

**STUDENT WORKBOOK  
IN MEDICAL EMERGENCIES**

**Department of Medicine  
Faculty of Medicine  
Sabaragamuwa University of Sri Lanka**

First Edition 2021

*2021 Department of  
Medicine Faculty of  
Medicine  
Sabaragamuwa University of Sri Lanka*

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**CLINICAL APPOINTMENT IN EMERGENCY MEDICINE**

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1. Name of the student

.....

2. Year passed GCE Advanced level Examination

.....

3. Duration of the appointment

From: ...../...../..... To: ...../...../.....

4. Name of the consultant

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## **PREFACE**

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Students of the Faculty of Medicine, Sabaragamuwa University of Sri Lanka, study medical emergencies as a separate appointment of one week at the Accident and Emergency Department and medical emergencies will be covered in eight weeks of General Medicine Appointments as well at the Teaching Hospital Ratnapura. During this one-week period, they will be attached to the Accident and Emergency Department under the consultant in critical care appointed by the Ministry of Health

This workbook in Medical Emergencies is compiled to help students achieve essential knowledge and skills in medical emergencies expected from an undergraduate when they qualify to work in medical wards as intern house officers. Thus, the workbook will guide the student during their emergency medicine short appointment.

This workbook is a joint effort of the academic staff of the Department of Medicine, SUSL and the current consultant in critical care and the consultant physicians of the Teaching Hospital Ratnapura. Students are expected to organize their classes and do self-studies in order to complete the tasks set out in the workbook.

We value your feedback to improve the workbook.

Dr Champika Gamakaranage  
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UR - Wrote the initial draft, compiled the initial assessment in the ETU, history taking examination and updated all the sections

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## **CHAPTER 1**

### **INTRODUCTION**

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Dear Students,

We have prepared a series of workbooks to guide you during your medical appointments. These include 3<sup>rd</sup> year workbook, 4<sup>th</sup> year workbook and workbook for each short appointment and a workbook for the professorial appointment.

The appointments in finer specialties are organized based on the University Grants Commission guidelines and according to the needs of the Ministry of Health.

The short appointment in Emergency Medicine will give you the opportunity to study Medical Emergencies with exposure to specific case scenarios in more detail. This workbook is prepared to provide guidance to the students during the Emergency Medicine appointment to cover the essential areas expected from an undergraduate. You are expected to learn the management plans in further detail. This includes the investigation, treatment of common medical emergencies, which are essential clinical topics for an intern medical officer. This knowledge, skills and experience you gather during the short appointments will help you to understand patient problems in greater depth.

Your continuous assessments will be based on these workbooks.

## Learning Outcomes in Medical Emergencies

At the end of the appointment students should be able to

1. Correctly assess, identify medical emergencies, obtain a focused history and examine rapidly (verbal and non-verbal) relevant to patient presentation and arrive at a diagnosis or a differential diagnosis.
2. Obtain histories, elicit physical signs and interpret physical signs, describe pathophysiology, principles of management and prognosis of patients having the following conditions in medical emergencies.
  - a. Acute shortness of breath
  - b. Acute chest pain
  - c. Acute severe headache
  - d. Acute states of confusion
  - e. Sudden loss of consciousness
  - f. Uncontrolled convulsions
  - g. Sudden onset neurological deficit
  - h. Acute poisoning
  - i. Snake bite
  - j. Shock (Cardiogenic, hypovolemic, anaphylactic, septic and neurogenic)
  - k. Cardiac arrest
  - l. Anaphylaxis
  - m. Endocrine and metabolic emergencies
3. Organize information gathered from the interview, physical examination, and diagnostic tests and formulate reasonable hypotheses and differential diagnoses appropriate to the acute care setting
4. Identify the indications, describe the necessary preparations and perform under supervision the following procedures
  - a. Arterial puncture for blood gas analysis
  - b. Carotid massage
  - c. Basic and advanced life support
  - d. Cardioversion
  - e. Assisted ventilation/ airway skills (Bag mask ventilation, endotracheal intubation)
5. Obtain consent for investigations and treatment and communicate the prognosis of common emergencies.
6. Write case notes, daily status, referrals, discharge summaries, clinic notes and prescriptions.
7. Demonstrate empathy and maintain high ethical standards
8. Be an effective member of the healthcare team and know the health facilities and social support available to care for medical emergencies in Sri Lanka.



## CHAPTER 2

### CORE CLINICAL KNOWLEDGE AND SKILLS

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At the end of the emergency medicine appointment, you should be competent in the technique of history taking, physical examination and clinical reasoning at a level of a student about to enter the final year.

In addition to the cases, you are allocated during the appointment, you are advised to see the following presentations given in the next section on “Topics to Cover during Emergency Medicine Appointment”

#### 2.1 Clinical Presentations: Emergency Medicine Appointment

These are some of the key presentations that ought to be ‘covered’ during the Emergency Medicine and General Medicine Appointments.

- a. Acute shortness of breath
- b. Acute chest pain
- c. Palpitations
- d. Acute severe headache
- e. Acute state of confusion
- f. Sudden loss of consciousness
- g. Ongoing convulsions
- h. Sudden onset neurological deficit
- i. Acute poisoning
- j. Snake bite
- k. Shock (Cardiogenic, hypovolemic, anaphylactic, septic and neurogenic)
- l. Cardiac arrest
- m. Anaphylaxis

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## CHAPTER 3

### INITIAL ASSESSMENT OF A PATIENT IN THE EMERGENCY DEPARTMENT OR EMERGENCY TREATMENT UNIT

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The Emergency Treatment Unit (ETU) is usually a busy and an active place. Patients coming to ETU are usually ill or critical or having an acute life-threatening condition. Time is so vital, and a few seconds or minutes can change the outcome of the situation.

The patient assessment and management are usually done simultaneously and focused, in an emergency we need to prevent any delays in providing treatment. Thus, the usual assessment is altered according to the needs.

The assessment of a patient is not in the very usual order of taking history and examination. We assess them to ensure the vital functions are stable. A simple Airway, Breathing, Circulation, Disability and Exposure (ABCDE) assessment while correcting any deficiency in each parameter.

Brief focused history will be taken during this initial encounter as there is no time to take a complete history. Once the vital parameters are stabilized and secured you get the opportunity to get a detailed history. A simple mnemonic could be used: Signs and Symptoms • Allergies • Medications • Past medical history • Last oral intake • Events (SAMPLE).

Initial assessment of a patient presenting to the ETU is discussed in this chapter. Obtaining history and examination with common case scenarios encountered is discussed in the next chapter.

There is teamwork. Usually in such a scenario, the team leader (senior doctor) guides the team by allocating different aspects of care to relevant persons in the team. You are expected to fill the following table after visiting the ETU and witnessing the management of some medical emergencies.

Vital parameter	Assessment	Management
A- Airway		
B- Breathing		
C- Circulation		
D- Disability		
E- Exposure		

These vital parameters are organized in such a way that they are the most important things that could kill someone if not stabilized and secured.

In the ETU, you need to recognize the immediate life-threatening conditions. When there are several admissions with acute medical problems, identify the sick patients with life threatening conditions who need immediate intervention. This process is called 'triage'

## CHAPTER 4

### HISTORY TAKING AND EXAMINATION IN THE EMERGENCY UNIT

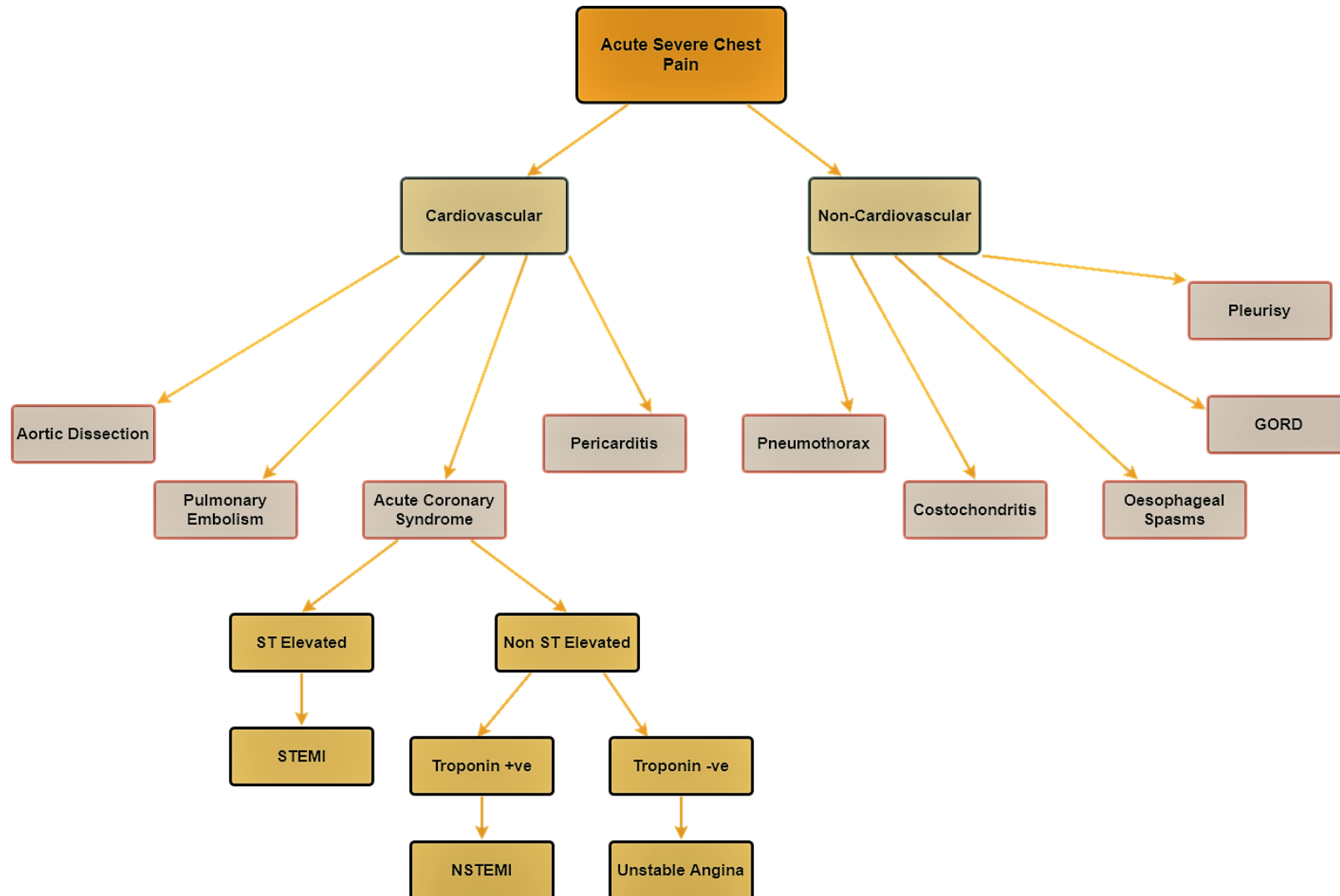
The initial assessment of the patient as we discussed in chapter 3 is to ensure the vital parameters are stable or to correct any derangement in them. During the initial assessment you are unable to take detailed history, but you may be able to get a short history to find out; what happened to the patient and what is the presenting complaint. The essentials are covered by asking for symptoms, allergies, medications, past medical history, last oral intake (important in case anesthesia or endoscopy is needed) and events (e.g., were there key events such as party or fall). If the patient is unable to speak you may get the information from the person who accompanies the patient.

Once the vitals are assessed and secured you get the opportunity to gain a detailed history. Here the history taking follows the usual 'history taking' methodology. Sometimes you will have to get a collateral history as the patients themselves could be too ill to give a detailed history.

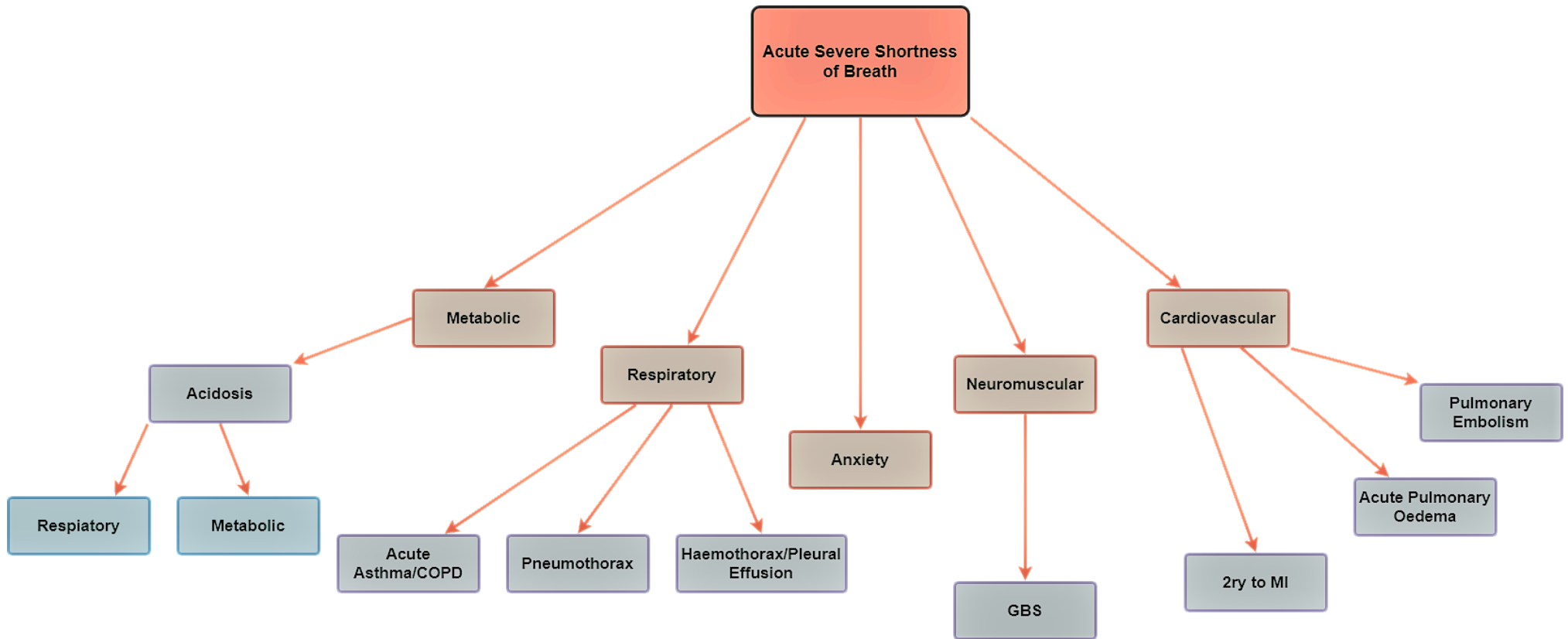
Following is an exercise that you could do to familiarize yourselves with common medical emergencies that you may encounter in the emergency department.

<b>Presentation to the ETU</b>	<b>Causes you considered</b>	<b>History</b>	<b>Examination</b>	<b>State how you differentiated each condition</b>
Cardiac arrest				
Acute chest pain				
Palpitations				
Acute severe shortness of breath				
Massive haemoptysis				
Severe abdominal pain				

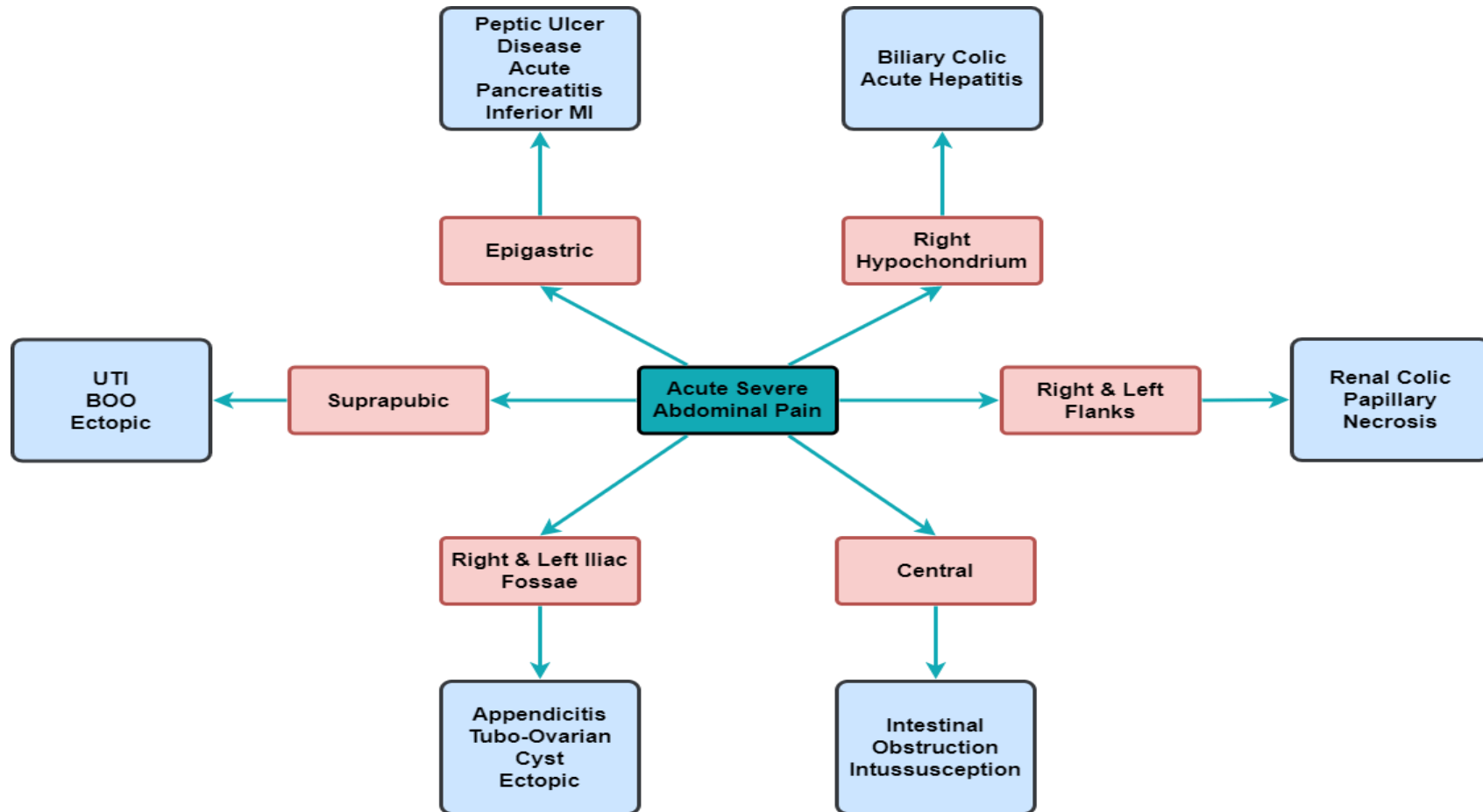
Haematemesis and melaena)				
Acute poisoning				
Snake bite				
Wasp bite				
Inhalation of toxic gases?				
Acute confusion state				
Acute severe headache				
Shock				
Sudden onset neurological deficit (e.g., hemiparesis)				
Ongoing convulsions				
Dizziness /Vertigo				
Syncope ( Blackout/collapse )				
Anuria/reduced urine output				
Acute back pain				
Aggressive/disturbed behavior				



NSTEMI-Non ST Elevated Myocardial Infarction, STEMI-ST Elevated Myocardial Infarction, GORD-Gastroesophageal Reflux Disease

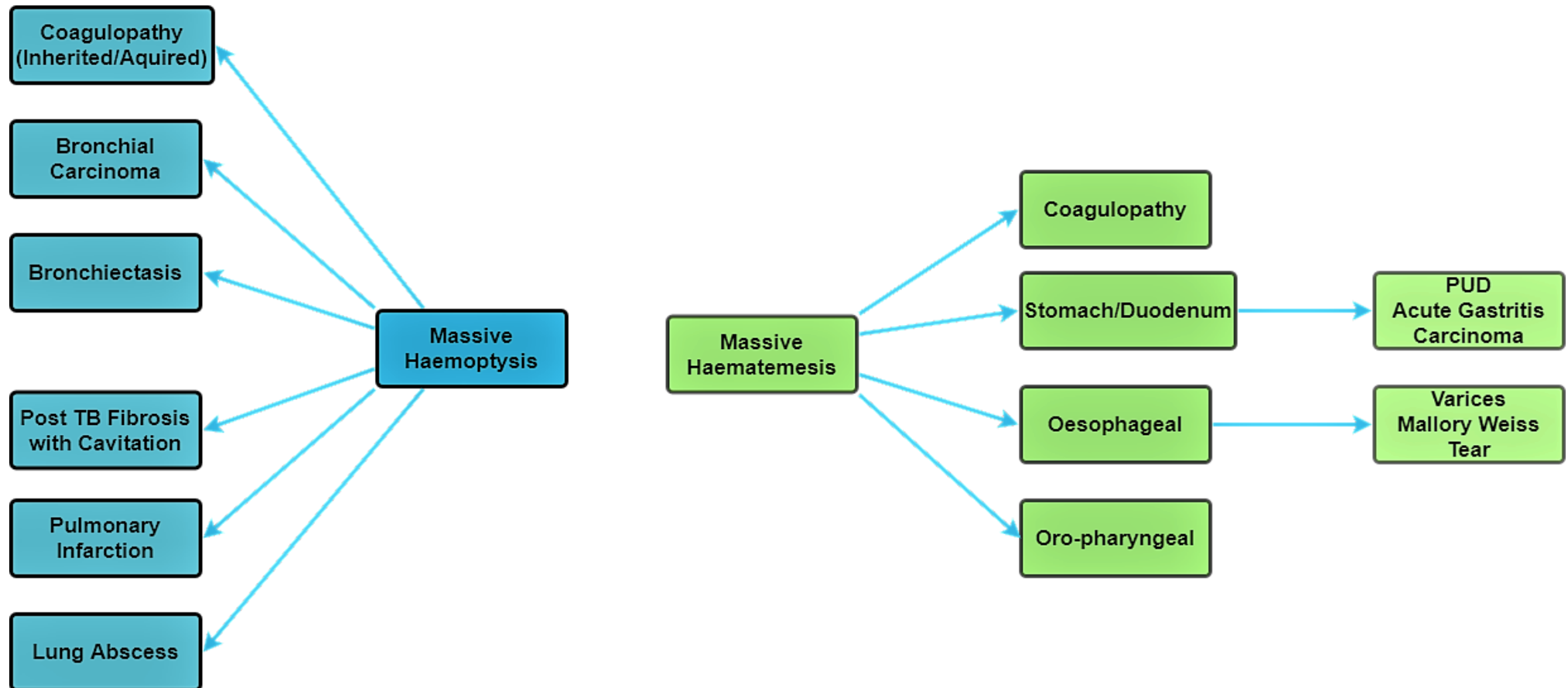


COPD-Chronic Obstructive Pulmonary Disease, GBS-Guillain Barre Syndrome, MI-Myocardial Infarction



UTI-Urinary Tract Infection, BOO-Bladder Outflow Obstruction,





PUD-Peptic Ulcer Disease, TB-Tuberculosis

## CHAPTER 5

### COMMON INVESTIGATIONS

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1) Pulse Oximeter

a) How does it work? Explain with a diagram.

b) What is the normal oxygen saturation you expect during a medical emergency?

2) Random Blood Glucose

a) State the normal blood glucose.

b) What is the definition of hypoglycaemia? How do you stage the severity of hypoglycaemia?

c) Write the definition of hyperglycaemia.

d) What are the likely complications for hyperglycaemia? How do you diagnose these conditions?

e) Outline the management of a diagnosed patient with diabetic ketoacidosis(DKA).

f) What is euglycaemic ketoacidosis? What are the causes?

g) What are the principles in the management of hyperosmolar hyperglycaemic state (HHS)?

3) Serum Sodium

- a) State the normal range of sodium.
  
  
  
- b) What are the likely complications of hyponatraemia?
  
  
  
- c) Describe the clinical types of hyponatremias. How do you diagnose these types?
  
  
  
  
  
  
  
- d) What are the treatment options available to treat hyponatraemia?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- e) Explain why it is dangerous to rapidly correct hypoglycaemia?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- f) List the options available to treat hypernatraemia?

4) Serum Potassium

- a) State the normal range of serum potassium.

b) List out common causes of hypokalaemia.

c) Outline the management of hypokalaemia.

d) Give 3 clinical conditions you suspect hyperkalaemia.

e) How do you manage hyperkalemia depending on the degree of hyperkalaemia?

5) Full Blood Count

Describe the information you can gather from the FBC to help manage an acutely unwell patient in the ETU.

6) C-Reactive Protein (CRP)

a) Describe how the CRP is produced as a response to infection and inflammation?

b) What is the importance of CRP to differentiate viral and bacterial infection and inflammation?

7) Cardiac Biomarkers

a) Draw a timeline diagram and explain how different cardiac biomarkers behave after myocardial injury?

b) Describe the pathophysiological basis of use of troponin I to diagnose myocardial infarction.

8) Whole Blood Clotting Time

- a) Describe how do you perform whole blood clotting time

9) What are the likely errors you might do to get a wrong result?

## 10) ABG/ VBG

- a) Collect sample results of ABGs of the following conditions and paste copies and fill the table below.
- (i) Type I respiratory failure
  - (ii) Type II respiratory failure
  - (iii) Metabolic acidosis

Type	Short history of the patient	Other investigations and diagnosis	Outlined management plan
(1)Type I RS failure			
(2)Type II RS failure			



(3) Metabolic acidosis			
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## 11) ECG

a) Draw and explain, how the ECG leads are attached to the patient?

b) Take an ECG from a patient and get the signature from the doctor in charge of a medical or ETU.

## 12) X-ray

See the following useful x-rays and discuss the changes noted with a senior colleague or a peer.

- i) Chest X-ray
  - (a) Lobar pneumonia
  - (b) Pneumothorax
  - (c) Air under the diaphragm
  - (d) Massive/ large pleural effusion
- ii) X-ray abdomen/ KUB
  - (a) Acute intestinal obstruction
  - (b) Pancreatic calcification
  - (c) Ureteric stone
  - (d) Gallstones
- iii) X-ray lumbosacral spine
  - (a) Spondylolisthesis
  - (b) Degenerative spinal changes with loss of lumbar lordosis

## 13) NCCT brain

- i) Observe the following CT scan films and familiarize yourselves.
  - (a) Ischemic stroke
  - (b) ICH
  - (c) SAH
  - (d) SDH
  - (e) Bleeding into a tumor

## 14) Urine for ketone bodies

- i) State two conditions when urine ketone bodies could be high.
  
- ii) Explain the pathophysiology behind the formation of ketone bodies.

15) Serum Creatinine

- i) What are the parameters you take note of in a patient presenting to the ETU when having a high creatinine report?
  
- ii) How do you use blood urea value with creatinine to understand the fluid status of the patient?

16) Point of Care Ultrasound Scan (is paramount in modern emergency departments)

Observe the following scans.

- i) B- lines in pulmonary oedema
- ii) Pleural effusions
- iii) Free fluid in abdomen (in Dengue Haemorrhagic Fever)

## CHAPTER 6

### EXERCISES

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- 1) ACS (Acute Coronary Syndrome)
  - a) Outline the management of a patient presented to the ETU with acute STEMI who underwent thrombolysis.
  
  
  
  
  
  
  
  
  
  
  - b) Outline the management of a patient who was diagnosed as NSTEMI or UA, that you encountered.

2) AF (Atrial Fibrillation)

- a) Outline the management of a patient with acute AF with low blood pressure that you encounter.

- b) Outline the management of a patient with AF who had medical cardioversion.

3) VT/VF (Ventricular Tachycardia / Ventricular Fibrillation)

- a) Outline the management of a patient with VF or pulseless VT that you witnessed at the emergency department.

- 4) Supra Ventricular Tachycardia (SVT)
  - a) Write a brief history of a patient presented with SVT.
  
- 5) What are the characteristics in the ECG of a patient with SVT?
  
- 6) What are the medications you can use to treat SVT and mention contraindications for each medication you mentioned?
  
- 7) How do you diagnose WPW syndrome in the ECG?
  
- 8) Outline your management of a patient with SVT.

9) Complete Heart Block (CHB)

i) Obtain a history from a patient presented with CHB. Write the summary of the history below.

ii) Outline the management.

10) Hypertensive Emergency

i) Outline the management of a patient with hypertensive urgency, that you witnessed.

ii) Outline the management of a patient with hypertensive emergency that you have encountered.

11) Pulmonary Embolism

i) Write the summary of the history you obtained from a patient with pulmonary embolism.

ii) How was the diagnosis established?

iii) Outline the management of your patient.

12) Pneumothorax (+/ tension pneumothorax)

i) Write the signs and symptoms you elicit to diagnose spontaneous pneumothorax.

ii) Outline the management of a patient you encountered to have spontaneous pneumothorax.



13) Acute Severe Asthma

Outline the management of a patient that you encountered to have acute severe asthma.

14) Haematemesis

- i) Outline the immediate management of a patient presented with haematemesis that you encountered.

- ii) Explain the rationale behind the medication you used.

15) Hepatic Encephalopathy

- i) Outline the management of a patient diagnosed with hepatic encephalopathy at the acute presentation.

16) Guillain Barre Syndrome (GBS)

- i) Study a patient diagnosed with GBS and state the main features you consider in making the clinical diagnosis of GBS.

- ii) What are the parameters you use to monitor the progression of the disease?

iii) What are the treatment options available for the management of GBS?

17) Stroke

i) Study a patient underwent thrombolysis for acute ischemic stroke and write the summary of the presentation.

ii) Outline the management of the patient during the first 24 hours.

iii) List the factors considered to make the decision of thrombolysis.

18) Acute Kidney Injury (AKI)

i) Write a summary of the history of a patient presented with AKI.

ii) Outline the investigations you requested at the first encounter with rationale behind it.

iii) Outline the immediate management of the patient during the first 24 hours.

## 19) Snake bite

- i) What are the aims of your history and examination of a patient presented to the emergency department with a snake bite?

- ii) Complete the following table.

Snake	Characteristics of identification of the snake	Signs of envenomation	Indications for antivenom	Possible complications
Russel's viper				
Common Krait				
Sri Lankan Krait				
Hump nosed viper				
Cobra				

iii) Outline the immediate management of a patient you encountered in the emergency ward with a snake bite.

iv) What are the likely adverse effects of antivenom.

20) Obtain a history from a patient presented with Paracetamol poisoning and complete the exercise below.

i) What are the toxic and lethal doses of paracetamol poisoning?

ii) How do you decide to administer an antidote?

iii) What are the adverse effects of N-Acetyl Cysteine (NAC)?

iv) What are the indications to terminate NAC before completion of the course?

v) Explain how paracetamol could cause poisoning and liver damage. You may illustrate with a diagram.

vi) How do you interpret the results of paracetamol level done in a case of paracetamol poisoning?

vii) Outline the immediate management of a patient presented with paracetamol poisoning that you encountered.

21) Poisoning with an unknown substance

i) Outline how do you approach a patient who comes with acute poisoning?

22) What are the indications/ contraindications for induction of emesis and describe the procedure?



23) State when do you give activated charcoal and how do you give it?

24) Organophosphate (OP) Poisoning

- i) What are the immediate steps of management of a patient admitted with suspected OP poisoning?

25) List the clinical features of OP poisoning.

26) What are the antidote/s you give?

27) Describe when and how do you give Atropine?

28) Prinso poisoning

i) What are poisonous chemicals in 'Prinso'? Mention their pathophysiological effects.

ii) Outline the immediate steps in management including investigations you order.

iii) What is the antidote and indications to give it?

iv) What are the expected complications?

v) Outline the management of the complications you mentioned.

29) Study a patient managed with status epilepticus and complete the section below.

i) Briefly mention the history of your patient.

ii) Outline the management of your patient during immediate and subsequent ward stay.

30) 'Kaneru' poisoning

i) How do you assess the severity of Kaneru poisoning?

ii) What are the parameters you check, how frequent and what do you look for in a patient after Kaneru poisoning?

iii) When do you decide to offer temporary pacing?

iv) Outline the management of a patient presented with Kaneru poisoning.

31) Evaluate a patient presented with shock and complete the section below

i) What is shock?

ii) What are the three different ways that they present?

iii) Classify shock giving examples for each.

iv) Outline the immediate management steps of your patient during an acute state.

v) What are the immediate investigations you order in this patient?

32) Evaluate a patient presented with anaphylaxis and complete the section below.

i) Explain how you came to the conclusion of anaphylaxis?

ii) Outline the management of anaphylaxis in your patient.

iii) Describe the type of hypersensitivity that explains the pathophysiological basis of anaphylaxis?

iv) Explain why the patient is monitored and kept 1 to 2 days in hospital after settling the anaphylaxis.

## CHAPTER 7

### CASE SCENARIOS

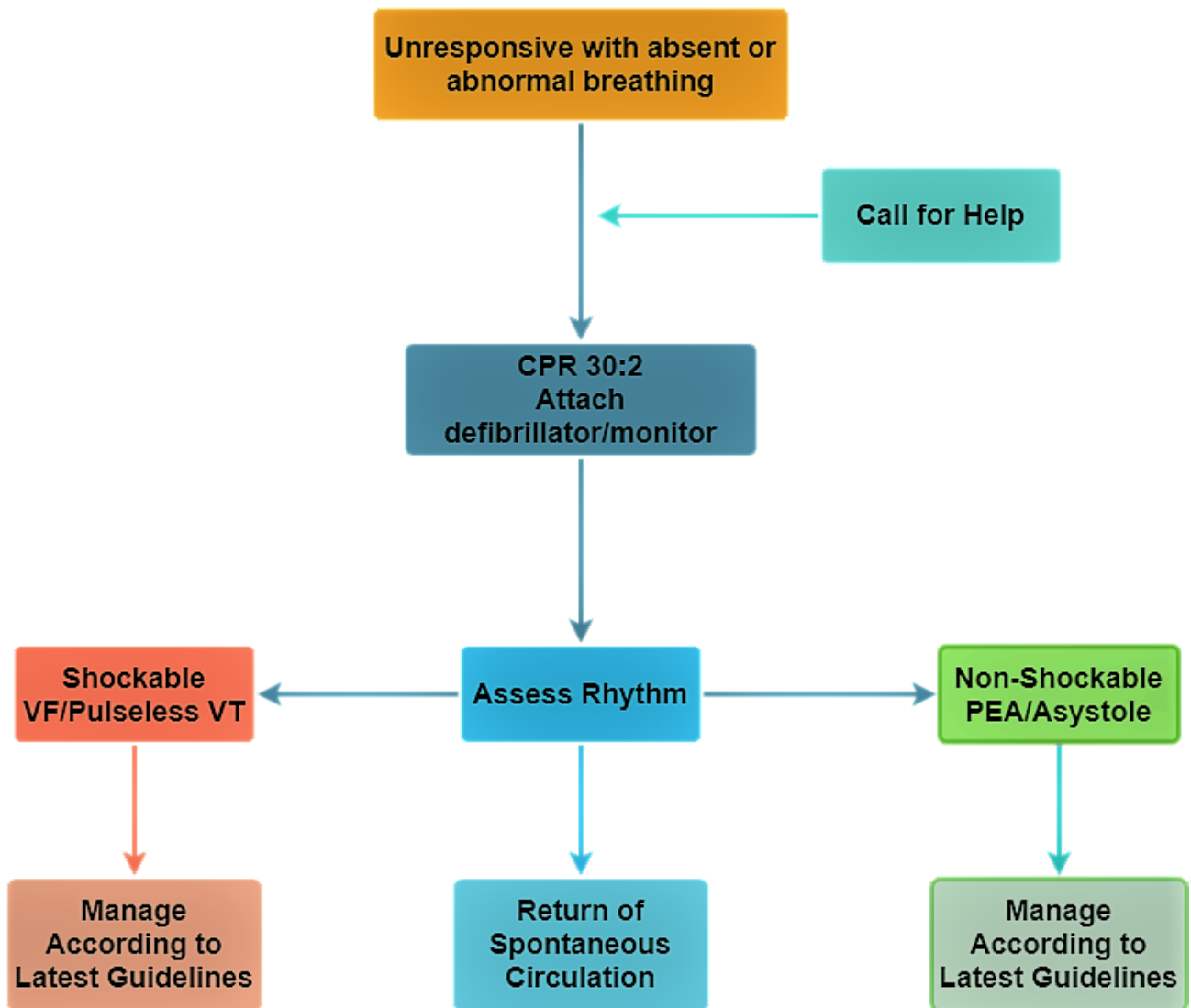
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In this section, we expect you to write histories (minimum of 3 cases as complete documentations) of patients that you encountered during your Emergency Medicine Appointment.

## ANNEXURES

Advanced Cardiovascular Life Support (ACLS)

Reference: European Resuscitation Council (ERC) Guidelines 2021.



## Identify and Treat Reversible Causes

- Hypoxia
- Hypovolaemia
- Hypo/Hyperkalaemia/metabolic
- Hypo/Hyperthermia
- Thrombosis - coronary/pulmonary
- Tension Pneumothorax
- Tamponade -Cardiac
- Toxins



**This book is peer reviewed and recommended as a teaching and learning material for the Department of Medicine, Faculty of Medicine Sabaragamuwa University of Sri Lanka, by the following experts,**

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