

Forum:Seminar papers/Biophysics/2. LF/2018-2019/Group 4/IJ

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Basic Body Examination

INTRODUCTION

Basic body examination is a primary procedure that must be performed by every physician before developing a diagnosis. This includes using methods such as measuring blood pressure, BMI, and heart rate.

Basic body examination is especially important because the doctor can take note of things that the patient might not be able to describe or forget to mention. Some of the clues may also be based on what the patient feels subjectively (symptoms) but others may be from what the doctor observes objectively (signs). Examples of symptoms are fatigue, pain or nausea. Examples of signs are pale face, skin rash or an unstable gait. Both symptoms and signs are extremely crucial for the doctor's diagnosis. It is also essential because it will help give the doctor a better idea of what he/she might be up against and would eliminate other diagnoses that do not fit with the patient's physical examination. This information then adds up together with the data collection retrieved from laboratory work and radiology studies to develop a diagnosis.

IMPORTANCE

Basic body examination is crucial in every specialty of medicine. In any specialty, the physician must be able to do it in a bid to make sure the patient does not have any serious pathologies that may cause harmful consequences during prescribed procedures or to even to assess the intensity of treatment required. The importance of basic body examination lies in diagnostics. Results of the procedure help to indicate which additional tests must be carried out. In addition, it is a common way of monitoring the patient's condition at hospitals. It checks those signs, which are first to show that something has gone wrong during the treatment. Also, it can be carried annually in a bid to notice the first signs of disease, if it occurs, and to be able to detect it at an early stage hence increasing the probability of successful therapy. However, some statistic researches have been carried, that show this method of prevention is ineffective on its own.

BRIEF LITERATURE REVIEW

The advantage of basic body examination is how by carrying out simple measurements you can develop a better initial overall picture of a person's state of health. When comparing to other examinations run by the physicians, the equipment required for the basic body examination is affordable even for a person that wants to perform the basic body examination away from the clinic of a physician. Basic body examination works in a way that includes measuring the patient's heart rate at rest and after exercise, BMI (body mass index), blood pressure, and lung function.

Simplicity of the examination brings some disadvantages. The BMI takes only the height and the weight into consideration but leaves out the composition and structural differences of the patient's body thus a patient with a large muscle mass might get a value of 25 and over, which would incorrectly indicate an unhealthy relation between height and body mass. Also the values of the patient's height and weight might vary when measured at different times of the day, since the patient can be as much as 2 centimeters taller and 3 kilograms lighter in the morning than in the evening. Blood pressure measurement might not give reliable results if the patient has followed an abnormal diet for him/her before the examination or the measurement situation might alter the patient's blood pressure. Some of those examples could be the patient talking/listening(10/10), upset bladder (15/10), smoking 30 min before measurement (6-20/) cuffing over Clothing (5-50/)

((Source: The Permanente Journal/ Summer 2009/ Volume 13 No. 3; The Importance of Accurate Blood Pressure Measurement; Joel Handler, MD; www.thepermanentejournal.org/files/Summer2009/blood_pressure.pdf [14.12.2018]))

One of the risks regarding the examination is that the patient might go through some pain while doing it, for example during the measurement of the blood pressure when the blood pressure cuff is wrapped snugly around the upper arm which can cause the feeling of tightness around the arm. Another risk is the need to quickly raise the heart rate during measurement of heart rate under exercise which may cause a problem for a patient who hasn't done any strenuous activity for a long period of time. And the patient should also be careful while checking the pulse at the location of the carotid artery, especially at an age older than 65. If the pressing of the artery is too hard, the person may become lightheaded and fall.

Because of frequent yearly body examination that can lead to abnormal or incorrectly measured test results, as mentioned before, the examination might cause some ethical issues concerning the patient experiencing unnecessary worry and stress because of the results. It may also lead to an extreme reaction by the patient by for example an unhealthy loss of weight which can lead to anorexia, an eating disorder characterized by low weight, fear of gaining weight, and a strong desire to be thin, resulting in food restriction.

Technical

How does the sphygmomanometer work?

By wrapping the rubber cuff around the arm and inflating it, you create a pressure onto the arm and so on the arteries. Increasing the pressure applied to the arteries, you constrict them more and more to this point no blood flows through. This pressure (mm/Hg) is called the systolic pressure. (can be measured without stethoscope). By releasing the pressure the blood can start flowing through the artery. This COULD be seen at the peak (arrow) of the sphygmomanometer by a small up and down movement. Once the pressure is so low the blood can run through the artery unrestricted, the movement of the meter and the sound audible on the stethoscope vanish, it indicates the diastole value. Those two values represent the Blood Pressure (BP).

((Source: Medical Training and Simulation LLC; Sphygmomanometer;
<https://www.practicalclinicalskills.com/sphygmomanometer> [14.12.2018]))

How does a Pulse Oximeter Work?

The Pulmometry device consists of two part the body (screen and computer) and the sensor: Two parts on the finger clip a light emitting LED and a light sensor which analyses the transmitted light beam going through the tissue which can then be used to calculate the SpO₂. However there are some factors which diminish the accuracy of the device. For example a cold finger can lead to falsely low results due to the reduced circulation in cold tissue. Moreover objects that can block the light on its way through the tissue such as nail polish or dirt on the device can lead to non-sensical results. Furthermore, the pulse oximeter can give false positive results eg. Due to CO. This is a gas formed by incomplete burn which binds better on haemoglobin than O₂ and therefore represses the O₂ from the haemoglobin. However, the Pulse oximeter can't determine the difference o₂ bound haemoglobin or CO bound haemoglobin and therefor gives a wrong result.

((Source: WHO; Pulse Oximetry Training Manual;
https://www.who.int/patientsafety/safesurgery/pulse_oximetry/who_ps_pulse_oxymetry_training_manual_en.pdf [14.12.2018]))

PROCEDURE

1. Body weight measurement using a weight scale

The patient should step on the weight scale and his/her body weight shown on the scale is recorded in kg.

2. Height measurement using a stadiometer

After the patient gets on the stadiometer, the examinee should adjust the sliding horizontal headpiece to rest on top of the patient's head.

The height can then be measured by reading off the ruler where the headpiece rests.

3. BMI calculation

Body Mass Index (BMI) is calculated by applying the weight and height measured in the previous steps into the metric BMI formula:

$$\text{BMI} = \text{weight (kg)} / \text{height}^2 (\text{m}^2)$$

4. Blood pressure measurement using a manual sphygmomanometer

A manual sphygmomanometer is composed of an inflatable cuff, a measuring device (a mercury manometer), and a bulb that inflates the cuff.

Place the patient's arm on a table so that the arm is at the same level as the heart.

Wrap the inflatable cuff around the patient's upper arm so that it covers the brachial artery (which can be located by palpation at the crease of the arm).

Place the stethoscope's bell over the brachial artery just below the edge of the cuff and start pumping the cuff bulb.

Continue pumping the cuff bulb until the pulse sounds can no longer be heard. At this point, start deflating the cuff slowly.

Record the pressure at which the first pounding sound is heard (the systolic blood pressure)

Record the pressure at which rhythmic sounds stop (diastolic blood pressure)

5. Stethoscope – a tool that helps doctors and nurses listen to the internal organs of patients, which is crucial in detecting any abnormalities.

Ask the patient to relax, sit straight and to breathe normally (in case you can't hear anything through the stethoscope ask the patient to take deep breaths)

Use the diaphragm of the stethoscope to listen to patient's lungs. Listen to the upper chest region, midclavicular line of the chest and the lower chest region. Do this on both lungs and from both sides (front and back). This way you will listen to all of the lobes of the patient's lungs.

Listen carefully to the sounds in order to make a diagnosis.

Normal breathing sounds clear, like someone is blowing air into a tube.

There are four types of abnormal breathing:

Wheezing – a high pitched sound when a person exhales and sometimes even during inhalation

Stridor – similar to wheezing, a high pitched sound heard most often when the person is inhaling

Rhonchi – sounds like snoring

Rales – sounds like some kind of rattling inside the lungs

6. Pulse Oximeter

First make sure the patient's fingers are warm and free from nail polish

Then measure the resting pulse. Ask the patient to sit and relax. Place the probe on the patient's finger and start up the device.

As the patient breathes in and out record the pulse rate for both inhalation and exhalation. Make these recordings 3 times.

Next, ask the patient to perform some sort of physical exercise (e.g. squats or jumping jacks). Let the patient do 20 repetitions of this exercise (in case the person cannot do 20, ask them to do as many as they think they can).

Record the pulse rate right after the exercise just like previously.

The beginner, intermediate and advance labeling on the chart suggest the targeted heart rate during an exercise regarding the level of fitness.

CONCLUSION

A basic body examination is critical for the diagnostic process and provides important information regarding the patient's health-care issues. Particularly important for middle-aged and elderly patients, these exams check for chronic diseases or infections and can help find problems at an early stage. The exam includes checking vital signs and health history of the patient, visual and physical exams to check for any abnormalities. For example, the presence of lumps or lesions, fever, muscle weakness or poor reflex response point out a possible health problem and are treated accordingly. Additionally, screening tests are performed if needed depending on the age of the patient.

In the future, these exams will help health care professionals to point out abnormalities or risk of chronic diseases and treat them at an early stage, thereby ensuring healthier lives for the patients.

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Some MCQs to test your knowledge

1) Which instrument do you use to measure the blood pressure?

Thermometer

Stadiometer

Sphygmomanometer

Stethoscope

2) Which instrument do doctors and nurses use to listen to the internal organs of patients

Thermometer

Stadiometer

Sphygmomanometer

Stethoscope

3) What instrument is used to measure the height

Thermometer

Stadiometer

Sphygmomanometer

Stethoscope

4) When measuring the resting pulse rate using the pulse oximeter, where should the probe be placed?

The nose

The lips

The finger

The wrist

5) When measuring the blood pressure, where should the inflatable cuff be placed

Finger

Upper Arm

Lower Arm

Wrist

6) Which of these is a type of abnormal breathing?

Wheezing

Stridor

Rales

All of the above

7) How many repetitions of the exercise should you do

20

30

40

50

8) When measuring the pulse rate after vigorous activity, how long must the patient wait before getting his last reading measured

3 minutes

4 minutes

5 minutes

6 minutes

9) What is the calculation that is used to measure the BMI of a patient?

$BMI = \text{mass (kg)} / \text{height}^2 (\text{m}^2)$

$BMI = \text{mass}^2 (\text{kg}) / \text{height}^2 (\text{cm}^2)$

$BMI = \text{mass (kg)} / \text{height (cm}^2)$

$BMI = \text{mass}^2 (\text{kg}^2) / \text{height (m}^2)$

10) What method is not part of a basic body examination?

Measuring heart rate at rest and after exercise

BMI (Body mass index)

Blood pressure

X ray

11) Which of the following is NOT a disadvantage of basic body examination

requires expensive equipment to carry out

Does not provide an overall picture of patient's state of health

BMI only takes into account height and weight and not patient's structural composition

Is time consuming

12) Which is the major risk of carrying out the examination?

That the patient might go through some pain while doing it

The examination is not reliable

The examination has to be carried out more than once

The patient has to be stationary

13) Where should you listen to the patients lungs?

Listen to the upper chest region, midclavicular line of the chest and the lower chest region.

Listen to only the upper chest

Listen to the lungs while placing the stethoscope on her back

None of the above

14) How many times should you repeat the Pulse Oximeter measurement?

2 times

3 times

4 times

1 time

15) What are the 2 components of the Pulse Oximeter?

Computer and probe

Computer and finger clip

Finger clip and probe

None of the above