Heart 101

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Module 1: Introduction to the Cardiovascular System and Cardiovascular Disease (CVD)
Objectives

By the end of this module, students will have learned... 

• An overview of the heart and the cardiovascular system
• What is cardiovascular disease
• Symptoms
• Who is diagnosed with cardiovascular disease
• Risk Factors
• Prevention
Overview of the Heart

• Fist-sized muscular pump that moves blood around the body
• Heart situated 2/3 left of center & 1/3 right of center of the rib cage.
• Located in the mediastinum.

• Plumbing system
  – Moves blood through heart and body
  – Arteries carry blood away from heart
  – Veins carry blood to heart
  – Heart ➔ arteries ➔ capillaries ➔ veins ➔ back to heart
    ▪ 60 second cycle

• Electrical system
  – Triggers heart beat
  – Conducts electrical signal to contract heart muscles
Overview of the Heart

• 2 different halves, 2 different functions

• **Right Heart** + pulmonary arteries + capillaries + veins = PULMONARY CIRCULATION (lungs)

• **Left Heart** + systemic arteries + capillaries + veins = SYSTEMIC CIRCULATION (body)
The Human Heart

- Superior Vena Cava
- Inferior Vena Cava
- Tricuspid valve
- Bicuspid (mitral) valve
- Pulmonary veins
- Right Atrium
- Left Atrium
- Right Ventricle
- Left Ventricle

Oxygenated Blood
De-Oxygenated Blood
<table>
<thead>
<tr>
<th>Divisions of the heart</th>
<th>Structure</th>
<th>Function</th>
<th>Receives blood from</th>
<th>Sends blood to</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Right Atrium</strong></td>
<td>- Tricuspid valve</td>
<td>- End systemic circulation</td>
<td>- Venae cava</td>
<td>- Right ventricle</td>
</tr>
<tr>
<td><strong>Right Ventricle</strong></td>
<td>- Tricuspid valve (top)</td>
<td>- Start of pulmonary circulation</td>
<td>- Right atrium</td>
<td>- Lungs, via pulmonary trunk (arteries)</td>
</tr>
<tr>
<td></td>
<td>- Semilunar valve (bottom)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Left Atrium</strong></td>
<td>- Bicuspid valve</td>
<td>- End of pulmonary circulation</td>
<td>- Lungs, via pulmonary veins</td>
<td>- Left ventricle</td>
</tr>
<tr>
<td><strong>Left Ventricle</strong></td>
<td>- Bicuspid valve (top)</td>
<td>- Start of systemic circulation</td>
<td>- Left atrium</td>
<td>- Rest of body, via aorta &amp; systemic arteries</td>
</tr>
<tr>
<td></td>
<td>- Aortic valve (bottom)</td>
<td></td>
<td></td>
<td></td>
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</table>
What is cardiovascular disease (CVD)?

• Heart Disease
  – Affects heart and blood vessels
  – Caused by buildup of cells and cholesterol (fat)

• Plaques
  – Atherosclerosis
  – Obesity

References:
What are symptoms of CVD?

• Chronic, “silent,” no symptom disease
• But, the following can lead to cardiovascular disease:
  – High blood pressure
  – High cholesterol
Who is gets heart disease?
Mortality Rates for CVD by Ethnicity, Hawaii 2000*

*Rates were age-adjusted based on the 2000 U.S. Census Population

SOURCE: Hawaii State Department of Health, Vital Statistics
Heart Disease and Native Hawaiians & Pacific Islanders (NHPI), and Asians

• Compared with Asians, NHOPI are:
  – 50% more likely to die from heart disease
  – 50% more likely to smoke cigarettes

• Compared with Whites, NHOPI are:
  – 20% more likely to be obese
  – 40% more likely to be diagnosed with heart disease

Traditionally...

- Past: healthy diets, active lifestyles
- Present: poor diets, sedentary lifestyle
  - Decline in health of Native Hawaiians and Pacific Islanders
First Western Contact, Capt Cook, Waimea, Kaua‘i, January 19, 1778

“...Indians are above middle size, strong, well made...of a dark copper Colour...walk gracefully, run nimbly and are capable of great fatigue.... Women have handsome faces ...good Teeth...agreeable tempers...truly good natured, social, friendly, and humane, possessing much livelyness and a constant flow of good Humour.”

Third Western Contact, January 13, 1779, Kealakekua, at Makahiki
What are risk factors for cardiovascular disease?
Risk Factors Game
Risk factors that CANNOT be controlled

• Age
  – Men over the age of 55
  – Women over the age of 65
• Family history
• Ethnicity
• Gender

References:
Risk factors that CAN be controlled

- High blood pressure
- High cholesterol
- Diabetes
- Smoking
- Lack of physical activity
- Unhealthy diet
- Obesity and overweight
- Oral health
Diabetes

- Diabetes is a chronic disease where a person’s body cannot make insulin or cannot use insulin properly.

- What are the 3 key players in the disease?

- **Without Diabetes:**
  - Food → Sugar (Glucose) → Energy
  (The food we eat gets changed to sugar (glucose) that our bodies can process and use as energy for everyday functioning)

- **With Diabetes:**
  - Food → Sugar (Glucose) → Energy
  (The food we eat still gets changed to sugar (glucose) but our bodies **cannot** process and use it for energy)
Diabetes

• Diabetes type 2 is the more common of the two types of diabetes and is controllable.

• Even when the blood glucose levels are under control, diabetes increases the risk of heart disease.

• About 75% of those diagnosed with diabetes develop some form of heart disease.
What are other risk factors?

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Effect</th>
</tr>
</thead>
</table>
| **Stress**                        | • Too much stress may be at a greater risk of having coronary artery disease.  
|                                   | • Blood pressure increases as a response to stress                      |  
|                                   | • Effect other risk factors:                                           |  
|                                   |   – May overeat                                                         |  
|                                   |   – Smoking                                                             |  
| **Alcoholism**                    | • Raises blood pressure                                                |  
|                                   | • Cause heart failure and lead to stroke                               |  
|                                   | • Contribute to high triglycerides                                     |  
|                                   | • Cancer and other diseases                                            |  
|                                   | • Irregular heartbeats                                                 |  
| **Hormone Replacement Therapy (HRT)** | Through clinical trials it has shown that some women are at an increased risk for blood clots, heart attack and stroke. |
What are Ways to PREVENT Cardiovascular Disease?
Prevention

Areas/opportunities for Interventions with Cardiovascular Disease

Primary
- Prevent cardiovascular disease
- Screening and education (i.e. health fairs)
- Lifestyle changes

Secondary
- Prevent complications (i.e. oral health, heart attack)
- Lifestyle changes
- Medication and treatment

Tertiary
- Delay death (complications)
- Maintain quality of Life
- Medication and treatment
What are ways to prevent cardiovascular disease?

Lifestyle changes
- Quit smoking and avoid secondhand smoke
- Maintain a healthy weight
- Participate in physical activity
- Eat a heart healthy diet
- Maintain good oral health

Medication and treatment
Quit Smoking

- Most preventable cause of disease and death in the U.S.

- Substantially increases risk for coronary heart disease in women who use oral contraceptives.

<table>
<thead>
<tr>
<th>Blood pressure</th>
<th>Increases ▲</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise tolerance</td>
<td>Decreases ▼</td>
</tr>
<tr>
<td>Blood clotting</td>
<td>Increases ▲</td>
</tr>
<tr>
<td>HDL (good) cholesterol</td>
<td>Decreases ▼</td>
</tr>
</tbody>
</table>
Maintain a Healthy Weight

• Being overweight or obese will increase:
  – Heart’s work
  – Blood pressure
  – Cholesterol

• Being overweight or obese will decrease:
  – HDL (healthy cholesterol)

• Balance the calories you eat with the amount you use up each day

• A reasonable weight loss goal should be about 2 pounds a week
Participate in Physical Activity

• Regular to moderate physical activity (at least 30 minutes/day, 5 days/week). . .
  – decreases risk of heart disease
  – reduces the amount of work the heart does for a given workload

• Can help to control:
  – Cholesterol
  – Blood pressure
  – Diabetes
  – Obesity
Eat a Heart Healthy Diet

• **Enjoy all foods in moderation**

• There are no “forbidden” foods, but you must practice portion-/self-control

• Because there is no one perfect food, we must enjoy a **variety of foods** in moderation
  
  – Include fruits, vegetables, grains, low-fat or nonfat diary products.
  
  – Limit intake of trans fatty acids

• **Portion sizes** are key to this concept
Lunch/Dinner Plate
Don’t Forget.....
There is a link between nutrition, physical activity, and the well-being of individuals and families. Historically established is the link between nutrition, a fundamental physical building block of human beings, and the well-being of our country. Food assistance programs have been based on these links.

NUTRITION EDUCATION FOR WELLNESS (NEW) is a statewide "umbrella concept" program that facilitates consumer foods and nutrition education.

**Goals are:**

- **To provide educational programs that increase the likelihood of healthy food choices** consistent with the most recent dietary advice as reflected in the Dietary Guidelines for Americans, MyPyramid and Nutrition Facts.

- **To provide practical foods and nutrition education training** via training and technical assistance and services delivery, materials adaptation and development, resources support, development of practical applied research, evaluation, and collaboration facilitation.

- **To safeguard the health and well-being of limited income households** by promoting skills building and access to a healthy diet.

- **To provide statewide leadership and work** with a diversity of organizations to achieve common goals.
Maintain Good Oral Health

• Gum disease can affect an individual’s heart and brain.
  – Bacteria found in the gum line can travel to the heart or brain and trigger heart disease, heart attack, and stroke.

• Having advanced stages of gum disease will double one’s risk of suffering a fatal heart attack.
Ways to avoid gum disease

• Brush at least twice a day and floss once
• Floss properly
• Brush outside and inside of the teeth for two minutes
• Eat a balanced diet rich in a variety of nutrients.
• Limit snacks, especially sugary and starch based ones.
• Quit smoking (smoking raises risk of gum disease by 400%)
• Get a professional cleaning and checkup every six months
Case Study
Case Study – Changing one’s lifestyle

Patient/client – You have been stressed at work with the deadlines lining up. On your way home for dinner you pick up fast food and when you reach home you end up drinking a few beers to relax. Since you have had these projects to complete you have not been able to even get outside for 5 minutes.

You go to the doctor and he/she has noticed that you have gained 15 pounds in the past 4 months, and noticed that your blood pressure & cholesterol are increasing. He/she refers you to the community health worker.
Case Study – Changing one’s lifestyle

Community health worker –

Taking what you learned earlier today, work with the patient on a way to change his/her lifestyle to reduce hypertension, high cholesterol and reduce his/her risk for heart disease.

• Focus on lifestyle changes.
Review

In this module, we covered. . .

• An overview of the heart and the cardiovascular system
• What cardiovascular disease is
• The symptoms of cardiovascular disease
• Who is diagnosed with cardiovascular disease
• The risk factors of cardiovascular disease
• Prevention of cardiovascular disease
Questions or Comments