



Competencies on Basic Sciences to underpin circulation management

PACU Circulation Learning and Teaching Resource

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Competencies : Basic sciences to underpin management of the circulation

Core clinical/learning outcomes:

- *Is able to explain how the cardio-vascular system functions in the delivery of oxygen to the body cells for metabolism and carbon dioxide to the lungs for exhalation in normal health*

Content	A. Function of Cardio-vascular system : Metabolism <i>Enables the novice to understand how the cardio-vascular system works with the lungs in</i> • <i>Enabling external respiration in the lungs</i> • <i>In mass transport of gases to and away from body tissue cells</i> • <i>In enabling internal respiration and exchange of gases at tissue cell</i>
1.	Describes the process of 'metabolism'
2.	Describes how the cardio-vascular system enables metabolism
3.	Explains the role of circulation in enabling external and internal respiration
4.	Rationalises why circulation is always the third priority in emergency care [ABC]
	B. Gross anatomy and physiology of the heart • <i>Enables the student to understand the heart as a pump and how it functions</i>
5.	Describes the relationship of the heart to lungs within the mediastinum
6.	Discusses the significance of the heart's function as a double pump

7.	Describes the gross anatomy of the heart : Heart chambers [identifying pressures within each chamber and rationalizing same] Pericardium Myocardium Endocardium Heart Valves Blood vessels to and from the heart
8.	Describes the coronary artery supply to the heart
9.	Describes what happens in systole and diastole
10.	Describes the electrical conduction system of the heart : cardiac cycle [PQRST]
11.	Explains why a cardiac arrhythmia may compromise the blood pressure
	<i>C. Structure and structure of the circulatory system</i> <i>Enables the student to understand how the circulatory system delivers blood to all body tissue cells and removes waste products for excretion</i>
11.	Describes the structure of the arteriole resistance vessels : aorta, arteries, arterioles, capillaries including their layers
12.	Discusses how the pressure gradient works in the arteriole system
13.	Explains why the arteriole system is called the 'resistance' system
14.	Describes how the micro-circulation [capillaries] enable gas exchange in the capillary bed
15.	Describes the structure of the venous system vessels : capillaries, venules, veins, inferior and superior vena cavae
16.	Discusses how the veins return blood to the right heart against gravity
17.	Explains why the venous system is called the 'capacitance' system

	<i>D. Haemodynamics : constituent mechanisms of blood pressure</i> • <i>Enables the student to understand blood pressure and its maintenance</i>
18.	Gives a definition of blood pressure
19.	Explains the relationship between flow and resistance which determines blood pressure
20.	Blood flow leaving the heart is called cardiac output : what is the normal volume of cardiac output and explain how stroke volume and heart rate maintain this volume
21.	Explains how venous return [preload], contractility and afterload affect stroke volume
22.	Identifies the chamber of the heart where the myocardium [heart muscle] works hardest
23.	Identifies three factors that can affect the pumping power of the heart muscle
24.	Explains what central venous pressure [CVP] measures
25.	Explains how the diameter of the blood vessels is controlled by the autonomic nervous system
26.	Explains how the autonomic nervous system also controls the hearts pumping power and heart rate
27.	Identifies two common cardiac arrhythmias that can affect heart rate and thence cardiac output
	<i>E. Autonomic nervous system [ANS] : how the blood pressure is controlled</i> • <i>Enables the student to understand the role of the autonomic nervous system in controlling the blood pressure</i>
28.	Explains the role of the cardio-vascular centre in the medulla in controlling blood pressure

29.	Explains the role of the baroreceptors in informing the cardio-vascular centre of the status of blood pressure
30.	Explains what is meant by the negative feedback system : explain how sympathetic nerve stimulation impact on the heart pump and diameter of the blood vessels.