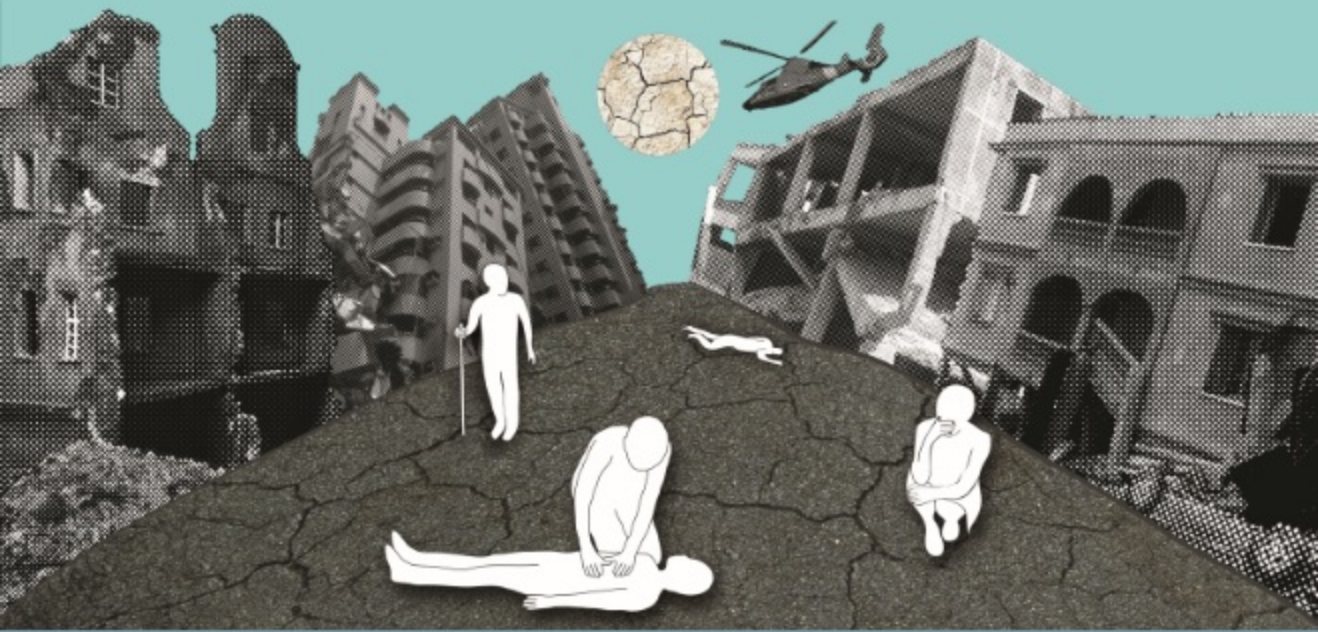


**Cardiac Life Support Workshop**  
**Disaster Management Response Workshop**

**醫療急救技能培訓班**  
**災難應變處理工作坊**

2020.8.2 & 8.15



# Adult, Child and Infant CPR

Dr Cheang Teng Fong,  
Emergency physician,  
AHA ACLS, BLS instructor  
2/8/2020

- \* Concepts and basic technique
- \* Changes to 2015 guidelines
- \* BLS evaluation

Cardiovascular disease is one the most 10 killer. There is most sudden arrhythmia cases as ventricular tachycardia or fibrillation. If no emergency management to cardiac arrest, death is forseeing in some minutes.

As brain will be damaged in less than 4 minutes after cardiac arrest. Brain death will come within 7-10minutes.

4mins -> Brain is going to die  
7-10min -> Brain is dead

### Time is Brain

### When to start CPR?

No response  
No breath  
No pulse!

### Key point for CPR

Cardiac Pulmonary Cerebral Resuscitation  
Heart Lung Brain Survive

Key to success : Brain-Heart-Lung

### 2015 BLS Major changes . . .

- > Identify and early activate
- > Focus on Chest compression
- > Early defrib VS Early CPR
- > CCR
- > Depth of compression
- > Full Recoil
- > Minimal interruption

DIE -> LIVE

### Time is key to success

### Vf and AED

Vf and survival rate

Survival rate decreased 7-10% per min

### Early identy and activation

Simultaneously and practically

- Ask for help, no need to leave the victim
- Check Breath and pulse simultaneously
- Activate EMS or shout/call

Examples for 5 cycles before call for help: < 8 yro, drowning

### Check Pulse and breath

Check Pulse and breath 10s

### Chest Compression

- > Good compression is essential to quality CPR
- > If noeffective compression: No flow to brain, No flow to heart, No drug can go

### What is high Quality CPR?

- > Fast (100~120bpm)
- > Hard (5~6cm)
- > Recoil (Full recoil)
- > Pause (Pause no > 10s)

Not too fast! Not too hard!

### CPR standard posture

### Early defib VS EarlyCPR

- > Early Defib if Withness arrest and ready for the AED
- > For unwitness and no AED ready, early CPR is the point
- > Keep CPR while setting up pads and before rhythm analysis

### Chest compression rate

Chest compression rate at 100-120bpm

- \* Trial showed lower survival rate if >140bpm
- \* Poor outcome if <100bpm or 120bpm
- \* Rate affects depth(>140bpm -< 3.8cm rate increased)

### Chest compression depth

Depth 5-6cm(2~2.4inch)

- \* Small trials showed depth > 6cm cause more injuries (Helleveuo et al, Resuscitation, 2013)
- \* Difficult to check depth if no feedback device
- \* Less depth is far more often than too deep

| Rate          | Depth<3.8cm |
|---------------|-------------|
| 100to 119/min | 35%         |
| 120to 139/min | 50%         |
| ≥140/min      | 70%         |

### Ches Recoil

Avoid leaning on the chest to keep full recoil

### Minimal interruption

- \* In Adult CPR, it is suggested to keep at least 60% CCF without advanced airway
- \* In addition, it can achieve 80% CCF in a good team

Advanced chest compression fraction (CCF)

|                         |                        |
|-------------------------|------------------------|
| unprotected airway 200% | CCF = 105 / 120 = 87.5 |
|-------------------------|------------------------|

### 2015 Adult BLS Flowchart 1

### 2015 Adult BLS Flowchart 2

### High quality CPR—BLS

| 施救者體狀   | 施救者不體狀                               |
|---|--------------------------------------|
| 執行胸外按摩：速率為 100-120 次/分鐘                       | 按摩速率低於 100 次/分鐘或高於 120 次/分鐘          |
| 按摩深度至少 2 英寸 (5 cm)                            | 按摩深度不足 2 英寸 (5 cm) 或超過 2.4 英寸 (6 cm) |
| 確保每次按摩後胸廓充分回彈                                 | 在按摩之間放氣在胸部                           |
| 盡量避免中斷按摩                                      | 中斷時間超過 10 秒                          |
| 適當換氣 (30 次按摩後給予 2 次人工呼吸，每次呼吸時間超過 1 秒並使胸廓充分升起) | 過度換氣 (胸部收緊或太多次或太大力)                  |

### 心肺復甦程序(叫叫C)



# AED & Choking

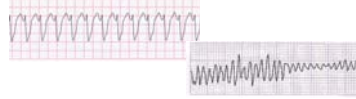
Emergency Physician- Dr CHOI IENG LOK

## Content

- AED
  - Introduction
  - Why AED
  - How to perform AED
- Choking
  - Introduction
  - Management

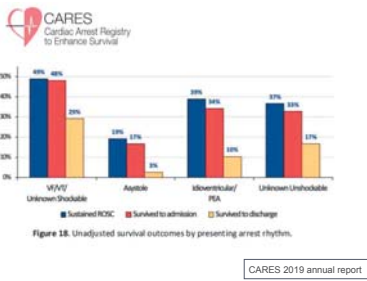
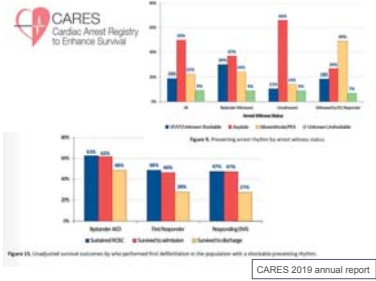
## Introduction

Sudden cardiac arrest (SCA) refers to the sudden cessation of cardiac activity with hemodynamic collapse and is most often due to sustained **ventricular fibrillation (VF)** or pulseless **ventricular tachycardia (VT)**.



## Introduction

SCA is a major public health challenge, accounting for approximately 5 to 15 percent of total mortality in industrialised nations.



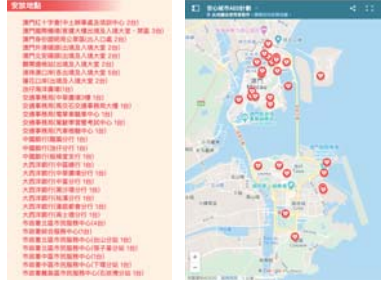
### AED and text message responders density in residential areas for rapid response in out-of-hospital cardiac arrest

Remy Stieglitz<sup>1</sup>, Jolande A. Zijlstra<sup>2</sup>, Frank Friedijk<sup>3</sup>, Martin Smeekes<sup>4</sup>, Wim E. van der Worp<sup>5</sup>, Rudolph W. Koster<sup>6</sup>

<sup>1</sup> Groningen AED, University of Groningen, Department of Cardiology, Groningen, The Netherlands  
<sup>2</sup> Radboud University Medical Center, Department of Cardiology, Nijmegen, The Netherlands  
<sup>3</sup> Amsterdam Chest, Groningen, The Netherlands

**Abstract** For out-of-hospital cardiac arrest (OHCA) in residential areas, a dispatcher-driven alert system using text message (TM) responders may increase the response time to OHCA patients and improve the density of AEDs in residential areas. We investigated the response time to OHCA patients and the density of AEDs in residential areas. We investigated the response time to OHCA patients and the density of AEDs in residential areas. We investigated the response time to OHCA patients and the density of AEDs in residential areas.

The recommended density of AEDs and TM-responders for earliest defibrillation is 2 AEDs/km<sup>2</sup> and >10 TM-responders/km<sup>2</sup>.



## AED - definition

An automated external defibrillator (AED) is a portable electronic device that automatically diagnoses the life-threatening cardiac arrhythmias of ventricular fibrillation (VF) and pulseless ventricular tachycardia, and is able to treat them through defibrillation, the application of electricity which stops the arrhythmia, allowing the heart to re-establish an effective rhythm.



## How to perform AED?



## Retrieve the AED

- Open the case
- Turn on the AED



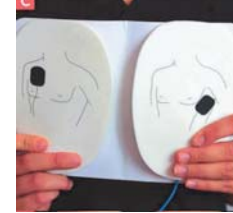
## Expose the person's chest

- If wet, dry chest.
- Remove medication patches.



## Open the AED pads

- Peel off backing.
- Check for pacemaker or defibrillator.



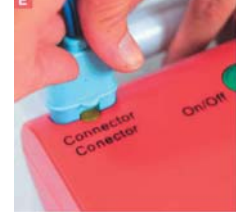
## Apply the pads

- Apply one pad on upper right chest above the breast.
- Apply the second pad on lower left chest below the armpit.



## Ensure the wires are attached to the AED box

- Ensure the wires are attached to the AED box



## Move away from the person

- Stop CPR.
- Clear the person. Tell others not to touch the person.



## Caution in special situation

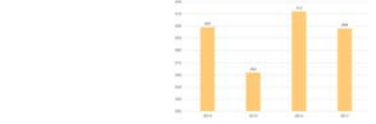
- Much hair on chest?
- Pacemaker on right chest?
- nearly drowning patient?



SECTION BREAK

## Choking - introduction

Choking occurs when a patient's airway becomes blocked, causing inability to breathe. This commonly leads to fatal cardiac arrest or lack of oxygen to the brain.



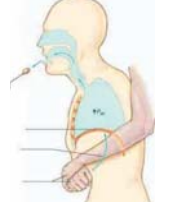
## Management (<1yrs)



## Management (>1yrs & Adult)



- Stand directly behind the child/adult.
- Place both of your arms around patient's waist.
- Make a fist with one hand and grab the fist with opposite hand.
- Position the thumb end of the fistted hand immediately above the patient's navel (ample distance away from the eploist process).
- Perform fast upward and inward diaphragmatic abdominal thrusts.
- Continue abdominal thrusts until the obstruction is removed.



### Resuscitation in COVID-19 Patient

IC, Tom Ka Lok  
Emergency Medicine  
CACCU  
Date: 2020/08/02

### Annual Generating Procedures and Risk of Transmission of Acute Respiratory Infections in Healthcare Workers & Systems Review

Key findings from a systematic review:

- High flow oxygen (HFHO)
- Intensity of mechanical ventilation increases exposure risk
- Transportation (ambulance) is high risk
- Transfer across (within a ward/unit)
- Transportation

Prevention strategies in small practices:

- Transfer location
- Transfer
- Prevent spread: gloves, PPE, ventilation, building, maintenance, disinfection

### COVID-19

3.2% Required Intubation

### CONSENSUS REPORTS

#### Interim Guidance for Basic and Advanced Life Support in Adults, Children, and Neonates With Suspected or Confirmed COVID-19

From the Emergency Cardiovascular Care Committee and Get With The Guidelines Resuscitation Adult and Pediatric Task Forces of the American Heart Association

#### GENERAL PRINCIPLES

- Reduce Provider Exposure to COVID-19
- Prioritize Organization and Ventilation Strategies With Lower Aerosolization Risk
- Consider the Appropriateness of Starting and Continuing Resuscitation

### Outline

#### Intubation for COVID-19

- Preparation
- Protection
- Pre-oxygenation
- Pretreatment
- Paralytic
- Placement
- Post-intubation management

#### BLS/ACLS updated for COVID-19

### Outline

#### Intubation for COVID-19

- Preparation
- Protection
- Pre-oxygenation
- Pretreatment
- Paralytic
- Placement
- Post-intubation management

#### BLS/ACLS updated for COVID-19

### Preparation - Environment

Require a minimum of 12 air changes of exhaust per hour

Use negative-pressure room for intubation whenever possible

- If available: a negative pressure rooms with an ante-room
- If not available: a neutral pressure rooms with door closed

### Preparation - Personnel

- Use the best available and most experience staff
- Excluding by logic: Immunosuppressed, Pregnant
- Excluding by evidence: Older staff (>60 y/o), Chronic respiratory, cardiac disease, Diabetes mellitus, Recent cancer, Perhaps HTN

### Preparation - Personnel

- A minimum of 3 personnel in room (Balances safe intubation & minimizes staff exposure)

Minimize the number of clinicians performing resuscitation

### Preparation - Equipment

- Prepare all required equipment and draw up and label all medications
- Keep all nonessential equipment just outside room

### Preparation - Equipment

- Have available all standard airway equipment plus:

- Viral (HEPA) Filter
- Video Laryngoscope
- Waveform Capnography
- Smooth clamp for ETT
- Close Suction System

### Viral Filter

- Play a key role in reducing the risk of cross contamination and preventing the spread of infection
- Usually combined in Heat and moisture exchanger (HME) filters
- Should be use on every oxygenation interface in COVID-19 patient:
  - Face mask, supraglottic airway devices, endotracheal tube, ventilator ports, etc.

### Capnography (ETCO2)

Side-stream

Main-stream

### Close Suction System

- Use close suction system to minimize aerosolization
- Also: Desaturation, Atelectasis, VAP incidence, Drop in the HR

### Close Suction System

- Use close suction system to minimize aerosolization
- Also: Desaturation, Atelectasis, VAP incidence, Drop in the HR

### Protection

- Precautions Protocol:
  - Contact, Droplet & Aerosol
  - Fit tested N95 Mask
  - Eye Protection
  - Double Gloves
  - Gown and Cap
- Utilize 'spotter' or 'buddy check' to assist with donning and doffing of PPE.
- Personal protective equipment (PPE) according to local guidelines

### PPE Donning (Putting on)

- Perform hand hygiene
- Put on the gown
- Put on the mask
- Put on eye protection
- Put on gloves
- Full PPE

### PPE Doffing (Taking off)

- Remove gloves
- Remove the gown
- Perform hand hygiene
- Remove eye protection
- Remove the mask
- Perform hand hygiene

### Outline

#### Intubation for COVID-19

- Preparation
- Pre-oxygenation
- Pretreatment
- Paralytic
- Placement
- Post-intubation management

#### BLS/ACLS updated for COVID-19

### Pre-oxygenation

- Sniffing position
- Ramped position
- Avoid high-flow oxygenation methods unless clinically required
- Avoid nasal cannula for oxygenation, including apneic oxygenation

### Pre-oxygenation

- Using tight-fitting Bag-Valve-Mask (BVM)
- PEEP valve with 15L/min 100% Oxygen for 3-5 minutes or 8 vital capacity breaths
- Use viral filter +/- ETCO2
- Use a well-fitting occlusive face mask
- Use 2 hands V-E or vice grip method
- Avoid providing assisted respirations

### Pre-oxygenation

- Using tight-fitting Bag-Valve-Mask (BVM)
- PEEP valve with 15L/min 100% Oxygen for 3-5 minutes or 8 vital capacity breaths
- Use viral filter +/- ETCO2
- Use a well-fitting occlusive face mask
- Use 2 hands V-E or vice grip method
- Avoid providing assisted respirations

### Pretreatment & Paralytic

- Pretreatment:
  - Keep hemodynamic stable if time permits: Fluid or Vasopressors if needed
- Paralysis with induction:
  - Use high-dose neuromuscular blocking agent. Rapid onset apnea and elimination of cough.

| Agent     | Weighting | Time to Onset |
|-----------|-----------|---------------|
| Etomidate | 0.2 mg/kg | <1 min        |
| Propofol  | 1-2 mg/kg | 0.5-1 min     |
| Propofol  | 2mg/kg    | <1 min        |
| Midazolam | 0.1 mg/kg | 1-5 min       |

| Agent      | Weighting          | Time to Onset |
|------------|--------------------|---------------|
| Rocuronium | 1.0-1.2 mg/kg      | 60-90 sec     |
| Vecuronium | use 2.0 mg/kg (BW) | >1 min        |
| Rocuronium | use 1.0 mg/kg      | 60-90 sec     |
| Vecuronium | use 2.5 mg/kg (TW) | 60-90 sec     |

### Placement

- Off oxygen before dropping mask
- Ensure ETT is inserted 19 to 22 cm (measured at teeth)
- Inflate cuff immediately prior to initiating PPV
- Use video laryngoscopy whenever possible
- Maximize intubation success rate
- Maximize operator distance from airway

# Applications of Triangular and Roller bandages

**DR. WAN CHUN**

EMERGENCY MEDICINE SPECIALIST, EMERGENCY DEPARTMENT OF C.H.C.S.J. OF MACAO  
(澳門仁伯爵綜合醫院急診部急症醫學專科醫生)  
FELLOW OF MACAO ACADEMY OF MEDICINE (澳門醫學專科學院院士)  
GENERAL SECRETARY OF MACAO SOCIETY OF EMERGENCY AND CRITICAL CARE MEDICINE (澳門急重症醫學會秘書長)  
02/08/2020

## Outlines

1. Definition of bandages
2. Basic bandaging forms
3. Goal of bandaging
4. Common types of bandages
5. Conclusion
6. Take home messages

## Definition of bandages

A bandage is a piece of material used either to

1. covering wounds, to keep dressings in place
2. to applying pressure controlling bleeding
3. to support a medical device such as a splint, or on its own to provide support to the body
4. can also be used to restrict a part of the body

## Basic bandaging forms

1. Circular bandaging
2. Spiral bandaging
3. Reverse spiral bandaging
4. Figure-of-eight bandaging

## Circular bandaging

Circular bandaging is used to hold dressings on body parts such as arms, legs, chest or abdomen or for starting others



Circular Turns

## Spiral bandaging

1. An elasticated bandage can also be used to apply spiral bandaging to a tapered body part.

2. Despite the increasing diameter of the body part, the elasticity will allow the bandage to fit closely to the skin.
3. With each spiral turn, part of the preceding turn is covered generally by 2/3 of the width of the bandage.



Spiral Turns

## Reverse spiral bandaging



Spiral Reverse Turns

## Figure-of-eight bandaging

1. Involves two turns, with the strips of bandage crossing each other at the side where the joint flexes or extends.
2. It is usually used to bind a flexing joint or body part below and above the joint.



Figure 4 Turn

## Goal of bandaging

1. Reduce risks of bleeding, infection, swelling
2. Immobilization
3. Prevent secondary injuries of nerves, blood vessels and muscles etc..
4. Support

## Common types of bandages

1. Triangular bandages\*
2. Roller bandages\*
3. Tubular bandages



## Triangular bandages

Triangular bandages are made of cotton or disposable paper. They have a variety of uses:

1. When opened up, they make slings to support, elevate or immobilize upper limbs.
2. Folded narrowly, a triangular bandage becomes a cold compress that can help reduce swelling.
3. They are used also for applying pressure to a wound to control bleeding.

## Uses for a triangular Bandage

1. Head and facial injuries such as scalp wound or jaw fracture
2. Sling (Arm or Elevated), minor hand burns, sprained ankle, splint for broken legs
3. Tourniquet, compression for bleeding wounds



## Sling



## Arm Sling

Ask the casualty to support their arm with their other hand. Gently slide the triangular bandage underneath the arm. The point of the triangle should be underneath the elbow of the injured arm. Bring the top end of the bandage around the back of the neck.



## Arm Sling

Fold the lower end of the bandage up over the forearm to meet the top of the bandage at the shoulder of the injured side.



## Arm Sling

Tie the two ends of the bandage together in a reef knot above their collar bone and tuck in the free ends.



## Arm Sling

Adjust the sling so that it supports their arm all the way to the end of their little finger.



## Arm Sling

Make sure that the edge of the bandage by the elbow is secured by twisting the fabric and tucking it in, or using a safety pin to fasten.



## Arm Sling

Check the circulation in their fingertips every 10 minutes. Press their nail for 5 seconds until it turns pale, then release to see if the color returns within 2 seconds.



## Head Sling

**Head Top (for head injuries)**

- Fold the base at least 3" wide
- Place folded base aligned with midline
- Pull back and cover over at the back, holding over forehead
- Pull both ends in front/ear area with fingers flat at the center of the folded bandage ends
- Pull down over (back side neck)
- Tuck over neatly at cross-over area

**Cravat Bandage for Forehead**

- Place the center of the cravat over the compass covering the wound.
- Carry the ends around to the opposite side of the head, cross them, bring them back to the starting point and tie them.

## Roller bandages

Roller bandages are long strips of material.

1. An elastic roller bandage is used to apply support to a strain or sprain and is wrapped around the joint or limb many times. It should be applied firmly, but not tightly enough to reduce circulation.
2. Cotton or linen roller bandages are used to cover gauze dressings. They come in many different widths and are held in place with tape, clips or pins. They can also be used for wound compression if necessary, as they are typically sterile.

## Application of Roller bandages

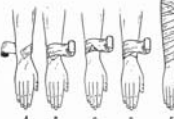
1. Select the appropriate bandage material for the injury
  2. Select the appropriate width of bandage
- Head and fingers-1 inch  
Forearm, wrist, hand and foot-2 inch  
Upper elbow, upper arm, knee-3 inch  
Knees, legs, and trunk-4 inch
3. Apply the bandage wrap to the injury
  4. Check the circulation after application of the bandages
  5. Elevate the injured extremities

### ROLLER BANDAGES



## Rules in applying Roller bandages

1. Head of the bandage held uppermost
2. Begin from with outwards
3. Cover 2/3 while leaving 1/3 exposed
4. Proceedure in front of the casualty
5. Support injured part while bandaging



## SAM products



# 氣道建立和管理

麻醉科 寧肇基 MD

## 概況：

- 氣道的組成及主要生理意義。
- 氣道建立的概述。
- 基本氣道工具。
- 氣管插管。
- 困難氣管插管。
- 氣管切開術。

## 氣道的組成及主要生理意義：

- 氣管、支氣管。
- 呼吸時氣管可以擴大或縮小。
- 氣管在其下端分支處比較固定，其餘部分較易活動，可隨頭部伸仰、頸部轉動、吞嚥、呼吸等動作而變換位置。

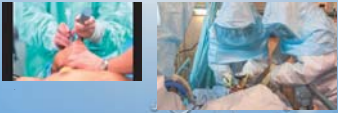


## 氣道建立的適應症。

- 氣道阻塞。
- 窒息。
- 急性創傷昏迷。
- 嚴重頸部創傷。
- 心臟功能不穩定。
- 嚴重氣管痙攣。
- 嚴重過敏性反應。
- 肺水腫。
- 鎮靜、麻醉藥物的作用。
- 氣道異物。
- 誤吸、存在誤吸危險。
- 非計劃性拔管。

需保持氣道通暢，進行有效通氣；需進行氣道保護。

- 人工氣道技術應用的有效性，直接影響呼吸。
- 支持治療的效果。
- 護士和醫生均應熟練掌握氣道管理技術。



## 氣道評估：



- 診斷。
- 呼吸狀況。
- 氣道保護能力。
- 氣道阻塞程度。
- 皮膚粘膜損傷。
- 所需干預措施。

| AIRWAY ASSESSMENT                      |         |
|--|---------|
| ASSURE ABILITY TO ESTABLISH AIRWAY VIA |         |
| CONSIDER THE FOLLOWING FACTORS         |         |
| 1. 視察                                  | 1. 視察   |
| 2. 聽覺                                  | 2. 聽覺   |
| 3. 觸覺                                  | 3. 觸覺   |
| 4. 嗅覺                                  | 4. 嗅覺   |
| 5. 呼吸音                                 | 5. 呼吸音  |
| 6. 呼吸功                                 | 6. 呼吸功  |
| 7. 呼吸困難                                | 7. 呼吸困難 |
| 8. 呼吸機                                 | 8. 呼吸機  |
| 9. 呼吸器                                 | 9. 呼吸器  |
| 10. 呼吸器                                | 10. 呼吸器 |
| 11. 呼吸器                                | 11. 呼吸器 |
| 12. 呼吸器                                | 12. 呼吸器 |
| 13. 呼吸器                                | 13. 呼吸器 |
| 14. 呼吸器                                | 14. 呼吸器 |
| 15. 呼吸器                                | 15. 呼吸器 |
| 16. 呼吸器                                | 16. 呼吸器 |
| 17. 呼吸器                                | 17. 呼吸器 |
| 18. 呼吸器                                | 18. 呼吸器 |
| 19. 呼吸器                                | 19. 呼吸器 |
| 20. 呼吸器                                | 20. 呼吸器 |

## 氣道管理工具。

### 基本氣道工具。

- 體位，開放氣道。(Head & jaw positioning)
- 口咽通氣道。(Oropharyngeal Airway)
- 鼻咽通氣道。(Nasopharyngeal Airway)
- 喉罩通氣道。(Cobra Perilaryngeal Airway, Cobra PLA)
- 喉罩導氣管。(LMA)



### 高級氣道工具。

- 聯合氣管插管。(COMBITUBE)
- 氣管內導管。ENDOTRACHEAL TUBE
- 氣管切開管。TRACHEOSTOMY TUBE
- 環甲膜穿刺針。CRICOTHYROIDOTOMY



## 基本氣道工具-體位手法開放氣道。



Jaw Thrust 雙手舉頤。

Head Tilt-Chin Lift 仰頭抬頤。

## 高級氣道工具-氣管內導管



## 高級氣道工具-氣管內導管

- 保持氣道通暢。
- 維持有效通氣、氧合。
- 進行適當的機械通氣。
- 氣道保護。



## 氣管插管的適應症。

- 無自主呼吸。
- 完全或不完全上氣道梗阻。
- 非計劃性拔管後病人自主呼吸不能維持正常氧合。
- 難以控制的上氣道出血。
- 昏迷，有增加顱內壓的危險。
- 嚴重肺部感染。
- 急性咽喉水腫。
- 嚴重扁桃體肥大。
- 缺乏氣道保護性反射。
- 大咯血。

## 氣管插管方法-準備：

- 病人。
- 體位：仰臥位，小枕墊於枕下，頭後仰。
- 適當鎮靜。
- 預充氧。
- 知情同意。
- 醫務人員準備。
- 用物準備
- 喉鏡、合適型號氣管內導管。
- 壓墊、導引內芯。
- 20 CC 注射器、潤滑劑、固定。
- 負壓吸引裝置、聽覺呼吸器。
- 聽診器，ETCO<sub>2</sub> 監測
- 保護裝置
- 困難插管预案

## 插管前對患者的評估。

- 1.一般檢查體型、面容。



## 3.口齒情況

- (1) 張口度 (MOUTH OPENING) 是指病人最大的張口程度，即上下門齒之間的距離。正常距離介於 3.5~5.6 CM；如果小於 3 CM，提示插管可能遇到困難；小於 1.5 CM，提示無法施行直接喉鏡顯露聲門。
- (2) 牙齒情況。
- (3) MALLAMPATI 氣道分級。
- 1級：可以看到軟腭、咽弓、懸雍垂、硬腭。
- 2級：可以看到軟腭、懸雍垂、硬腭。
- 3級：可以看到軟腭、硬腭。此級病人預示有插管困難。
- 4級：僅見硬腭。插管困難。

## MALLAMPATI 氣道分級。

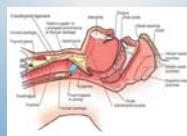


## 2.寰枕關節及頸椎活動度：關係到氣管插管時口、咽、喉三軸線的重疊。



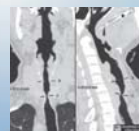
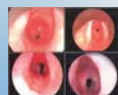
## 3. 頰甲距離

指下頷內側面至甲狀切跡的距離：正常 3~4CM (兩橫指) 以上，小於此距離可能暴露困難。



## 4. 氣管 (TRACHEA)

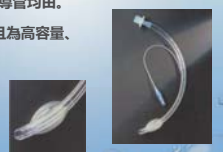
氣管狹窄 (外部受壓、氣管創傷、氣管造口、氣管內腫瘤)



## 氣管插管用具及準備

(-) 氣管導管。

現在使用的氣管導管均由聚氧乙烯製成，且為高容量、低壓套囊。



## Intubation Tube



## 氣管導管

型號：

兩種標號：導管內徑 (ID) 標號，每號相差 0.5MM。  
法制 (F) 標號，F 號 = 導管外徑 (OD) × 3.14。

兩種標號間的換算：F 號 = ID 號 × 4 + 2

導管的選擇。

推薦成人：男性 8.0MM ID  
女性 7.5MM ID。

小兒：導管選擇可參考表 8-3，亦可參考下列公式：

$$F = \text{年齡} + 18 \text{ 或 } ID = \text{歲} / 4 + 4$$

Table 8-3. Suggested Uncuffed Endotracheal Tube Sizes (Pediatric Cuffed Tubes use half size smaller)

| Age              | Size mm I.D. | Depth (cm) | Miller | Mac |
|------------------|--------------|------------|--------|-----|
| Infant (0-1 yrs) | 4            | 8.5-10.5   | 1      | 1   |
| 1 yr             | 4            | 12.5-13.5  | 1      | 1   |
| 2 yrs            | 4.5          | 13.5       | 2      | 2   |
| 3 yrs            | 5            | 14         | 2      | 2   |
| 4 yrs            | 5.5          | 15         | 2      | 2   |
| 5 yrs            | 6            | 16         | 2      | 2   |
| 6 yrs            | 6.5          | 17         | 2-3    | 2-3 |
| 7 yrs            | 7            | 18         | 2-3    | 3   |
| 8 yrs            | 7.5          | 19         | 2-3, 4 | 3   |
| 9 yrs            | 8            | 20         | 2-3, 4 | 3-4 |

插管深度：導管斜口位於聲門後繼續推進 3~5CM 即可，使導管斜口位於氣管中段 (即相當於胸骨上切跡處)，成人一般在 22-24CM。

小兒插管深度 (CM) = 年齡 / 2 + 12。

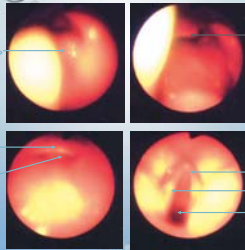


### 纖維支氣管鏡引導法經口插管。

用喉鏡暴露咽喉區。  
氣管導管套在纖維支鏡外。  
纖維支鏡經口咽部。  
直視下經聲門進入氣管。  
氣管導管沿纖維支鏡推入氣管。



懸雍垂。



會厭。

會厭。

聲門。

會厭。

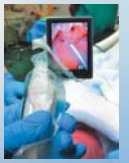
聲門。

聲門。

聲門。



### McGrath視頻喉鏡。



### 人工氣道氣囊管理。



### 人工氣道管理-氣管插管氣囊管理

- 氣囊種類。
- 低容量高壓力氣囊。
- 高容量低壓力氣囊。
- 等壓氣囊。
- 氣囊管理技術。
- 氣囊壓力維持。
- 氣囊充氣。
- 氣囊上滯留物清除。

參考文獻：  
Papaya Sengupta, Daniel J Sessler, et al. Endotracheal tube cuff pressure in three hospitals, and the volume required to produce an appropriate cuff pressure. BMC Anesthesiology 2004, 4:8

### 人工氣道管理-氣管插管氣囊管理。

- 氣囊壓力要求。
- 氣管的毛細血管壓力在20~30MMHG, 達22MMHG時對氣管血流具有損傷作用。在37MMHG時可完全阻斷血流。
- 氣囊的壓力不可超過。20~30MMHG
- 氣囊壓力測量。
- 指觸法。壓力表測量法。
- 推薦用壓力表測量氣囊壓力。

參考文獻：  
Papaya Sengupta, Daniel J Sessler, et al. Endotracheal tube cuff pressure in three hospitals, and the volume required to produce an appropriate cuff pressure. BMC Anesthesiology 2004, 4:8  
Estimation of endotracheal tube cuff pressure by pilot balloon palpation. J Laryngol Otol. 2007 Sep; 121(9):869-71. Epub 2007 Jan 9

### 人工氣道管理 - 氣管插管氣囊管理。

#### 不同充氣方法：

推薦應用專用氣囊測壓充氣裝置。  
操作簡便,一般不需聽診,測壓精確。



| Plan A             | Plan B             | Plan C             | Plan D             |
|--------------------|--------------------|--------------------|--------------------|
| Plan A: 20-30 mmHg | Plan B: 20-30 mmHg | Plan C: 20-30 mmHg | Plan D: 20-30 mmHg |

# THANKS