

Analysis of Vital Parameters

-R. Naga Leela Krishna

Vital Health Parameter is a mechanism to universally communicate a patient's condition and severity of the disease. In general, it acts as an indicator of one's health (it can be any living organism) condition and the assurance of proper circulatory, respiratory, neural, and endocrinal functions.

Importance of Vital Health Parameters :

Vital signs measure your body's basic functions. Vitals display a snapshot of what's going on inside your body. They provide crucial information about your organs.

Therefore, the importance of vital signs monitoring is that it allows medical professionals to assess your wellbeing.

There are four main vital signs routinely monitored by medical professionals and health care providers which include the following:

- Body temperature
- Pulse rate
- Respiration rate (rate of breathing)
- Blood pressure

Body Temperature : It is the degree of heat maintained by the body or it is the balance between heat produced in the tissues and heat lost to the environment.

Health care providers use the axillary, rectal, oral, and tympanic membrane most commonly used to record body temperature, and the electronic and infrared thermometers are the devices most commonly used.

Pulse rate : It is defined as the wave of blood in the artery created by contraction of the left ventricle during a cardiac cycle.

In day to day practice, the radial pulse is the most frequently used site for checking the peripheral pulse, where the pulse is palpated on the radial aspect of the forearm, just proximal to the wrist joint. Clinicians also measure the carotid pulse in the neck.

Respiratory rate : The respiratory rate/the number of breaths per minute is defined as the one breath to each movement of air in and out of the lungs

The normal breathing rate is about 12 to 20 beats per minute in an average adult. In the pediatric age group, it is defined by the particular age group.

Blood pressure : It is the force of circulating blood on the walls of the arteries, mainly in large arteries of the systemic circulation.

It is taken using two measurements: systolic (measured when the heartbeats, when blood pressure is at its highest) and diastolic (measured between heartbeats, when blood pressure is at its lowest). It is written with the systolic blood pressure first, followed by the diastolic blood pressure.

Analysis of Vital Parameters :

In the medical environment, the clinical study of the most basic vital signs of a patient represents the simplest and most effective way to detect and monitor health problems. There are many diseases that can be diagnosed and controlled through regular monitoring of these medical data.

Many models have been proposed for analyzing and monitoring the patient's health using these Vital parameters. To monitor and track the user's vital signs, device with various sensors is used and it is connected to central server where user data are processed and can provide an immediate response if a risk is detected.

The various sensors used are:

Temperature sensor or thermometer: This sensor can measure body temperature. This data is of great medical importance as it can quickly determine if there are any health problems. In fact, a number of diseases are accompanied by characteristic changes in body temperature. Likewise, the course of certain

diseases can be monitored by measuring body temperature, and the efficiency of a treatment initiated can be evaluated by the physician.

Blood pressure sensor: Blood pressure is the pressure of the blood in the arteries as it is pumped around the body by the heart. When the heart is beating, it contracts and pushes blood through the arteries to the rest of the body. This force creates pressure on the arteries

Pulse and Oxygen in Blood: Oxygen saturation is defined as the measurement of the amount of oxygen dissolved in the blood, based on the detection of Hemoglobin and Deoxyhemoglobin. Two different light wavelengths are used to measure the actual difference in the absorption spectra of HbO₂ and Hb.

Airflow sensor: Abnormal respiratory rates and changes in respiratory rate are a broad indicator of major physiological instabilities, and in many cases, respiratory rate is one of the earliest indicators of this instability. Therefore, it is critical to monitor respiratory rate as an indicator of patient status. AirFlow sensor can provide an early warning of hypoxemia and apnea.

Electrocardiogram Sensor (ECG): The electrocardiogram (ECG or EKG) is a diagnostic tool that is routinely used to assess the electrical and muscular functions of the heart. The Electrocardiogram Sensor (ECG) has become one of the most commonly used medical tests in modern medicine. Its utility in the diagnosis of a myriad of cardiac pathologies ranging from myocardial ischemia and infarction to syncope and palpitations has been invaluable to clinicians for decades.

Apart from these, there are a few other sensors too such as Glucose sensor or glucometer, electromyogram (EMG), etc. Patient's health recordings are compared to the standard ranges and then the problem is further diagnosed.

Vital signs and their range:

- Blood pressure: 90/60 mm Hg to 120/80 mm Hg
- Breathing: 12 to 18 breaths per minute
- Pulse: 60 to 100 beats per minute

- Temperature: 97.8°F to 99.1°F (36.5°C to 37.3°C); average 98.6°F (37°C)

Monitors that simultaneously measure and display the relevant vital parameters are commonly integrated into the bedside monitors in intensive care units, and the anesthetic machines in operating rooms. These allow for continuous monitoring of a patient, with medical staff being continuously informed of the changes in general condition of a patient. They provide crucial information about your organs. Hence, monitoring and analysis of Vital Parameters plays major role in patient's health diagnosis.