危重症患者机械通气的撤机—2017美国指南

解放军第一一七医院机场路院区创伤急救中心、重症医学科

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MAQUET

CHEST

Liberation From Mechanical Ventilation in Critically Ill Adults

Executive Summary of an Official American College of Chest Physicians/American Thoracic Society Clinical Practice Guideline

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BACKGROUND: This clinical practice guideline addresses six questions related to liberation from mechanical ventilation in critically ill adults. It is the result of a collaborative effort between the American Thoracic Society (ATS) and the American College of Chest Physicians (CHEST).

METHODS: A multidisciplinary panel posed six clinical questions in a population, intervention, comparator, outcomes (PICO) format. A comprehensive literature search and evidence synthesis was performed for each question, which included appraising the quality of evidence using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE)

CHEST

Liberation From Mechanical Ventilation in Critically Ill Adults: An Official American College of Chest Physicians/American Thoracic Society Clinical Practice Guideline

Inspiratory Pressure Augmentation During Spontaneous Breathing Trials, Protocols Minimizing Sedation, and Noninvasive Ventilation Immediately After Extubation

Daniel R. Ouellette, MD, FCCP; Sheena Patel, MPH; Timothy D. Girard, MD; Peter E. Morris, MD, FCCP; Gregory A. Schmidt, MD, FCCP; Jonathon D. Truwit, MD, FCCP; Waleed Alhazzani, MD; Suzanne M. Burns, RN, MSN, ACNP, RRT; Scott K. Epstein, MD, FCCP; Andres Esteban, MD, PhD; Eddy Fan, MD, PhD; Miguel Ferrer, MD, PhD; Gilles L. Fraser, PharmD; Michelle Ng Gong, MD; Catherine L. Hough, MD; Sangeeta Mehta, MD; Rahul Nanchal, MD, FCCP; Amy J. Pawlik, DPT; William D. Schweickert, MD; Curtis N. Sessler, MD, FCCP; Thomas Strøm, MD; and John P. Kress, MD, FCCP

BACKGROUND: An update of evidence-based guidelines concerning liberation from mechanical ventilation is needed as new evidence has become available. The American College

AMERICAN THORACIC SOCIETY DOCUMENTS

Official Executive Summary of an American Thoracic Society/American College of Chest Physicians Clinical Practice Guideline: Liberation from Mechanical Ventilation in Critically Ill Adults

Gregory A. Schmidt, Timothy D. Girard, John P. Kress, Peter E. Morris, Daniel R. Ouellette, Waleed Alhazzani, Suzanne M. Burns, Scott K. Epstein, Andres Esteban, Eddy Fan, Miguel Ferrer, Gilles L. Fraser, Michelle Ng Gong, Catherine L. Hough, Sangeeta Mehta, Rahul Nanchal, Sheena Patel, Amy J. Pawlik, William D. Schweickert, Curtis N. Sessler, Thomas Strøm, Kevin C. Wilson, and Jonathon D. Truwit; on behalf of the ATS/CHEST *Ad Hoc* Committee on Liberation from Mechanical Ventilation in Adults

This official clinical practice guideline of the American Thoracic Society (ATS) and the American College of Chest Physicians (CHEST) was approved by the ATS Board of Directors, December 2016, and by the CHEST Board of Regents, October 2016

Background: This clinical practice guideline addresses six questions related to liberation from mechanical ventilation in critically ill adults. It is the result of a collaborative effort between the American Thoracic Society and the American College of Chest Physicians.

Methods: A multidisciplinary panel posed six clinical questions in a Population, Intervention, Comparator, and Outcomes format. A comprehensive literature search and evidence synthesis was performed for each question, which included appraising the certainty in the evidence (i.e., the quality of evidence) using the Grading of Recommendations, Assessment, Development, and Evaluation approach. The Evidence-to-Decision framework was applied to each question, requiring the panel to evaluate and weigh the importance and balance of desirable and undesirable outcomes, the resources and costs associated with the intervention, the impact on health disparities, and the acceptability and feasibility of the intervention.

Results: Evidence-based recommendations were formulated and graded initially by subcommittees and then modified after full-panel discussions. The recommendations were confirmed by confidential electronic voting; approval required that at least 80% of the panel members agree with the recommendation.

Conclusions: The panel provides recommendations regarding liberation from mechanical ventilation. The details regarding the evidence and rationale for each recommendation are presented in the

TABLE 2] Summary of Recommendations

Recommendation	Strength of Recommendation	Certainty of Evidence (ie, Quality of Evidence)
1. For acutely hospitalized patients ventilated more than 24 h, we suggest that the initial SBT be conducted with inspiratory pressure augmentation (5-8 cm H_2O) rather than without (T-piece or CPAP)	Conditional	Moderate certainty in the evidence
2. For acutely hospitalized patients ventilated for more than 24 h, we suggest protocols attempting to minimize sedation	Conditional	Low certainty in the evidence
3. For patients at high risk for extubation failure who have been receiving mechanical ventilation for more than 24 h and who have passed am SBT, we recommend extubation to preventive NIV	Strong	Moderate certainty in the evidence
4. For acutely hospitalized patients who have been mechanically ventilated for > 24 h, we suggest protocolized rehabilitation directed toward early mobilization	Conditional	Low certainty in the evidence
5. We suggest managing acutely hospitalized patients who have been mechanically ventilated for > 24 h with a ventilator liberation protocol	Conditional	Low certainty in the evidence
6a. We suggest performing a CLT in mechanically ventilated adults who meet extubation criteria and are deemed at high risk for PES	Conditional	Very low certainty in the evidence
6b. For adults who have failed a CLT but are otherwise ready for extubation, we suggest administering systemic steroids at least 4 h before extubation; a repeated CLT is not required	Conditional	Moderate certainty in the evidence

More detailed discussions of questions 1-3 appear in Ouellette et al[3] and of questions 4-6 appear in Girard et al.[4] CLT = cuff leak test; NIV = noninvasive ventilation; PES = postextubation stridor; SBT = spontaneous breathing trial.

CLINICAL PRACTICE GUIDELINE: SUMMARY FOR CLINICIANS

Liberation from Mechanical Ventilation in Critically Ill Adults

An Official ATS/ACCP Clinical Practice Guideline

Eddy Fan[1], Bishoy Zakhary[2], Andre Amaral[1], Jessica McCannon[3], Timothy D. Girard[4], Peter E. Morris[5], Jonathon D. Truwit[6], Kevin C. Wilson[7], and Carey C. Thomson[8]

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Summary of:

1) *Schmidt GA, Girard TD, Kress JP, Morris PE, Ouellette DR, Alhazzani W, Burns SM, Epstein SK, Esteban A, Fan E, and colleagues; on behalf of the ATS/CHEST Ad Hoc Committee on Liberation from Mechanical Ventilation in Adults. Official executive summary of an American Thoracic Society/American College of Chest Physicians Clinical practice guideline: liberation from mechanical ventilation in critically ill Med 2017;195:120–133. http://dx.doi.org/10.1164/rccm.201610-2075ST (2)*

3) *Ouellette DR, Patel S, Girard TD, Morris PE, Schmidt GA, Truwit JD, Alhazzani W, Burns SM, Epstein SK, Esteban, and colleagues. Liberation from mechanical ventilation in critically ill adults: an official American College of Chest Physicians/American Thoracic Society Clinical Practice Guideline: inspiratory pressure augmentation during spontaneous breathing trials, protocols minimizing sedation, and non-invasive*

the intervention. The guidelines were published in three separate documents (1–3). This consolidated summary is prepared for practicing clinicians.

The guidelines have different implications for patients, clinicians, and policy makers. Clinicians should use caution when interpreting the recommendations and should always consider compelling unique individual clinical circumstances when considering liberation from mechanical ventilation in critically ill adults, such as comorbid conditions

《2017美国撤机指南》，针对的对象——急性疾病，机械通气时间超过24小时的成人住院患者。

第一条推荐意见：

在做“自主呼吸试验”（SBT）时，建议给予吸气压力支持（5-8cmH_2O）

TABLE 2] Summary of Recommendations

Recommendation	Strength of Recommendation	Certainty of Evidence (ie, Quality of Evidence)
1. For acutely hospitalized patients ventilated more than 24 h, we suggest that the initial SBT be conducted with inspiratory pressure augmentation (5-8 cm H_2O) rather than without (T-piece or CPAP)	Conditional	Moderate certainty in the evidence

研究表明，临床医生更多的是往往低估了病人脱机后维持自主呼吸的能力。

因此现在主张一旦病人具备了相当的条件，就做一个SBT。如果SBT诱发呼吸衰竭迹象，就恢复机械通气。反之，就继续进行拔管步骤。

做SBT的方法：

不给予吸气压力支持（T管法或CPAP法）

给予轻度吸气压力的支持（PSV法），通常给予5-8cmH2O，或自动插管补偿

分析表明，使用压力支持后，SBT通过率更高（84.6% VS 76.7%），拔管成功率也更高（75.4% VS 68.9%），并有ICU死亡率降低倾向（8.6% VS 11.6%）。

最有意思的一个实验，31个病人在没有压力支持下做SBT失败了，然后改用7cmH2O的压力支持继续了30分钟的SBT，结果成功了。

点评：

SBT三种传统方式，理论上都一样，但实际上临床大多数偏爱PSV法。

这次指南明确了PSV法的优势。

为什么PSV法存在优势？——气管插管存在有一定的吸气阻力。阻力与插管的内径及长度有关。

第二条推荐意见：

实施最低镇静程度控制。

TABLE 2] Summary of Recommendations

Recommendation	Strength of Recommendation	Certainty of Evidence (ie, Quality of Evidence)
2. For acutely hospitalized patients ventilated for more than 24 h, we suggest protocols attempting to minimize sedation	Conditional	Low certainty in the evidence

机械通气病人会因各种原因接受镇静镇痛治疗。这些药物会引起神志改变，并抑制呼吸中枢，从而阻断撤机。

采用镇静控制后，ICU住院时间缩短了。

Special Article

Clinical Practice Guidelines for the Management of Pain, Agitation, and Delirium in Adult Patients in the Intensive Care Unit

2013美国
镇痛、镇静
及谵妄指南

Intensive Care Medicine | OPEN ACCESS | This is the original (English) version. The translated (German) version starts at p. 22. | Guideline

Evidence and consensus based guideline for the management of delirium, analgesia, and sedation in intensive care medicine. Revision 2015 (DAS-Guideline 2015) – short version

2015德国
谵妄、镇痛
及镇静指南

REVIEW

Comfort and patient-centred care without excessive sedation: the eCASH concept

Jean-Louis Vincent[1*], Yahya Shehabi[2], Timothy S. Walsh[3], Pratik P. Pandharipande[4], Jonathan A. Ball[5], Peter Spronk[6], Dan Longrois[7], Thomas Strøm[8], Giorgio Conti[9], Georg-Christian Funk[10], Rafael Badenes[11], Jean Mantz[12], Claudia Spies[13] and Jukka Takala[14]

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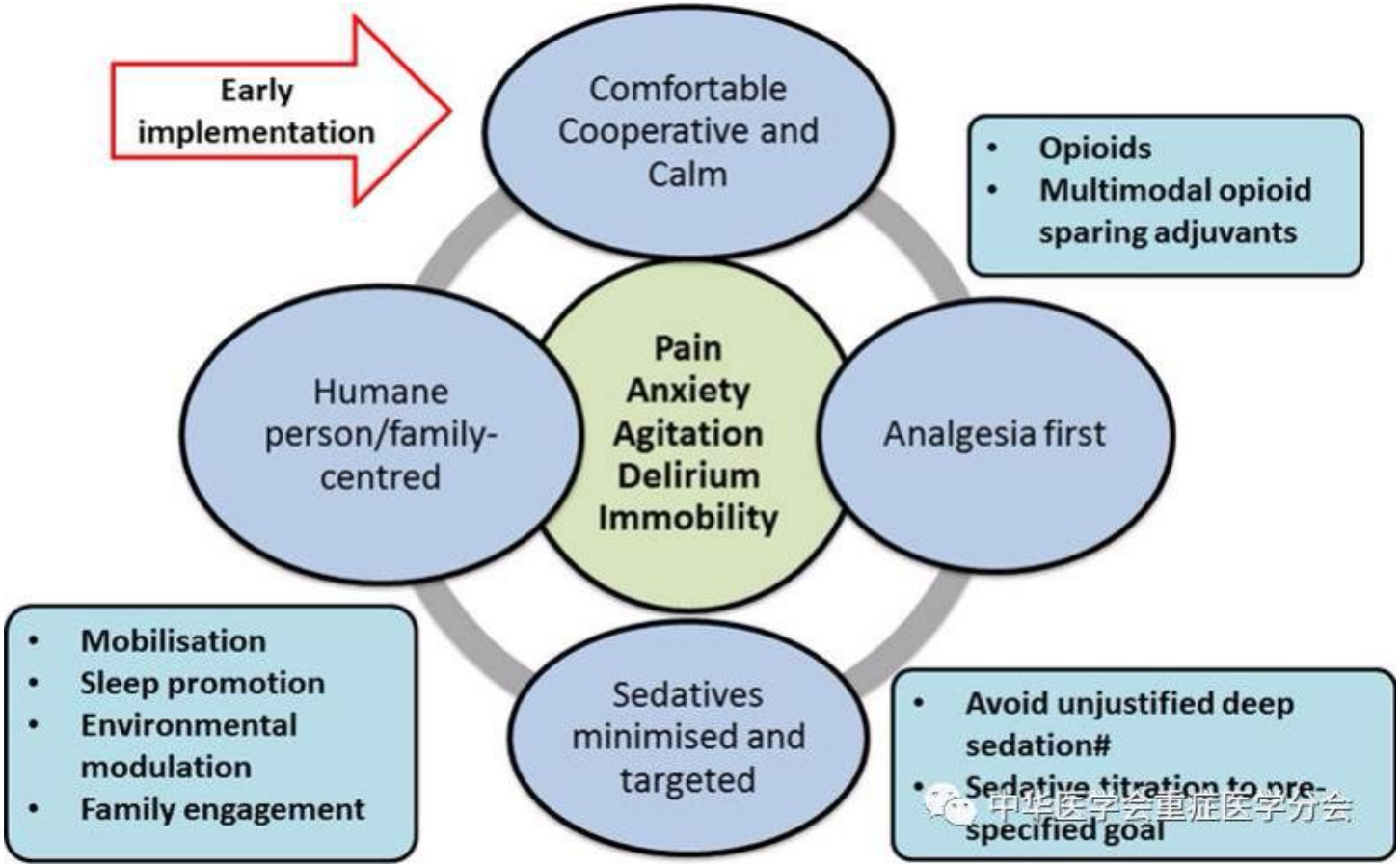
2016
eCASH
概念

eCASH概念


Early implementation
Comfortable Cooperative and Calm
• Opioids
• Multimodal opioid sparing adjuvants
Humane person/family-centred
Pain
Anxiety
Agitation
Delirium
Immobility
Analgesia first
• Mobilisation
• Sleep promotion
• Environmental modulation
• Family engagement
Sedatives minimised and targeted
• Avoid unjustified deep sedation#
• Sedative titration to pre-specified goal
中华医学会重症医学分会

点评：

用最低镇静，比过度镇静好，也比不用镇静好。

bis或熵指数监测

第三条推荐意见：

建议对已经通过SBT的高危患者，拔管后预防性的给予NIV。

TABLE 2] Summary of Recommendations

Recommendation	Strength of Recommendation	Certainty of Evidence (ie, Quality of Evidence)
3. For patients at high risk for extubation failure who have been receiving mechanical ventilation for more than 24 h and who have passed am SBT, we recommend extubation to preventive NIV	Strong	Moderate certainty in the evidence

有创机械通气病人存在感染和多脏器功能衰竭等并发症。而这些并发症会延长机械通气时间及增加医疗开支。因此需要尽快撤机，但撤机失败，则又会增加死亡率。

NIV在COPD、急性心源性肺水肿和免疫抑制病人的应用都有明确的证据，但在撤机拔管后的效果仍存在争议。

经过专家组的荟萃分析，倾向于在拔管后高危病人中使用无创通气。NIV在ICU住院时间和短期死亡率上结果占优。

拔管失败的高危因素：

1、年龄>65岁；

2、合并慢性阻塞性肺疾病；

3、充血性心力衰竭；

4、SBT过程中出现二氧化碳潴留。

另外，高流量氧疗作为一种新型的无创通气方式，同样降低再插管率。

点评：

唯一一个强推荐！

NIV的适应症，除了COPD、急性心源性肺水肿和免疫抑制病人，重新扩增了高危病人撤机拔管后。

高流量氧疗，目前出现在所有机械通气类指南中，地位日益升高。其作用原理：1、高流量气流对二氧化碳的冲刷；2、产生低水平的外源性PEEP。

第四条推荐意见：

建议实施促进康复的早期活动方案。

TABLE 2] Summary of Recommendations

Recommendation	Strength of Recommendation	Certainty of Evidence (ie, Quality of Evidence)
4. For acutely hospitalized patients who have been mechanically ventilated for > 24 h, we suggest protocolized rehabilitation directed toward early mobilization	Conditional	Low certainty in the evidence

ICU病人面临的问题：1、卧床休息影响肌肉、心血管、呼吸和免疫系统，减慢康复速度；2、缺乏运动产生的并发症：压力性溃疡、VTE等；3、ICU获得性衰弱。

实施康复早期活动方案后，可以缩短机械通气时间（平均缩短2.7天），增加出院后步行能力。

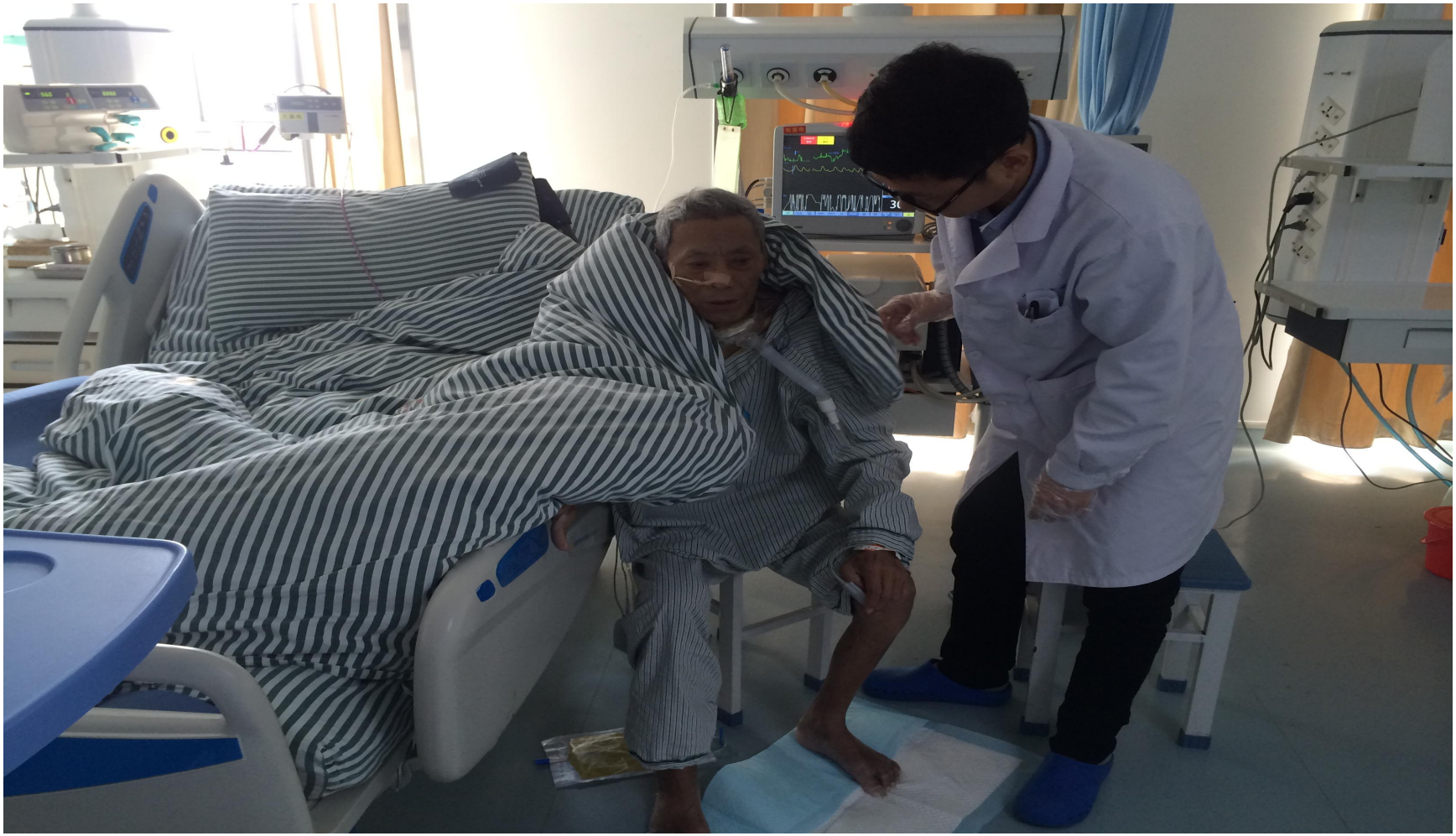
具体方案：

a、每周5天的周期性运动；

b、每周3天，每次在椅子上坐30—120分钟；

c、从座位切换到站位、肢体活动、主动阻力运动；

d、每日镇静终止后紧接着运动练习、床上活动、功能锻炼等。



点评：

在国内，这片几乎是空白。但现在部分民营医院在大力发展这块项目。

第五条推荐意见：

建议实施撤机方案。

TABLE 2] Summary of Recommendations

Recommendation	Strength of Recommendation	Certainty of Evidence (ie, Quality of Evidence)
5. We suggest managing acutely hospitalized patients who have been mechanically ventilated for > 24 h with a ventilator liberation protocol	Conditional	Low certainty in the evidence

由医生主观掌控的机械通气病人的撤机，不仅会导致SBT开始时间的延误，而且会导致SBT的失败。

由于这个原因，制定呼吸机的撤机方案非常重要。撤机时由呼吸治疗师或护士按照撤机方案，有时是电脑驱动的，已被设计为标准化和提高撤除机械通气。

拟定撤机方案，并按方案执行后，能把撤机时间缩短25小时，ICU住院时间缩短1天。

至于这个方案是人工驱动还是电脑驱动，没有差别。

点评：

1、此推荐非常好，有了统一的方案，只需要呼吸治疗师、年轻医师或护士也能把下一步措施延续下去。否则，一定要主任看过才能撤机，那主任得有多忙。这样的情况下，估计撤机延迟的时间跟主任繁忙程度肯定呈正相关。

点评：

2、至于人工智能好不好，曾经有一个软件，号称智能化撤机，时髦过一阵子，并且有法国的临床研究证实能加快撤机。但后来澳大利亚和巴西的两个临床研究呈现了相反的结果，认为这个软件延长了撤机。

但把方法学一分析，就明白了。原来法国的主管医生比较忙，忙工作忙喝咖啡，一天才调一次参数。而澳大利亚和巴西人就派了护士守在床边盯着呼吸机减参数，然后就让电脑软件完败。

第六条（a、b）推荐意见：

a、建议对拟拔管，并存在拔管呼喘鸣高风险患者，实施气囊漏气试验。b、阳性者，建议拔管前4小时给予全身类激素。

TABLE 2] Summary of Recommendations

Recommendation	Strength of Recommendation	Certainty of Evidence (ie, Quality of Evidence)
6a. We suggest performing a CLT in mechanically ventilated adults who meet extubation criteria and are deemed at high risk for PES	Conditional	Very low certainty in the evidence
6b. For adults who have failed a CLT but are otherwise ready for extubation, we suggest administering systemic steroids at least 4 h before extubation; a repeated CLT is not required	Conditional	Moderate certainty in the evidence

对机械通气时间超过36小时的病人，气管插管容易导致喉头水肿，并在拔管后出现喘鸣。

由于在气管插管在位的情况下很难直接观察声带，因此气囊漏气试验就成了最常用的替代观察方法。

用气囊漏气试验进行管理，可以降低再插管率和拔管后喘鸣发生率，但也会增加不必要的拔管延迟。

而对于气囊漏气试验阳性者，在应用了全身性激素后，则能有效降低在插管率和拔管后喘鸣的发生率。

鉴于气囊漏气试验有不必要延迟拔管的潜在副作用，故而要权衡利弊。但在高危病人则应该推行。

高危因素包括：1、有插管损伤；2、插管>6天；3、使用大号插管；4、女性；5、意外拔管后在插管等。

点评：

从管理的角度，气囊漏气试验没有必要常规开展。但在高危病人，确实要做。但阳性标准，目前有主观判断的，有用潮气量绝对值的，有用潮气量相对值的，这个迫切需要统一。

还有拔管前4个小时给药，明显是把拔管时间拖长了4小时。

Thank you for your attention!