

## Collaborative Case Tutorial

### Topic: Emergency & Critical Care

Patient-centric script title: *I am unable to breathe*

Module Code/Title: PPNP3

#### Identification of author

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#### Pre-Tutorial Task

Please read e lecture 3,4&5 from LumiNUS.

Additional reading:

- PATHOPHYSIOLOGY, Copstead-Kirkhom & Banasik, J.L, 6<sup>TH</sup> EDITION

## **Entrustable Professional Activities (EPAs) Covered**

DOMAIN 1: COMMUNICATION  
DOMAIN 2: PROFESSIONALISM  
DOMAIN 3: PATIENT CARE  
DOMAIN 4: CLINICAL PROCEDURE DOMAIN  
DOMAIN 5: SAFE PRACTICE  
DOMAIN 6: CLINICAL KNOWLEDGE/REASONING  
DOMAIN 7: PATIENT EDUCATION

## **Learning Outcomes**

List the learning outcomes for the tutorial.

- Describe the pathophysiology of Acute Respiratory Failure (ARF) & Shock.
- Describe the etiology and Risk factors of Acute Respiratory Failure (ARF) & Shock.
- Explain the clinical presentation in ARF and Shock
- Describe the acute and chronic complications
- Interpret the investigations done. Which other investigations or monitoring needs to be done.
- Discuss medical management (surgical & non-surgical interventions)
- Indications, contraindications, mechanism of action, interactions and other pharmacological aspects of the drugs used.
- Nursing Management of patient using Mental framework ABCDE and collaborative care

## Overview

The case will provide the nursing student a grasp of the clinical presentation of Acute Respiratory Failure with shock. It will cursorily explore the pathological aspects of the disease and will link the clinical picture with investigations, complications, medical and surgical management as well as considerations in nursing practice. It will also explore the rationale for treatment and side effects.

### Section A. Case History

Chief complaint, history, signs and symptoms, past-medical history, review of systems

Mr Lee, a 62-year-old Chinese man, 65kg, presented at the Emergency Department (ED) at 3:00am with severe shortness of breath. On initial assessment, his temperature was 37.0, respiratory rate was 32 breaths per minute and oxygen saturation (SpO<sub>2</sub>) was 88%. Although he was still alert and oriented to time, place and person, he was slightly agitated. In the ED, Mr Lee received noninvasive ventilation (NIV) using Continuous Positive Airway Pressure (CPAP). Despite receiving CPAP for 2 hours, Mr Lee's respiratory status did not improve, and he looked more lethargic. As such, he was intubated at 5am, and transferred to the intensive care unit (ICU) at 5:30am. The chest X-ray was done, and it showed the Endotracheal Tube (ETT) was in situ.

Mr Lee has been diagnosed with Chronic Obstructive Pulmonary Disease (COPD) for more than 10 years. He was a heavy smoker for more than 20 years but has quit smoking after he was diagnosed with COPD. Currently, he lives with his wife who is 58 years old and has no children. They live in a 2 bed-HDB flat that is very close to the new development of a new 30-storey condominium. He has a past medical history of Type II Diabetes Mellitus (DM) and Hypertension for more than 10 years. His Type II DM and hypertension were well controlled with medications. He was having cough and fever for the past one week. The doctor requested for his wife to bring his current medications for review.

Past Medication History:

1. Metered dose inhaler (MDI) Salbutamol 2 puffs hourly or (180mcg) 4 to 6 when necessary
2. Tab. Metformin(500mg) twice daily
3. Atorvastatin (Lipitor) 10 mg daily
4. PO Enalapril 10mg BD

ABG on admission

pH 7.24	P <sub>a</sub> O <sub>2</sub> 60 mm Hg	PaCO <sub>2</sub> 58 mm Hg	HCO <sub>3</sub> 24 mEq/l
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**Section B: Physical Assessment**

**Day 1 in ICU:**

Mr Lee was intubated and on invasive ventilation. He was on sedation as per doctor's order. At 06:00hr, physical examination indicated that he responded to pain, obeyed commands, had a clear lung sounds in the bilateral lower lobes, and had normal heart sounds. His abdomen was soft with active bowel sounds. Skin remained intact and no swelling were seen at both legs. He appeared comfortably sleeping.

His vital signs are as below:

Parameters	6:00am	8:00am
Blood pressure (mmHg)	120/68	130/58
Heart Rate (beats/min)	70 (regular)	76 (regular)
Respiratory (breaths/min)	14	14
Temperature (C)	37.0	37.5
O2 sat	98%	96%

## Section C: Diagnostic Tests

### ABG at 10:00am:

pH	HCO <sub>3</sub>	pCO <sub>2</sub>	pO <sub>2</sub>	O <sub>2</sub> Sat %
7.37	25	45	94	96

Reference Range: pH (7.35 – 7.45) pCO<sub>2</sub> (35 – 45 mmHg) pO<sub>2</sub> (75 – 100 mmHg) HCO<sub>3</sub> (22 – 28 mEq/L)

### Blood Tests

Test	Results	Unit	Reference Interval
White Blood Cell	11.2	x10 <sup>9</sup> /L	4.0- 10.0
Red Blood Cells	4.8	x10 <sup>12</sup> /L	4.2-5.4
Haemoglobin	12.0	g/dL	12.0-16.0
MCV	85	fL	85.0-95.0
Haematocrit	29	%	36-46
Platelets	150	x10 <sup>9</sup> /L	140-440
Neutrophils %	80%	%	40-75
Lymphocytes %	15%	%	15-41
Eosinophils %	0.5%	%	0-6
Urea	5.5	mmol/L	2.7-6.9
Sodium	132	mmol/L	136-146
Potassium	3.0	mmol/L	3.6-5.0
Magnesium	0.63	mmol/L	0.64-1.24
Chloride	99	mmol/L	100-107
Creatinine	68	µmol/L	37-75



CHEST X-RAY

## Section D: Treatment Plan

- Bed rest
- ICU care/protocol
- Nil by mouth (NBM)
- Insert Nasogastric (NG) tube and Foley's catheter.
- Ventilator setting: CMV, FiO2 40%, TV 420, PEEP 10; to keep SpO2 > 95%
- Check ABG at 8:00am
- IV Propofol (Diprivan) at 50 mg/hr; to titrate and keep patient comfortable
- IV Normal Saline at 80 ml/hr      • Nexium 40 mg IV once a day
- IV Cefuroxime 750mg 8 hrly
- Have respiratory therapist following up with the patient
- Check FBC, renal panel, and ABG in the morning

The doctor made his afternoon round at 3:00pm and the patient was stable. The doctor ordered to start Mr Lee on continuous NG Glucerna feedings at a rate of 60mls/hr. At 4:00pm, the nurse started the patient on continuous NG feeding. At 8:00pm, the nurse did her routine NGT placement check. 50mls of NG aspirates with a pH value of 8 was aspirated. The nurse returned the NG aspirates to the patient and continued the patient with continuous NG feeding.

**Day 3 in ICU:**

**Physical Assessment**

Mr Lee appeared agitated even though he was on the same dose of sedation as yesterday. Physical examination findings were the same as Day 1 in ICU, with the addition of crackles heard in the bilateral lower lobes of the lungs. There were large amounts of thick and yellowish secretions suctioned from his ETT.

His vital signs are as below.

Time	6:00am	8:00am
Blood pressure (mmHg)	100/60	89/45
Heart Rate (beats/min)	89 (regular)	110 (regular)
Respiratory (breaths/min)	16	20
Temperature (C)	37.9	38.2
O2 sat	92%	85%

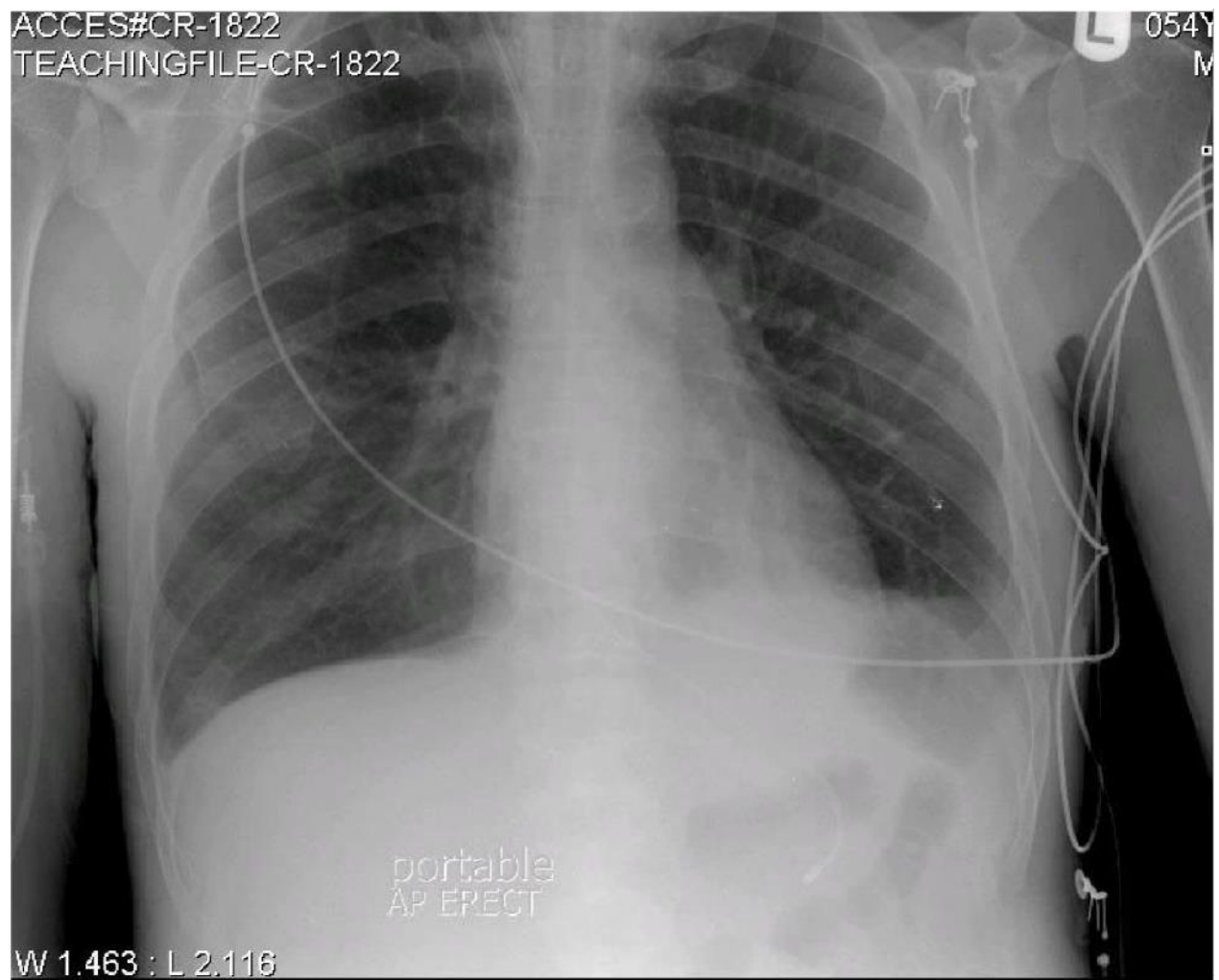
**ABG at 08:00 am**

pH	7.23	HCO <sub>3</sub>	pCO <sub>2</sub>	O <sub>2</sub> Sat %	pO <sub>2</sub>
		15	40	90	80

Reference Range: pH (7.35 – 7.45) pCO<sub>2</sub> (35 – 45 mmHg) pO<sub>2</sub> (75 – 100 mmHg) HCO<sub>3</sub> (22 – 28 mEq/L)



<b>Lab results at 08:00am</b>		
<b>1. Complete blood count (CBC) Adults</b>		<b>08:00am</b>
Hemoglobin (g/dl) (M: 13.5 - 16.5, F: 12.0 - 15.0)		<b>11</b>
Hematocrit (%) (M: 41 - 50, F: 36 - 44)		35
RBC's (x 10 <sup>6</sup> /ml) (M: 4.5 - 5.5, F: 4.0 - 4.9)		4
Platelet count (100,000 to 450,000)		100,000
<b>2. WBC + differential</b>		
WBC (cells/ml) (4,500 - 10,000)		<b>20,000</b>
Basophils (0 - 1 (0 - 0.75%))		0.65
Eosinophils (0 - 3 (1 - 3%))		2
lymphocytes (24 - 44 (25 - 33%))		40
Monocytes (3 - 6 (3 - 7%))		6
<b>3. Electrolytes</b>		
Calcium (8.8 - 10.3 mg/dL)		9
Calcium, ionized (2.24 - 2.46 meq/L)		<b>2.1</b>
Chloride (95 - 107 mEq/L)		106
Magnesium (1.6 - 2.4 mEq/L)		1.6
Phosphate (2.5 - 4.5 mg/dL)		4
Potassium (3.5 - 5.2 mEq/L)		<b>3.5</b>
Sodium (135 - 147 mEq/L)		140
<b>Glucose (ref: 3.0 – 6.0 mmol/L)</b>		<b>8</b>
<b>4. Renal function</b>		
Creatinine (mg/dl) (0.5 - 1.4)		1.2
BUN (7 - 20 mg/dl)		14



CHEST X Ray

## Section E: Nursing Practice/Management

In this section, students should be able to discuss and apply nursing care using nursing frameworks (A-P-I-E /ABCDE) and effective communication (ISBAR):

- PRIORITY/IMMEDIATE
- Potential problems/Prevention of complications

### Immediate nursing problems:

- Ineffective breathing patterns r/t to acute lung injury
- Impaired gas exchange r/t acute lung injury/sepsis
- Ineffective airway clearance r/t acute lung injury
- Decreased in cardiac output r/t sepsis/decreased preload Fluid volume deficit r/t sepsis/vasodilation

### Potential nursing problems:

- Risk for ventilator associated pneumonia r/t endotracheal tube and mechanical ventilation
- Risk for central line associated blood stream infection r/t presence of CVP line
- Risk for catheter associated urinary tract infection r/t presence of IDC
- Risk for fluid electrolytes imbalance r/t NBM

## Nursing Management

### 1. Management of A&B (COPD/ARDS)

### 2. Management of C (Septic Shock)

### 3. Management of D&E

### 4. Specific Care to prevent Hospital Acquired Infections (HAIs) [ICU Bundles]

- VAP Bundle
- CLBSI Bundle
- Urinary Catheter Bundle

## Section F: Collaborative Care

**RT** – management of ventilator setting

**PT/OT** – chest physiotherapy, prevention of contractures, exercises, mobility

**ST** – communication, swallowing, feeding

**MSW** – financial counseling/ support

**Dietitian** – nutritional intake

## Section G: Patient/Family/Caregiver Education

Caregiver Training (CGT)

**Section H: Transition Care/Discharge Plan**

- Transfer/Handover

- Community resources e.g. AIC

- Rehabilitation

**Supplementary Resources**

- Angus, D. and van der Poll, T. (2013). Severe Sepsis and Septic Shock. *New England Journal of Medicine*, 369(9), pp.840-851.
- Gots, J. and Matthay, M. (2016). Sepsis: pathophysiology and clinical management. *BMJ*, p.i1585.
- LeMone, P., & Burke, K. M. (2004). *Medical-surgical nursing: critical thinking in client care* (5th ed.). New Jersey: Prentice-Hall
- Borgert, M. J., Goossens, A., & Dongelmans, D. A. (2015). What are effective strategies for the implementation of care bundles on ICUs: A systematic review. *Implementation Science: IS*, 10(1), 119. doi:10.1186/s13012-015-0306-1
- Hellyer, T. P., Ewan, V., Wilson, P., & Simpson, A. J. (2016). The Intensive Care Society recommended bundle of interventions for the prevention of ventilator-associated pneumonia. *Journal of the Intensive Care Society*, 17(3), 238-243.
- Ista, E., Dr, van der Hoven, Ben, MD, Kornelisse, R. F., PhD, van der Starre, Cynthia, PhD, Vos, M. C., Prof, Boersma, E., Prof, & Helder, O. K., PhD. (2016). Effectiveness of insertion and maintenance bundles to prevent central-line-associated bloodstream infections in critically ill patients of all ages: A systematic review and meta-analysis. *Lancet Infectious Diseases*, the, 16(6), 724-734. doi:10.1016/S1473-3099(15)00409-0
- How-to Guide: Prevent Central Line-Associated Bloodstream Infections (CLABSI). Cambridge, MA: Institute for Healthcare Improvement; 2012. (Available at [www.ihc.org](http://www.ihc.org)).
- Wip, C., & Napolitano, L. (2009). Bundles to prevent ventilator-associated pneumonia: how valuable are they?. *Current opinion in infectious diseases*, 22(2), 159-166.
- Meddings, J., Rogers, M. A., Krein, S. L., Fakh, M. G., Olmsted, R. N., & Saint, S. (2014). Reducing unnecessary urinary catheter use and other strategies to prevent catheter-associated urinary tract infection: an integrative review. *BMJ quality & safety*, 23(4), 277- 289.

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