

University of Rochester Medical Center

Acute Shock Program

CARDIAC & RESPIRATORY FAILURE,
MECHANICAL CIRCULATORY SUPPORT,
ADVANCED HEART FAILURE TEAM



UR
MEDICINE

MEDICINE of the HIGHEST ORDER

URMC Acute Shock Program:

**For immediate response please call the
URMC Shock Team at 1-888-SHOCK35**

Dr. Igor Gosev

Cardiac Surgery, (857) 205-0513

Dr. Katherine Wood

Cardiac Surgery, (408) 605-9866

Dr. Elliott S. Cohen

Cardiac Critical Care, (615) 679-7214

Dr. Ryan Magnuson

Cardiac Critical Care, (860) 716-5412

Dr. Yang Gu

Cardiac Critical Care, (845) 323-9811

Dr. Jeffrey Bruckel

Interventional Cardiology, (585) 233-2696

Dr. Sabu Thomas

Heart Failure Cardiology, (585) 309-4522

Karen Smith

Chief Perfusionist, (585) 748-6007

Lisa Owen

*Acute Shock & Critical Care Transport
Programs Coordinator, (585) 739-5682*

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What sets us apart.

URMC is among the nation's leading academic centers. We are dedicated to building and nurturing a partnership with our professional colleagues and patients and families to provide more equitable, inclusive and ever better care across our region.

1

The **only** heart transplant center in the region along with an experienced solid organ transplant team able to provide multi-organ transplantation.

24/7

The **only** critical care transport team in the region providing safe travel by ground or air 24/7 with specialty trained experts in the care of all MCS devices.


350+

Minimally-invasive LVADs placed through our cutting-edge VAD program comprised of world leaders in advanced heart failure care.

1000+

ECMO runs. URMC is recognized as an ELSO Center of Excellence for its high-quality care in advanced life support.





Cardiogenic shock (CS) is life-threatening. It requires prompt diagnosis, careful decision making and early intervention. The priority of our Acute Shock Program at the University of Rochester Medical Center (URMC) is early recognition and expert management of patients in shock. The Acute Shock Program also includes an experienced veno-venous ECMO (VV ECMO) program skilled at providing lung rescue therapy for patients with severe respiratory failure.

The Acute Shock Program at URMC is the regional leader in providing team-based care to deliver the best outcomes including the most advanced therapies with all types of mechanical circulatory support (MCS) devices. Our MCS care is provided in a comprehensive cardiac intensive care unit staffed with specialized cardiac care nurses, advanced practice providers and intensivists. We have a committed and caring team of shock experts including world-renowned advanced heart failure surgeons that can assess your patient for heart transplant or ventricular assist device (VAD).

To optimize the chance of a favorable patient outcome, we encourage early referrals to our institution. URMC has the only critical care transport team in the area that is specially trained and experienced in the retrieval of shock patients including those already supported with MCS. Our transport team is available 24/7 and has access to both ground and air transportation.

Cardiogenic Shock Team Coordination

STEP 1: INCLUSION CRITERIA

Shock Team Goals:

- Early identification of shock
- Early invasive hemodynamic assessment (RHC, PAC)
- Early support with MCS to minimize vaso/inotropes
- Early assessment for heart recovery and ability to wean MCS
- Early referral for advanced therapies if unable to wean

- $CPO = MAP \times CO/451$
- $PAPi = (sPAP-dPAP)/RA$

Cardiogenic shock suspected

Must have at least one from both (A) and (B)

(A) Clinical Criteria

- Acute Coronary Syndrome or Heart Failure suspected
- Hypotension
 - $SPB < 90$ or $MAP < 60$ for > 30 min
 - Lactate > 3
 - Evidence of end-organ malfunction
 - Encephalopathy
 - AKI, UOP < 30 cc/hr
 - Acute liver injury

Hemodynamic Criteria*

- Cardiac Index < 1.8
- Cardiac index < 2.2 with inotropes at moderate doses**
 - PCWP > 15
 - RAP > 12
 - RA:PCWP > 0.6
 - CPO < 0.6
 - PA Pi < 1

*Consider echo if invasive hemodynamics not immediately available

- LVEF $< 40\%$
- LVOT VTI < 16
- TAPSE < 16

**Milrinone ≥ 0.25
Epinephrine ≥ 0.04
Dobutamine ≥ 5

STEP 2: REVIEW

Relative Exclusion Criteria for MCS:

- Age > 75
- Neurologic injury
- Severe MOSF
- Bleeding
- Prohibitive vascular access
- DNR

If criteria for cardiogenic shock are met: Shock team alert: CICU/Cardiac surgery review and discussion

- Confirmation of cardiogenic shock Medical optimization
- Evaluation of exclusion criteria

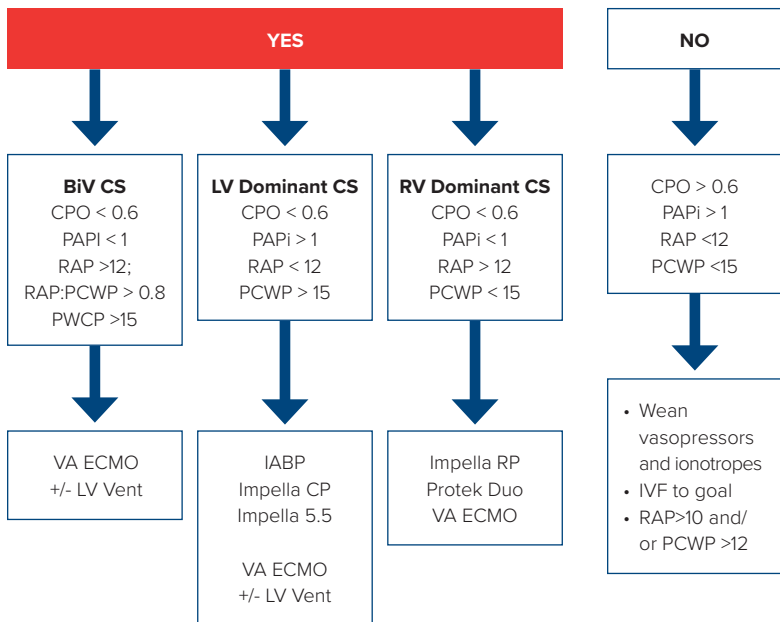
STEP 3: ACTIVATE

Shock team activation with virtual discussion before mechanical circulatory support (MCS)

referral: CICU, Cardiac surgery, Interventional cardiology, Heart Failure

Admit to cardiac intensive care unit Resuscitation, medical optimization, temporary MCS

Is there Cardiogenic Shock that warrants temporary MCS?



Lung Rescue Team Coordination

Lung Rescue Team Goals

- Early identification and coordinated care.
- Early support with VV ECMO.
- Complete lung recovery and improved survival.

STEP 1: INCLUSION CRITERIA

Acute respiratory failure failing conventional medical management. Examples including ARDS, status asthmaticus and/or air leak syndromes.

(A) Clinical Criteria

- PaO₂/FiO₂ ratio < 80 x6h
- PaO₂/FiO₂ ratio < 50 x3h
- pH < 7.25 and/or pCO₂ > 60 x6h
- High pressure, high oxygen mechanical ventilator settings

STEP 2: REVIEW

Relative Exclusion Criteria for MCS:

- Age > 65
- Neurologic injury
- Severe MOSF
- Bleeding
- Prohibitive vascular access
- DNR

If criteria for severe respiratory failure are met:

Shock team alert with CICU/Cardiac surgery review and discussion.

- Continuation of medical optimization including treating modifiable conditions such as volume overload, atelectasis and/or pneumothorax.
- Attempt prone positioning when appropriate.
- Trial of neuromuscular blocking agents and/or inhaled pulmonary vasodilators.

STEP 3: ACTIVATE

Shock team activation with virtual discussion before MCS and primary versus secondary ECMO transport; we offer a mobile respiratory ECMO team.

Admit to CICU for advanced respiratory support.

Best Practices for Adult Critical Care Transport

Airway & Breathing

- Secure airway prior to transportation including intubation if appropriate
- Utilize low tidal volume ventilation to minimize lung injury, generally tidal volumes 6-8 ml/kg IBW
- Aim to keep plateau pressures < 32 mmHg
- Maintain pO₂ > 60 on < 90% FiO₂
- We can consider transporting with inhaled pulmonary vasodilators to improve gas exchange (ex Veletri)

Hemodynamics & Circulation

- Optimize hemodynamics aiming for a MAP > 60mmHg without high dose vasopressor/inotropic support
- If moderate to high dose vaso-inotropic support consider temporary mechanical circulatory support prior to transport
- Attempt correction of significant acid/base derangements to goal pH > 7.2
- Place arterial line for most accurate hemodynamic measurements
- Place central venous catheter if possible for reliable med administration. Minimum of two peripheral IV if central line not placed.

Hematologic

- Mitigate bleeding for goal < 300 cc/hr of acute blood loss
- Transfuse blood products prior to transport if necessary
- Correct significant coagulopathy as able
- Consider if systemic anticoagulation is needed (i.e., Impella), use UFH infusion prior to transfer

Neurologic

- Evidence of neurologic function: able to move all extremities, follow commands
- If GCS is < 8 consider brain imaging to identify neurologic injury
- Minimize sedation as able and utilize opioid infusion as first line for analgo-sedation

ECMO or MCS

- VA ECMO (peripheral): cannulation with 15-17f (LCFA) arterial and 25f (RCFV) venous configuration.
- Ensure adequate distal perfusion by placing 6f reperfusion catheter (arterial cannulation, ipsilateral SFA) at time of cannulation
- Consideration of LV venting with IABP or Impella CP
- VV ECMO: cannulation with 25f (RCFV) inflow and 25f (RIJV) outflow configuration
- XRAY imaging to confirm appropriate cannula positioning. POCUS to evaluate any device alarms as needed.
- Ability to maintain device flow > 2.0 L/min

Communication

- We encourage early referral and are available 24/7 to assist in management and optimization prior to transport
- Report any changes in the patient's clinical status that occur prior to our arrival
- We will provide regular patient follow up and the opportunity to debrief on your patient's clinical course and outcome

UR Medical Center Adult Critical Care Transport Team



Contact Us.

For immediate patient consults and referrals please call the URMCC Shock Team at **1-888-SHOCK35** or the URMCC Transfer Center at **1-800-449-9298**, as these are monitored 24/7.



In collaboration with the Division of Cardiac Surgery,
Chief of Cardiac Surgery Dr. Peter Knight.



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