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ARDS

Berlin and Global definitions, lung-protective ventilation, PEEP, proning, paralysis, steroids, ECMO and the nursing care

36 sources + more detail
erbasics.com/sheets/ards.html
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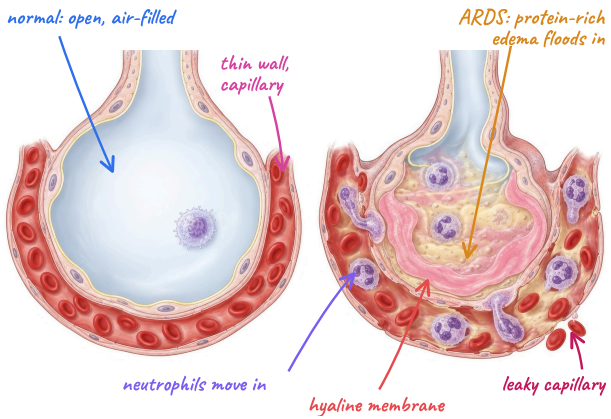
LUNG What goes wrong in the alveolus



1 Definition and severity

Severity by P/F on PEEP≥5: mild 201–300, moderate 101–200, severe ≤100 (Berlin mortality 27%, 32%, 45%).

CRITERION	BERLIN 2012	GLOBAL DEFINITION 2024 ADDS
Timing	Within 1 week of an insult or new symptoms	Same
Imaging	Bilateral opacities on CXR or CT	Bilateral B-lines or consolidation on ultrasound
Edema	Not fully explained by heart failure or overload	Same
Oxygenation	P/F ≤300 on PEEP ≥5	SpO_2/FiO_2 ≤315 if SpO_2 ≤97%; HFNC ≥30 L/min or NIV/CPAP ≥5 count
Resource-limited	Not addressed	SpO_2/FiO_2 ≤315; no PEEP or flow requirement

2 Causes and pathophysiology

- Direct: pneumonia, aspiration, inhalation, contusion. Indirect: sepsis, pancreatitis, transfusion (TRALI), trauma, burns
- Phases: exudative (leaky capillaries, protein-rich edema, hyaline membranes), proliferative (repair), fibrotic in some
- Baby lung: only 300–500 g is aerated, so a normal Vt overstretches it; small, not stiff (Gattinoni)

3 Lung-protective ventilation (see Ventilator Modes)

PBW: men 50 kg, women 45.5 kg, + 2.3 kg per inch over 5 feet.

SETTING	TARGET	SOURCE
Tidal volume	6 mL/kg PBW (range 4–8); start 8, down 1 mL/kg every ≤2 h	ARMA: mortality 31.0% vs 39.8%
Plateau	≤30 cm H_2O (0.5-s hold)	ATS 2024 strong; SSC 2026 strong
Driving pressure	Plateau – PEEP, aim under about 15	Observational (Amato 2015); no guideline target
PEEP	ARDSNet lower table; higher table if P/F ≤200	ATS 2024 conditional for higher; ESICM 2023 no recommendation
Oxygenation	SpO_2 88–95% or PaO_2 55–80 mm Hg	ARDSNet
pH	7.30–7.45; raise rate first (max 35)	ARDSNet permissive hypercapnia

4 Adjuncts: what, when and the evidence

ADJUNCT	WHEN	EVIDENCE AND GUIDELINE
Prone	P/F <150 despite optimized settings; ≥16 h sessions	PROSEVA 28-day mortality 16.0% vs 32.8%; ATS 2024 strong (>12 h/day, severe); ESICM 2023 strong
Neuromuscular blockade	Early (<48 h) severe ARDS if deeply sedated, or dyssynchrony; ≤48 h	ACURASYS HR 0.68; ROSE 42.5% vs 42.8% vs light sedation. ATS conditional for; ESICM against routine infusion
Recruitment maneuvers	No prolonged maneuvers (≥35 cm H_2O for ≥1 min)	ART: mortality 55.3% vs 49.3%, barotrauma 5.6% vs 1.6%; ATS and ESICM strong against
Conservative fluids	Once out of shock	FACTT: vent-free days 14.6 vs 12.1; mortality 25.5% vs 28.4% (NS)
Corticosteroids	Moderate–severe, within 14 days of onset	DEXA-ARDS: 60-day mortality 21% vs 36%; ATS 2024 conditional for; RECOVERY (COVID, ventilated) 29.3% vs 41.4%
Inhaled NO or epoprostenol	Rescue for oxygenation or RV failure only	Better P/F at 24 h, no survival gain, more renal failure (Cochrane 2016)
VV-ECMO	P/F <50 >3 h, <80 >6 h, or pH <7.25 with $PaCO_2$ ≥60 >6 h (see ECMO)	EOLIA 35% vs 46% (p = 0.09); CESAR 37% vs 53%; ATS conditional, ESICM strong, at ECMO centers

5 Refractory hypoxemia: the usual order

1. Confirm Vt 6 mL/kg PBW, plateau ≤30, tube position, no auto-PEEP; treat the cause
2. Higher PEEP by table (moderate–severe); watch BP and the RV
3. Prone ≥16 h while P/F stays <150
4. Paralysis if deeply sedated or fighting the ventilator (≤48 h)
5. Net-negative fluids; steroids if within 14 days
6. Inhaled NO or epoprostenol as a bridge
7. Call the ECMO center before EOLIA thresholds are met; no HFOV

6 Nursing care and monitoring

- Prone (see the Prone positioning checklist): tube and lines secured, depth noted, suction, preoxygenate, eyes lubricated and closed, pads for face, chest, pelvis, knees; head and swimmer arms turned every 2 h; feeds resume after the turn; ABG at 1 h
- Sedation: light (see Sedation Scales) unless paralyzed; then deep sedation first, train-of-four, eye care
- Each shift: plateau, driving pressure, P/F trend, $PaCO_2$ and pH, exhaled Vt in mL/kg PBW
- High PEEP: hypotension with rising CVP is an overloaded RV; sudden high pressure, one-sided breath sounds, falling BP: pneumothorax
- VAP bundle (see Infection Prevention): head of bed 30–45°, daily SAT/SBT, toothbrushing, subglottic suction
- Improving: daily SBT screen once FiO_2 ≤0.40 and PEEP ≤8 (see Ventilator Liberation)

SAFETY A paralyzed patient cannot show pain, awareness or a seizure: never start a neuromuscular blocker before deep sedation is confirmed. During a turn, one person owns the airway.

7 Exam pearls

EXAM TIP Exams test: Vt by predicted, not actual, weight; plateau ≤30 beats a normal $PaCO_2$ (accept pH 7.30); hypoxemia refractory to FiO_2 is shunt, fixed by PEEP and proning; P/F <150 triggers proning for ≥16 h; a rising plateau with hypotension is pneumothorax until proven otherwise.

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