



Venting Wisely

HRF & ARDS Pathway

All Patients

Measure

All Mechanically Ventilated Patients RRT

- Measure Height & Document in Electronic Medical record
- Obtain Predicted Body Weight (PBW)

Interventions with this symbol require an order or diagnosis by the MRHP (or designate) MD

Screen

Patients ventilated at midnight (00:00h) with PF ratio ≤ 300 (any ABG) RRT

- Perform ABG at clinical steady state 00:00-08:00h on PEEP ≥ 5
- Report results of screen, positive or negative, on daily rounds

Interventions may be proposed by any member of the multidisciplinary team

PF ratio > 300
rescreen Q 24H

PF ratio ≤ 300
meets criteria for HRF

Ensure recent CXR
has been completed RRT

Presence of bilateral infiltrates & absence of heart failure meets criteria for ARDS MD

Escalation of treatment should be based on:

- Increasing FiO₂ requirements
- Decreasing PF ratio
- Worsening respiratory acidosis
- Violation of Lung Protective Ventilation

HRF & ARDS Patients

Manage

Lung Protective Ventilation RRT

Control Mode of Mechanical Ventilation

- Tidal Volume 6-8 ml/kg PBW
- Plateau pressure ≤ 30 cm H₂O
- Driving pressure ≤ 18 cm H₂O

Oxygenation and ventilation goals:

- Define on admission
- Review on daily rounds
- Document in Electronic Medical Record

Fluid Balance
Neutral or negative RN
MD

Adjunctive Therapies

Monitor

Plateau Pressure & Driving Pressure RRT

1st within 1H of meeting criteria for HRF, then Q12H (consider Q4H)

Optimal PEEP Study RRT

PF ratio ≤ 200 1st within 4H of meeting threshold, then Q24H

Recruitment Maneuvers RRT MD

Routinely assess for appropriateness; if used, perform Q4H

HRF & ARDS Patients

Basic Interventions

Sedatives RN
MD

To meet lung protective goals or target a Richmond Agitation-Sedation Score (RASS) of ≤ -3

Esophageal Balloon RRT MD

Consider in obese or stiff chest

ARDS Patients

Advanced Interventions

Neuromuscular Blockade RN
MD

PF ratio ≤ 150 (Consider)

PF ratio ≤ 100 (Strongly recommended)

Proning MD RN
RRT

PF ratio ≤ 150 & FiO₂ ≥ 0.6 (Consider)

PF ratio ≤ 100 & FiO₂ ≥ 0.6 (Strongly recommended)

Extracorporeal Life Support (ECLS) MD

Consider referral ONLY if PF ratio ≤ 100 despite above interventions & NO contraindications

Inhaled Vasodilators RRT MD

Routine use is not recommended; available in exceptional circumstances



ALL PATIENTS

Within 1 hour of intubation/admission to ICU all mechanically ventilated patients should have documented in electronic medical record:

1. Height
2. Predicted Body Weight (PBW)

SCREENING

1. All patients who are mechanically ventilated at midnight (00:00 hrs) AND have a PF ratio less than or equal to 300 on ANY arterial blood gas (ABG) should be identified for screening for HRF/ARDS by the RRT
2. Screening for HRF consists of:
 - a. ABG performed at clinical steady state between 00:00 and 08:00 to demonstrate PF ratio less than or equal to 300 (on a minimum PEEP of 5)
3. Screening for ARDS consists of the following 3 criteria:
 - a. Meeting criteria for HRF (see step 2 above) plus:
 - b. Bilateral infiltrates: Screening chest x-ray should be performed and interpreted by intensivist/delegate to determine the presence of bilateral infiltrates
 - c. Absence of heart failure: Intensivist/delegate appropriately rules out heart failure as the primary cause of HRF
4. Results of the HRF/ARDS screen (positive or negative) should be reported on daily multidisciplinary rounds by the RRT
5. Patients should be screened every 24 hours to determine eligibility in the pathway and/or identify applicability of any new interventions

GOALS AND EARLY MANAGEMENT

1. Controlled mode of ventilation should be used for all patients with new onset HRF/ARDS
2. On controlled ventilation the following initial “lung protective” goals should be targeted:
 - a. Tidal volume 6-8mL/kg PBW
 - b. Plateau pressure less than or equal to 30 cm H₂O
 - c. Driving pressure less than or equal to 18 cm H₂O (Pplat-PEEP)
3. Oxygenation and ventilation goals should be defined on patient admission and reviewed on daily multidisciplinary rounds. These should be documented by the RRT and intensivist/delegate in the electronic medical record
4. Target neutral or negative fluid balance in the absence of contraindications
5. Escalation of treatment should be based on:
 - a. Increasing FiO₂ requirements,
 - b. Decreasing PF ratio,
 - c. Worsening respiratory acidosis, and/or
 - d. Violation of lung protective ventilation (e.g. oxygenating or treating respiratory acidosis by using higher tidal volumes, higher plateau pressures, higher driving pressures than accepted)

MONITORING AND BASIC INTERVENTIONS

Monitoring Plateau and Driving Pressures

1. Measure a plateau and driving pressure on all patients with a controlled mode of ventilation (independent of PF ratio, FiO₂ requirements, or lung compliance)
 - a. Initial plateau pressures should be measured within 1H of meeting criteria for HRF
 - b. Should be repeated at least Q12H (consider Q4H)
 - c. RRT to determine appropriateness and perform

Sedatives

1. Consider using sedatives to a target RASS of less than or equal to -3 or to reduce ventilator dyssynchrony
2. Sedatives may be proposed by any member of multidisciplinary team; however, needs Most Responsible Health Practitioner (MRHP) approval prior to initiation. RN to administer and meet sedation goals

Recruitment Maneuvers

1. Recruitment maneuvers should be routinely **assessed** for appropriateness
 - a. If used, should be performed Q4H
 - b. Recruitment maneuvers may be proposed by any member of the multidisciplinary team; however, needs MRHP approval prior to initiation. RRT to perform

Optimal PEEP Study

1. A PEEP study should be completed for patients with a PF ratio less than or equal to 200
 - a. First PEEP study should be completed within 4H of meeting PF ratio threshold
 - b. Should be repeated Q24H
 - c. A PEEP study may be proposed by any member of the multidisciplinary team. RRT to perform

Esophageal balloon

1. Consider an esophageal balloon to guide/determine both end inspiratory (trans-pulmonary plateau) and end expiratory (trans-pulmonary PEEP) pressures (especially if a patient is obese or is suspected to have a stiff chest wall)
 - a. Esophageal balloons may be proposed by any member of the multidisciplinary team; however, needs MRHP approval prior to initiation. RRT to perform

ADVANCED INTERVENTIONS

Neuromuscular Blockade

1. Neuromuscular blockade:
 - a. **Consider** for patients with a PF ratio less than or equal to 150
 - b. **Strongly recommend** for patients with a PF ratio less than or equal to 100
 - c. Goals for neuromuscular blockade (e.g. EtCO₂, train of four, or ventilator dyssynchrony) should be determined by MRHP and documented in the appropriate electronic health record
 - d. Neuromuscular blockade may be proposed by any member of the multidisciplinary team; however, needs MRHP approval prior to initiation. RN to administer and meet goals

Proning

1. Proning:
 - a. **Consider** for patients with a PF ratio less than or equal to 150 AND FiO₂ requirement greater than or equal to 0.60
 - b. **Strongly recommend** for PF ratio less than or equal to 100 AND FiO₂ requirement greater than or equal to 0.60, in the absence of contraindications
 - c. Proning may be proposed by any member of the multidisciplinary team; however, needs MRHP approval prior to initiation. Multidisciplinary team to enact

Extracorporeal Life Support (ECLS)

1. Should be considered as a potential treatment modality for HRF/ARDS only if a patient has a PF ratio less than or equal to 100 despite above therapies and in the absence of contraindications
2. Referral for ECLS may be proposed by any member of the multidisciplinary team; however, needs MRHP approval prior to initiation of referral

Inhaled Vasodilators

1. Routine use of inhaled vasodilators is not recommended; however, they are available on a case by case basis in exceptional circumstances

Interventions are additive as PF ratio decreases