

SHORT COMMUNICATION

AIRWAY MANAGEMENT

“ESICM guidelines on acute respiratory distress syndrome 2023”- a short summary

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ABSTRACT

New European Society of Intensive Care Medicine (ESICM) guidelines on acute respiratory distress syndrome (ARDS) were published in June, 2023. This is the commentary and the comparison of changes to the previous guidelines that were published in 2017. These new guidelines are applicable to adult patients and cover only non-pharmacological respiratory support strategies that also cover ARDS due to coronavirus disease 2019 (COVID-19).

Abbreviations: AHRF- Acute Hypoxemic Respiratory Failure; ARDS- Acute Respiratory Distress Syndrome; ECMO- Extra Corporeal Membrane Oxygenation; ESICM- European Society of Intensive Care Medicine; CPAP- Continuous Positive Airway Pressure; HFNO- High Flow Nasal Oxygen; NIV- Non-invasive Ventilation; PEEP- Positive End Expiratory Pressure; RM- Recruitment Maneuvers

Key words: Acute Hypoxemic Respiratory Failure; Acute Respiratory Distress Syndrome’ Mechanical Ventilation; Extracorporeal Membrane Oxygenation; Prone Position; Non-Invasive Ventilation; Prognosis.

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1. INTRODUCTION

A wide range of clinical conditions can lead to increased alveolo-capillary membrane permeability, low lung compliance and increased dead space resulting in hypoxemia. A large number of patients admitted to the intensive care units (ICU) are labelled as suffering from acute respiratory distress syndrome (ARDS) which can lead to a high mortality. One of the main problems with the Berlin definition of ARDS is that patients who are not receiving positive pressure ventilation cannot be formally included in the ARDS category. The new European Society of Intensive Care Medicine (ESICM) 2023 ARDS guidelines have addressed this issue as a large number of patients with acute hypoxemic respiratory failure do not fulfill the Berlin definition criteria.¹ These guidelines have also addressed the issues related to phenotyping in ARDS patients. This includes the definition of ARDS sub-phenotypes and endotypes.

Accurately classifying the sub-phenotypes is critical as they may get benefit from specific treatment and patients’ outcome could be different between sub-phenotypes. The ESICM expert panel have also answered important questions relating to the use of Continuous Positive Airway Pressure (CPAP) / High Flow Nasal Oxygen (HFNO) and Non-invasive Ventilation (NIV), neuromuscular blockade and extra corporeal CO₂ removal, which were not covered in the 2017 guidelines. Healthcare professionals managing critically ill patients can adopt or reject these recommendations according to the quality of evidence and availability of resources at their centers.

2. MAIN FEATURES

In this paper we will discuss main features of the new guidelines, with the aim of generating interest in this very important subject among our clinicians responsible for the care of this particular group of patients.

2.1. ARDS definition

It is important for the healthcare professionals to understand that the Berlin definition of ARDS requires a patient to be on mechanical ventilation and receiving a minimum PEEP of 5 cmH₂O. However, this usually doesn't reflect the real-world practice where a large number of patients are in respiratory failure and are not intubated as seen during the COVID-19 pandemic. As the ESICM guidelines panel cannot change the ARDS definition, it remains unchanged. Because of the limitations of the current ARDS definition, the expert panel has allowed the clinicians to use the term acute hypoxemic respiratory failure (AHRF) when deciding to use certain therapeutic strategies which might benefit non-intubated patients. In the near future, it is possible to see a new definition of ARDS which will replace the decade old Berlin definition.^{1,2}

2.2. ARDS phenotyping

The guidelines expert panel has also established the definitions of phenotype, sub-phenotype and an endotype. This classification is critical for research purposes and will help the clinicians to decide which sub-phenotype will benefit from simvastatin, PEEP or from a liberal fluid strategy, for example. In addition to this sub-phenotyping is related to the patient outcome (prognosis). For example, patients with hyper-inflammatory response may get benefit from simvastatin; and liberal fluid strategy is also beneficial in patients with hyper-inflammatory response. This clarification will definitely help the clinicians in decision making.¹⁻⁷

2.3. High flow nasal oxygen

As compared to low flow oxygen, high-flow nasal oxygen is well tolerated, delivers heated and humidified oxygen, and decrease the anatomical dead space. These new ARDS guidelines strongly recommend the use of HFNO in patients with AHRF not due to cardiogenic pulmonary edema or exacerbation of chronic obstructive pulmonary disease (COPD). However, HFNO doesn't reduce mortality as compared to conventional oxygen therapy. There is no doubt that invasive mechanical ventilation is associated with complications such as delirium, nosocomial infections and long hospital stay. Therefore, it is suggested by the experts to consider using HFNO in patients with AHRF which is not due to cardiogenic pulmonary edema and COPD exacerbation. More importantly, intubation should not be delayed in patients who are not improving after a trial of HFNO.

Finally, as compared to HFNO, CPAP/NIV should be preferred in patients with AHRF secondary to COVID-19. In terms of reducing the risk of intubation or mortality in those patients, who present with respiratory failure not due to cardiogenic pulmonary edema or acute exacerbation of COPD, there is no difference between HFNO and CPAP/NIV.

2.4. CPAP/NIV

By addressing CPAP/NIV, the ESICM guidelines experts have included those patients in these new guidelines who don't fulfil the Berlin criteria of ARDS definition. The experts have suggested that those patients who are in respiratory distress but not being invasively ventilated should also be included in the ARDS definition as they share same pathophysiology. As compared to conventional oxygen therapy, the use of CPAP may reduce the risk of intubation in patients with AHRF due to COVID-19. According to the current evidence, there is no advantage of CPAP/NIV in terms of mortality reduction or to prevent intubation in patients with non-cardiogenic pulmonary edema or exacerbation of COPD. Presently, there is no evidence that helmet interface is superior to facemask to reduce mortality or risk of intubation. Similarly, NIV is not superior to CPAP in AHRF.

2.5. Low tidal volume ventilation

Low tidal volume can be defined as delivering tidal volumes of 4-8 ml/kg predicted body weight and accepting the gas exchange within the safety limits. The ESICM 2023 ARDS guidelines strongly recommend the use of low tidal volume ventilation as stated in their guidelines published in 2017. In addition, the new recommendations also suggest using low tidal volume ventilation in patients with ARDS secondary to COVID-19.¹⁻⁷

2.6. PEEP

These 2023 ARDS guidelines have changed the recommendations about the PEEP. The 2017 guidelines suggested that adult patients with moderate to severe ARDS should receive higher level of PEEP. But the new guidance states that there is insufficient data to make a recommendation for or against high PEEP levels. There is evidence that high PEEP levels can result in hyperinflation lung injury and hemodynamic instability. Unfortunately, 'excessive PEEP' is still undefined and it is unclear what is the best way to optimize PEEP in an individual patient.

2.7. Recruitment maneuvers

As compared to 2017, recruitment maneuvers (RM) are not recommended in the new guidelines due to higher mortality and other risks. There are different RM available to achieve an increase in end-expiratory lung volume that could lead to improvement in oxygenation. These maneuvers can also result in hemodynamic instability, right ventricular failure and barotrauma. New guidelines recommend against the use of both prolonged and brief high-pressure recruitment maneuvers in ARDS patients. This new recommendation is also applicable to COVID-19 patients. It is estimated that approximately 10% patients suffer from hypotension and desaturation during or after a recruitment maneuver. In addition to this, barotrauma, bradycardia and cardiac arrests have also been reported. As a result of these risks, experts have recommended against their routine use. However, it is important to note that brief RMs can be used in our clinical practice, for example, after suctioning, ventilator disconnection or bronchoscopy.¹⁻⁷

2.8. Prone positioning

The 2023 guidelines about the prone positioning in ARDS is not only in agreement with the 2017 recommendations, it also advocates awake proning in COVID-19 patients. There is evidence that in patients with $\text{PaO}_2/\text{FiO}_2 < 200\text{mmHg}$ who are prone for longer than twelve hours, a mortality reduction can be achieved. The expert panel could not find any randomized control trial related to proning of mechanically ventilated patients with COVID-19. According to the PROSEVA trial, proning can significantly decrease short-term mortality. However, there is no difference in the long-term mortality. Therefore, the new guidelines recommend that prone position should be considered in patients with $\text{PaO}_2/\text{FiO}_2 < 150\text{ mmHg}$ and $\text{PEEP} > 5\text{ cmH}_2\text{O}$. These new guidelines also recommend that prone position should be applied for 16 hours or more to reduce mortality. Decision to stop proning can be taken by observing the difference between $\text{PaO}_2/\text{FiO}_2$ ratio in prone and supine positions. Finally, the expert panel have recommended the use of awake prone positioning in patients with AHRF due to COVID-19. At present awake prone position is not recommended for non-COVID-19 patients.¹⁻⁷

2.9. Neuromuscular blocking agents

The new ESICM guidelines do not recommend the use of neuromuscular blocking agents in non-COVID-19 related moderate to severe cases of ARDS. Despite the

fact that neuromuscular blockade reduces the work of breathing and patient-ventilator asynchrony, it can also result in adverse outcome due to neuromuscular weakness. This recommendation is based on the new evidence that was collected during the Reevaluation of Systemic Early Neuromuscular Blockade (ROSE) trial which as compared to the previous ARDS et Curarisation Systematique (ACURYS) trial, do not show any benefit of the use of neuromuscular blocking agents with deep sedation when applied to moderate-to-severe ARDS patients. Those patients who are at risk of developing pneumothorax may still get benefit from the use of neuromuscular blocking agents.

2.10. Extracorporeal life support

As compared to the 2017 guidelines, the ESICM experts recommend ECMO in patients with severe ARDS. This involves passing blood through an artificial lung for exchange of oxygen and carbon dioxide. There is evidence of a better outcome at high-volume centers where this facility is available. In order to offer this intervention, resources and skills are required which are available only at few centers in the world. Despite the fact that ECMO is recommended for severe COVID-19 patients, there is lack of good quality evidence to support this practice. Finally, 2023 guidelines recommend against the use of extracorporeal carbon dioxide removal in ARDS patients.¹⁻⁷

3. CONCLUSION

To sum up, these recommendations have highlighted the need to once again re-consider the ARDS definition. ARDS phenotyping classification will help the clinicians in decision making. It is recommended to give a trial of HFNO in patients with AHRF that is not due to cardiogenic pulmonary edema and acute exacerbation of COPD. By including CPAP/NIV, the ESICM expert panel have addressed those patients who don't fulfill the Berlin definition criteria. The issue of optimization of PEEP in an individual patient remains unclear. Recruitment maneuvers are not recommended in the new guidance. Awake prone position ventilation is only recommended for non-COVID-19 patients. Neuromuscular blocking agents can still be used in those patients who are at high risk of pneumothorax. These new guidelines have also suggested directions for the future research.

4. Conflict of interest

The study utilized the hospital resources only, and no external or industry funding was involved.

5. Authors' contribution

FM is the sole author of this paper.

6. REFERENCES

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