

The 6 P's of ARDS Management




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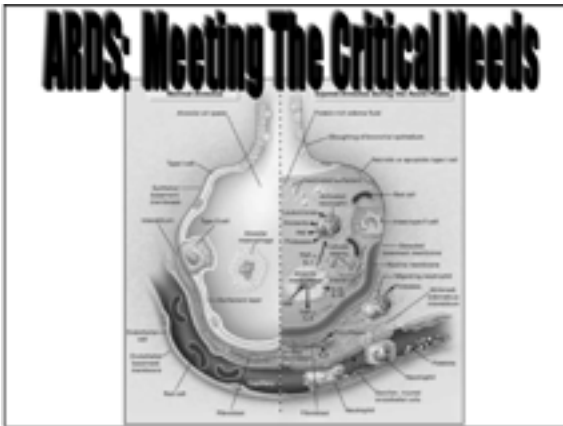
ARDS: Meeting The Critical Needs

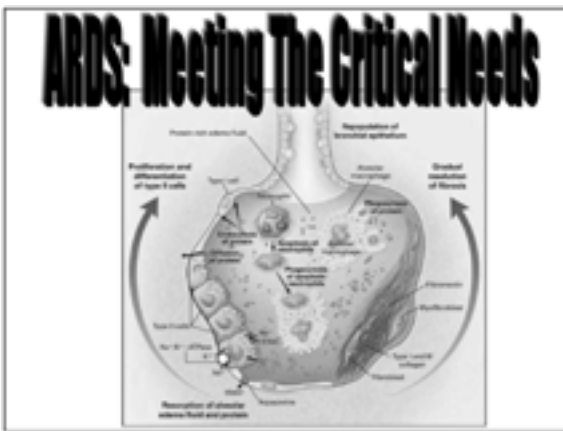
- 6 P's of ARDS Management
 - Pathophysiology
 - Prevention
 - Positive Pressure Ventilation
 - Perfusion
 - Pharmacology
 - Positioning

ARDS: Meeting The Critical Needs




diffuse lung injury resulting in noncardiogenic pulmonary edema due to increase in capillary permeability

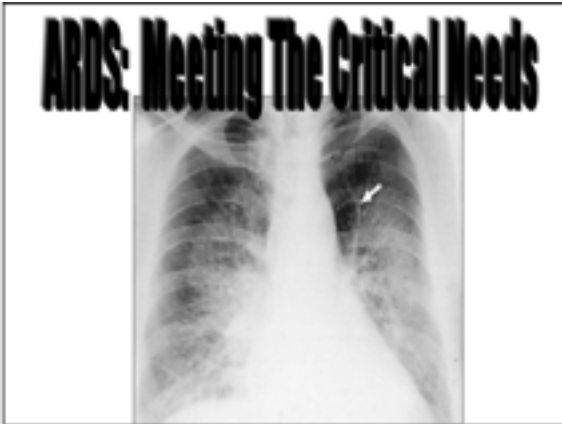


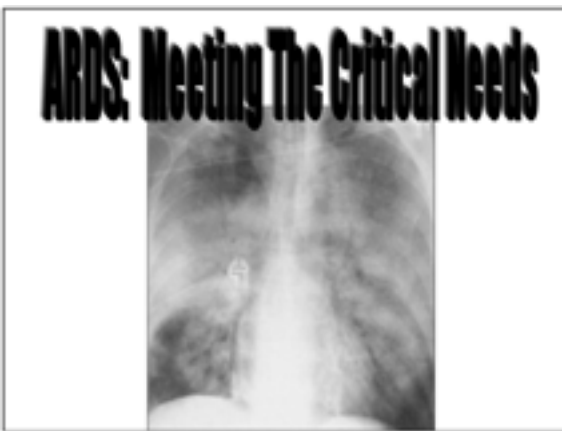


ARDS: Meeting The Critical Needs



- refractory hypoxemia
- diminished compliance
- diffuse infiltrates on chest x-ray
- normal PAOP
- PaO_2 / FiO_2 ratio < 200





ARDS: Meeting The Critical Needs

- Etiology
 - shock
 - trauma
 - infections
 - inhaled toxins




ARDS: Meeting The Critical Needs

- Etiology
 - aspiration
 - near-drowning
 - massive blood transfusions
 - fat or amniotic fluid emboli
 - pancreatitis




ARDS: Meeting The Critical Needs

- Phase I & II
 - subclinical respiratory distress
 - ABGs (respiratory alkalosis)
 - hyperventilating




ARDS: Meeting The Critical Needs




- Phase III
 - established respiratory distress
 - pulmonary shunt > 10% above baseline
 - chest x-ray shows infiltrates
 - crackles in lung bases

ARDS: Meeting The Critical Needs

- Phase IV
 - severe respiratory failure
 - rising pCO_2
 - rising physiologic shunt
 - white-out on chest x-ray



ARDS: Meeting The Critical Needs



- Diagnosis
 - history
 - signs/symptoms
 - labs (ABGs)
 - x-ray
 - hemodynamics


ARDS: Meeting The Critical Needs

- Treatment
 - establish patent airway
 - restore arterial O_2 level



ARDS: Meeting The Critical Needs

- Mechanical Ventilation
 - PC / IRV
 - HFJV
 - other methods
 - conventional with PEEP



ARDS: Meeting The Critical Needs

- Fluid Management
 - maintain adequate perfusion
 - isotonic solutions
 - fluid restriction
 - consider diuretics




ARDS: Meeting The Critical Needs



- Improve systemic O₂ Delivery
 - modest volume expansion
 - vasopressors / vasodilators

ARDS: Meeting The Critical Needs



- Sedation
 - control anxiety & physical activity
 - may require addition of neuromuscular blocker
 - suggestions:
 - propofol
 - versed

ARDS: Meeting The Critical Needs

- Positioning
 - "good lung" in dependent position
 - both lungs are equally injured
 - beneficial positions include:
 - prone
 - right lung down




ARDS: Meeting The Critical Needs

- Pharmacologic Therapy
 - corticosteroids
 - antimicrobials
 - non - steroidal anti - inflammatory agents
 - anti - pyretic
 - "Star - Trek Meds"



ARDS: Meeting The Critical Needs

- Hemoglobin
 - 12 to 15 gm / dL
 - factors decreasing offloading:
 - hypophosphatemia
 - alkalosis
 - hypothermia




ARDS: Meeting The Critical Needs

- Nutritional Support
 - often overlooked in ARDS
 - ingredients required:
 - stress amino acid
 - trace elements
 - omega 3 / omega 6
 - Oxepa or Impact



ARDS: Meeting The Critical Needs


- Other Therapeutics
 - nitric oxide
 - surfactant
 - ECMO
 - partial liquid ventilation



ARDS: Meeting The Critical Needs

Extracorporeal Membrane Oxygenation (ECMO)

- Description
 - type of cardiopulmonary bypass
 - CO₂ removal; O₂ replacement
 - ventilated (lower V_T, FiO₂, & PEEP)
 - still experimental in adults




ARDS: Meeting The Critical Needs

Extracorporeal Membrane Oxygenation (ECMO)



- Complications
 - technical difficulties
 - cannula malposition
 - hemorrhage
 - sepsis

ARDS: Meeting The Critical Needs



Case Study 3

- 48 - year old alcoholic with GI bleed & pancreatitis
- severe epigastric pain, acute abdomen
- ultrasound confirms enlarged, edematous pancreas
- hemodynamically unstable
- refractory hypoxemia

ARDS: Meeting The Critical Needs

Case Study 3

HR	130
BP	80 / 50 / 62
CI	2.2
PAP	15 / 8 / 10
PAOP / CVP	2 / 1



ARDS: Meeting The Critical Needs

Case Study 3

PVRI	290
SVRI	2218
SVI	28
LVSWI/RVSWI	22.8 / 2.6



ARDS: Meeting The Critical Needs


Case Study 3

ABGs (.70 FiO₂)

pH	7.38
pCO ₂	45
pO ₂	50
SaO ₂	.83
HCO ₃	27
SvO ₂	60%




ARDS: Meeting The Critical Needs



Case Study 3	
Laboratory Values	
Na	150
Cl	96
Hgb / Hct	12.1 / 36.3
CO ₂	26


ARDS: Meeting The Critical Needs

- PEEP can ↓ DOI₂
- WOB ↑ VOI₂
- triggers inflammatory response
- maldistributed blood flow → ↓ VOI₂
- ideal Hgb is 12



ARDS: Meeting The Critical Needs

↑ DOI₂ until VOI₂ plateaus



ARDS: Meeting The Critical Needs

Case Study 3

$$DOI_2 = CI (1.38 \times Hgb \times SaO_2) \times 10$$
$$2.2 \times 1.38 \times 12.1 \times 0.83 \times 10$$

305 mL/min/m²
(normal = 360 - 600 mL/min/m²)

ARDS: Meeting The Critical Needs

Case Study 3

$$VOI_2 = CI \times 1.38 \times Hgb \times (SaO_2 - SvO_2) \times 10$$
$$2.2 \times 1.38 \times 12.1 \times (.83 - .60) \times 10$$

84 mL/min/m²
(Normal 220 - 290 mL/min/m²)

ARDS: Meeting The Critical Needs

Case Study 3

▪ Anion Gap

- Na - (CO₂ + Cl)
- 150 - (96 + 26)
- 28

(Normal = 12 - 15)

ARDS: Meeting The Critical Needs

Case Study 3

PaO₂ / FiO₂ Ratio (P/F)

• 50 / .70

• 71

Normal = > 300

ALI = < 250

ARDS = < 200
