Simulation Scenario: Massive Pulmonary Embolism with Progressive Respiratory Failure

Title: Pulmonary Embolism in a Post-Operative Patient with Hemodynamic Instability
Target Learners: ECHO participants
Duration: 15–20 minutes
Learning Objectives:

1. Recognize risk factors and presentation of massive pulmonary embolism (PE).
2. Stabilize a critically ill patient with severe hypoxia and shock.
3. Initiate high-flow nasal cannula (HFNC) and escalate to intubation.
4. Make timely decisions for thrombolysis in the ED.
5. Demonstrate effective team communication and leadership during resuscitation.

Scenario Summary

- **Patient:** Mukasa John, 45-year-old obese male truck driver, known smoker, hypertensive.
- **Presenting Complaint:** Severe shortness of breath (DIB) progressively worsening over 3 days.
- **Key History:**
    - Recent hospital admission for **pelvic fracture repair (1 week ago)** after a fall.
    - Discharged home; developed worsening dyspnea 3 days ago.
    - No fever, no chest pain reported.
- **Referral:** From Jinja Regional Referral Hospital for advanced care.

Handover (Paramedic/Referring Clinician)

"I'm bringing Mukasa John, 45, from Jinja RRH. He's a known hypertensive and heavy smoker. He was discharged last week after pelvic fracture surgery. He started deteriorating 3 days ago with worsening shortness of breath.

He's been on a non-rebreather mask at 15 L/min, but his saturations are only 85–88%. He's tachypneic, hypotensive, and confused. We suspected pulmonary embolism but couldn't do a Chest CT angiogram at Jinja."

Primary Survey Findings

System	Findings
Airway	Patent, speaking in short sentences, no trauma signs
Breathing	Severe respiratory distress, RR 36/min, SpO_2 85% on 15L NRM, bilateral breath sounds, no wheeze/crackles
Circulation	HR 180 bpm (sinus tachycardia), BP 80/60 mmHg, clammy, cold peripheries, weak pulses
Disability	GCS 14 (confused), pupils 3 mm equal/reactive, RBS 8.3 mmol/L
Exposure	Afebrile, diaphoretic, no new injuries, surgical scar over pelvis

Simulation Setup

Category	Details
Monitor	HR 180, BP 80/50, SpO_2 85% on NRM, RR 36
Imaging	CXR: Clear lung fields, PXR: Normal, FAST: Negative, E-FAST: Normal lung sliding
Manikin/Props	Manikin in respiratory distress, 2x14G IV cannula, oxygen mask setup
Environment	Busy ED resus bay, referral papers from Jinja RRH, limited initial labs

Expected Learner Actions

1. **Immediate Assessment & Supportive Care:**
   - Full primary survey (ABCDE).
   - Apply **High Flow Nasal Cannula (HFNC)** (FiO_2 100%, 60 L/min).
   - Start fluid resuscitation cautiously (to avoid RV strain).
   - Attach cardiac and SpO_2 monitor.
2. **Diagnostics:**
   - Request **D-dimer** (if available) and **Chest CT Pulmonary Angiography (CTPA)** (once stabilized).
   - Perform bedside **E-FAST** to rule out pneumothorax/other causes of shock.
3. **Escalation Decision Points:**
   - Patient **desaturates to 75% despite HFNC** → prepare for **intubation with RSI** (note high peri-intubation risk).
   - Persistent hypotension (SBP <90) despite fluids → initiate **vasopressors (noradrenaline)**.
   - Discuss and **initiate thrombolysis** (Alteplase) based on high suspicion of massive PE.
4. **Team Roles:**
   - Assign team leader, airway manager, medication nurse, scribe, and runner.
   - Use **closed-loop communication** and **PE advanced life support algorithms**.

Scenario Progression

Time/Trigger	Patient Response	Expected Actions
Start	RR 36, SpO_2 85% on NRM, tachycardic, hypotensive	Recognize shock, start resus
After HFNC	Slight improvement (SpO_2 90%)	Continue workup, plan for imaging
After 3 min	Sudden SpO_2 drop to 75%, HR 160	Intubation prep, team briefing
After Intubation	Persistent shock	Start vasopressors, consider thrombolysis
After Thrombolysis	Gradual improvement	Transfer to ICU

Debriefing Points

1. Rapid recognition of PE in a post-op high-risk patient.
2. Decision-making for **HFNC vs intubation** in hypoxemic shock.
3. Hemodynamic support and risk of RV failure.
4. Indications and timing for **thrombolysis in massive PE**.
5. Team dynamics and communication in high-stress resuscitation.