



Stress & Strain during Mechanical ventilation: Clinical application in ARDS

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Outcome of pediatric respiratory failure

Europe: The ICU and hospital mortalities of ARDS in children reported by Spanish group (PED-ALIEN network) were 26% and 27.4%.¹

Asia: The Chinese Collaborative Study Group for Pediatric Hypoxemic Respiratory Failure reported mortality of 30.3% and 32.8% in AHRF and ARDS.² The report from Singapore group showed overall mortality of pARDS was 63%.³

South America: The Brazilian pARDS Study group reported mortality of severe ARDS (Berlin definition) was 41%.⁴

¹Lopez-Fernandez Y, Azagra AM, de la Oliva P, et al. Crit Care Med 2012; 40:3238–3245.

²Chinese Collaborative Study Group for Pediatric Hypoxemic Respiratory Failure. Chin Med J. 2012;125(13):2265-71.

³Wong JJ, Loh TF, Testoni D, Yeo JG, Mok YH, Lee JH. Front Pediatr. 2014 Jul 25;2:78.

⁴The Brazilian Pediatric Acute Respiratory Distress Syndrome Study Group. Crit Care Med 2015; 43:947–953

Acute Respiratory Distress Syndrome

The Berlin Definition

The ARDS Definition Task Force*

Acute Respiratory Distress Syndrome	
Timing	Within 1 week of a known clinical insult or new or worsening respiratory symptoms
Chest imaging ^a	Bilateral opacities—not fully explained by effusions, lobar/lung collapse, or nodules
Origin of edema [✓]	Respiratory failure not fully explained by cardiac failure or fluid overload Need objective assessment (eg, echocardiography) to exclude hydrostatic edema if no risk factor present [✓]
Oxygenation ^b	
Mild	200 mm Hg < $\text{PaO}_2/\text{FiO}_2 \leq 300$ mm Hg with PEEP or CPAP ≥ 5 cm H ₂ O ^c
Moderate	100 mm Hg < $\text{PaO}_2/\text{FiO}_2 \leq 200$ mm Hg with PEEP ≥ 5 cm H ₂ O
Severe	$\text{PaO}_2/\text{FiO}_2 \leq 100$ mm Hg with PEEP ≥ 5 cm H ₂ O

Abbreviations: CPAP, continuous positive airway pressure; FiO_2 , fraction of inspired oxygen; PaO_2 , partial pressure of arterial oxygen; PEEP, positive end-expiratory pressure.

^a Chest radiograph or computed tomography scan.

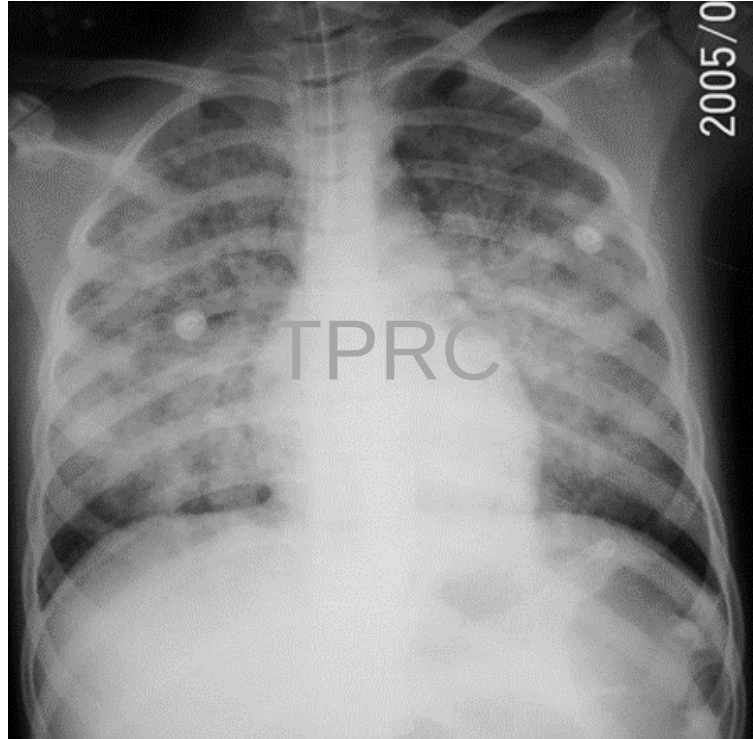
^b If altitude is higher than 1000 m, the correction factor should be calculated as follows: [$\text{PaO}_2/\text{FiO}_2 \times (\text{barometric pressure}/760)$].

^c This may be delivered noninvasively in the mild acute respiratory distress syndrome group.

New definition of pARDS

Age	Exclude patients with peri-natal related lung disease			
Timing	Within 7 days of known clinical insult			
Origin of Edema	Respiratory failure not fully explained by cardiac failure or fluid overload			
Chest Imaging	Chest imaging findings of new infiltrate(s) consistent with acute pulmonary parenchymal disease			
Oxygenation	Non Invasive mechanical ventilation	Invasive mechanical ventilation		
	ARDS (No severity stratification)	Mild	Moderate	Severe
	Full face-mask bi-level ventilation or CPAP ≥ 5 cm H ₂ O ² PF ratio ≤ 300 SF ratio ≤ 264 ¹	$4 \leq \text{OI} < 8$ $5 \leq \text{OSI} < 7.5$ ¹	$8 \leq \text{OI} < 16$ $7.5 \leq \text{OSI} < 12.3$ ¹	$\text{OI} \geq 16$ $\text{OSI} \geq 12.3$ ¹
Special Populations				
Cyanotic Heart Disease	Standard Criteria above for age, timing, origin of edema and chest imaging with an acute deterioration in oxygenation not explained by underlying cardiac disease. ³			
Chronic Lung Disease	Standard Criteria above for age, timing, and origin of edema with chest imaging consistent with new infiltrate and acute deterioration in oxygenation from baseline which meet oxygenation criteria above. ³			
Left Ventricular dysfunction	Standard Criteria for age, timing and origin of edema with chest imaging changes consistent with new infiltrate and acute deterioration in oxygenation which meet criteria above not explained by left ventricular dysfunction.			

**Abnormal
Imaging
Studies:
Computerized
Tomography
(CT) of the
Chest**



Chest x-ray – AP view

**Abnormal CT scan
of the Chest**