

林口長庚胸腔內科系氣喘病患急診與加護病房照護指引

A、氣喘病患急診照護指引

1. 氣喘突然發作或惡化是指氣喘病人的症狀，如呼吸急促、咳嗽、喘鳴、胸悶等症狀進行性加劇，以及肺功能的持續下降，而這些症狀的變化比平常狀態更厲害，通常需要給予額外的治療。

2. 氣喘急性發作的嚴重度評估包括病史及身體檢查

病史：此次急性發作之原因/誘發因子；是否有防禦性過敏（anaphylaxis）的症狀；是否有發作致死的危險因子（曾因氣喘急性發作而接受氣管插管；過去1年內曾發生 ≥ 1 次嚴重急性發作；高度使用SABA；嚴重食物過敏史。）

理學檢查：

a. 氣喘惡化嚴重度分級

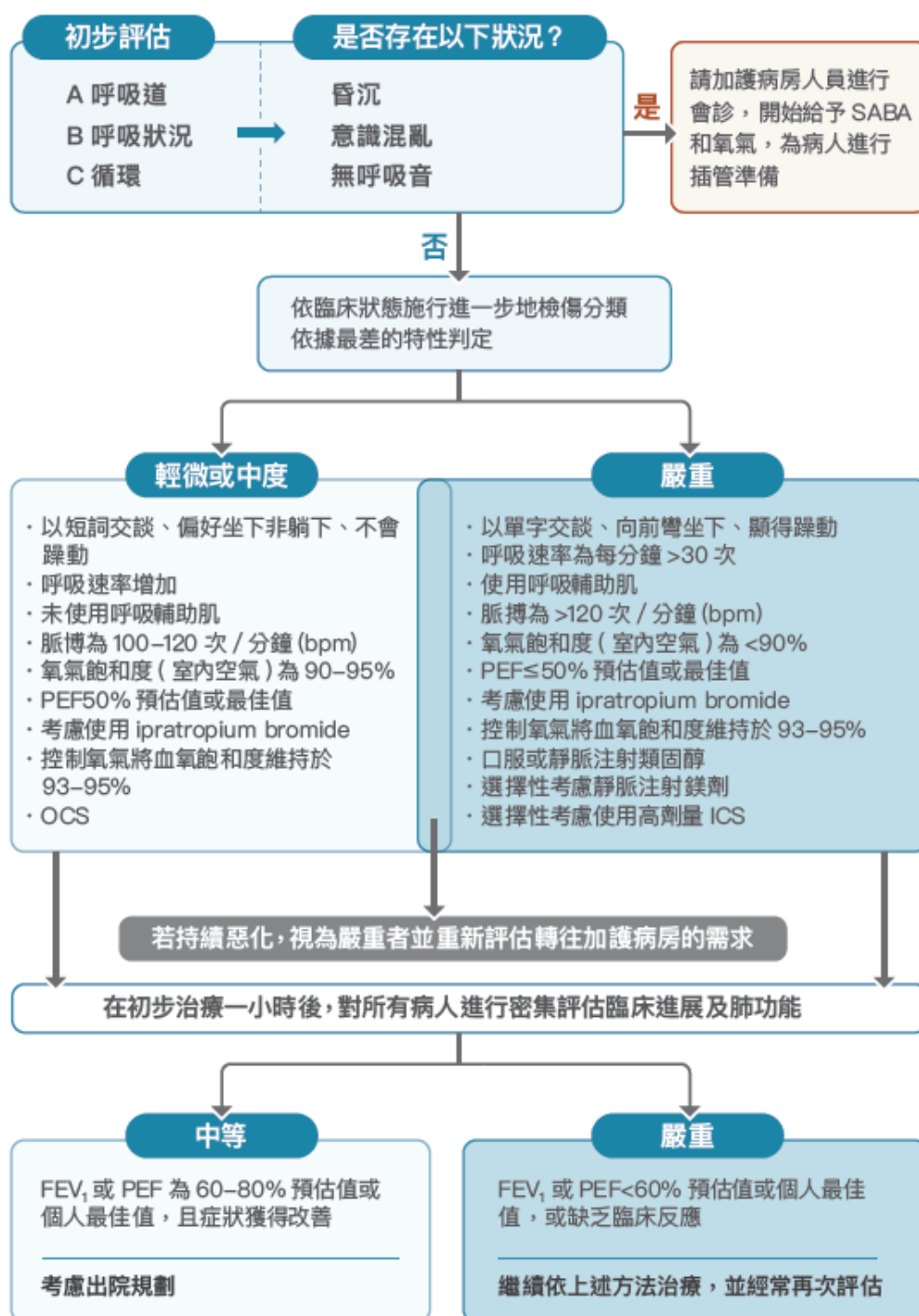
	輕微至中度發作	嚴重發作	危及生命之發作
說話	能說一個句子或僅片段	只能說單字	無法說話
姿勢	能平躺但偏好坐姿	坐姿前傾	無法坐起
情緒	不焦躁	焦躁	嗜睡或意識不清
呼吸次數及呼吸音	增快	通常超過 30 次 / 分	可能變慢、呼吸音減弱或消失
呼吸輔助肌	未使用	使用	異常胸腹動作
脈搏	100-120 次 / 分	>120 次 / 分	可能變慢
血氧飽和度	90-95%	<90%	<90% (或 PaO ₂ <60 mmHg)
PEF	>50%	≤ 50%	無法測量

PaO₂ : pulmonary partial pressure of oxygen ; PEF : peak expiratory flow.

b. 是否合併其他狀況（如無防禦性過敏休克、肺炎、肺扁塌、氣胸、縱膈氣腫。

c. 需跟其他可能造成急性呼吸困難的疾病做鑑別診斷（如心臟衰竭、上呼吸道功能不全（upper airway dysfunction）、異物吸入、肺栓塞）。

3. 急診室中的氣喘急性發作處置



SABA: short-acting β_2 agonists; PEF: peak expiratory flow; OCS: Oral corticosteroid; ICS: inhaled corticosteroid; FEV₁: forced expiratory volume in one second.

3. 從急診出院後的氣喘處置

- 口服型類固醇：對於成人應開立至少 5–7 天的口服型類固醇療程 (prednisolone 或等效藥物每天 1 mg/kg，最多每天 50 mg)。

- b. 緩解型藥物：視症狀和客觀改善狀況，讓病人從規律使用緩解型藥物改回視需要使用。如果在急診或醫院使用 ipratropium bromide，由於不太可能持續帶來效益，因此可儘快停用。
- c. 吸入型類固醇：如果先前未曾開立吸入型類固醇，應於出院前開始使用。對於目前經開立含吸入型類固醇藥物的病人，一般應將治療升階並持續 2-4 週。
- d. 提醒每日確實用藥的重要性。

參考資料：2022 台灣成人氣喘臨床照護指引. 台灣胸腔暨重症加護醫學會

B. 氣喘病患急性發作併呼吸衰竭照護指引(適用急診、一般病房與加護病房)^{1,2 3,4,5,6}

急性重度氣喘-使用呼吸器適應症

1. 病人精疲力竭合併代謝性酸中毒
2. 若病人有哮鳴聲(wheeze)，聽起來聲音愈來愈遠
3. 經氧氣治療後仍呈現嚴重低血氧
4. 胸部 X 光呈現橫隔膜下壓
5. 精神狀態改變、意識混亂
6. 危及生命的心律不整
7. 逐漸惡化的呼吸性酸中毒 ($\text{PaCO}_2 \geq 40 \text{ mmHg}$; $\text{PH} \leq 7.25$)

呼吸器設定目標

1. To maintain adequate oxygenation, reduce the work of breathing, and prevent barotrauma due to air trapping, while waiting for bronchodilator and glucocorticoid medications to reverse the bronchoconstriction.
2. Options to minimize hyperinflation: reducing minute ventilation and lengthening expiratory time low tidal volume, low respiratory rate and high inspiratory airflow rate with the objective of targeting an inspiratory-to-expiratory time of 1:4 to 1:6).

急性重度氣喘-呼吸器設定

1. VC or PC-CMV , PC-CMV較易控制氣道壓力
2. Tidal volume: 4-6 ml/kg
3. Rate : 8-12次/min.
4. T_i - ≤ 1 秒, 確保足夠的吐氣時間, 降低空氣滯留機會
5. FiO_2 - Keep PaO_2 60~100 mmHg
6. PEEP -小於80%的auto PEEP
7. Plateau pressure <28 cmH₂O
8. Driving pressure<15 cmH₂O
9. Permissive hypercapnia : $\text{PH} \geq 7.20$ 即可, 允許血中二氧化碳濃度升高

Suggestion of Monitor

- Plateau airway pressure (Pplat): <30 cm H₂O
- Auto-PEEP < 10 cm H₂O

Troubleshooting high peak pressure

1. Dynamic hyperinflation and/or airway resistance

a. An increase in both Ppeak and Pplat (with less than a 5 cm H₂O difference between them), suggests a lung parenchymal, pleural, or chest wall/diaphragmatic process (eg, asynchrony, hyperinflation, pneumonia, pleural effusion, pneumothorax).

b. Large difference between Ppeak and Pplat indicates more airway resistance (eg, bronchoconstriction, airway mucus, endotracheal tube obstruction).

2. **Dyssynchrony**: common causes including ineffective triggering of machine-assisted breaths (eg, due to insufficient trigger sensitivity or auto-PEEP), intolerance of a slow inspiratory flow rate, and cough.

Noninvasive ventilation (Optional)

In the absence of contraindications such as altered consciousness, hemodynamic instability, excessive secretions, or uncooperativeness, a trial of NIV is appropriate for patients with asthma who might otherwise require intubation.

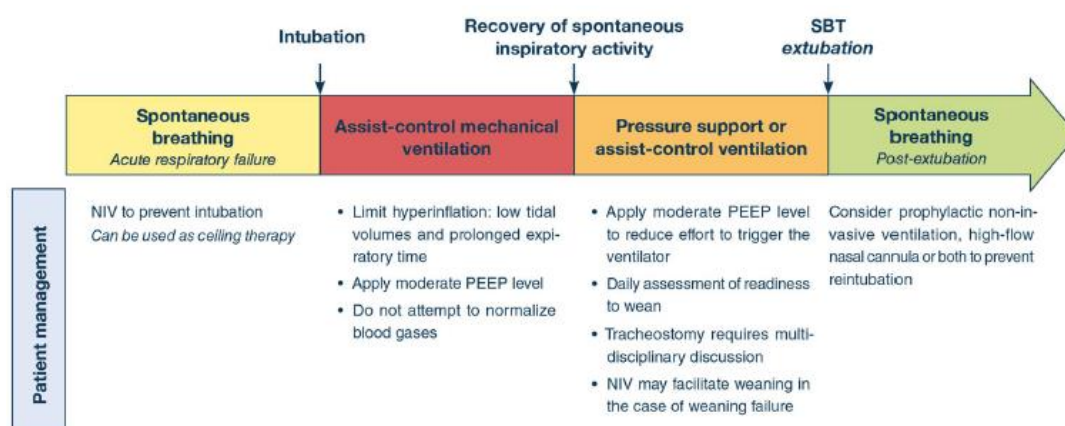


Figure. Therapeutic options at the different stages of patient management. NIV non-invasive ventilation, PEEP positive end-expiratory pressure.

Nonventilator Management

Inhaled bronchodilators

1. Fenoterol or salbutamol pMDI 4puff 20min-60min as needed
2. Terbutalin 5mg/2ml/vial by nebulization 20min-60min as needed

3. Ipratropium 0.2mg+salbutamol 1mg Q8h and as needed
May shift to long-acting bronchodilators after stabilization

Corticosteroids

1. 2mg/kg/d of methylprednisolone or equivalent iv for 5 to 7 days
2. Daily doses of OCS equivalent to 50 mg prednisolone as a single morning dose, or 200 mg hydrocortisone in divided doses
May shift to Inhaled corticosteroids after stabilization.

References

1. Leatherman J. Mechanical ventilation for severe asthma. *Chest.* 2015;147(6):1671-1680.
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