

Clinical Module 2 – Cardiovascular Disease, Metabolic Syndrome, Body Composition, & Obesity

Module 2 Questions:

I. Definitions

Angioplasty

- A procedure in which a catheter is inserted from an artery in the leg or arm through the heart. A balloon is then inflated in order to open up the blocked artery.

Stenosis

- Narrowing of the spaces within the spine.

Cardiac Catheterization

- A procedure performed to find out whether or not an individual has a disease of the heart muscle, valves or coronary arteries. A catheter is inserted into a large blood vessel that leads to the heart which then allows health professionals to measure pressure and blood flow in the heart.

Pulmonary Edema

- A condition where excess fluid accumulates in the air sacs of the lungs. This fluid buildup causes difficulty in breathing.

Syncope

- Another term for fainting. Syncope is caused by insufficient blood flow to the brain.

CABG

- Stands for Coronary Artery Bypass Graft. This surgery creates a new path for blood flow to the heart in order to get around the blockage.

LVAD

- Stands for left ventricular assist device. LVAD is a type of mechanical circulatory support device. It is a mechanical pump that is placed inside a patient (left ventricle) to pump blood throughout the body.

II. Interventions

A. For each of the following disorders, describe the etiology and recommended MNT.

1. CAD (Coronary Artery Disease)

Etiology:

- Coronary arteries become hardened and narrowed due to plaque buildup on the inner walls or lining of the arteries which reduces blood flow and lowers oxygen supply to the heart muscle.

Recommended MNT:

- Individualized approach. Individuals should combine diet and exercise as well as other lifestyle changes.
- Mediterranean Diet – consumption of olive oil, red wine, fish, fruits, and vegetables.

2. CHF (Congestive Heart Failure)

Etiology:

- Heart is not able to pump enough blood since the heart muscle is damaged or is no longer working.

Recommended MNT:

- Heart failure patients have significantly higher protein needs
- Fluid intake 48 – 64 oz/d
- Sodium intake <2 g/d
- Consume folate
- Promote DASH Diet
- When a patient is getting TPN, make sure that the patient is getting adequate amounts of macronutrients and micronutrients.
- Phytochemicals (pomegranate, blueberry, and grape products)
- Limit caffeine and alcohol intake
- Avoid gas-forming vegetables

3. Hypertension

Etiology:

- Blood flow through blood vessels is consistently high
- Primary hypertension: No identifiable cause
- Secondary hypertension: Caused by certain conditions, medications, and risk factors.
 - Conditions: Obstructive sleep apnea, kidney problems, thyroid problems, congenital defects in blood vessels.
 - Medications: Birth control pills, cold remedies, decongestants, OTC pain medications, some prescription drugs. Illegal drugs. Alcohol abuse.
 - Risk factors: Age, race, family history, overweight or obese, lack of physical activity, smoking, diet high in salt, diet low in potassium, diet low in Vitamin D, stress.

Recommended MNT:

- Limit sodium intake
 - 1,500 mg for individuals at risk and those who already have hypertension.
 - 2,300 mg for everyone else
- Increase intake of heart healthy fats:
 - Unsaturated fats
 - Soybean, canola, olive, and sunflower oil
 - Omega-3 fatty acids
 - Salmon, tuna, mackerel, and sardines.
 - Flaxseeds
 - Walnuts

- Maintain healthy weight through diet (fruits, vegetables, whole wheat, low sodium, heart healthy fats) and exercise

4. Metabolic Syndrome

Etiology:

- Caused by increased blood pressure, high blood sugar, excess abdominal body fat, and abnormal cholesterol or triglyceride levels.

Recommended MNT

- Low intake of saturated fats, trans fats, and cholesterol. Increase consumption of Omega-3 PUFA and MUFA especially olive oil.
- Plan a plant based Mediterranean-type diet.
 - Fiber, starches, whole grains, fruits, vegetables, and nuts.
 - DASH Diet (3-4 g of sodium, with good sources of potassium, calcium, magnesium, and low-fat dairy products.
 - Encourage consumption of soy protein, beans, and legumes as meat substitute.
 - Consume adequate amounts of folate, Vitamin B6, B12, C, and E.

B. List and discuss the three most prevalent modifiable risk factors associated with cardiovascular disease.

The three most prevalent risk factors for heart disease include high blood pressure, high cholesterol, and smoking. These risk factors are completely modifiable by switching to the heart-healthy diet, aiming for a healthy weight, exercising, and quitting smoking. A heart-healthy diet or Mediterranean style diet consists of consuming fish, fruits, vegetables, and healthy oils. Consumption of a Mediterranean style diet has been shown to lower cholesterol levels and blood pressure. Along with diet, physical activity is also extremely important since a healthy weight is also important in regulating blood pressure. Lastly, smoking cessation is extremely important in decreasing CVD risks and there are many programs which aid individuals who wish to quit smoking. These changes are difficult but if individuals commit to these changes, the likelihood of suffering from CVD and its comorbidities will likely decrease.

C. What is the relationship between body composition and CVD risk?

What measure(s) of body composition would be most practical to use in a clinical setting?

Body composition and CVD are closely related. The more visceral fat an individual has, especially in the waist area, the higher the risk of developing high blood pressure, high blood pressure, and diabetes. These conditions can lead to heart disease and stroke if not remedied. Obesity is also now recognized as a major independent risk factor for heart disease. For individuals who are obese, losing weight and maintaining a healthy weight is recommended to lower heart disease risk.

The most practical body composition measures to use in a clinical setting would be measuring an individual's BMI, waist circumference, and skinfold thickness. For BMI, values between 18.5 and 24.9 are considered healthy. Recommended waist circumference

for men is < 40 inches while for women it is < 35 inches. Skinfold thickness measures an individual's body fat and may also be helpful in assessing body composition.

D. What role, if any, do omega 3 fatty acids play in the management of CAD?
What are the recommended amounts of omega 3 fatty acids?

Omega-3 fatty acids are a type of polyunsaturated fat that our body needs but cannot make which makes them essential. Omega 3's play an important role in the body such as being part of the phospholipid structures that form the cell membrane. Along with Omega-6, Omega-3 provides energy to the body. Both also form signaling molecules called eicosanoids. These signaling molecules that have a variety of functions in the body's cardiovascular, pulmonary, immune, and endocrine systems.

According to research, two types of Omega-3's called EPA and DHA have been shown to lower CAD rates in individuals who consumed large amounts of these Omega-3's. Researchers believe that consumption of Omega-3 rich foods help lower triglyceride levels, reduce risk for abnormal heart rhythm, reduce growth rate of plaque, slightly lower blood pressure, and help prevent inflammation of blood vessels and formation of blood clots.

The recommended amount of Omega-3 to be consumed is 2 servings a week which is equivalent to 3.5 ounces of cooked fish. Good sources of Omega-3's can be found in fatty fish, canola oil, flaxseed oil, soybean oils, and walnuts.

E. Explain the role of plant stanols in the management of CHD. What are the recommended amounts of stanols?

Some research has shown that plant stanols help lower LDL (bad cholesterol) levels by blocking the absorption of cholesterol in the body. However, it seems that plant stanols do not have an effect on triglycerides and HDL. The effect of plant stanols in reducing heart attack or stroke risks are still unclear. Researchers agree that more research needs to be conducted in order to find out how plant stanols affect bad cholesterol levels.

According to the FDA, the recommended amount of plant stanol that has been associated with reduced risk of CHD is 3.4 g/day.

F. What is the relationship of trans fats in the diet to serum cholesterol?

Serum cholesterol circulates in the blood and is mostly produced in the body. Consumption of trans fat raises total cholesterol and LDL levels (bad cholesterol) while lowering HDL levels (good cholesterol). High levels of LDL can build up in the artery walls which causes them to become narrow. This narrowing can cause a blood clot which cuts off blood supply to the heart or brain which causes a heart attack or stroke.

G. What precautions must be taken when recommending salt substitutes?

Salt substitutes contain potassium chloride instead of sodium chloride. For individuals with kidney problems, too much potassium is dangerous since their kidneys are unable to get rid of it. It is important to read nutrition labels to make sure that the product does not contain sodium. Look for products that are salt free. Products that are lite or low-sodium still contain sodium so reading the label is very important.

III. Drug Therapy

A. Discuss the use of the following drugs. Include classification, mechanism of action, indication for use with the cardiac patient, effect of the drug on nutrient absorption and utilization, effect of nutrients on drug absorption and utilization.

Drug	Classification	Mechanism of Action	Indication of use w/ the cardiac patient	Effect of drug on nutrient absorption & utilization	Effect of nutrients on drug absorption & utilization
Digoxin (Lanoxin, Digox)	Cardiotonic, Antiarrhythmic, CHF treatment, Inotropic agent	Cardiac glycoside (Digoxin inhibits sodium-potassium ATPase, an enzyme that regulates the quantity of sodium and potassium inside cells)	Heart failure Atrial fibrillation	Potassium intake must be monitored since it may cause toxicity	Take 2 hours before antacids or Mg supplements since this may lower drug absorption
Aspirin	Analgesic, Antipyretic, Antiarthritic, NSAID, Prevention of CVA or MI	Platelet aggregation inhibitor	Prevention of CVD	Take with 8 oz of water or milk after meals or with food to lower GI irritation. However, taking aspirin with food lowers its absorption	Increase consumption of foods high in Vitamin C & Folate with long-term high dose aspirin intake Avoid or limit consumption of garlic, ginger, ginkgo, ginseng, or horse chestnut w/c may affect coagulation
Coumadin (Warfarin)	Anticoagulant	Inhibits the Vitamin K synthesis of	Prevention and treatment of venous thrombosis and	N/A	Increased Vitamin K

		certain clotting factors (II, VII, IX, and X) as well as a few regulatory clotting factors (Proteins C,S,Z)	pulmonary embolism Prevention and treatment of thromboembolic complications associated with atrial fibrillation and/or cardiac valve replacement Reduction in the risk of death, recurrent myocardial infarction, and thromboembolic events such as stroke or systemic embolization after myocardial infarction		intake lowers drug effect Decreased Vitamin K intake increases drug effect Vitamin K or MVI supplements – changes in intake will increase or decrease PT INR >400 IU of Vitamin E alters PT INR Do not exceed UL of Vitamin A since it may increase bleeding risk High protein and low carbohydrate diet.
Aldactone (Spironolactone)	Antihypertensive, Diuretic, Primary hyperaldosteronism treatment, Hypokalemia treatment, Cirrhosis with ascites, PCOS, PMS, Hirsutism, Nephrotic syndrome, K-sparing adjunct CHF treatment	Aldactone causes increased amounts of sodium and water to be excreted, while potassium is retained. Aldactone acts both as a diuretic and as an antihypertensive drug by this mechanism	Congestive heart failure Essential hypertension Hypokalemia Severe heart failure (NYHA class III – IV)	Take with meals or milk to lower GI irritation and increase absorption	Avoid excessive potassium intake, potassium supplement, and salt substitutes. Lower sodium intake and lower calorie intake may be recommended (Discontinue sodium restriction if hyponatremia occurs) Avoid natural licorice while taking this drug.
Mevacor/Lovastatin	Antihyperlipidemic	HMG-CoA Reductase Inhibitor (statin)	Primary prevention of CHD	Take with meals to increase	Separate fiber, pectin, or oat bran from drug

		Statins reduce cholesterol by inhibiting the liver enzyme HMG-CoA reductase that is necessary for the production of cholesterol.	Reduce the risk of heart attack, unstable angina, coronary revascularization procedures. Coronary Heart Disease Hypercholesterolemia	absorption. Take with last meal of the day.	by several hours as these lower the absorption of the drug Avoid grapefruit, Seville oranges, tangelos, minneolas, pummelos, and certain exotic oranges. Avoid St. John's Wort and Red yeast
Lasix (Furosemide)	Diuretic, Antihypertensive	Loop diuretic (blocks the absorption of water, sodium, and chloride that has been filtered in the kidneys which results in an increase of urine output.	Edema (CHF) Hypertension	Take on an empty stomach since food decreases its bioavailability May take with food if GI distress occurs	Increase potassium and magnesium intake (can take supplement if necessary) Low sodium intake is recommended Avoid natural licorice
Streptokinase	Thrombolytic enzyme	Breaks down blood clots	Acute myocardial infarction Pulmonary embolism Deep vein thrombosis Arterial thrombosis or embolism Occlusion of arteriovenous cannulae	N/A	N/A
Tissue plasminogen activator	Fibrinolytic agent	Protein that is involved in breaking down blood clots	Acute myocardial infarction Pulmonary embolism	N/A	N/A

			Acute Ischemic stroke		
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