【呼吸治療師可信賴專業活動-EPAs 課程規劃及評量影片設計競賽】

團隊名稱：臺大呼吸治療教你學會救Lung

負責主題：EPAs-6使用侵襲性呼吸器病人之初始設定及照護

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重要聲明

本影片使用於非營利的教學用途，已由影片提供者確認涉及肖像權及個資等，有取得當事人同意，提供中華民國呼吸治療師公會全國聯合會及台灣呼吸治療學會無償放置在網頁中，限由兩會所屬呼吸治療師會員自由使用，但須載明來源。

教學設計背景

- 使新進呼吸治療師能將所學更快與臨床結合，透過一般講課、實作外，加入擬真教案，使新進同仁更快累積經驗，熟悉臨床操作。再加上每週的臨床個案討論case based discussion，到職半年的個案報告等，加強學員對各種疾病病人初始設定的了解與熟悉。

分析 - 教學目標

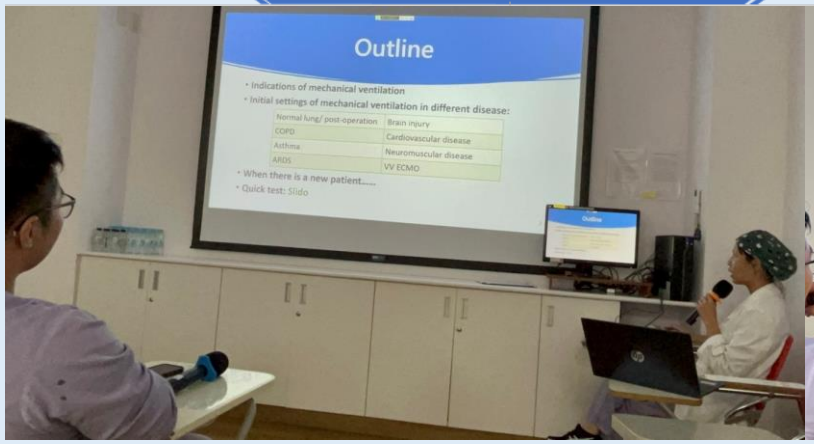
- 插管的適應症及流程
- 插管後的評估(包含身體評估、ETT正確位置)
- 呼吸器的原理、模式、操作
- 各大疾病的初始設定

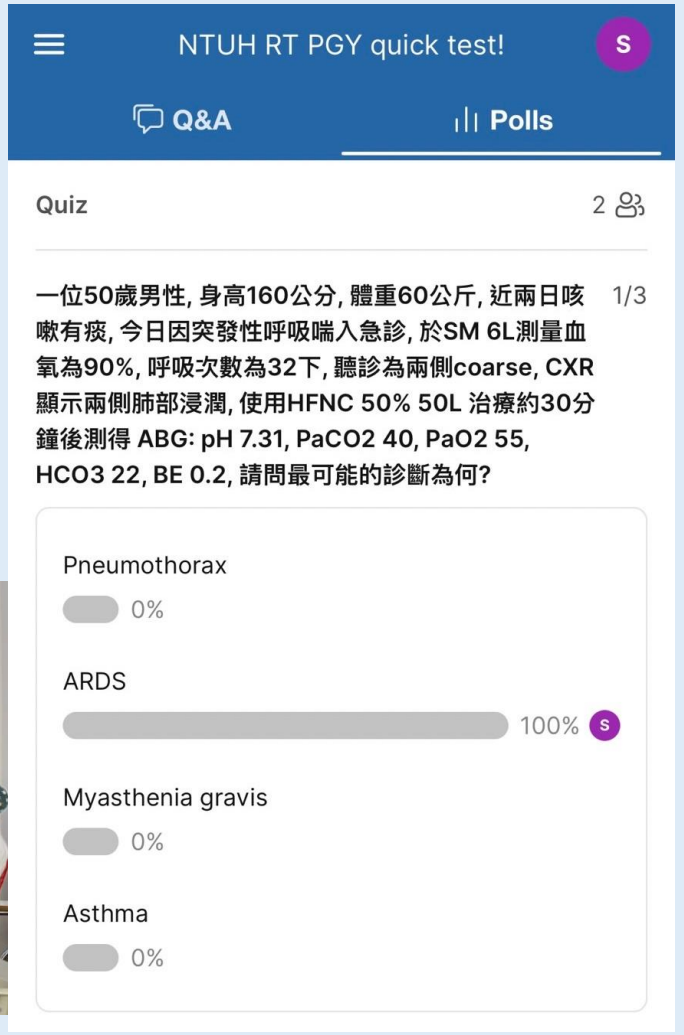
- 團隊合作與溝通
- Trouble shooting的求救時機

- 正確選擇呼吸器並備機
- 完成初始設定
- 新病人評估
- Trouble shooting的判斷與處理

知識課程

實體課程
課堂中問答
及Slido測驗





PGY課程-呼吸器初始設定

臺大醫院RT洪儀婷

Outline

- **Indications of mechanical ventilation**
- **Initial settings of mechanical ventilation in different disease:**

Normal lung/ post-operation	Brain injury
COPD	Cardiovascular disease
Asthma	Neuromuscular disease
ARDS	VV ECMO

- **When there is a new patient……**
- **Quick test: Slido**

Indications of mechanical ventilation

Indications of mechanical ventilation

肺泡通氣量不足 Inadequate alveolar ventilation	PCO_2 > 55 mmHg pH < 7.2
肺部擴張不全 Inadequate lung expansion	Vt < 5 ml/kg VC < 10 ml/kg RR > 35 bpm
呼吸肌力不足 Inadequate muscle strength	Pi max ≧ -20 cmH_2O VC < 10 ml/kg, MVV < 2*Ve L/min
呼吸功增加 Increase work of breathing	Ve > 10 L/min Vd/Vt > 60%
低血氧 Hypoxemia	PaO_2 < 60 mmHg $P(A\text{-}a)O_2$ > 350 mmHg on FiO_2 1.0 PaO_2 / FiO_2 < 200
其他 Other indication	Poor tolerated NIV upper airway obstruction sputum clearance, airway protection……

Initial settings of mechanical ventilation in different diseases

Normal lung/ Post-operation

- Goal:
  - Keep lung expansion and FRC
  - Keep airway hygiene
  - Adequate ventilation and oxygenation
- MV setting:

Tidal volume	6-8 ml/kg (IBW)
Respiratory rate	10-16 bpm
FiO_2	Maintain PaO_2 > 80 mmHg or SpO_2 > 92%
PEEP	5 cmH_2O

COPD

- Goal:
  - Normalizing oxygenation and ventilation
  - Reducing the work of breathing
  - Avoiding dynamic hyperinflation
- MV setting:

Tidal volume	6-8 ml/kg (IBW) , shorten Ti if feasible
Respiratory rate	10-12 bpm
FiO_2	maintain SpO_2 > 92%
PEEP	5-10 cmH_2O(80% of intrinsic PEEP to avoid worsening of auto-PEEP)

COPD

- Auto-PEEP:
  - Causing dynamic hyperinflation, which can lead to patient-ventilator dyssynchrony, increased WOB, barotrauma, cardiovascular collapse……
  - Prevention and treatment:
    - ↓RR, ↓Vt, ↑inspiratory flow rate to prolonging T_E
    - Adjust inspiratory trigger sensitivity to reduce ineffective triggering
    - Application of extrinsic PEEP
    - Treating the underlying airflow obstruction(inhaled bronchodilators, inhaled or systemic steroid……)

Asthma

- Goal:
  - Maintain adequate oxygenation
  - Reduce WOB
  - Prevent barotrauma due to air-trapping
  - Waiting for bronchodilator and glucocorticoid medications to reverse the airway edema, inflammation, and bronchoconstriction
- MV setting:

Tidal volume	6-8 ml/kg, 4-6 ml/kg in severe asthma (IBW) , shorten Ti if feasible
Respiratory rate	10-12 bpm
FiO_2	Maintain PaO_2 > 60 mmHg, SpO_2 > 90%
PEEP	80% of intrinsic PEEP, to avoid worsening of auto-PEEP

Asthma

- If high PIP:
  - Differentiating airway and lung parenchymal causes of high pressures
  - Check Cst and Raw
- Dyssynchrony:
  - May cause due to auto-PEEP, trigger failure, machine-assisted breaths, intolerance of a slow inspiratory flow rate, cough……
  - Sedative and paralytic agent as needed
  - NMB in patients receiving high-dose glucocorticoids increases the risk of post-paralytic myopathy
  - Avoid Opiate medications (the risk of histamine release exacerbating bronchoconstriction)

Asthma

- Dynamic hyperinflation:
  - May causing cardiovascular collapse, barotrauma, increase WOB
  - Adjust MV, keep Pplat< 30 cmH_2O, intrinsic PEEP < 10 cmH_2O
    - Decrease Vt or shorten Ti
    - Increase inspiratory flow carefully (may trigger bronchoconstriction)
    - Decrease RR to increase T_E
    - Trigger sensitivity should not be overly sensitive
    - Adding extrinsic PEEP (80% off intrinsic PEEP)
    - Permissive hypercapnia

ARDS

ARDS New Global Definition 2023

● new definition criteria	Classification		
	Mild	**Moderate**	**Severe**
Time to instalation	Up to seven days - known risk fator(s)		
Pulmonary edema	Not explained by cardiogenic edema or intravascular volume overload		
Radiologic features	Bilateral infiltrates on chest X-ray or CT or lung ultrasound (by a trained professional) (not explained by nodules, pleural effusion or atelectasis)		
Hypoxemia PaO_2/FIO_2**	201-300 with NIV/CPAP PEEP ≥ 5* **or HFNO > 30l/min**	101 - 200 com PEEP ≥ 5	≤ 100 com PEEP ≥ 5
Hypoxemia SpO_2/FIO_2	**≤ 315 with SpO_2 ≤ 97%**		

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ARDS

- Goal:
  - Low tidal volume: avoid alveolar overdistension induced by MV
  - Optimal PEEP: maximize and maintain alveolar recruitment
  - Consider early prone position in patients with $PaO_2/FiO_2 < 150$ mmHg

Tidal volume	4-8 ml/kg, initial 6 ml/kg (PBW) keep Pplat ≦ 30 cmH_2O, Driving pressure ≦ 15 cmH_2O
Respiratory rate	14-22 bpm, avoid > 35 bpm
PEEP and FiO_2	Controversial Titrate with the severity of hypoxemia Maintain SpO_2 88-95%

FiO_2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
PEEP	5	5 to 8	8 to 10	10	10 to 14	14	14 to 18	18 to 24

PEEP should be applied starting with the minimum value for a given FiO_2.

Brain injury

- Goal:
  - Keep lung expansion
  - Maintain brain perfusion
  - Avoid IICP
- MV setting:

Tidal volume	6-8 ml/kg (IBW)
Respiratory rate	12-16 bpm(keep $PaCO_2$ 31–35 mmHg)
FiO_2	Maintain PaO_2 > 80 mmHg or SpO_2 > 92%
PEEP	3-5 cmH_2O

Cardiovascular disease

- Goal:
  - To protect the airway and maintain oxygen supply in patients with unstable hemodynamics
  - To treat acute respiratory failure, most often due to cardiogenic pulmonary edema
  - Beware of frothy sputum caused by pulmonary edema
- MV settings:

Tidal volume	6-8 ml/kg (IBW)
Respiratory rate	12-16 bpm
FiO_2	Maintain PaO_2 > 80 mmHg or SpO_2 > 92%
PEEP	5 cmH_2O (higher if lung edema present)

Neuromuscular disease

- Goal:
  - Keep lung expansion and FRC
  - Keep airway hygiene
  - “20-30-40 rule”: initiation of mechanical ventilation when:

VC < 20 ml/kg	MIP > -30 cm H_2O	MEP < 40 cm H_2O

- MV settings:

Tidal volume	6-8 ml/kg (IBW)
Respiratory rate	12-16 bpm
FiO_2	Maintain PaO_2 > 80 mmHg or SpO_2 > 92%
PEEP	5 cmH_2O

VV ECMO

- Goal:
  - An opportunity for the lung to rest while maintaining tissue oxygen supply and carbon dioxide elimination
  - PEEP: preventing complete collapse and reopening of the alveoli with
  - Lung rest!
- MV settings:

Vt	< 6 ml/kg
PIP	< 20-25 cmH_2O or < 30 cmH_2O
Respiratory rate	10-12 bpm
FiO_2	40-60% Maintain PaO_2 > 80 mmHg or SpO_2 > 92%
PEEP	10-18 cmH_2O, keep lung expansion and lung rest

When there is a new patient……

When there is a new patient……

1. Preparation
Choose the adequate ventilator
Choose the adequate tube size (neonatal, pediatric, adult……)
Connect all MV tube correctly
Pre-testing (EST, SST, system check……)
Test lung ventilation

2. Viewing patient's information → Initialize ventilator settings
Diagnosis
Underlying disease
Cause of respiratory failure
Blood gas, lab data
Exam and image (CXR, CT, echo……)
Other

When there is a new patient……

3. Assessment when patient arrival
Check the position of artificial airway
Connect MV and ensuring tube fixation
Check vital signs, airway patency
Adjusting and monitoring ventilator parameters
Check breathing sound and chest wall movement
Blood gas after MV connection
Discuss with doctor
Recording

Quick test!

Join at

slido.com

#3019 797

Thank you! Any question?

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