Exercise and the Elderly

How to Exercise the Elderly

- Environment
  - Encourage social interaction
  - Background music
  - Minimize distractions
  - No competition
  - Encourage self-paced work

How to Exercise the Elderly

- Explanations
  - Slow, clear instructions, repeat
  - Speak loudly
  - Use simple language
  - Demonstrations
  - Don't talk down to participants

How to Exercise the Elderly

- Safety
  - Proper footwear
  - Appropriate activities
  - Freedom to opt out
  - Warning signs/medications
  - Getting down and up from mats/floor
  - Exercise vs. training

How to Exercise the Elderly

- Fun
  - Be enthusiastic
  - Get to know your group
  - Participant input
  - Variety vs. routine

Objectives of Exercise Programs for the Elderly

5. Maximize social contact and enjoyment of life.
6. Improve weight control and nutrition.
7. Aid digestion and reduce constipation.
8. Promote relaxation.
9. Relieve anxiety, insomnia and depression.
10. Sustain sexual vigour.

Objectives of Exercise Programs for the Elderly

1. Improve self-care capabilities and general well being.
2. Improve cardiovascular condition and general endurance.
3. Increase muscular strength and endurance.
4. Maintain or improve flexibility, coordination and balance.

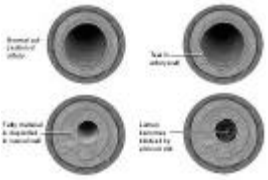
Exercise Testing for the Elderly

Characteristic	*Test Modification*
Low VO2 max	Start at low intensity
More time required to reach steady state	Long warm-up period, small increases in work load
Increased fatigability	Reduce total test time
Increased need to monitor ECG and BP	Bike > treadmill > step test
Poor balance	Bike > treadmill > step test
Poor leg strength	Treadmill > bike or step test
Less Ambulatory ability	Increase treadmill grade rather than speed
Poor neuromuscular coordination	Increase amount of practice, two tests may be required

Cardiovascular Disease and the Effects of Exercise

Atherosclerosis

- The development of arterial atherosclerosis may occur when deposits of cholesterol and plaque accumulate at a tear in the inner lining of an artery.
- As the deposits harden and occlude the arterial lumen, blood flow to distant tissues decreases and a clot may become lodged, completely blocking the artery.



Introduction

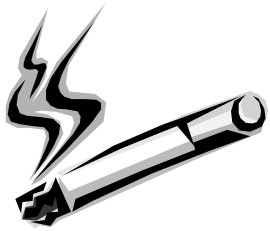
- Coronary artery disease (heart disease) and cerebrovascular disease are the most prevalent cardiovascular diseases (CVD).
- As individuals age, there is an increased incidence of these diseases.

Cardio Vascular Disease

- Atherosclerosis is the underlying cause of CVD.
- Epidemiological studies have determined several risk factors which are associated with the development of CVD.The primary risk factors are:
  - High blood pressure (hypertension)
  - High blood (serum) cholesterol (hypercholesterolemia)
  - Smoking
- With increasing age, there is an increase in both blood pressure and serum cholesterol.

Cardio Vascular Disease

- Cigarette smoking may be the most significant risk factor associated with premature death from CVD.
- There is a dose-response relationship; the more an individual smokes, the greater the risk of CVD.
- However, as soon as one year after an individual quits smoking, there is approximately a 50% reduction in the risk of developing CVD.

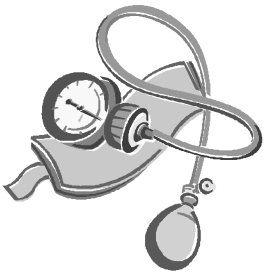


Cardio Vascular Disease

- Family history incorporates both genetic factors and behavioural / environmental factors.
- In general, the risk of developing CVD is greater for males compared to females. However, with increasing age, females also have a high incidence of CVD. Age is an independent risk factor and is also implicated in the development of hypertension and hypercholesterolemia.

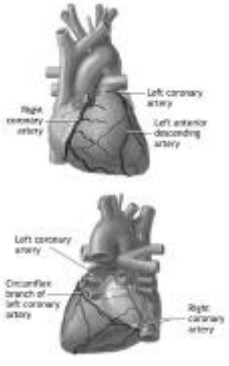
Cardio Vascular Disease

- Other risk factors for CVD include:
  - family history
  - Gender
  - Age
  - Obesity
  - Diabetes mellitus



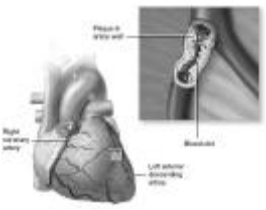
Coronary Artery Disease (CAD)

- The coronary arteries are located on the superficial aspect of the walls of the heart. They supply the myocardium (heart muscle) with blood, and therefore oxygen.



Coronary Artery Disease (CAD)

- CAD (heart disease) results when the coronary arteries become clogged with atherosclerotic plaque.
- Narrowing of the coronary arteries decreases blood flow, and thus reduces the oxygen available to that area of the myocardium. Depending on the location of the blocked artery, sudden death may or may not result from a myocardial infarction.



Role of Exercise in CAD

- Exercise plays an important role in both primary and secondary prevention of CAD.
- You may have participants in your program who have completed cardiac rehabilitation programs. They should be able to take part in all aspects of your class and monitor their exercise intensity.

Coronary Artery Disease (CAD)

- There are several procedures which may be used to identify CAD:
  - Electrocardiogram (ECG) - records the pattern of electrical currents generated by the heart with each heartbeat
  - Exercise stress test - monitoring the activity of the heart during exercise (on a treadmill or cycle ergometer) using an ECG
  - Thallium or cardiolite scan - provides a picture of the amount of radioactive substance that reaches the heart during exercise
  - Echocardiogram - ultrasound of the heart
  - Coronary angiogram - x-ray used to record the passage of a contrast dye in the blood vessels

Role of Exercise in CAD

- Individuals with angina should always carry their nitroglycerine with them while they exercise, and stop exercise immediately if they should develop anginal pain.
- When working with participants who have heart disease, it is important that you review your emergency procedures and the signs / symptoms of cardiovascular distress as a precautionary measure.

Primary Prevention

- Individuals who have one or more risk factors for heart disease, but do not have medically diagnosed CAD, are the target of primary prevention programs.
- A general physical activity or exercise program, emphasizing cardiovascular activity, can help to control risk factors (high blood pressure, obesity, and diabetes). Remember that medications to control high blood pressure also affect heart rate.
- Therefore, rating perceived exertion (RPE) should be used to monitor intensity.

Cerebrovascular Disease (Stroke)

- Cerebrovascular disease involves the arteries supplying blood, and therefore oxygen and nutrients, to the brain. There are two causes of a cerebrovascular accident or stroke:
  - The brain's blood supply is interrupted for a prolonged period of time.
  - There has been a loss of blood onto the brain's surface or deep within its tissue.

Secondary Prevention

- These programs target individuals with diagnosed heart disease. However, they may or may not have had a myocardial infarction.
- The aim of cardiac rehabilitation programs is to restore, maintain, and improve fitness levels of participants and identify safe exertional limits for general lifestyle and occupational activities. Risk factor modification is also a key aspect of these programs.
- Participants are given an exercise prescription based on the results of a medically supervised stress test. Classes are also physician-supervised and often include a weight-training component.

Cerebrovascular Disease (Stroke)

- In both situations, the disruption of the blood supply to the brain tissue starves neurons of oxygen and nutrients. The nerve cells are unable to communicate with the parts of the body they serve, which results in a temporary or permanent loss of function. Haemorrhage impairs normal functioning of the brain by compressing and irritating tissue. The severity of the stroke depends on the blood vessels affected and their location in the brain.

Terminology

- Ischemia - decreased supply of oxygenated blood marked by pain or temporary loss of function.
- Thrombus - atherosclerotic plaque narrows the blood vessel and may encourage the formation of a blood clot (thrombus) which blocks blood flow through the artery.

Terminology

- Transient Ischemic Attack (TIA) - blockage of an artery for only a few minutes causing temporary ischemia and a short period of neurological dysfunction. TIAs usually last only a few minutes and are called *mini-strokes*. They precede approximately 10% of strokes.
- Hemiplegia - paralysis of one side of the body.
- Hemiparesis - neurological impairment resulting in weakness.

Terminology

- Embolus - fragment of material, such as a piece of a thrombus, that has traveled through the bloodstream and becomes lodged in a cerebral artery.
- Aneurysm - weakness of the blood vessel wall which causes localized dilation of the wall. The weakness may be present from birth, but bursts due to prolonged hypertension. The survival rate is less than 5%.

CVA Risk Factors

- The risk factors for stroke are similar to coronary artery disease. They include:
  - Hypertension
  - High serum cholesterol
  - Atherosclerosis/heart disease
  - Diabetes
  - Obesity
  - Smoking
  - Age
  - Gender
  - Physical inactivity

CVA Risk Factors

- Age is the strongest primary risk factor for stroke. Over 2/3 of all strokes happen to individuals 65 years or older.
- This may be a result of the long-term effects of lifestyle factors or health conditions. A decrease of 2 mm Hg in diastolic blood pressure has been estimated to reduce the risk of stroke or TIA by 15%.

Determining Risk

- Further analysis may also be required. Tests to determine the number of cells in the blood can show how easily blood flows through the vessels. Clotting components such as fibrinogen and platelets are measured in addition to the amount of time it takes blood to clot.
- Your doctor may also want to perform a Doppler test. A microphone-like probe measures how well blood is flowing through the neck arteries. The vessels may be narrowed due to the build-up of atherosclerotic plaque, thus reducing blood flow to the brain. In some cases, a carotid endarectomy may be required to clear the artery (a surgical procedure that involves opening the artery and manually removing the plaque).

Determining Risk

- Knowing your own risk and making changes to reduce your risk can help prevent stroke in the future. Your physician has a number of ways to determine your risk and help you reduce it. She/he will evaluate your risk based on the factors listed plus your family history of stroke and heart disease.

Signs and Symptoms

- There are five common warning signs of stroke:
  1. Sudden weakness - also numbness or tingling in the face, arm, or leg, particularly on one side.
  2. Sudden trouble speaking - loss of speech, slurred speech (dysarthria), or trouble understanding speech.
  3. Sudden vision problems - loss of vision, particularly in one eye, or double vision (diplopia).
  4. Sudden severe headache.
  5. Sudden dizziness - loss of balance (ataxia) or fall.

Transient Ischemic Attacks (TIA)

- Also called mini-strokes, TIAs precede approximately 10% of strokes and cause the warning signs listed above. Ischemia typically lasts for 5 -10 minutes, with complete recovery of neurological function within 24 hours. TIAs can occur days, weeks, or months before a major stroke. The most common form of TIA affects the middle cerebral artery or the opthalmic artery. After a TIA, it's important to locate the vascular territory of the TIA, rule out other possible causes (e.g. minor haemorrhage or cerebral tumour), and/or identify and control risk factors. If the ischemia is prolonged or severe, a stroke may result.

Acute Treatment

- For ischemic strokes, a thrombolytic drug, called tPA, dissolves clots and restores blood flow to the brain.
- This drug may improve the outcome of some patients if given within three hours of the onset of the stroke.

Primary Prevention

- Primary Prevention
  - Lifestyle changes, including increased physical activity, are the first step in primary prevention and may substantially reduce the risk of stroke.
  - Medications may be prescribed for hypertension or hypercholesteremia.

Secondary Prevention

- Secondary Prevention.
  - Strokes are more common in stroke survivors than in the general public.
  - Lifestyle changes, such as quitting smoking, reducing dietary fat, and increasing physical activity, can help to manage the risk.
  - Anticoagulant drugs, or blood thinners, prevent blood clots from forming. Aspirin (ASA) is often prescribed for this reason, and reduces the chance of a stroke by approximately 25 to 30 per cent. However, it is only effective in people at risk of an ischemic stroke, and should not be taken by individuals at risk of a hemorrhagic stroke.
  - A blockage in the carotid artery may be removed surgically before it causes a second stroke. Surgeons can also "clip" a leaking aneurysm.

Effects of a Stroke

- As the body heals itself, new blood supply routes take over the work of those cut off during a stroke. Stroke results in the death of brain cells, which do not regenerate. Memory, language, or motor skills may be affected, depending on the location of the cells damaged. The brain can learn to compensate in many cases by identifying new or extending old neurological pathways. Rehabilitation encourages the relearning that must take place after a stroke.

Right-Brain Stroke

- Damage to the right side of the brain usually affects spatial and perceptual tasks, including the ability to judge distance, size, rate of movement, and how parts relate to a whole. Paralysis will affect the left side of the body. Survivors of a right-brain stroke can also be overconfident and use poor judgment. To help a right-brain stroke survivor learn, try giving detailed verbal and written instructions, and break the task down into clear steps. Always ask the person to demonstrate their abilities to do things on their own. Provide verbal encouragement.

Effects of a Stroke

- Many stroke survivors find learning or relearning daily tasks or activities extremely challenging.
- Stroke will affect the brain's ability to "hang on" to new information. Individuals should schedule learning for times when they are well-rested, learn in small, repetitive steps to "fix" the information in the brain, and take frequent breaks to avoid information overload or fatigue.

Left-Brain Stroke

- Stroke on the left side of the brain usually affects language abilities, possibly resulting in aphasia (inability to speak). These individuals can also be slow, cautious, and disorganized when approaching a new problem. Paralysis will occur on the right side of the body. Verbal or written instructions may be confusing. Demonstration may facilitate the learning of left-brain stroke survivors. A gesture for encouragement, such as a smile or pat on the back, may be better than words.

Spasticity

- This clinical phenomenon is defined as increased resistance to passive movement. It is also called hyper-reflexia, hypertonia, or clonus.
- Because of loss of brain control, stronger reflexes take over from weaker ones and produce spasticity patterns.
- Anti-gravity muscle groups are affected.
- This results in flexion of the joints of the upper extremity (fingers, wrist, and elbow), shoulder adduction, depression, and internal rotation, and forearm pronation.
- Hip adduction and external rotation, knee extension, and ankle inversion and plantar flexion describe the spasticity pattern of the lower extremity.

Assessment

- A physical assessment of a stroke survivor can:
  - Determine if abnormal muscle tone is present and where it is distributed in the body.
  - Determine abnormal movement patterns.
  - Identify any deficits in normal motor responses, including both automatic postural responses and movement patterns in the trunk and limbs.
  - Analyze his/her ability to perform functional movements.

Rehabilitation

- Rehabilitation should occur as soon as possible post-stroke. The main goals of rehabilitation are:
  - To prevent complications of prolonged inactivity such as deterioration of intellectual function, slowing of psychomotor processing, muscle atrophy and strength declines, and decreased range of motion.
  - To improve functional ability through training in specific daily living tasks, including mobility, locomotion, and self-care

Assessment

- The assessment of locomotor-related tasks is an important part of the functional assessment. The spectrum of locomotor-related tasks that could be assessed includes:
  - Gait speed over different distances (5m, 10m, and 30m)
  - Walking endurance by the 6-minute walk test (distance walked in six minutes)
  - Mobility and balance (timed up-and-go (TUG) test)
  - Stair test (TUG plus ascending and descending a flight of 14 stairs)
  - Step test (repeatedly stepping one foot on, then off, a block 7.5 cm high for 15 seconds)

Methods of Rehabilitation

- Bobath Therapy
  - This treatment involves the facilitation of movement on the hemiplegic (paralysed) side to achieve symmetry.
  - It assumes that abnormal postural reflex activity is the major cause of dysfunction. Thus, therapy consists of inhibiting spasticity and unwanted muscle activity and normalizing abnormal muscle tone.

Methods of Rehabilitation

- Task-Related Training
  - There must also be opportunity for intensive practice to develop skill in walking. Treadmill training, with a harness to provide partial body-weight support, has been found to be useful in improving gait after stroke. The overhead harness prevents collapse, reduces the muscle-force requirements, and decreases postural demands and anxiety which allows the individual to practice walking in the presence of muscle weakness and loss of coordinated movement. Eventually, the individual will practice walking over variant surfaces and obstacles, and up and down slopes, escalators and stairs.

Methods of Rehabilitation

- Task-Related Training
  - Rehabilitation aims to reduce disability after stroke. For example, independent walking may be the ultimate goal for many stroke survivors. Task-related training to improve walking involves strategies to increase strength, coordination, flexibility, and weight-bearing capacity of the affected lower limb. Stepping up and down off blocks forwards and sideways promotes the use of the affected limb to support, balance, and propel the body mass. Sit-to-stand from various chair heights is another functional strengthening exercise.