
Clinical Guidance

Paediatric Critical Care: Acute Respiratory Distress Syndrome (ARDS)

Summary

Guidance for the management of patients with Acute Respiratory Distress Syndrome.

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Superseded documents	
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Keywords	ARDS, acute respiratory distress syndrome, ventilation, respiratory, hypoxia, ECMO, PICU, child, Evelina,
Relevant external law, regulation, standards	This clinical guideline has been produced by the South Thames Retrieval Service (STRS) at Evelina London for nurses, doctors and ambulance staff to refer to in the emergency care of critically ill children. This guideline represents the views of STRS and was produced after careful consideration of available evidence in conjunction with clinical expertise and experience. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient.

Change History		
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Glossary:

OI: oxygenation index, OSI Oxygen Saturation Index
 TAPVD: total anomalous pulmonary venous drainage,
 FRC: functional residual capacity

Diagnostic criteria

Paediatric ARDS is the clinical syndrome of hypoxaemia associated with pulmonary infiltrates secondary to oedema (Table)¹. OI (PaO₂) used to classify severity, but use OSI (SpO₂) if no arterial gas.

Age	Exclude patients with perinatal lung disease		
Timing	Within 7 days of known insult		
Origin of oedema	Respiratory failure not fully explained by cardiac failure of fluid overload		
Chest imaging	Chest imaging findings of new infiltrate(s) consistent with acute pulmonary parenchymal disease		
Severity	Mild	Moderate	Severe
OI*	4–8	8–16	≥16
OSI**	5–7.5	7.5–12.3	≥12.3
Special populations	Not explained by cyanotic heart disease, chronic lung disease and/or left ventricular dysfunction		
*OI = (FiO ₂ in % x mean airway pressure) / PaO ₂ in mmHg			
**OSI = (FiO ₂ in % x mean airway pressure) / SpO ₂			

Mortality is high: 10-12% (mild to moderate)
33% (severe)²

Aetiology and investigations

Treat with broad-spectrum antibiotics (*allergies*)

Major causes of paediatric ARDS²:

- Pneumonia (63%, mortality 12%)
- Sepsis (19%, mortality 30%)
- Aspiration (8%, mortality 22%)

Baseline investigations:

- FBC, CRP, procalcitonin, biochemistry, coagulation, blood culture, BAL, Group and save
- Daily CXR

Consider:

- USS: discriminate between ARDS and effusions
- Echocardiogram: ventricular function; structural anomalies (e.g. TAPVD), concerns of pulmonary hypertension (PH)

“Open lung” ventilation strategy for ARDS^{1,3,4}

If dynamic hyperinflation⁵ do not use this strategy

Targets:

- SpO₂ ≥85% (>90% if pulmonary hypertension hypertension) pH ≥7.2 (pH ≥7.3 if PH)

Mode:

- Conventional ventilation preferred to HFOV⁶
- Volumes: 3–6 ml/kg V_T¹

Pressures:

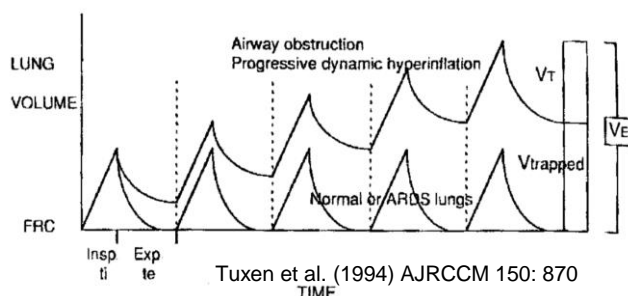
- Peak plateau pressure limited to 32 cmH₂O¹
- PEEP: 10–14 cmH₂O¹ (care: decreased preload)
- Increase Ti to 1–1.2s depending on set rate¹
- Give iNO if documented PH or RV dysfunction¹

Monitoring:

- SpO₂, ETCO₂, arterial gases (place line), OI trend
- Regular CXR; CT chest not routinely indicated

Exclude dynamic hyperinflation (gas trapping)⁵

- End-expiratory volume exceeds FRC leading to barotrauma and haemodynamic compromise (Figure). Typically in [asthma](#) or [bronchiolitis](#).



Identified by:

- Upward slope in ETCO₂ at end expiration
- Flow time loops for end expiratory flow
- Inspiratory hold to measure peak to plateau pressures

If hyperinflation: use [asthma/ bronchiolitis](#) strategy

Ancillary therapy

- Prone positioning for 18/24 h⁷
- No evidence to support: lung recruitment manoeuvres⁸, routine suctioning of ETT¹, administration of surfactant¹ and/or steroids⁹; or chest physiotherapy¹

Non-pulmonary treatment

Determine and treat aetiology:

Sedation: review at least twice daily

- IV morphine and IV/PO clonidine; wean slowly
- Muscle relaxation beneficial in severe ARDS

Fluids:

- standard protocol, aim negative balance

Sepsis:

- If hypotensive, add inotropes early and titrate fluid boluses carefully

Extra-corporeal membranous oxygenation

- ECMO discussion if OI ≥25
- ECMO indicated if OI ≥40, disease process is reversible and no contraindications¹⁰
- Optimal time to initiate is unknown¹¹. Worse outcomes if: pH<7.2, cardiac arrest prior to ECMO¹², or >7 days since onset of disease¹⁰
- Standard of care is veno-venous ECMO¹⁰
- Counsel parents (stroke, bleeding, infection)¹⁰

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