Principles of Biomedical Science

Virtual Learning

9-12 / PLTW® PBS

April 16, 2020

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Lesson: April 16 2020

Objective/Learning Target:

Students will be able to: evaluate patients using a blood pressure charts to determine what ranges their patients are under and what should be done about it.*(Reference: PLTW® 4.2.2 Heart Rate)*

Let’s Get Started (Bell Ringer):

Read Article: MAYO CLINIC Blood pressure chart: *What your reading means*

Read Article: Harvard Health Publishing Harvard Medical School *Reading the new blood pressure guidelines*

Lesson/Activity:

Start by… Watch the following video link. How Blood Pressure Readings Work Write down some facts about blood pressure that were new to you in your notebook or paper.

Answers:

1. Will vary depending on students background

Lesson/Activity continued:

Read through the following articles and write down the ideas that they suggest in lowering blood pressure in your notebook or seperate piece of paper. MAYOCLINIC *10 ways to control high blood pressure without medication* & MedicalNewsToday *Fifteen natural ways to lower your blood pressure*

Answers:

Good Starting List

1. Lose Weight
2. Exercise
3. Eat Healthy
    - More potassium
    - Dark chocolate
    - Eat berries
    - Natural supplements
    - More magnesium
4. Reduce
    - Sodium
    - Refined carbs
    - Added sugar
5. Limit Alcohol
6. Don’t Smoke
7. Cut back on Caffeine
8. Reduce Stress
9. Monitor Regularly
10. Meditation or Deep Breathing

Additional Practice:

Become familiar with the following BP chart, there are lots of them out there, this one will do for our general purposes. Feel free to look for other charts precise charts

BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (upper number)		DIASTOLIC mm Hg (lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120 – 129	and	LESS THAN 80
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130 – 139	or	80 – 89
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	140 OR HIGHER	or	90 OR HIGHER
HYPERTENSIVE CRISIS (consult your doctor immediately)	HIGHER THAN 180	and/or	HIGHER THAN 120

Practice:

Read over the following Case Studies and come up with a plan for your patient based on their senario. Put this plan in your notebook or on a seperate piece of notebook paper. You may need to do some of your own research to help you in your patient plan.

CASE #1 A 59-year-old man with type 2 diabetes presents with concerns about high blood pressure (BP). At a recent visit to his dentist he was told his BP was high. He was reclining in the dentist's chair when his BP was taken, but he doesn't remember the exact reading. He has no symptoms. He has never taken medications for high BP. He takes metformin for type 2 diabetes. His BP is measured once at 146/95 mm Hg in the left arm while sitting. Physical exam is unremarkable except for obesity. EKG is unremarkable.

Answers:

Case #1 Plan:

Not stressing out at the moment, BP is an average not a one time shot, he was also reclined when it was taken at the dentist. He should be taught how to measure his BP while in the office with the correct technique and timing. He should continue to take and measure BP at home with a validated monitor. He should take at least 2 readings 1 minute apart in the morning and in the evening before supper (4 readings per day). The optimal schedule is to measure BP every day for a week before the next clinic visit, which is set for a month from now. Obtaining multiple clinic and home BP readings on multiple days will support a well-informed assessment of the patient's BP status and subsequent treatment decisions.

Additional Practice:

CASE #2

A 62 year old African-American woman with prediabetes presents for her annual physical. She has no complaints. The average of 2 BP readings in her right arm is BP 143/88. Her physical exam is unremarkable except for obesity. She has no history of myocardial infarction, stroke, kidney disease, or heart failure. After the visit, she measures her BP at home and returns 1 month later. The average BP from multiple clinic and home readings is 138/86. Her total cholesterol is 260 mg/dL, HDL 42 mg/dL, and LDL 165 mg/dL. She does not smoke.

Answers:

Case #2 Plan:

Patient-specific factors, such as age, comorbidities, concurrent medications, drug adherence, and out-of-pocket costs should be considered. Nonpharmacologic strategies for prediabetes include dietary changes, physical activity, and weight loss. If clinically appropriate, she should also avoid agents which could elevate BP, (such as NSAIDs, oral steroids, stimulants, and decongestants). A goal BP of 130/80 is recommended. After starting the new BP medication, she should monitor BP at home and return to the clinic in 1 month. If the BP goal is not met at that time despite adherence to treatment, consideration should be given to intensifying treatment by increasing the dose of the first medication or adding a second agent.

Additional Practice:

CASE #3

A 63 year old man with type 2 diabetes has an average BP of 151/92 over the span of several weeks of measuring at home and in the clinic. He also has albuminuria.

Answers:

Plan:

Given the presence of albuminuria, an ACE inhibitor or ARB would be beneficial for slowing progression of kidney disease. However, an ACE inhibitor and ARB should not be used simultaneously due to an increase in cardiovascular and renal risk observed in clinical trials. He is started on a fixed-dose medication combination of an ACE-inhibitor and thiazide diuretic to help with his high blood pressure. He needs to purchases a validated BP monitor which can transmit BP readings to his provider's electronic health records system. Direct transmission of BP data to the provider has been shown to help patients achieve greater reductions in BP compared to self-monitoring without transmission of data. One month follow-up is recommended to determine if the treatment goal has been met.