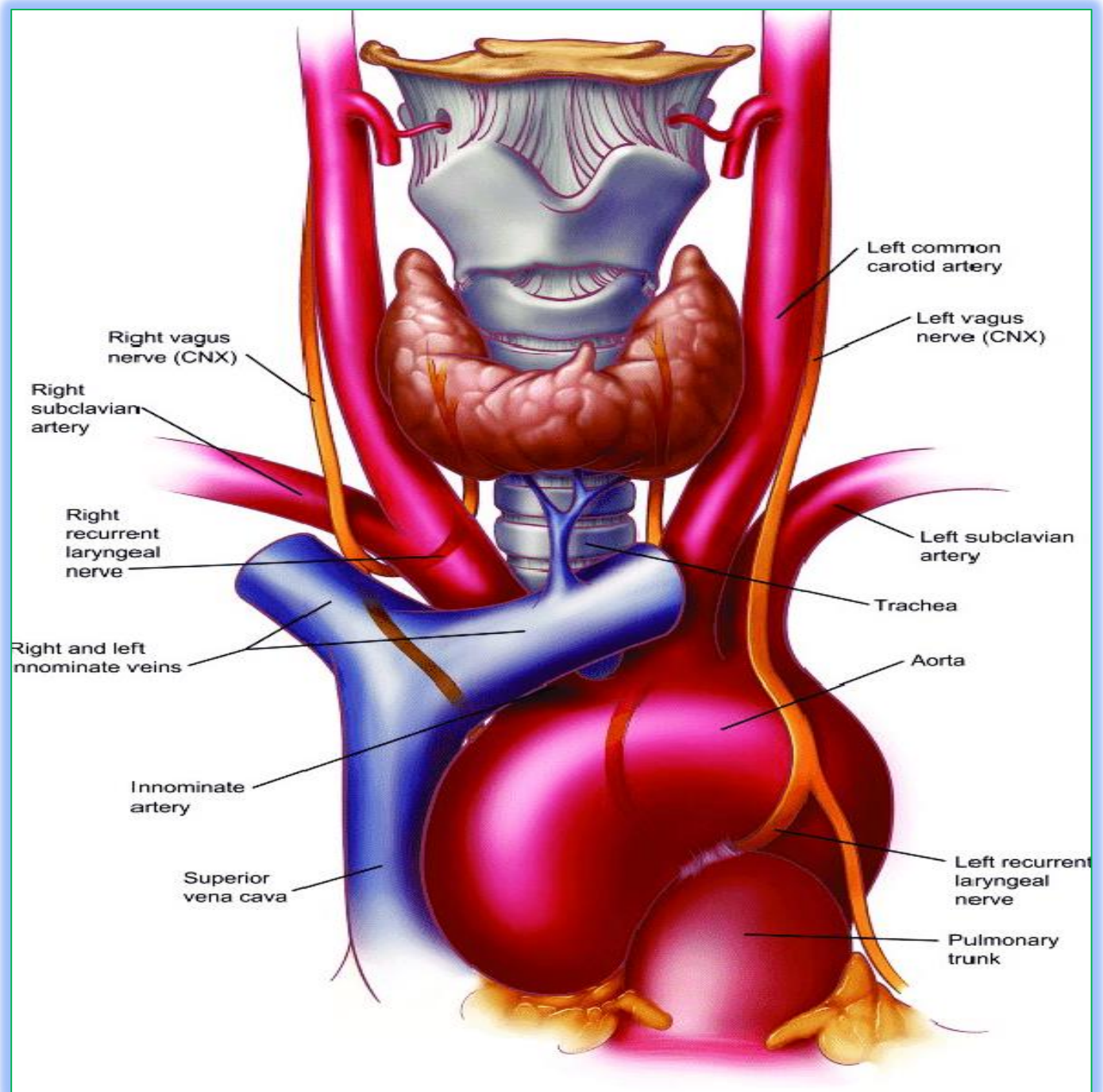
Relative Contraindications (Favoring Surgical Tracheostomy)

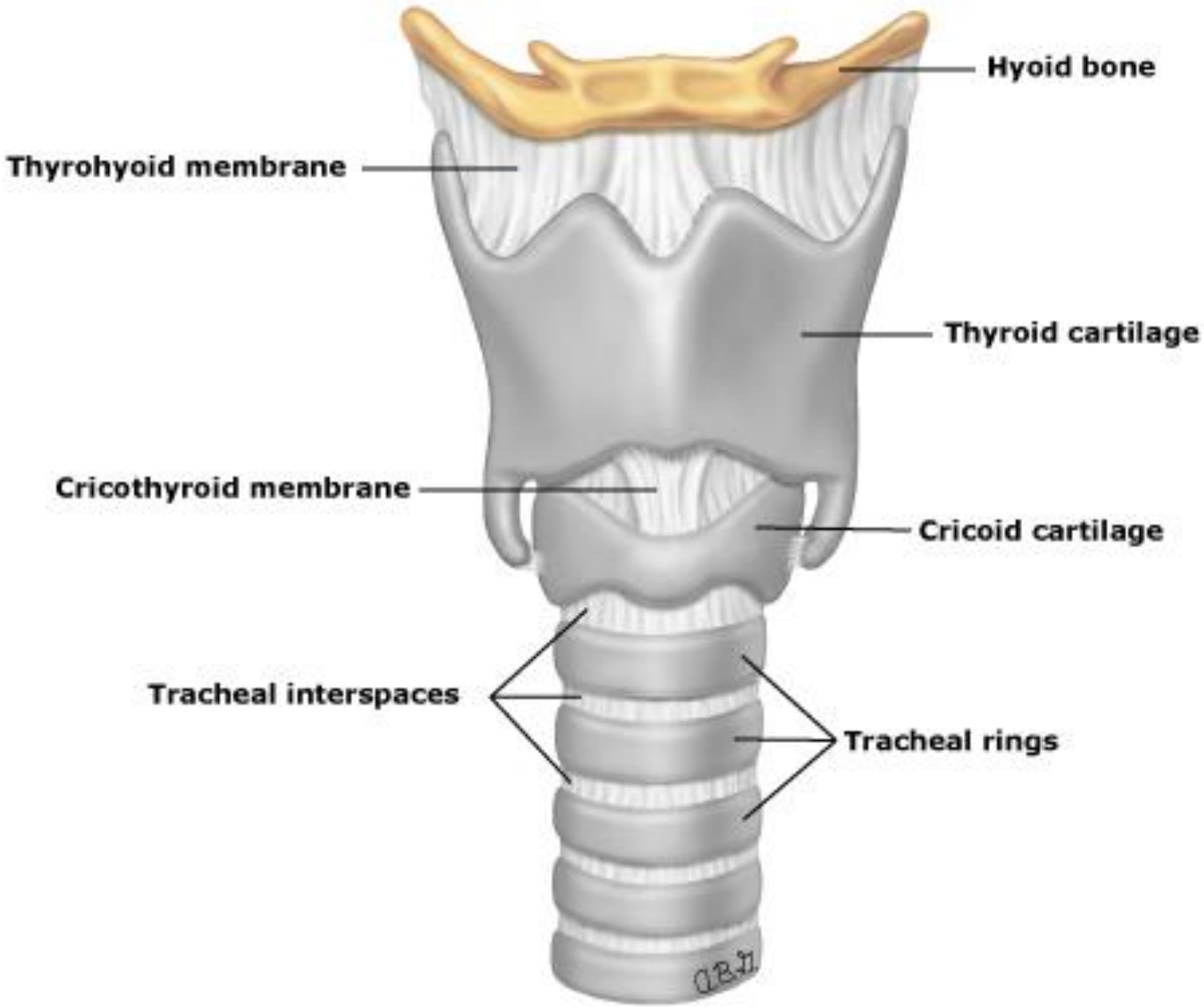
5. Difficult anatomy
6. Unstable cervical spine
7. Presence of pulsatile vessels at the insertion site
8. High PEEP or FIO_2 requirements
9. Enlarged thyroid gland

FIO_2, Fraction of inspired oxygen; *PEEP,* positive end-expiratory pressure.

Tracheal Anatomy:

- Knowledge of the patient's anatomy is crucial before any surgical procedure.
- In the case of tracheotomy, there are two main factors to consider:
- 1- The site of the procedure, which is surrounded by major vessels and vital organs
- 2- The critical role of the trachea itself


Left common carotid artery
Left vagus nerve (CNX)
Right vagus nerve (CNX)
Right subclavian artery
Right recurrent laryngeal nerve
Left subclavian artery
Trachea
Right and left innominate veins
Aorta
Innominate artery
Superior vena cava
Left recurrent laryngeal nerve
Pulmonary trunk


Hyoid bone
Thyrohyoid membrane
Thyroid cartilage
Cricothyroid membrane
Cricoid cartilage
Tracheal interspaces
Tracheal rings

Timing:

- The timing of replacing a tracheostomy has been controversial
- Early tracheostomy : has been generally defined as within 3 to 10 days
- Late tracheostomy (after 10 days)

Optimal time:

There is no optimal time for transition to tracheostomy,

and practice varies among clinicians, with most transitioning between one and three weeks following intubation

Timing:

- We typically do not perform a tracheostomy before 10 days. This preference is based on the rationale that early tracheostomy is of no proven benefit and may lead to unnecessary surgery and prolonged mechanical ventilation in patients who may otherwise be extubated.
- We also believe that patients should not be ventilated via an endotracheal tube for longer than three weeks unless they are either unstable or unlikely to benefit from tracheostomy.

Timing in mechanically ventilated patients:

- We **individualize the timing** of tracheostomy according to :
- The clinical circumstances and the patient's preference.
- For most patents on mechanical ventilation, we suggest tracheostomy be performed between 7 and 21 days(Grade 2C).

Predicted need for prolonged mechanical ventilation:

- ●Cervical spine trauma (especially trauma resulting in transection of the spinal cord at C3-5)
- ●Traumatic or hypoxic brain injury
- ●General and multiple traumas
- ●Severe, progressive, or slowly resolving neuromuscular conditions (eg, bulbar amyotrophic lateral sclerosis, severe Guillain Barré syndrome)

Special consideration:

- **Later tracheostomy** placement may be reasonable in patients with COVID-19
- **early tracheostomy** may be justified in patients with:
- A predicted need for long-term mechanical ventilation
- Patients with extensive head and neck tumors or trauma

Advantages of Tracheostomy:

- Safer airway protection
- Increases patient mobility by decreasing the risk of accidental extubation
- The occurrence of lesions resulting from tracheal mucosal abrasion and laryngeal damage is low
- Easier airway suctioning
- Secretions management improve pulmonary secretion management
- Better oral hygiene

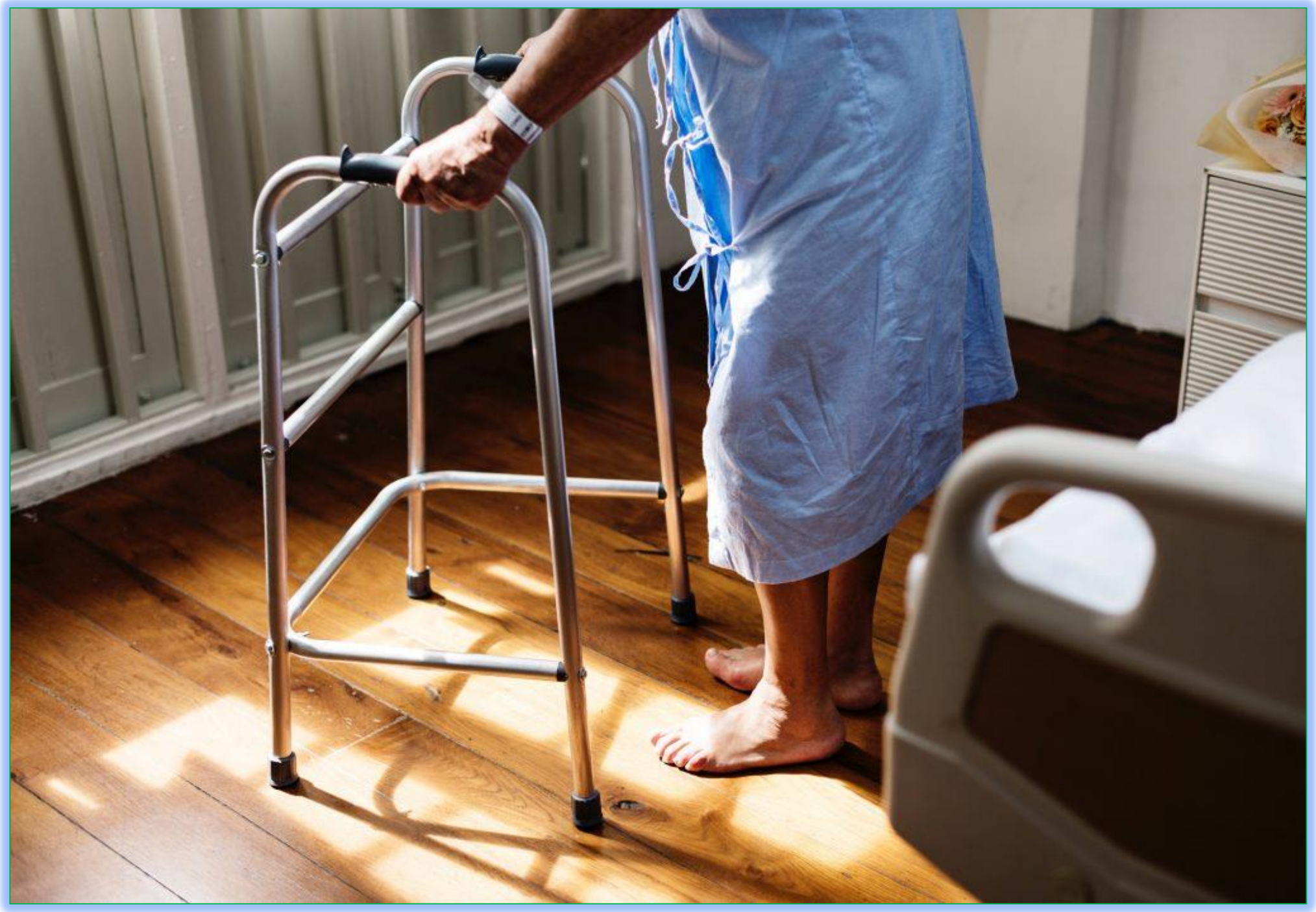
Advantages of Tracheostomy:

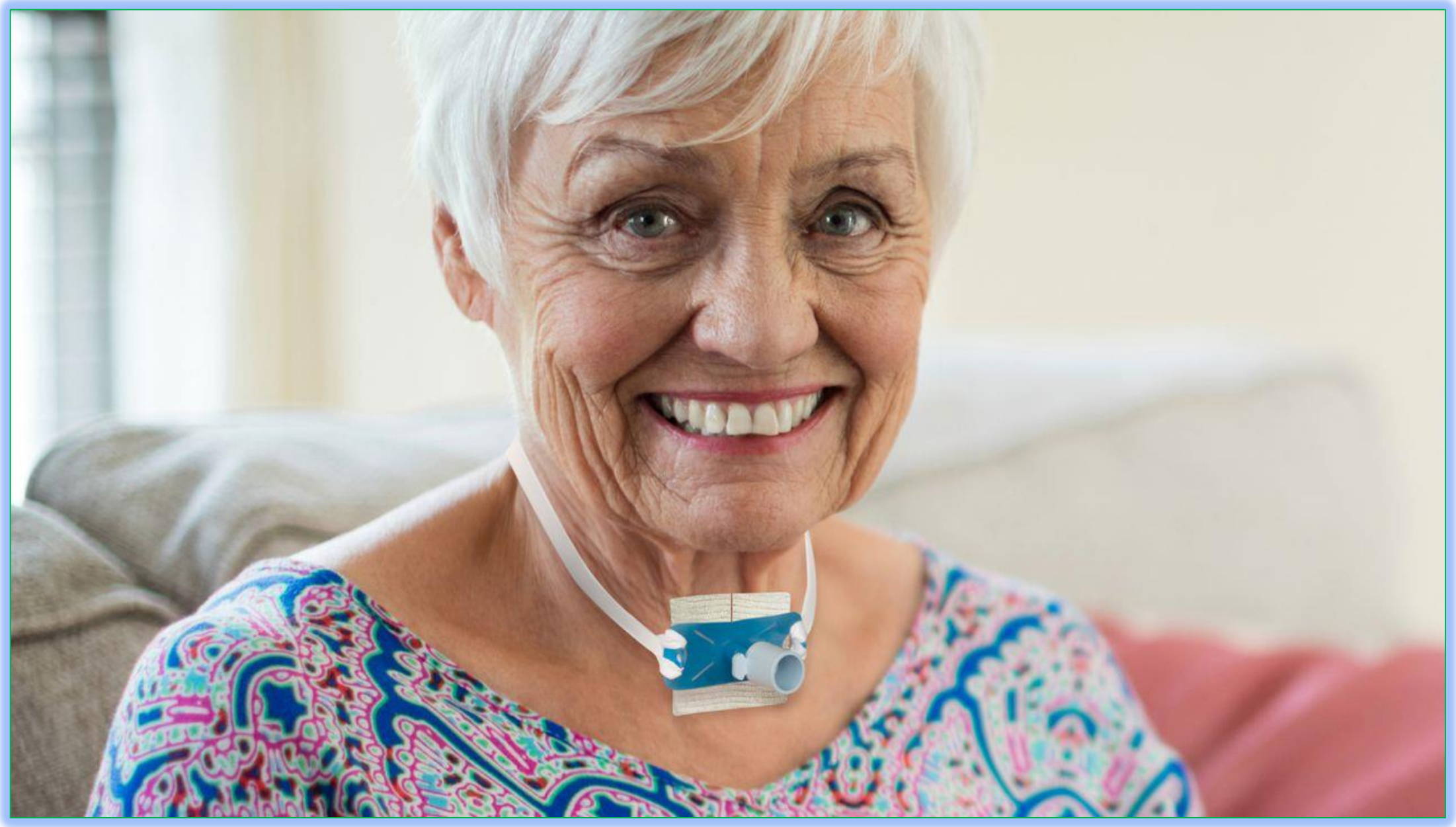
- Better patient comfort
- Facilitate communication with family members and nurses.
- Patients can be mobilized earlier
- More easily faster return to oral feeding
- Shorter nasogastric tube dwell time
- Reduced risk of tracheoesophageal fistula occurrenc

Advantages of Tracheostomy:

- Use of a tracheostomy tube can aid in weaning from MV
- Reduce airflow resistance
- faster resumption of autonomous respiration
- Less use of sedative agents
- Fewer days on the ventilator
- Shorter length of stay in the ICU
- Reduced use of resources


dynamex





Title:

Advantages and disadvantages of tracheostomy versus tracheal intubation

Advantages and disadvantages of tracheostomy versus tracheal intubation

	Tracheostomy	Intubation
Advantages	Ease of replacement (once tract has formed) Speech, mobility, and swallowing enhanced Patient can be nursed outside of ICU Ease of suctioning Patient comfort	Rapid insertion by skilled consultant in most settings Lack of need for surgical procedure (risk, expense) Lack of stomal complications
Disadvantages	Complications at cuff site Stomal complications Possible contribution to ultimate laryngeal injury Tracheo-innominate artery fistula formation Possible increase in pulmonary infections Access to mediastinum by infectious agents after local surgery High mortality for inadvertent decannulation before tract formation	Complications at cuff site Laryngeal complications Replacement requires skill at all times Generally requires ICU level supervision Injuries at nose or mouth

Graphic 76699 Version 2.0

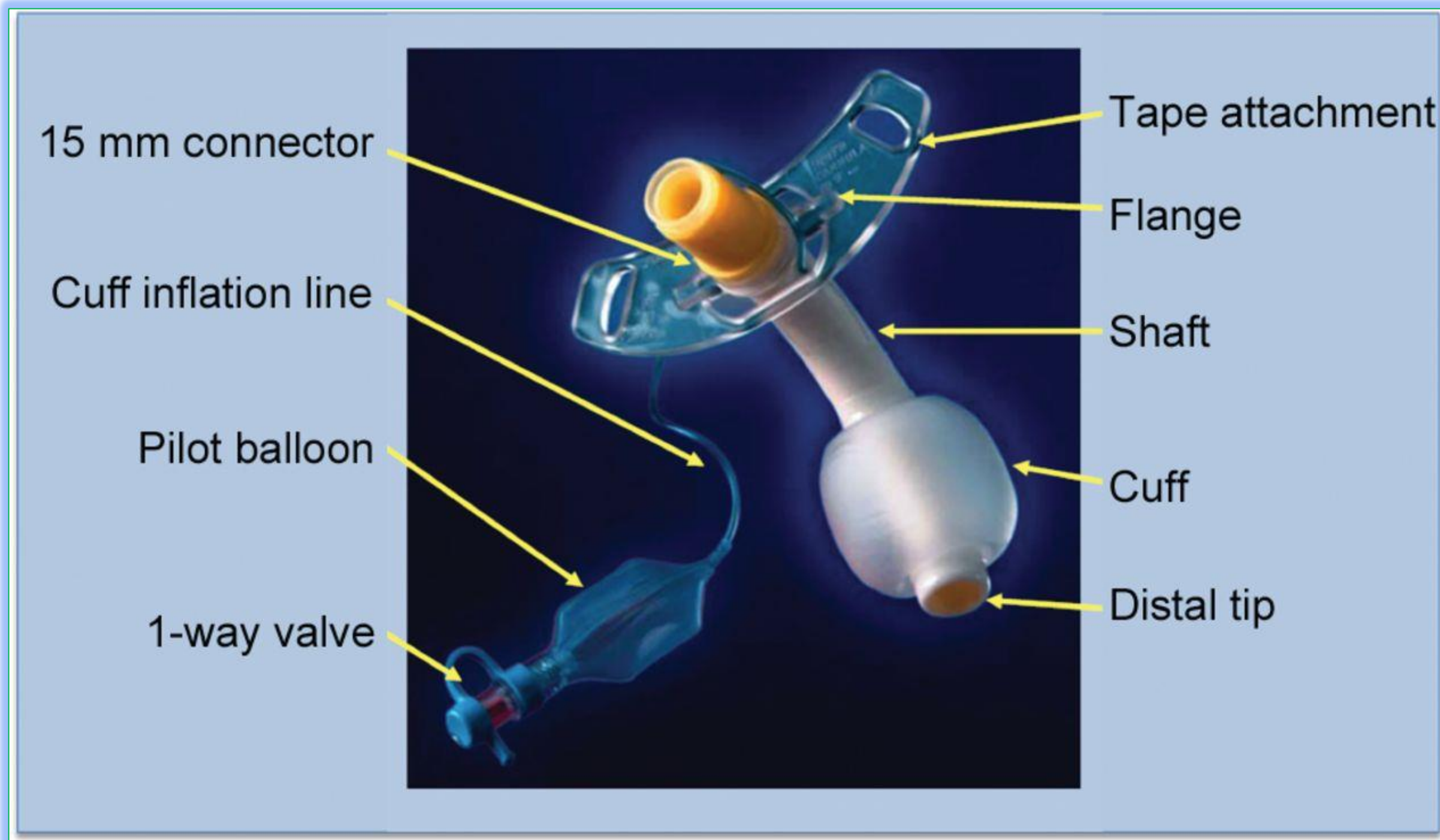
Unclear benefits:

- Risk of aspiration and pneumonia
- Mortality

There are several different types of tracheostomy tubes:

- Cuffed tracheostomy tubes.
- Uncuffed tracheostomy.
- Tracheostomy tubes with disposable inner cannulas.
- Tracheostomy tubes with reusable inner cannulas.
- Fenestrated tracheostomy tubes.
- Tracheostomy tubes with a proximally extended length.
- …

Types:


15 mm connector
Cuff inflation line
Pilot balloon
1-way valve
Tape attachment
Flange
Shaft
Cuff
Distal tip


Cuff (balloon)
Syringe with air
Inflation line
Outer cannula
Neck flange
Cuff port
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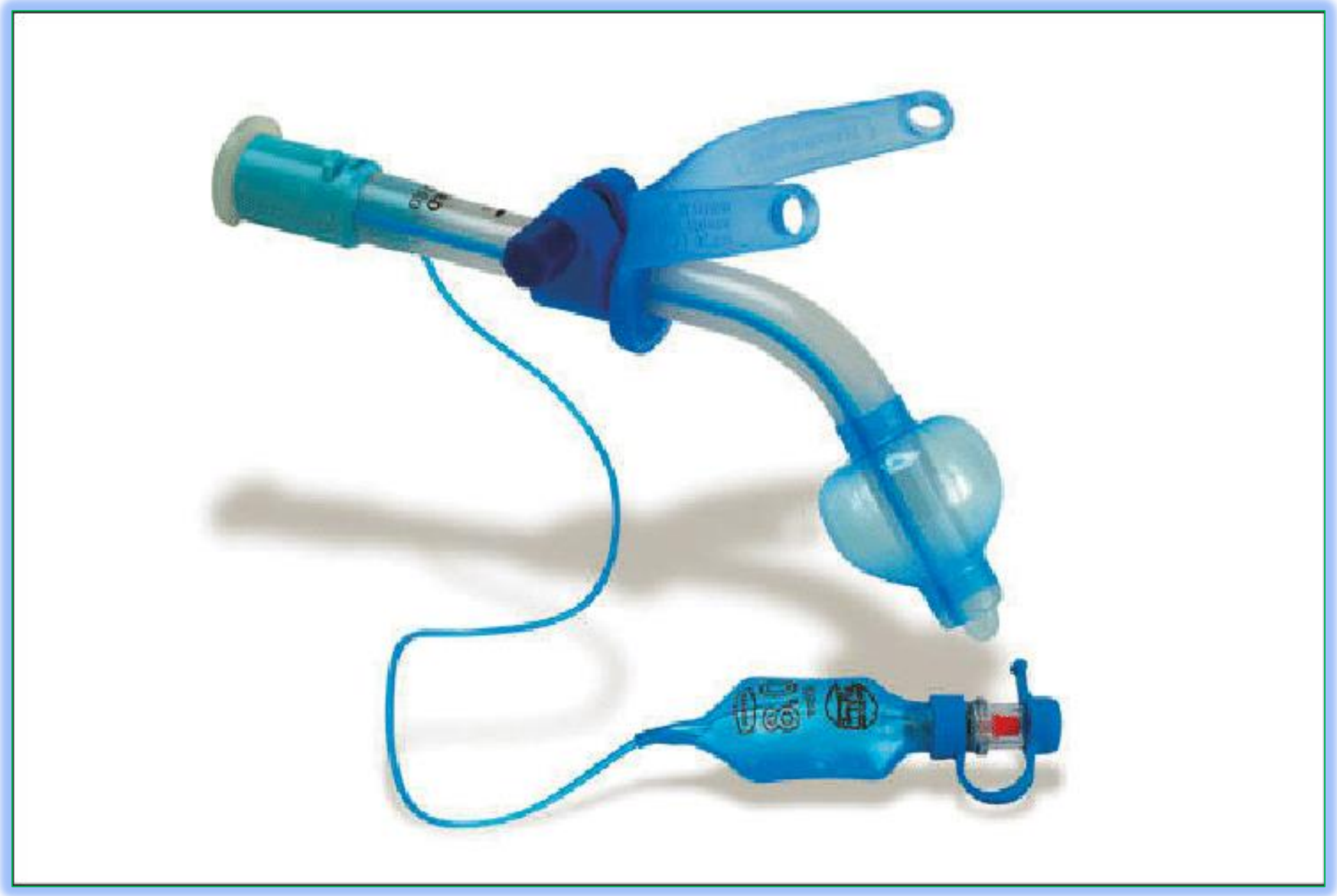
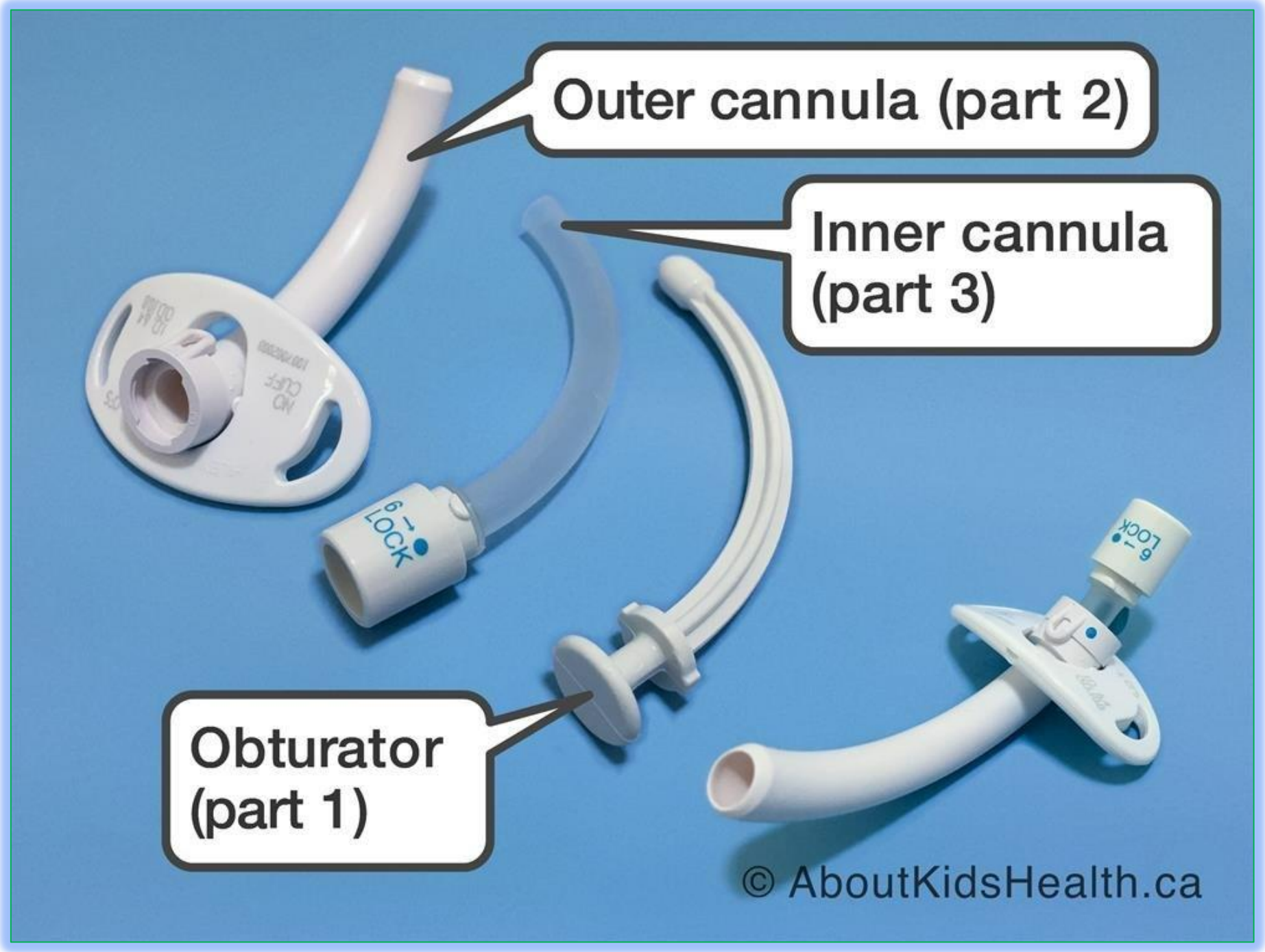



Shiley
XLT Distal


Outer cannula (part 2)
Inner cannula (part 3)
Obturator (part 1)
LOCK
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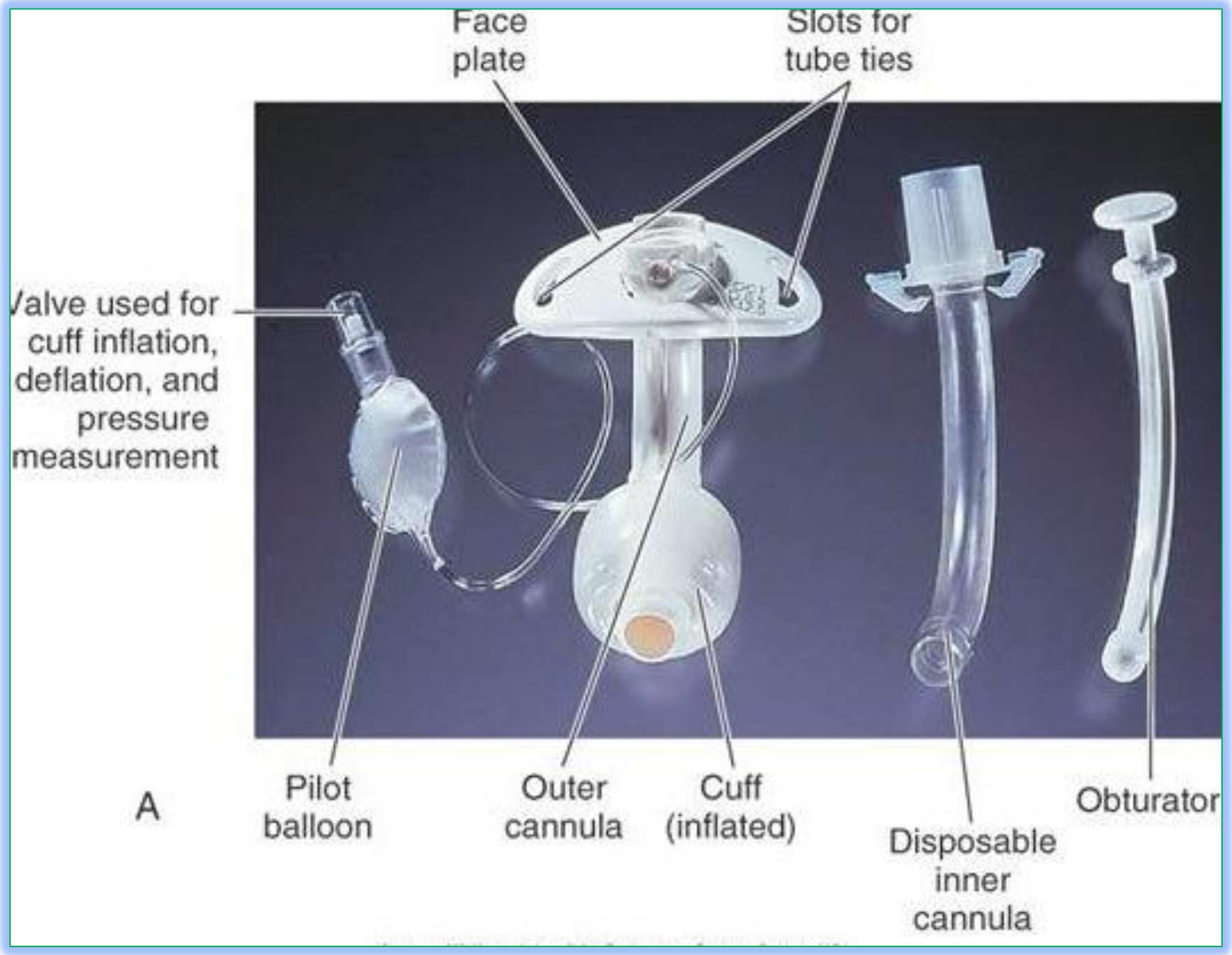

Face plate
Slots for tube ties
Valve used for cuff inflation, deflation, and pressure measurement
Pilot balloon
Outer cannula
Cuff (inflated)
Disposable inner cannula
Obturator
A


Shaft
Fenestration
Outer Cannula
Cuff
Pilot Balloon
Faceplate
Inner cannula
PracticalSLPInfo.com

Tracheostomy tube sizes :

- The outer diameter of the tracheostomy tube should be about ⅔ to ¾ of the tracheal diameter.
- As a general rule, most adult females can accommodate a tube with an outer diameter of 10mm, whilst an outer diameter of 11mm is suitable for most adult males.
- The average size of the tube for an adult male is 8.0, and an adult female is 7.0, though this is somewhat an institution dependent practice.

Sizes:

Jackson Size	Inner Diameter With IC (mm)	Inner Diameter Without IC (mm)*	Outer Diameter (mm)
4	5.0	6.7	9.4
6	6.4	8.1	10.8
8	7.6	9.1	12.2
10	8.9	10.7	13.8

*The inner diameter of the outer cannula is for narrowest portion of the shaft.
IC = inner cannula (Adapted from Shiley Quick Reference Guide, courtesy of Tyco Healthcare, Pleasanton, California.)

Sizes:

Bivona Tubes

Size (mm)	ID (mm)	OD (mm)	Length (mm)
5.0	5.0	7.3	60
6.0	6.0	8.7	70
6.5	6.5	9.4	70
7.0	7.0	10.0	80
7.5	7.5	10.4	80
8.0	8.0	11.0	88
8.5	8.5	11.8	88
9.0	9.0	12.3	98
9.5	9.5	13.3	98

Sizes:

Size	ID (mm)	OD (mm)	Length (mm)
4	5.0	9.4	62
6	6.4	10.8	74
8	7.6	12.2	79
10	8.9	13.8	79

tracheostomy tubes material :

The most commonly used tracheostomy tubes are made from :

- polyvinyl chloride (PVC)
- silicone
- polyurethane

PVC trachestomy tubes:

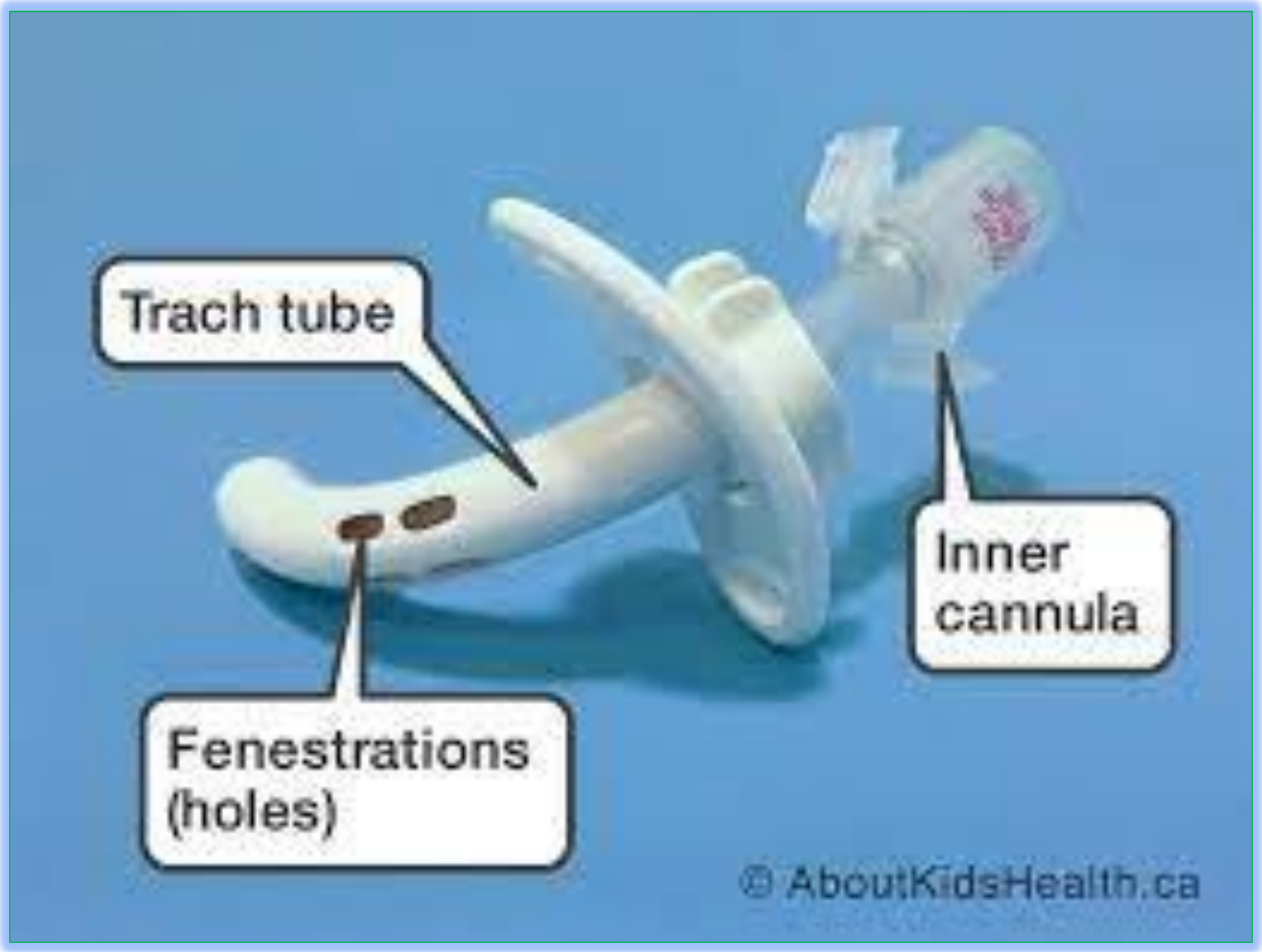
- **PVC** softens at body temperature
- Conforming to patient anatomy
- Centering the tube in the trachea

Metal trach tubes :

- Metal tubes are constructed of silver or stainless steel.
- They are not used commonly due to expense, rigid construction, and lack of a cuff and a 15-mm connector to attach a ventilator.
- Less infection risk (the surface of a metal trach is less porous than a plastic trach and less likely to grow germs)
- Thin wall (the wall of the tube is thinner compared to the plastic trachs, allowing for greater airflow through the airway)

Which is better PVC or silicone endotracheal tube?

- PVC plastic tubes are much stiffer than the silicone tubes.
- Silicone tubes easily bend to conform to the trachea while PVC tubes are manufactured with a curve already in them.
- Once the PVC tubes have been in the trachea for a while, the plastic softens and becomes more pliable


Trach tube
Inner cannula
Fenestrations (holes)
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