**Cardiac Case Study 2**

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**Cardiac Case Study 2**

Nancy Wilson (N.W.) a 50-year-old female patient with a history of previous myocardial infarction, hypertension, diabetes, and chronic renal insufficiency is brought to the emergency department by her husband.

At 42 years of age, she presented with prolonged chest pain and was hospitalized with the diagnosis of acute myocardial infarction. Coronary angiogram at that time revealed a 50% lesion in the anterior interventricular branch, a 90% lesion in the circumflex branch and occlusion of the right coronary artery. Patient underwent coronary angioplasty with the placement of a stent in the circumflex artery. The last echocardiogram showed an ejection fraction of 30%.

Over the past few weeks, N.W. has been experiencing weight gain; increasing dyspnea even at rest, increase in abdominal girth, peripheral edema, and paroxysmal nocturnal dyspnea.

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| **Chart View: Assessment** |
| BP: 100/55  HR: 98 beats/min  RR: 28 breaths/min  T: 37.4 oC  SaO2: 90% on room air  Weight: 80 kg  Height: 170 cm  Pulmonary crackles auscultated bilaterally  S1, S2, and S3 auscultated  JVP measured at level of earlobe |

1. **Based on N.W.’s presentation to the emergency department, what does the registered nurse suspects that the patient is experiencing?**

**List 2 answers with rationale for each**

Based on N.W.’s presentation, it is likely that she is experiencing congestive heart failure (CHF) and renal failure/chronic kidney disease (CKD). CHF is the heart’s inability to pump effectively, meaning organs of the body are not receiving an adequate amount of oxygenated blood (Colucci & Borlaug, 2022). The body overexerts to try and compensate for the lack of perfusion causing her symptoms of tachypnea, dyspnea, and general fatigue. The decrease in cardiac output also leads to fluid retention, shown by the high JVP (fluid from right atrium backing up), increase in abdominal girth (fluid in peritoneal cavity; ascites), paroxysmal nocturnal dyspnea (difficulty breathing at night because fluid no longer pooling in lower extremities with gravity), pulmonary crackles, and S3 (Colucci & Borlaug, 2022). N.W.’s history also helps support this, as her past myocardial infarction, low EF, and coronary artery lesions were likely the causes of myocardial damage that lead to the heart’s inability to function normally (Colucci & Borlaug, 2022).

CKD is often related to comorbidities like diabetes mellitus and hypertension, and results when these conditions are not managed properly (Fatehi & Hsu, 2022). Similar to CHF, in CKD the kidneys become damaged causing them to ineffectively filter the blood. This also results in fluid overload as the filtration process also creates urine, which is one of the body’s mechanisms to decrease vascular volume (Fresenius Kidney Care, n.d.a). As CHF and CKD both cause fluid overload, many of the symptoms overlap: rapid weight gain, shortness of breath, and edema (Fresenius Kidney Care, n.d.a). N.W.’s symptoms match all the previously mentioned ones, providing a reasonable prediction for her condition. The only definitive way to confirm this suspicion is through labs and diagnostics, including, but not limited to, echocardiogram, serum osmolarity, eGFR, urine albumin-creatinine ratio, and ultrasounds of the heart/kidneys (Brigham and Women’s Hospital, n.d.; Fatehi & Hsu, 2022; National Institute of Diabetes and Digestive and Kidney Diseases, 2016).

**/2 marks**

1. **Provide the rationale for the following assessment findings:**

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| **Assessment Finding** | Rationale |
| Paroxysmal Nocturnal Dyspnea | When people lie down, blood from other parts of their body travels to the right atrium and right ventricle and to the lungs where it becomes oxygenated (MedlinePlus, 2022). In people with healthy hearts, the oxygenated blood is brought back to the heart by the pulmonary veins, which enter the left atrium then to the left ventricle and this oxygenated blood is then redistributed back throughout the body. However, in people with heart failure, their heart cannot pump blood as effectively -> which leads to fluid buildup in their lungs and shortness of breath during sleep or when lying down (Sleep Foundation, 2022). |
| S3 | S3 is a third heart sound, which sounds like the word “Kentucky” (University of Washington Department of Medicine, n.d.). S3 is a result of rapid ventricular filling during the early part of diastole, and rapid blood flow deceleration in an already-filled ventricle (Boorsma, 2020).  S3 is heard upon auscultation of this patient due to volume overload of the ventricles which causes an increase in atrial pressure (Silverman, 1990). This sound could also be due to or occurring in combination with systolic dysfunction, as supported by their history of hypertension diagnosis (Boorsma, 2020). |
| Increasing abdominal girth | Due to the heart’s inability to pump ineffectively, the body is not receiving adequate amounts of oxygenated blood. This causes a decrease in cardiac output which leads to fluid retention. Fluid retention then causes volume overload -> which causes signs such as: an increase in abdominal girth (Lijauco, 2020).  Moreover, CKD causes kidneys to ineffectively filter blood and remove excess fluid from the blood causing fluid overload. Then, CHF and CKD, both causing fluid overload causes an overlap of symptoms, which includes rapid weight gain, which then can involve an increase in abdominal girth (Fresenius Kidney Care, n.d.b.). |
| Ascites | Ascites is an abnormal buildup of fluid in the abdomen (Abbarh et al., 2022). In this case, as the right side of the heart loses pumping power, blood backs up in the body’s veins -> which results in an increased pressure in the hepatic veins and in the veins draining into the peritoneum -> which then causes swelling within the abdomen such as the GI tract and liver, causing ascites (Dumitru, 2023). |

**/2 marks**

The patient complains to the registered nurse that their breathing is getting worse. Upon reassessment of the patient the nurse finds the following:

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| **Chart View: Assessment** |
| BP: 80/55  HR: 102 beats/min  RR: 32 breaths/min  SaO2: 84% on non-rebreather mask  Skin is cold and clammy  LOC is deteriorating |

1. **What immediate intervention does the registered nurse anticipate for the patient? What should be the nurse’s priority action. List rationale.**

Based on the ABC rule, we would focus on the patient’s breathing (Thim et al., 2012). Thus, intubation would be the top priority action as the patient is tachypneic, hypoxic, and complaining of dyspnea despite the non-rebreather mask. As the patient is losing consciousness, their airway is even more compromised. Therefore, the nurse should notify the physician and prepare the patient for intubation and ventilation (Nursing.com, n.d.). Once the airway is controlled, we can focus on circulation and monitoring. This may include inserting an arterial line for hemodynamic monitoring, a central line for fluid and medication administration, and possible surgery to fix the damage that caused the cardiogenic shock (Nursing.com, n.d.). Medication may be initiated to address the circulation issue. This includes a vasopressor to increase the cardiac output and improve blood pressure. This also ensures that blood is being perfused to other organs to prevent organ failure (Belleza, 2021). Frequent monitoring is required to assess a patient’s change in status. Nurses should be assessing for respiratory distress, pain level, change in VS and level of consciousness, and monitor for any organ failure (Kosaraju et al., 2022; Saxena et al., 2020). For example, monitoring urine output to ensure that the kidneys are being perfused (Saxena et al., 2020).

**/2 marks**

1. **In a patient with cardiogenic shock, the registered nurse anticipates the following hemodynamic measurements. Complete the chart. Indicate if measurement high or low and provide the rationale.**

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| **Hemodynamic Parameter** | **High /Low** | **Rationale** |
| Cardiac output | low | Cardiogenic shock often occurs due to a myocardial infarction (MI) which is associated with compromised blood flow due to plague build up (National Heart, Lung, and Blood Institute, 2022). The plague builds up decreases the diameter of the blood vessels, leading to low cardiac out which is the amount of blood that is pumped by the heart, in one minute (National Heart, Lung, and Blood Institute, 2022). If not treated, this will lead to poor perfusion of other organs. |
| Pulmonary capillary wedge pressure | high | Pulmonary capillary wedge pressure (PCWP) is used to identify the severity of left ventricular failure. It measures the pressure of the left atrium and the filling of the left ventricles (Nair & Lamaa, 2022). Due to increased SVR, blood may not be pumping out of the heart and may back up into the lungs, increasing the PCWP (Klabunde, 2023b). |
| Central venous pressure | high | Central venous pressure (CVP) is used to evaluate the function of the heart by measuring the right atrial pressure/preload of the right ventricle (Shah & Louis, 2022). Patients with cardiogenic shock have an increase in CVP because of the low CO. With less blood being pumped out of the heart, more blood is backing up into the right atrium and thus increasing the CVP (Klabunde, 2023a). Along with low CO, the body will try to compensate for the low BP by initiating the sympathetic nervous system to release vasoconstrictor substances which will increase the CVP (Klabunde, 2023a). |
| Systemic Vascular Resistance (= Afterload) | high | Systemic vascular resistance (SVR) is the resistance that ventricles must overcome to eject blood (King & Lowery, 2022). When CO is low, patients experience hypotension; thus, as a compensatory mechanism, blood vessels will constrict, increasing the SVR, in order to maintain normal blood pressure (Dahling, 2003). However, due to the constant increase in SVR, the heart is pumping against high pressure, leading to further damage. |

**/2 marks**

1. **To improve the patient’s hemodynamic profile (CO, PCWP, CVP, and SVR), the registered nurse anticipates that the physician may order what type of medications?**

**List 2 medications and provide rationale for use.**

The registered nurse should anticipate the physician will order vasopressors and inotropic medications (Shankar et al., 2022)

* Norepinephrine- this is the most commonly used vasopressor for the treatment of cardiogenic shock (first line therapy). Norepinephrine increases mean arterial pressure (MAP), without significantly impacting heart rate, this also increases systemic vascular resistance (SVR). This medication will also increase the cardiac index without significantly contributing to oxygen demand (Shankar et al., 2022)
* Dobutamine- this is the first line therapy inotropic medication for the treatment of cardiogenic shock. Inotropic medications improve the contractility of the cardiac muscle, thus improving cardiac function. Particularly for this patient it will be useful as this medication does not require adjustments for patients complicated by renal insufficiency. Dobutamine works to increase cardiac output (CO) and lower cardiac afterload (Shankar et al., 2022)

**/2 marks**

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