



King Fahd University of Petroleum and Minerals  
College of Applied and Supporting Studies  
Physical Education Department

# Health and Physical Education I

## PE 101

### Health Education Course Material



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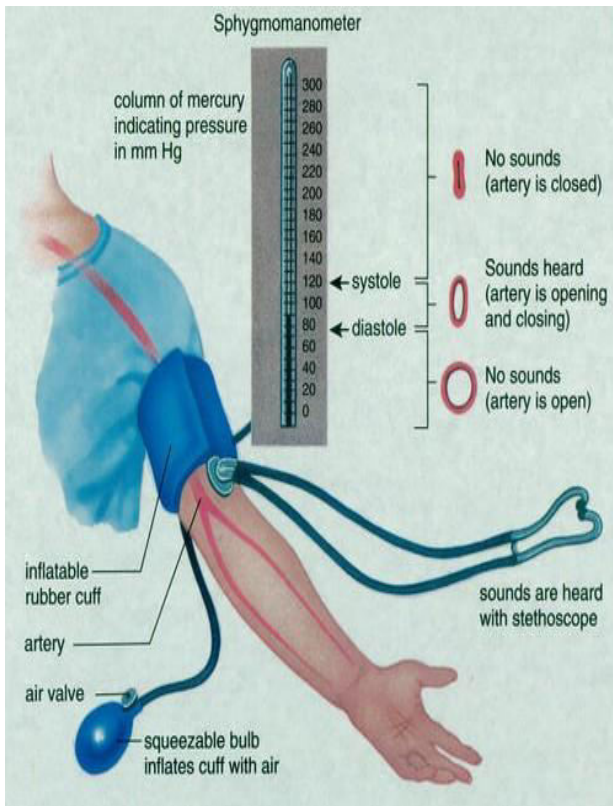
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## *Preface*

*The PE 101 course is offered in the first semester of the undergraduate programme. The content of this course highlights general health education, safety and CPR. Cardiovascular diseases are the single most fatal diseases globally in the present day. To keep up with recent trends, the course describes the blood pressure, heart rate, cholesterol and diabetes, their causes, effects and preventative measures. Another important life-saving aspect, CPR, is described in detail with its practical implementation and the safety measures to be adopted while administering it to save the life of a person.*

# Blood Pressure

**Blood Pressure (B.P.)** is the force of **blood** pushing against the walls of the arteries as the heart pumps **blood**.



## An optimal amount of blood pressure is essential for a healthy life

- Blood Pressure is usually measured in the brachial artery of the arm using an instrument known as a sphygmomanometer (as indicated in the figure).
- The blood pressure rises with each heartbeat (Systolic B.P.) and falls when your heart relaxes (Diastolic B.P.).
- While BP can change from minute to minute with changes in posture, exercise, stress or sleep, it should normally be less than **120/80 mm Hg** (less than 120 systolic and less than 80 diastolic) for an adult age 20 or over.

**Types of Blood Pressure:** There are two types of Blood Pressure: i) Hypertension (High blood pressure, HBP), ii) Hypotension (Low blood pressure, LBP).

**Hypertension (High blood pressure):** High blood pressure (HBP) means the pressure in your arteries is higher than it should be. It means that the pressure of 140 mm Hg systolic or higher and/or 90 mm Hg diastolic or higher stays high over time. When a person has got high B.P. it means that the heart has to exert greater force to pump almost the same quantity of blood within the same time due to which B.P. becomes more elevated than normal.

The HBP is classified as follows:

Category	Systolic B.P.	Diastolic B.P.
Prehypertension	120-139	80-89
Stage 1 Hypertension	140-159	90-99
Stage 2 Hypertension	Above 160	Above 100

**Causes of Hypertension:** The exact causes of high blood pressure are not known.

However, some of the conditions mentioned below lead to HBP:

- Smoking
- Being overweight
- Lack of physical activity
- Too much salt in the diet
- Drinking too much alcohol (more than 1 to 2 drinks per day)
- Older age
- Family history of high blood pressure (heredity)
- Having chronic kidney disease

**Common Symptoms of Hypertension:**

- Severe headache
- Fatigue or confusion
- Vision problems
- Chest pain
- Difficulty breathing
- Irregular heartbeat
- Blood in the urine
- Pounding in your chest, neck, or ears

**Risks of Hypertension:**

- Heart attack or stroke
- Aneurysm (weakening and bulge in blood vessel)
- Heart failure
- Weakened and narrowed blood vessels in the kidneys
- Thickened, narrowed or torn blood vessels in the eyes
- Metabolic syndrome (increased waist circumference, LDL, insulin levels)
- Trouble with memory or understanding

**Management of Hypertension:** 1. Weight reduction 2. Reduction of salt intake 3. Aerobic exercise (Walking, Jogging, swimming, cycling, etc.) 4. Avoid saturated fats 5. Intake of calcium, potassium and magnesium in proper proportions 6. Adopt healthy dietary habits like high intake of fibers (soluble fibers), Vitamin C, Vitamin B3 (Niacin) and Vitamin E, garlic, honey, lemon juice, onion etc. 7. Use of relaxation techniques like meditation. 8. Intake of water in large quantities especially in empty stomach in the morning 9. Adopt a positive outlook towards life.

## Hypotension

The term "hypotension is used when the flow of blood is low and inadequate to the organs of the body resulting in dizziness, fainting and shock.

### Causes

- Heart problems
- Endocrine problems
- Dehydration
- Blood loss
- Severe infection
- Lack of nutrients in the diet

### Symptoms:

- Dizziness or lightheadedness
- Fainting (syncope)
- Lack of concentration
- Blurred vision
- Nausea
- Cold, clammy, pale skin
- Rapid, shallow breathing
- Fatigue
- Depression
- Thirst

### Risks

- Dizziness
- Weakness
- Fainting
- Risk of injury from falls
- Lack of oxygen
- Damage to the heart and brain.

### Management

- Drinking more fluids
- Getting up slowly after sitting or lying down
- Avoid drinking alcohol
- Not standing for long periods
- Using compression stockings so blood does not collect in the legs
- Medication
- Physical activity (See also the exercises for Management of Diabetes on page 12 & 13)



## Heart Rate

Heart rate is the speed of the heartbeat or the number of beats measured by the number of contractions of the heart per unit of time, typically beats per minute (bpm).

A normal resting heart rate for adults' ranges from 60 to 100 beats a minute. During vigorous exercise, heart rate can increase to 220 beats per minute which results in an increased blood flow.

**Heart Rate Reading:** The heart rate is the pulse one feels at the periphery. When the blood is pumped in the arteries, they expand and the same pulse is felt throughout the arteries. There are two suitable points through which one can check the pulse.

1. In the radial artery at the thumb side (Figure 1)
  2. At the carotid artery located in the neck, at either side of the windpipe (Figure 2)
- Place two fingers (index and middle ) at these points and the count can be noted for 15 seconds or 30 seconds and can be multiplied by 4 or 2 respectively to get the heart rate for one minute.



Figure 1`



Figure 2

### **Heart Rate and Exercise**

There is a direct relationship between heart rate and exercise. As exercise increases, so does the heart rate. So one way to measure the intensity of your workout is to gauge how hard your heart is working. For example, a brisk walk around the track will increase your heart rate, but a run around the track will really get your heart pumping.

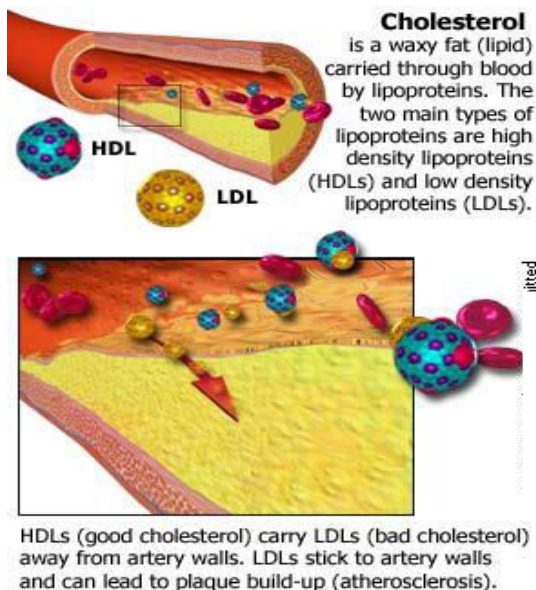
### **Maximum Heart Rate**

The maximum heart rate (MHR) is the highest heart rate your cardiovascular system can effectively cope with during physical activity. A simple way to calculate your MHR

is to subtract your age from 220. For example, a 20-year-old's MHR would be 220 minus 20, or 200. So 200 is the maximum number of times a 20-year-old's heart should beat each minute during exercise and physical activity.

#### Factors affecting heart rate:

- Illness
- Anxiety
- Dehydration
- Body temperature
- Altitude
- Elapsed time after meals
- Heart disease
- Breathing
- Glycogen levels
- Medication
- Exercise (See the exercises for Management of Diabetes on pages 12 & 13)



## CHOLESTEROL

**Cholesterol** is a soft, wax-like fatty substance found in all parts of the body. It is a white crystalline substance found in animal tissues and various foods, normally manufactured by the liver. Our body needs a little bit of cholesterol to work properly. But too much cholesterol can be harmful as it forms a fatty deposit which can block the arteries, reduce their circumference and lead to heart disease. Cholesterol has to be transported through the blood and the carriers are called lipoproteins.

#### Types of Cholesterol

There are two different types of lipoproteins: **1. Low Density Lipoproteins (LDL)** **2. High Density Lipoproteins (HDL)**. Lipoproteins are a combination of fat and proteins. LDL has more fat, less proteins, is called bad cholesterol, forms fatty deposits in the arteries and is the cause of heart disease. By contrast, HDL has more protein, less fat, is termed good cholesterol, and it carries cholesterol to the liver and out of the body. HDL prevents the formation of fatty deposit and heart disease. Different blood tests are needed to individually measure each type of cholesterol.



### Normal Values:

#### Total cholesterol

Less than 200 mg/dL: desirable

200-239 mg/dL: borderline high risk

240 and over: high risk

#### HDL (high density lipoprotein)

Less than 40 mg/dL (men), less than 50 mg/dL (women): increased risk of heart disease

Greater than 60mg/dL: some protection against heart disease

#### LDL (low density lipoprotein)

Less than 100 mg/dL: optimal

100-129 mg/dL: near optimal/above optimal

130-159 mg/dL: borderline high

160- 189 mg/dL: high

190 mg/dL and above: very high

### Causes

- Diet high in saturated fat
- Lack of exercise
- Overweight or obese
- Heredity
- Diabetes
- Kidney and liver diseases
- Hypothyroidism
- Medication
- Cigarette smoking

### Risk Factors:

- Heart attacks
- Gallstones
- Stroke
- Numbness in legs

## Prevention

- Eating a healthy diet
- Controlling body weight
- Maintaining normal levels of hypertension and diabetes,
- Not smoking
- Exercising every day for 30 minutes,
- Monitoring cholesterol levels regularly.

## Exercises for Managing Cholesterol

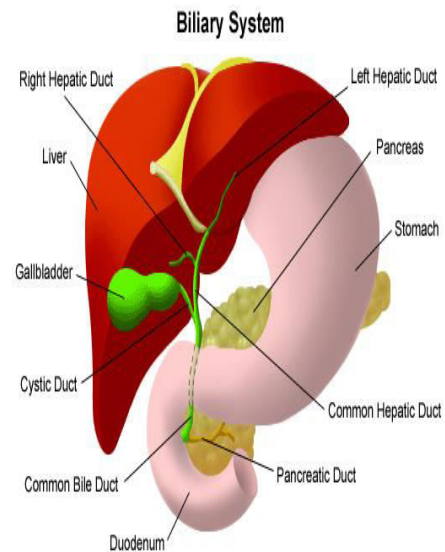
- Aerobics to get your heart rate up
- Strength training to build muscle
- Flexibility exercises like stretching

(See also the exercises for Management of Diabetes on pages 12 & 13)

# DIABETES

Diabetes is a serious disease in which the body cannot properly control the amount of sugar in the blood because it does not have enough insulin.

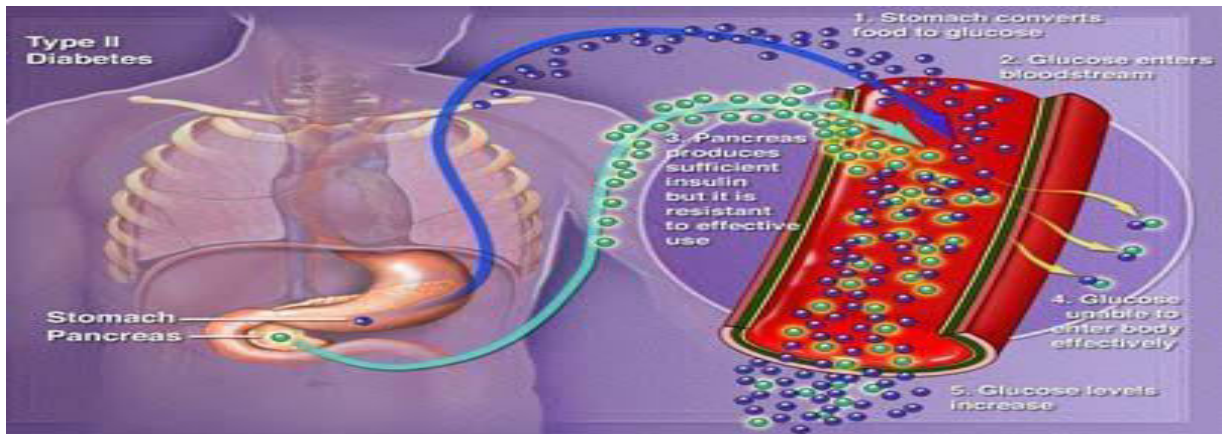
The deficiency of insulin or the inability of body cells to use the available insulin causes the accumulation of glucose in the blood causing the symptoms of diabetes



## Mechanism of Diabetes:

Glucose comes from the food you eat and is also made in the liver and muscles. The blood carries the glucose to all of the cells in your body. Insulin is a chemical (a hormone) made by the pancreas. The pancreas releases insulin into the blood. Insulin helps the glucose from food to get into your cells

If the body does not make enough insulin or if the insulin doesn't work the way it should, glucose can't get into the cells. It stays in the blood instead. The blood glucose level then gets too high, causing pre-diabetes or diabetes



**Mechanism of Diabetes**

## **TYPES OF DIABETES**

There are two main types of diabetes,

### **Type I Diabetes (IDDM)**

Type 1 diabetes, also called juvenile diabetes or insulin-dependent diabetes (IDDM), develops most often in young people. However, it can also develop in adults. In this form of diabetes, the body no longer makes insulin or doesn't make enough insulin because the immune system has attacked and destroyed the insulin-producing cells. About 5 to 10 percent of people with diabetes have type 1 diabetes.

### **Type II Diabetes (NIDDM)**

Type 2 diabetes, called adult-onset diabetes or non-insulin-dependent diabetes (NIDDM) can develop at any age. It begins with insulin resistance—a condition that occurs when fat, muscle, and liver cells do not use insulin to carry glucose into the body's cells to use for energy. As a result, the body needs more insulin to help glucose enter cells. At first, the pancreas keeps up with the added demand by making more insulin. Over time, the pancreas doesn't make enough insulin when blood sugar levels increase, such as after meals. If the pancreas can no longer make enough insulin, then it has to be treated..

## **SIGNS & SYMPTOMS OF DIABETES:**

- Excessive thirst
- Excessive and frequent urination
- Excessive hunger
- Feeling of exhaustion
- Weight loss
- Wound infection and delayed healing
- Dry, scratchy skin
- Numbness in the feet
- Blurred eyesight

## CAUSE OF DIABETES

- Lack of insulin
- Heredity or genetic factors
- Overweight & obesity
- Tension, anxiety and stress
- Use of some drugs
- Lack of exercise

## Blood Sugar Permitted Limits:

Category of blood sugar	Fasting Value in mg/dL	Value 2 Hours after Consuming Glucose mg/dL
<b>Normal</b>	70 – 100	Less than 140
<b>Early Diabetes</b>	101 – 125	141- 200
<b>Established Diabetes</b>	over 125	More than 200

## MANAGEMENT OF DIABETES



1. **Diet Control:** Diet is the single most important factor for controlling diabetes. If faulty dietary habits are not given up, drugs or any other treatment will be of little value. In fact, for obese diabetics, dietary change assumes all the more significance.
  - **Foods to be totally avoided:** All concentrated sources of sugar such as sugar, glucose, jam, chocolates, sweets, sweet drinks, sweetened milk, canned fruits, sweet biscuits, cake, pie, pudding, peppermint and alcohol.
  - **Foods to be taken in limited quantity:** cereals, potatoes, peas, dry fruits, cheese, milk, butter, oil, meat, eggs, fish, yogurt, etc.
  - **Foods that can be taken freely:** Most fruits, vegetables, drinks (tea, coffee, etc. sweetened with saccharine.)

- **Special medicinal foods:** Consume certain foods like bitter melon, blackberry, fenugreek, garlic and neem which are considered as natural foods for controlling diabetes.
- **Fiber foods:** Fibers lower the rate of glucose absorption from the gut and thereby lower glucose levels in the blood and aid the treatment of diabetes. Fiber helps in reducing insulin dosage administered to the diabetic patient. For fibers, take whole grain cereals and pulses along with fruits and vegetables.

**2. Exercise:** The types of physical activity for managing diabetes are aerobic exercise, strength training and stretching.

**i) Aerobic Exercise:** Aerobic exercise helps your body use insulin a hormone that helps the body use glucose for energy. The following aerobic exercises can be useful for managing diabetes:

- Brisk walking
- Climbing stairs
- Swimming or taking a water-aerobics class
- Riding a bicycle outdoors or a stationary bicycle indoors
- Sports activity like playing basketball, tennis, or other sports

Aim for 30 minutes of moderate-to-vigorous-intensity aerobic exercise at least 5 days a week or a total of 150 minutes per week. Spread the activity out over at least 3 days during the week and try not to go more than 2 days in a row without exercising.

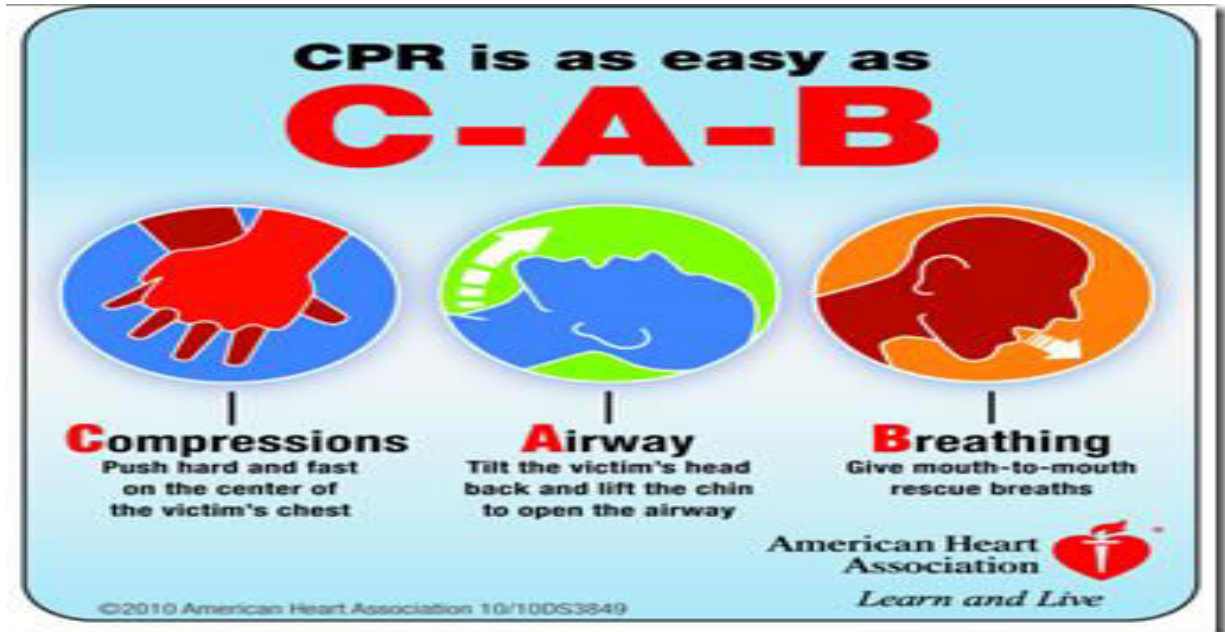
**ii) Strength training:** Strength training is a light-to-moderate physical activity that builds muscle and keeps your bones healthy. The strength training can be done with hand weights, elastic bands, or weight machines two to three times a week at home, at a fitness center, or in a class. Start with a light weight and slowly increase the size of your weights as your muscles become stronger.

**iii) Stretching Exercises:** Stretching exercises will increase the flexibility, lower the stress, and help prevent sore muscles. Stretching all the joints from head to toe which can be done before and after the training sessions will help keep the flexibility of the body.

## CPR- CARDIO-PULMONARY RESUSCITATION

Cardiopulmonary resuscitation (CPR) is an emergency medical procedure for lifesaving following cardiac arrest and other complications like stroke, choking, drowning, electrical shocks, severe bleeding etc.

**CPR has three main parts: Compression, Airway and giving breaths**



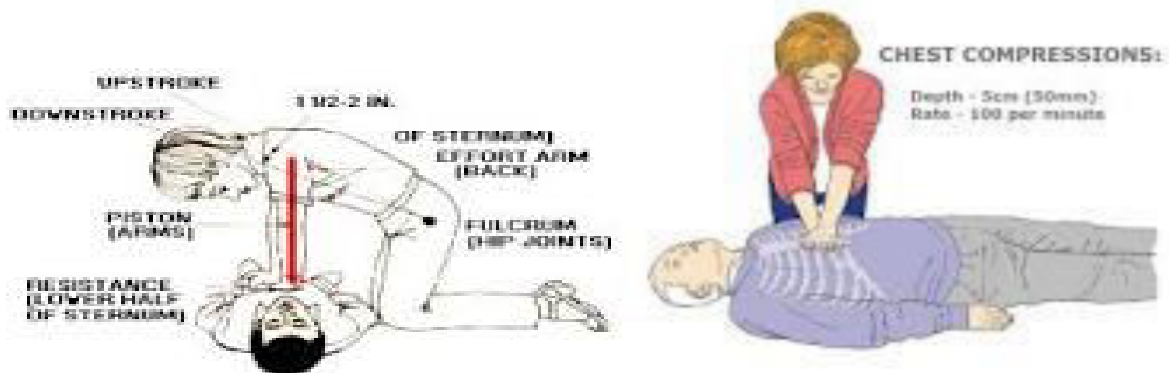
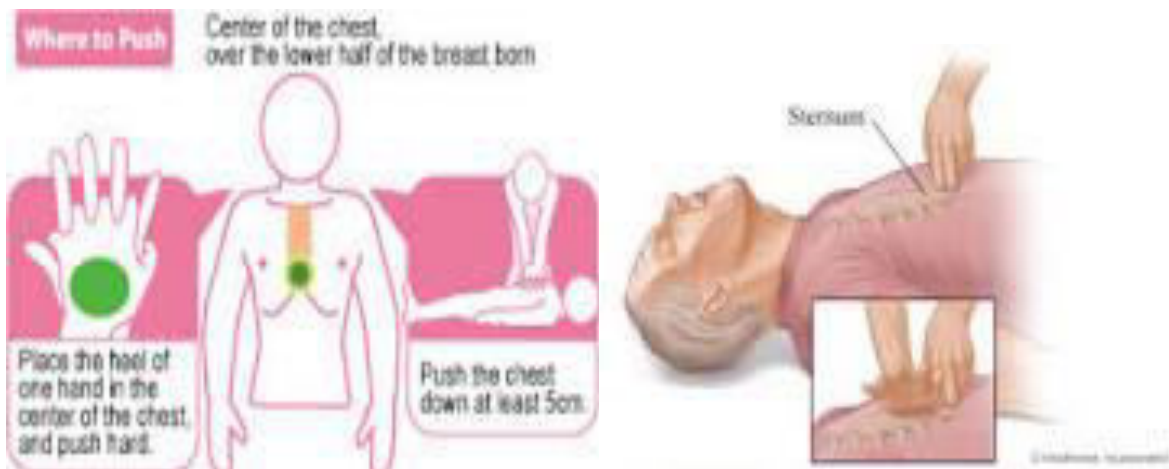
### PROCEDURE: THREE STEPS

#### STEP 1 (C): CHEST COMPRESSION

- Make sure the victim is lying on his back
- Move clothes out of the way
- Find the location of the chest compression site
- Keep the heel of one hand in the chest center (between nipples)
- Place the other hand on top of the hand already on the chest and interlock the fingers
- Use the palm of your hand on the compression site
- Keep fingers off the chest
- Deliver chest compression with shoulders directly over your hands with arms straight by locking elbows
- Keep the force of compression straight down, avoid pushing on the rib cage or lower tip of the breast bone
- With locked elbows allow body weight to deliver compression
- Push hard and fast depressing the breast bone by 1/3 the depth of victim's chest – at least 5 cm/ 2 inches
- After each compression, release, allowing the chest to return to its normal position and repeat at a rate of one-two-three-four for 30 compressions



- Perform compressions gracefully with a rate of at least 100 compressions per minute



## STEP 2 (A): Airway

- Put one hand on the forehead and the fingers of the other hand on the chin
- Tilt the victim's head back and lift the chin to open the airways



### STEP 3 (B): BREATHING

- While holding the airway open, pinch the nose closed
- Take a breath, cover the person's mouth with your mouth
- Give 2 breaths (blow for 1 second each). Watch for the chest to rise as you give each breath. Breaths can be done with mask if they are available



Direct mouth to mouth rescue breathing



Mouth to mouth rescue breathing with special mask

- Continue the combination of rescue breaths and manual chest compression
- If the victim has a restored heartbeat continue the rescue breaths.

Continue CPR and monitor the victim's condition until the arrival of AED or the emergency medical services

### **AED- AUTOMATIC EXTERNAL DEFIBRILLATOR**

It is a computerized machine that can give a shock to the heart and help it work properly again. It is safe, accurate and easy to use.

### **AFTER CHECKING THE SCENE AND THE INJURED OR ILL PERSON:**

#### **1. TURN ON AED**



**2. WIPE BARE CHEST DRY AND ATTACH PADS:** Place one pad below the collarbone on the upper right side of the victim's bare chest. The other should be placed below the neck or breast on the left, below the heart, slightly along his side.



**3. PLUG IN CONNECTOR**



**4. STAND CLEAR:** Make sure no-one, including you, is touching the person.  
■■ Say, "EVERYONE, STAND CLEAR."



**5. ANALYZE HEART RHYTHM:** Push the “analyze” button, if necessary. Let AED analyze the heart rhythm.

**6. DELIVER SHOCK:** If SHOCK IS ADVISED: ■■ Make sure no one, including you, is touching the person. ■■ Say, “EVERYONE, STAND CLEAR.” ■■ Push the “shock” button, if necessary



**\* If the person is not responding and not breathing or is only gasping, then you need to give CPR again or a combination of CPR and AED.**

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