

TCHP

Education
Consortium

Cardiovascular Issues in ElderCare

Part of the

ElderCare: Healthcare for the Aging Series

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Introduction/Purpose Statement

Three billion, two hundred and eighteen million, nine hundred and eighty two thousand, two hundred and sixty four. That's how many times the average 85 year-old person's heart has beaten. No wonder the aged are more prone to cardiovascular disease! The purpose of this section of the "ElderCare" series is to review the typical changes of aging related to the cardiovascular system, and then detail some of the related problems that can plague the elderly person. We'll also spend some time on how management for the elderly person with cardiovascular disease may be different than a younger person.

Target Audience

This home study was designed for health care professionals with little to no familiarity with caring for elderly patients with cardiovascular problems.

Content Objectives

1. Review normal changes of aging in the cardiovascular system.
2. Describe "typical" pathologies of the elderly related to the heart and blood vessels.
3. Discuss how the assessment and management of diseases of the heart and blood vessels can be different in the elderly patient.

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Planning Committee

Linda Checky, BSN, RN, MBA, Assistant Program Manager for TCHP Education Consortium.

Lynn Duane, MSN, RN, Program Manager for TCHP Education Consortium.

Author

Karen Poor, RN, MN, Former Program Manager for the TCHP Education Consortium.

Content Experts

Cleo Bonham, MSN, RN, CCRN, Nursing Instructor at the Minneapolis VA Medical Center.

Susan Bot, BSN, RN, CRRN, Nursing Instructor in Extended Care and Rehabilitation at the Minneapolis VA Medical Center.

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For completing this **Home Study**, you are eligible to receive:

For completing this Home Study and evaluation , you are eligible to receive:	2.0 MN Board of Nursing contact hours / 1.66 ANCC contact hours <i>Criteria for successful completion:</i> You must read the home study packet, complete the post-test and evaluation and submit them to TCHP for processing. The Twin Cities Health Professionals Education Consortium is an approved provider of continuing nursing education by the Wisconsin Nurses Association, an accredited approver by the American Nurses Credentialing Center's Commission on Accreditation.
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Please see the last page of the packet before the post-test for information on submitting your post-test and evaluation for contact hours.

Read the items in this column for more information on terms, research studies, and references!

“Cardiac output” is the amount of blood ejected from the heart in one minute. It indicates how much blood is getting to the tissues and organs every minute.

Sahyoun, N.R., et. al., Trends in Causes of Death Among the Elderly. Aging Trends; No. 1, Hyattsville, MD; National Center for Health Statistics, 2001.

Arteriosclerosis refers to plaque build up in

Changes in the Heart and Blood Vessels in a Healthy Elder

No matter how healthy a person is, there are undeniable changes that occur over time in the heart and blood vessels.

The heart of the elderly person is able to maintain the same cardiac output as a younger person at rest, but it does it in a different way. The younger person will have second-by-second increases and decreases in the heart rate to maintain an adequate cardiac output. An older person’s heart cannot change its heart rate so easily, so will have beat-to-beat changes in the amount of blood it pumps out. The heart of the elder will dilate to accommodate more blood, causing the amount of blood ejected in each beat to increase at need.

This mechanism works the best at rest. During activity or exercise, the ability to maintain the cardiac output without problems depends on the oxygen supply to the heart. The harder the heart works, the more oxygen it uses. Many older people have a hard time exercising without becoming tired or having chest pain.

The blood vessels definitely change with aging. Over time, the ability of the blood vessels to stretch (elasticity) decreases. The aorta becomes “stiff”, and the blood vessels don’t relax during diastole. All of this adds up to tighter blood vessels. The decreased ability to stretch can lead to systolic hypertension. The inability to relax during diastole can lead to diastolic hypertension. The combination of decreased stretch and relaxation of the blood vessels leads to increased work of the heart, causing left ventricular hypertrophy (muscular enlargement).

Atherosclerosis in the Aging Population

Because we work in health care, we usually don’t see older patients with the “normal” changes of aging. We usually see patients with significant diseases of the heart and blood vessels. In fact, heart disease is the leading cause of death in people who are more than 65 years of age.

Atherosclerosis is the underlying problem of all heart and blood vessel problems.

In atherosclerosis, there is a gradual build up of plaque on the intimal wall of the artery caused by repeated injury, clotting, and scarring. Problems in the arterial system occur when the amount of plaque build up has grown to such an extent that blood is no longer able to pass easily, or at all, through the narrowed arterial

the arteries.

The Framingham study is the best known and largest study in the world to looking long-term at cardiac risk factors, morbidity, and mortality related to the heart.

diameter.

Atherosclerosis is probably caused by a combination of high cholesterol levels, high triglyceride levels, smoking, and genetics. According to the Framingham study, people who have cholesterol levels greater than 300 mg/dl have been shown to have five times the risk of a heart attack than those with cholesterol levels of less than 200 mg/dl. High triglyceride levels are also linked to atherosclerosis, but its role is unclear. Cigarette smoking causes damage to the lining of the arteries, which accelerates the development of plaque. Genetics also appears to have a role in atherosclerosis, primarily related to how much cholesterol the liver makes.

Other risk factors for atherosclerosis are:

- Lack of physical activity
- Obesity
- Diabetes
- Low levels of HDL cholesterol (good cholesterol)

Atherosclerosis, in combination with the normal changes of aging, can lead to many different pathologies in the elderly patient.

Diseases of the Heart and Blood Vessels

Hypertension

It is estimated that over 70% of older African Americans, 60% of Hispanic, and 60% of Caucasian Americans have hypertension. Having hypertension puts people at more risk for angina, myocardial infarction, stroke, and congestive heart failure. The American Heart Association defines hypertension as:

**Systolic blood pressure > 130 mm Hg or
Diastolic blood pressure > 90 mm Hg**

The right way to take a BP:

Have patient sit for > 5 minutes

No smoking or caffeine for 30 mins prior to BP

Use right cuff size

Consider "white coat hypertension" – where BP increases because of clinical setting. Take a second BP at the end

Isolated systolic hypertension (where the systolic BP is > 140, but the diastolic pressure is < 90) seems to be more prevalent in older people. The higher the number, the more risk there is to the person for complications.

Diagnosis of Hypertension in the Elderly Adult

Diagnosis of hypertension is usually made on serial blood pressure measurements. You should take blood pressures the right way (see left), and keep in mind the

of the exam to check.

Osler's maneuver:

Inflate BP cuff on arm until radial pulse is gone. Palpate the radial artery. If you feel it, the patient has abnormally stiff arterial walls.

possibility that in some elders, the arteries are not easily compressed. When the arteries are "stiff", a falsely high BP reading may be obtained. Double-check with an Osler's maneuver. If patients with this condition are treated for hypertension, they will have problems with inadequate blood pressure.

After confirmation of a hypertension diagnosis, patients are usually assessed for end-organ damage by obtaining:

- a 12-lead electrocardiogram
- a urinalysis
- blood chemistries: BUN, creatinine, potassium, sodium, glucose, cholesterol

Other systems, such as the brain, may be assessed per physician or nurse practitioner discretion.

Management of Hypertension

A study done in 1991 proved that managing hypertension significantly reduced coronary heart disease, congestive heart failure, cerebrovascular disease, and stroke.

The goal of treatment for managing hypertension in the elder is the same as for a younger person – BP of less than 120/80 mm Hg. Reducing the blood pressure in an elder should be a gradual process, and care should be taken to minimize the orthostatic effects of many drugs.

Treating hypertension usually is a multi-drug approach. Treatment is started with one drug, with more drugs being added until a therapeutic response is attained. The usual course of pharmacological management is:

1. Diuretic therapy – starting at low doses and going up

The following may be used as alternative or supplementary therapy:

1. Substances that will inhibit the angiotensin system:
 - ACE inhibitors, such as enalapril and lisinopril
 - Angiotensin II receptor antagonist, such as valsartan (Diovan), candesartan (Atacand), eprosartan (Teveten) or losartan (Cozaar)
2. Beta blockers may be indicated if the person has angina as well
3. Long acting calcium channel blockers

Management for the elder with hypertension will also include dietary modifications. The patient is encouraged to lose weight if overweight, limit sodium intake to 1000 mmol/day, maintain a potassium intake of 90 mmol/day,

SHEP Cooperative Research Group, (1991), Prevention of stroke by anti-hypertensive drug treatment in older persons with isolated systolic hypertension. Final results of the Systolic Hypertension in the Elderly Program (SHEP). JAMA; 265 (3255-64).

and ingest calcium and magnesium for general health.

Peripheral Vascular Disease

Claudication is the pain felt in the lower extremities during activity. The pain occurs in muscle groups, not joints, and can start in the calf and go up to the buttocks.

Peripheral vascular disease affects up to 22% of people aged 65 and older. Peripheral arterial disease (PAD) accounts for a large number of hospitalizations for acute and chronic arterial insufficiency requiring angioplasty, surgical revascularization, wound care, or amputation. Perhaps 60-80% of all patients with PAD have “stable” claudication, which means they don’t get worse over time.

The primary symptom of peripheral artery disease is pain. Pain occurs when the artery is 70-90% occluded and may be seen late in the progression of the disease. There are no initial symptoms during the build-up of atherosclerotic plaque, caused by hypertension, hypercholesterolemia, hyperlipidemia, and diabetes. The arterial narrowing will progress to the point where the patient has intermittent claudication. The next step is pain at rest, usually occurring several hours after the patient lays down. This pain, often accompanied by numbness in the toes and foot, is relieved by putting the leg down in a dependent position. At the end, the blood flow is diminished enough that it doesn’t supply enough oxygenated blood to tissues, causing ischemic ulcers and necrosis.

Other symptoms of PAD are:

- Shiny, tight, smooth skin over the lower extremities, toes, and feet
- Ridged toenails
- Slow or poor healing of skin wounds
- Diminished peripheral pulses

PAD is often diagnosed when the patient is being seen for another problem. Diagnostic procedures that may be done include the ankle-brachial index, arteriography, and duplex scanning.

The ankle-brachial index (ABI) is the ankle BP ÷ brachial BP.

Normal – 0.8-1.2

Impairments:

Mild – 0.6-0.8

Moderate – 0.4 – 0.6

Severe - < 0.4

Management of PAD

Atherosclerosis is the cause of peripheral artery disease, just as it is of coronary artery disease. Cardiovascular health can be maintained or improved by following the steps listed in the angina section.

Pharmacologic management is focused on controlling the hypertension, lipid, and cholesterol levels and on preventing clots from forming at tight junctions in the arteries. Antiplatelet drugs are most commonly used for the second purpose. Aspirin has typically been used for its anti-platelet activity. A newer drug, clopidogrel (Plavix) has been shown to have better results than aspirin and have fewer side effects. Cilostazol (Pletal) is also a newer drug that helps people with claudication to walk further with less pain. It inhibits platelet aggregation and causes vasodilatation.

Interventional radiology can be of enormous help in opening a nearly closed or closed artery. The three procedures done in radiology are:

- Angioplasty — a catheter with a long, slim balloon near the tip is placed through the area of blockage and is inflated to open the artery.
- Stents — the angioplasty catheter can carry a stent, which is a metal expandable mesh, to place into the occluded artery to keep it open.
- Thrombolytic therapy — as a temporary measure, drugs that will break open blood clots will be infused into the artery.

If the patient is a candidate for surgery, a bypass graft – making an alternate route for blood to travel – can be placed around the area of blockage. One of the most common procedures is the “fem-pop” bypass – inserting a graft above the clog in the femoral artery and attaching it to the popliteal artery (behind the knee). A shorter-term fix is the thrombectomy – surgically removing a thrombus that has formed in a narrow area of the artery.

Angina

Angina is usually the first symptom the elder has related to insufficient blood supply to the heart muscle. The heart requires arterial blood, complete with oxygen, like any other muscle or organ. There are three main arteries on the surface of the heart that split into smaller and smaller branches which dig into the muscle of the heart to provide it with oxygenated blood. When the larger arteries – the right coronary artery, the left anterior descending artery, and the circumflex artery – become clogged with plaque, a smaller amount of blood can get through to the muscle.

Stable angina is pain that occurs with exercise, emotional stress, cold/heat or heavy meals and disappears with rest.

Unstable angina is pain that occurs without an identifiable cause.

When the heart needs more oxygen than it is getting, the heart sends out a distress signal – pain. This pain is called “angina.” The heart doesn’t have any pain nerve fibers, so it is forced to send its distress signal to the spinal cord. The spinal cord processes the signal and sends it back to surrounding areas of the heart. This is why anginal pain can occur in the shoulders, neck, arms, sternum, and back. Angina may be a heavy pain, or may feel like a pressure, backache, or aching sensation. Not all people who have chest pain are having myocardial ischemia, and not all people having myocardial ischemia have angina.

Management of the Elder with Angina

Because most people with angina are elderly, the standard treatment plan is usually not modified. Angina can be medically managed, treated with interventional cardiology, or surgically managed.

Gibbons et al.,
ACC/AHA/ACP-ASIM
Guidelines For The
Management Of
Patients With Chronic
Stable Angina, ACC
Vol. 33, No. 7, June
1999:2092-197

Recommendations:

*Aspirin 75 – 325 mg
daily*

*Short acting NTG for
symptom relief*

*Longer acting nitrates
(isosorbide,
transdermal NTG) for
symptom control*

*Beta-blocker to
maintain heart rate
between 55-60 at rest*

*Consider calcium
channel blockers with
beta blockers*

Smoking cessation

*Give lipid lowering
drugs to keep
cholesterol < 300
mg/dL*

*Low cholesterol, low fat
diet*

*Good control of
diabetes*

*Education regarding
the A, B, C, D, E
recommendations*

*Assistance with
planning for exercise*

Medical management suggested by the committee for the American College of Cardiology, American Heart Association, and American College of Physicians-American Society of Internal Medicine (1999) is based on the ABCDE mnemonic:

A = Aspirin and Anti-Anginal therapy

B = Beta-blocker and Blood pressure

C = Cigarette smoking and Cholesterol

D = Diet and Diabetes

E = Education and Exercise

Aspirin has been found to decrease the risk of a cardiac event – a myocardial infarction. Other drugs, such as ticlopidine, clopidogrel, and dipyridamole, have been studied but have not been found to be as efficient as aspirin. Aspirin may cause bleeding from the GI tract, skin, and brain. Education should include monitoring for bleeding in the stool, caring for the skin, and symptoms of stroke.

Anti-anginal agents include the nitrates – nitroglycerin! Nitrates dilate large coronary arteries, which helps to improve coronary perfusion, and also dilate the peripheral veins, which decreases the amount of blood returning to the heart. When the heart doesn't have as much blood to pump, it doesn't have to work as hard, so angina should be relieved. Nitroglycerin may cause postural hypotension because of its venodilating effects. Older adults should be taught how to stand or sit from a lying position to avoid dizziness and falls.

Beta-blockers help to decrease the demands on the heart by not allowing faster heart rates, stronger contraction, or vasoconstriction that the sympathetic nervous system wants to stimulate. Contrary to popular belief, the heart rate can and does increase related to metabolic demand when a person is on beta blockers. The heart rate will not increase with stress, pain, anxiety, or hypovolemia, as all of these problems trigger the SNS. Teach the patient and/or significant other how to check for the heart rate. The physician should be called for a HR less than 50.

Blood pressure control is vital in decreasing the work of the heart. See more under the hypertension section...

Cigarette smoking should be discouraged as much as possible. Within a year of quitting, the risk of a heart attack is half of a current smoker, and over five years, the risk drops to the same as a non-smoker. Cholesterol is another modifiable risk factor. Lipid lowering drugs such as bile acid sequestrants (cholestyramine), niacin, or fibric acid derivatives (gemfibrozil or clofibrate), HMG-CoA reductase inhibitors (simvastatin) or rosuvastatin (Crestor) that reduce cholesterol to under 300 mg/dL are associated with a 30-35% reduction in major coronary events and mortality.

Diet is very important in maintaining heart health. Studies have shown that eating a diet low in cholesterol may actually reverse some of the atherosclerotic heart problems. Elders should be encouraged to eat low-cholesterol foods and to lose weight. Habits can be hard to break, and the elder may have problems with obtaining and preparing appropriate food, as well as ingesting and enjoying food. Diabetes should be monitored and treated appropriately. Out of control blood sugars lead to increased atherosclerosis.

Education and exercise are very important for every patient. While preparing to educate the elder, you should assess for any sensory deficits that would make it difficult for the elder to obtain or retain information, such as poor vision, poor hearing, etc... Avoid overloading the elder with loads of information; focus on small pieces of survival information at a time. It doesn't matter how old the individual is – aerobic exercise is beneficial for everyone! Consultation with an exercise specialist (physical therapists or exercise trainers) can be very helpful in developing an exercise program the patient can stick to.

Angioplasty, atherectomy, and stent placement are all procedures that take place in the cardiac catheterization lab.

Interventional cardiology is halfway in between medical and surgical management. The geriatric patient may have increased risk and severity of complications during and after any of the procedures. Complications range from reaction to the dye used in the angiogram to plaque rupture causing a heart attack to plaque embolization causing a stroke. After the procedure, the older adult will need to excrete the dye and medications used. Because the kidneys and liver work less efficiently, excretion may take longer than normal, and the kidneys may be further damaged during the process. Acetylcysteine (Mucomyst) will usually be given orally before and after the procedure for patients with diabetes or chronic renal insufficiency.

A coronary artery bypass (CAB) graft is the most common surgical procedure for angina. Valve replacement may be done with a CABG.

Finally, surgical interventions may be indicated to treat angina. Because the heart has diminished reserve with age and the extent of the atherosclerosis, heart surgery may be complicated by a longer heart-lung bypass time and more difficulty in removing from bypass. Older patients do not tolerate the “beating heart” type of surgery because of the decreased cardiac output.

After surgery, elderly patients tend to have more neurological events, dysrhythmias, pulmonary complications, and difficulty weaning from the ventilator.

Myocardial Infarction

Gregoratos, G. (2001), Clinical manifestations of acute myocardial infarction in older patients, *The American Journal of Geriatric Cardiology*, 10 (6).

The stereotypical chest pain that people think of related to a heart attack – sternal chest pain with radiation down the left arm – does not necessarily occur in the elder. Some elders have “silent” MI's, heart attacks that had no symptoms at all. Other elders present with some chest pain, but more significant shortness of breath and pulmonary edema. Still others may have neurological signs and symptoms, such as syncope, transient ischemic attack, confusion, weakness and

agitation. Occasionally, abdominal pain is the primary symptom of an elder with an MI.

Because of the differences in symptoms between younger and older adults, there is often a delay in the health care system. This may mean that the myocardial infarction has been completed and that the person is in congestive heart failure. A myocardial infarction may be misdiagnosed as GI distress, stroke, or degenerative joint disease when the elder does get to the health care system.

Management of the Elder with a Myocardial Infarction

Accurate diagnosis is the key to managing an elder who is experiencing, or has experienced, an MI. A 12-lead electrocardiogram should be performed; however, elders are more likely to have non-specific changes on their EKG than a younger person. Cardiac enzymes will be drawn per protocol, which will demonstrate the same results as a younger person. The typical size of an infarction in the elder, however, is smaller, so the elevation in cardiac enzymes will not be as large. Other tests that may be helpful in diagnosing an MI are:

- Exercise electrocardiography
- Myocardial perfusion imaging
- Stress echocardiology
- Coronary angiogram

Research indicates that certain elders are less likely to be studied with a coronary angiogram than others. A younger (between 65 and 74 years of age), non-black male is more likely to be taken to the cath lab for an angiogram. Discrepancies in angiogram and interventional cardiology criteria may delay appropriate treatment for the elderly patient.

Gatsonis, G.A., et. al. (1995). "Variations in the utilization of coronary angiography for elderly patents with an acute myocardial infarction." *Medical Care* 33(6).

Once the diagnosis of a heart attack is made, the elder should be treated in a similar manner to a younger person. Nitrates (nitroglycerin), aspirin, and beta blocking agents are standards for both groups of patients. ACE inhibitors are usually indicated if the patient is in heart failure.

Recent studies have indicated that, although the periprocedural complications are higher, elderly and very elderly patients do well with interventional cardiac procedures such as angioplasty and stenting.

Chauhan, M.S., et. al. (2001) Coronary stenting in the aged. *Journal of American College of Cardiology*, 37, 856-862

Finally, coronary artery bypass grafting (as discussed in the angina section) is possible to prevent or minimize a myocardial infarction. Elders who are at high risk for complications are those who are older than 65 years, who have diabetes, who have continued pain after the MI, who have peripheral vascular disease or cerebrovascular disease. People with heart failure and hypotension, as well as

Resch, D. & Alla, H. (2001), Diagnosis and management of myocardial ischemia (angina) in the elderly patient, American Journal of Geriatric Cardiology, 10(6).

those who indicate through EKG or lab tests that damage to the heart is continuing, are also a higher risk.

Congestive Heart Failure

One of the most common chronic diseases of age is congestive heart failure (CHF). CHF is when the heart – either the right, the left, or both sides – does not pump enough blood out to the tissues.

About 250,000 people die of heart failure each year – it's the number one cause of death in people over 65 years.

Causes of CHF

The most common cause of CHF is coronary artery disease that causes myocardial ischemia and infarction. Other causes include hypertension, diabetes, valve disease, chronic alcohol abuse, and thyroid problems.

Types of CHF

The first type of CHF is “systolic congestive heart failure.” This type of CHF results from the heart muscle pumping ineffectively. The major cause of this type of CHF is a heart attack. After the heart tissue dies in an MI, that piece of the heart is very “stretchy” or compliant. Extra volume will stretch that part of the heart out – and it won't contract back. Each time the heart beats, that area will bulge out. Within about seven days, ventricular remodeling starts. If part of the heart is still stretched out and bulging, the scar tissue will form around the bulge. This stretched out part of the heart will never contract well, so the heart won't be able to pump out its blood.

Ventricular remodeling is when scar tissue forms in and around the infarcted (dead) part of the heart.

The second type of CHF is known as “diastolic dysfunction.” During diastole, the ventricles are supposed to relax and stretch to allow blood to enter from the atria. When a person has diastolic dysfunction, the ventricles don't relax, or they don't stretch – so they can't take in a normal amount of blood from the atria with each heartbeat.

Systolic and diastolic dysfunction can occur in either or both ventricles.

Diagnosis and Classification

One of the symptoms of left-sided failure is shortness of breath with activity; however, some elders do not have shortness of breath because of their lack of activity. Other symptoms that elders typically exhibit are fatigue, difficulty sleeping at night because of orthopnea or nocturnal dyspnea, rapid heart beat, and cardiac cachexia.

Cardiac cachexia is an unintentional weight loss of more than 7.5% of normal weight within the past six months.

Symptoms of right-sided failure are from the back-up of blood in the venous system. The most common sign in the elder is swelling of the ankles (dependent edema). Another classic symptom is lack of appetite and food intake with an increase in weight.

One of the ways to classify the severity of CHF is to use the New York Heart Association system. This classification system is very helpful in determining the level of activity that is appropriate for the person.

- Class I: patients with no limitation of activities; they suffer no symptoms from ordinary activities.
- Class II: patients with slight, mild limitation of activity; they are comfortable with rest or with mild exertion.
- Class III: patients with marked limitation of activity; they are comfortable only at rest.
- Class IV: patients who should be at complete rest, confined to bed or chair; any physical activity brings on discomfort and symptoms occur at rest.

Diagnostic tests that are helpful in determining the extent of CHF in the elder are:

- Two dimensional echocardiogram – to determine if the problem is systolic or diastolic
- Chest film
- B-type natriuretic peptide – a substance secreted by the ventricles in response to hypertension, volume overload, and hyponatremia. It is a blood test that is elevated in people with CHF.

Management of CHF in the Aging Person

Prevention of ventricular remodeling is one piece of the puzzle in managing CHF. Beta blocking agents given routinely to MI and post-MI patients for 30 days or longer prevent ventricular remodeling. Beta blockers prevent the sympathetic nervous system from flogging the heart – making it beat faster and stronger. This helps to prevent the initial bulging and overstretching.

Beta blocking agents block the sympathetic nervous system from increasing the heart rate, contractility, and from constricting the blood vessels.

Once a person has CHF, there is a recommended routine of pharmacological management:

1. ACE inhibitors – research is showing that giving adequate doses of ACE inhibitors to people with left ventricular systolic failure is very helpful. Older people may have a significant drop in BP with the first dose of the drug.
2. Beta blocking agents – Carvedilol may be useful in NYHA classes II-III patients who have been stabilized on diuretics, ACE inhibitors, and digoxin. Beta blockers are contraindicated for NYHA Class IV because the decreased heart rate may cause decreased cardiac output. This has detrimental effects for those with severe CHF.

ACE (angiotensin converting enzyme) inhibitors prevent the angiotensin – a potent vasoconstrictor – from acting.

3. Diuretics – furosemide or bumetanide are used in systolic dysfunction to decrease the volume going into the heart. Diuretics can lead to volume depletion and hypokalemia in the elderly quickly, so monitoring postural blood pressures, BUN and creatinine, and potassium are very important.

Be aware that many older people either adjust the time they take diuretics, or don't take them altogether, because of either diuretic-related incontinence or social activities.

4. Nitroglycerin may be helpful in diastolic and systolic dysfunction. Vasodilation of the coronary arteries may help ischemia related lack of compliance (diastolic), and dilation of the veins will help “unload” the heart (systolic).
5. Digoxin was the first drug used to treat CHF, and continues to be on the list. A recent study showed that while people on digoxin had the same mortality as those who were not, they were admitted to the hospital less frequently.

The effect of digoxin on mortality and morbidity in patients with heart failure. The Digitalis Investigation Group. N Engl J Med 1997; 336.

"Cardiac Resynchronization in Chronic Heart Failure." Abraham, W., M.D., et al. for the MIRACLE study group. New England Journal of Medicine, June 13, 2002

Another therapy is to pace both ventricles on the heart in a system called “cardiac resynchronization therapy” (Medtronic) or bi-ventricular pacing. By pacing the ventricles to contract at the same time, the amount of blood ejected from the heart's two lower chambers is increased.

Cardiac Dysrhythmias

We know that the aging heart has an electrical system that is slower to trigger an impulse, even with exercise. We also know that cardiac tachydysrhythmias are very common among the elderly. The drugs and interventions used to treat cardiac dysrhythmias in the elderly are the same as those used to treat younger patients; however, there are special considerations for the elderly.

Tachydysrhythmias are heart rates that are fast and either coming from the sinus node (sinus tachycardia), the atria (atrial fibrillation, atrial flutter, SVT), or the ventricles (ventricular tachycardia).

Pharmacological Issues for the Elder

As people age, there are changes in the skin, GI system, liver, and kidney which affect how drugs are absorbed, utilized, and excreted. Here's a list of what some of those changes are:

- Altered absorption of weak acid drugs (e.g. ASA) because of changes in the pH of the GI system
- Decreased absorption of drug into the bloodstream with a subcutaneous application/injection
- Delayed onset of action with IM injections
- Increased absorption of lipid-soluble drugs into the fat, which leads to decreased effect of the drug and increased accumulation of the drug
- Increased concentration of water-soluble drugs because of the decrease in body water

- Decreased proteins lead to increased circulation of “free” drug
- Liver changes cause decreased metabolism, increased half-life, and increased risk of drug toxicity
- Kidney changes lead to decreased excretion and increased drug accumulation

Whew! That’s a whole bunch of info! What it boils down to is this... The geriatric patient, particularly one over the age of 85, absorbs drugs in a different way than a younger person – that absorption may be slower or faster. Once the drugs are in the system, they tend to stay there, circulate, and be active for longer than a younger person. Finally, metabolism and excretion are delayed, leading to a build-up of the drug in the body.

The Rule of Thumb with Elders: Start Low and Go Slow!

The following antidysrhythmic drugs are metabolized by the liver – quinidine, lidocaine, amiodarone, ibutilide, diltiazem, verapamil. Procainamide, flecainide, and digoxin are all metabolized by the kidney. The geriatric patient should be screened for liver or kidney failure before being started on any of these drugs and should be monitored frequently, both to detect if there is further damage and to determine if the dosage of the drugs given should be altered.

Electrical Therapy and the Aged Patient

It is estimated that more than 70% of all permanent pacemakers are in people who are over 70 years. Permanent pacemakers are placed for bradycardias to increase the heart rate so that it can meet the demands of the body. Examples of rhythms which would warrant a pacemaker are second degree AV block, type II; complete heart block; and sick sinus syndrome. Elders with atrial fibrillation or atrial flutter and a slow ventricular heart rate may also need a pacemaker.

Bradycardias are rhythms that are slow – they are treated if the patient is symptomatic.

When a patient is very symptomatic with a fast rhythm, cardioversion or defibrillation may be needed. People with heart rates over 100 – 150 beats/min who are symptomatic, but have a pulse, would be treated with synchronized cardioversion. People who are in ventricular tachycardia or fibrillation without a pulse need defibrillation. Some people have cardioverter/defibrillators (ICD’s) implanted in their chests to deliver a shock when the person goes into an abnormally fast rhythm.

Management of Atrial Fibrillation and Atrial Flutter

Many elderly people develop atrial fibrillation or flutter as a result of coronary artery disease, heart attack, lung disease, or thyroid problems. These two rhythms

Aronow WS.
Management of atrial
fibrillation, ventricular
arrhythmias and
pacemakers in older
persons. Management
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atrial fibrillation. J Am
Geriatr Soc June
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are especially important to treat in the older adult.

When an individual “goes into” a-fib or a-flutter, the heart rate is typically very fast. Treatment is two pronged – slow the ventricular heart rate and convert the rhythm back to normal. Medications that will slow the heart rate include the beta blocking agents, calcium channel blockers (used with caution), and digoxin. Medications that will convert the rhythm include procainamide and amiodarone. If the patient is very symptomatic, synchronized cardioversion will be attempted.

Many elders have long-term atrial fib or flutter. These folks are treated with drugs to keep their heart rate in a normal – 60-80 beats/min - range and with warfarin (Coumadin) to prevent clots from forming and embolizing to the brain, lung, or visceral system.

Pulmonary Embolism

One of the complications of atrial fibrillation and atrial flutter is a pulmonary embolism. Pulmonary emboli can also be caused by other things that the elder faces: bed rest, inactivity, obesity, heart failure, malignancy, hip fracture, estrogen use, smoking, increased coagulation and products of fibrinolysis.

A pulmonary embolism is where a clot from somewhere in the venous system is dislodged and gets stuck in one of the blood vessels in the lung. Areas distal to the embolus don't receive any blood supply and can't contribute to gas exchange. Large emboli can cause the pressure to increase in the pulmonary artery, which can lead to right heart failure.

Fewer than 20% of elderly patients have the “classic” signs of a pulmonary embolism: dyspnea, chest pain, and hemoptysis. The most common symptoms are tachypnea with shortness of breath, pleuritic chest pain, anxiety, leg pain, and syncope. Right heart failure is more common in the elderly person with a pulmonary embolism than a younger one, so assessment for elevated right atrial pressure (RAP), jugular venous distention, and peripheral edema are important.

On assessment, the patient is tachycardic, tachypneic, and may have a fever, leg pain, cyanosis, and pleural friction rub. Only one third of elderly patients have clinical signs of leg thrombosis (leg swelling, tenderness, increased warmth, Homan's sign). Hypotension is an ominous sign that indicates a large pulmonary embolism that has caused the right heart, and subsequently the left heart, to fail.

Diagnostic tests and interventions are the same for both younger and older adults.

Summary

Elderly people are not “just like” all other adults – they must have special health care considerations because of the normal physiologic changes of aging, and the typical disease processes of age. We hope that you have a more clear understanding of the diseases and interventions related to the elderly patient!

Recommended Reading

1. American Nurses Association. [*Scope and Standards of Gerontological Nursing Practice*](#), 2nd ed. Washington, DC: ANA, 2001.
2. Ebersole P, Hess P. *Geriatric Nursing & Healthy Aging*. St. Louis: Mosby, 2001.
3. Eliopoulos C. *Manual of Gerontologic Nursing*, 5th ed. Philadelphia: Lippincott, 2001.
4. Fulmer T, Foreman MD, Walker M, eds. *Critical Care Nursing of the Elderly*, 2nd ed. New York: Springer Publishing Co.; 2001.
5. Hogstel MO, Zembruski CD, Wallace M. *Gerontology: Nursing: Care of the Older Adult*. Albany NY: Delmar, 2001.
6. Lueckenotte A. [*Gerontologic Nursing*](#), 2nd ed. St. Louis: Mosby, 2000.
7. Maas ML, Buckwalter KC, Hardy MA et al. (eds.). *Nursing Care of Older Adults: Diagnosis, Outcomes, and Interventions*. St. Louis: Mosby, 2001.

Directions for Submitting Your Post Test for Contact Hours

To obtain a certificate of completion for this home study program, please complete the post-test and evaluation on the next few pages. If you are completing this home study as pre-reading for a TCHP class, please bring your post-test and evaluation to class with you for processing. The date on your certificate of completion will be the date that your home study is received. **Any materials received with a postmark after the expiration will be discarded.**

HealthEast, HCMC, & MVAMC Employees

If you are an employee of HealthEast, HCMC, or MVAMC, you may send the post-test and evaluation to TCHP for processing. Your post-test will be returned to you through your hospital. It cannot be mailed to your home.

Paid Participants

If you are not an employee of one of the TCHP hospitals, please send the post-test and evaluation to TCHP with a check for \$12.00. Please make check payable to **TCHP Education Consortium** and mail to:

**TCHP Education Consortium
Capitol Office Building
525 Park Street, Suite 120
St. Paul, MN 55103**

Your post-test will be returned to you with the certificate of completion.

Cardiovascular Issues in ElderCare Post-Test

Please print all information clearly and sign the verification statement:

Name _____
(please print legal name above)

Birth date (required)

Format: 01/03/1999

M	M	D	D	Y	Y	Y	Y

For HealthEast, HCMC, or MVAMC, employees only:

Hospital _____ Unit _____

Personal verification of successful completion of this educational activity (required):

I verify that I have read this home study and have completed the post-test and evaluation.

Signature

- 1) Does the heart of the elder easily speed up to maintain the cardiac output?
 - a) No, not as easily as in a younger person
 - b) Yes, this does not change with age

- 2) Which of the following blood pressures would be considered hypertensive?
 - a) 139/89 mm Hg
 - b) 155/94 mm Hg
 - c) 109/60 mm Hg
 - d) 76/20 mm Hg

- 3) Symptoms of PAD include:
 - a) Pain
 - b) Slow or poor wound healing

- c) Diminished peripheral pulses
 - d) All of the above
- 4) Treatment recommendations for angina may include all of the following EXCEPT:
 - a) Aspirin and anti-anginals
 - b) Beta blocking agents
 - c) Cessation of all exercise
 - d) Cholesterol control

 - 5) What complications of interventional cardiology may the older patient be susceptible to?
 - a) Stroke
 - b) Dysrhythmias
 - c) Renal failure
 - d) All of the above

 - 6) Symptoms of a heart attack in the elderly may not be the typical sternal chest pain accompanied by left arm radiation.
 - a) True
 - b) False

 - 7) Drugs that may be helpful in managing the patient with CHF include:
 - a) ACE inhibitors
 - b) Diuretics
 - c) Nitrates
 - d) All of the above

 - 8) Kidney and liver functions are considerations when administering medications for dysrhythmias to an older patient.
 - a) True
 - b) False

Expiration date: The last day that post tests will be accepted for this edition is **December 31, 2017**—your envelope must be postmarked on or before that day.

Evaluation: Cardiovascular Issues in ElderCare

Please complete the evaluation form below by placing an “X” in the box that best fits your evaluation of this educational activity. Completion of this form is required to successfully complete the activity and be awarded contact hours.

At the end of this home study program, I am able to:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Review normal changes of aging in the cardiovascular system.					
2. Describe “typical” pathologies of the elderly related to the heart and blood vessels.					
3. Discuss how the assessment and management of diseases of the heart and blood vessels can be different in the elderly patient.					
4. The teaching / learning resources were effective. <i>If not, please comment:</i>					

The following were disclosed in writing prior to, or at the start of, this educational activity (please refer to the first 2 pages of the booklet).		
	Yes	No
5. Notice of requirements for successful completion, including purpose and objectives		
6. Conflict of interest		
7. Disclosure of relevant financial relationships and mechanism to identify and resolve conflicts of interest		
8. Sponsorship or commercial support		
9. Non-endorsement of products		
10. Off-label use		
11. Expiration Date for Awarding Contact Hours		
12. Did you, as a participant, notice any bias in this educational activity that was not previously disclosed? <i>If yes, please describe the nature of the bias:</i>		

13. How long did it take you to read this home study and complete the post test and evaluation:

_____ hours and _____ minutes.

14. Did you feel that the number of contact hours offered for this educational activity was appropriate for the amount of time you spent on it?

___ Yes

___ No, more contact hours should have been offered

___ No, fewer contact hours should have been offered

Expiration date: December 31, 2017