Visualizing and Predicting Heart Diseases with an InteractiveDash Board

VISUALIZATION

Team ID: PNT2022TMID02974

Average Age For Different Chest Pain Types

Different Kinds of Chest Pain and What Causes It:

Having a sudden chest pain is terrifying to most people. If you ask many people what they associate with the words chest pain, chances are their thoughts will jump directly to heart attacks. While chest pain can be caused by a heart attack, there are also other possibilities, many unrelated to your heart altogether.

Don't Ignore It!

Chest pain is not something to ignore, and you should always seek out the advice of a physician to rule out any cardiac or life-threatening causes for the pain. Problems in your lungs, muscles, ribs, gastrointestinal tract, or nerves can also cause chest pain. Some of these are life threatening, and some are simply uncomfortable but benign. The different causes of chest pain present with different symptoms.

Types of Pain:

Your pain can be sharp, dull, burning, stabbing, tight, or aching depending on the cause. When speaking to your physician, it is imperative that you try to describe your pain to help them diagnose the cause. Let’s explore some different types of chest pain and the part ofthe body involved. We will discuss the symptoms, causes, treatment and prevention for each category. As always, this is meant to serve as a guide, and is not a substitute for seeking professional medical advice.

Heart

Coronary Artery Diseases (CAD)

Coronary artery disease is caused by damaged or diseased blood vessels that supply the heart with blood and oxygen. Deposits of cholesterol, or plaque in your arteries, is usually the main cause of coronary artery disease. When the artery becomes either mostly or completely blocked by plaque or cholesterol, it deprives the heart muscle of oxygen, this results in a heart attack.

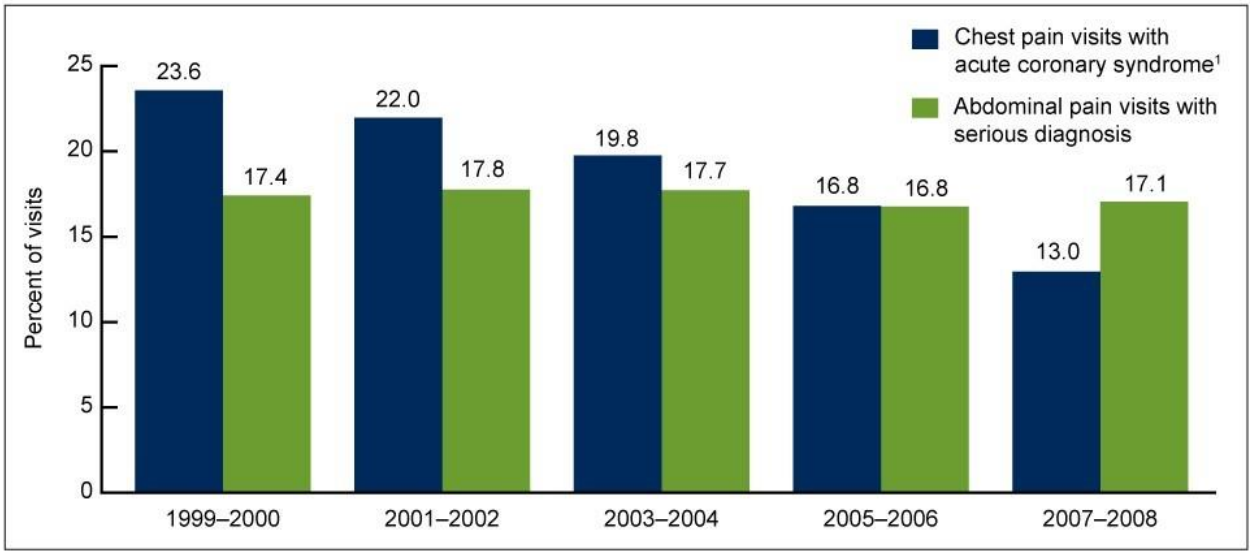
The chest pain you feel with CAD compares to someone sitting on your chest. Your chest feels tight and like it's under pressure. The pain may wax and wane, and may be exacerbated by exercise. Due to the blockages in your arteries, you may feel short of breath as your heart can't receive and pump enough oxygen to keep your lungs working properly. Along with the shortness of breath, you may also feel extremely fatigued and tired. If you suspect a heart attack or have a family history of heart disease, call 911 or get to your doctor as soon as possible if you suffer any of the above symptoms.

The best way to prevent CAD is to eat a healthy diet and exercise regularly, and absolutely **DO NOT SMOKE** tobacco products.Knowing your family health history is also critical because some families are genetically prone to heart disease. If you have a family member that had a heart attack, high cholesterol, or other heart problemsat a young age you may also be pre-disposed to those conditions.

Talk to your doctor about your risks and ask if there are any tests or blood work that you need to ensure you do not have CAD.

If CAD is caught in the early stages your doctor will prescribe medications to lower your cholesterol. They will also start you on an exercise program. This will lower your cholesterol and blood pressure if that also happens to be an issue.

Figure 5. Chest pain- and abdominal pain-related emergency department visits for persons aged 18 years and over with a serious diagnosis: United States, 1999–2008



[1]Trend is significant ($p < 0.05$).
NOTES: Figures are based on 2-year averages. Serious diagnosis is defined by the *International Classification of Diseases, Ninth Revision, Clinical Modification* codes. Serious abdominal diagnoses are defined as codes 540, 541, 560.8, 560.9, 574, 575.0, 575.1, 575.2, 575.4, 577.0, 578.9, 590.80, 590.81, 592.0, 592.1, 633.1, 633.8, 633.9, or 788.0. Acute coronary syndrome is defined as codes 410–414.
SOURCE: CDC/NCHS, National Hospital Ambulatory Medical Care Survey, 1999–2008.

Average Age For Different Types Of Chest Pain In Existing Heart Diseases

What could cause chest pain?

Although chest pain can sometimes be a symptom of a heart problem, there are many other possible causes. While some of these are serious conditions, most are not harmful.

Chest pain is the second biggest cause of emergency room (ER) visits in the United States, leading to over 8 million Trusted Source ER visits every year. Worldwide, chest pain affects 20–40% of the general population.

Various heart problems can cause pain in the chest.

1. Heart attack

Chest pain is one of the five Trusted Source main symptoms of a heart attack. The others are:

- pain in the jaw, neck or back
- lightheadedness or weakness
- pain in the arms or shoulders
- shortness of breath

Females particularly may also experience sudden tiredness, nausea, or vomiting.

If someone thinks they are having a heart attack, they should seek emergency medical help. The quicker a person can get to ER, the quicker treatment can begin.

Getting prompt treatment increases a person's chances of survival and potentially reduces the severity of the damage to the heart.

How do you recognize the signs of a heart attack?

2. Myocarditis

Myocarditis is when the heart becomes inflamed, resulting in symptoms that are similar to a heart attack, such as:

- chest pain
- shortness of breath
- fast or irregular heartbeat

Myocarditis usually results from a viral infection, according to the Centers for Disease Control and Prevention (CDC)Trusted Source.

What is an inflamed heart?

3. Angina

Angina feels like a squeezing pain or pressure on the chest.
It occurs Trusted Source when not enough blood is getting to the heart. A person may also feel pain in the:

- shoulder
- back
- neck
- arms

- jaw

Angina can feel like indigestion.

It is a symptom of coronary artery disease.

4. Aortic aneurism and dissection

Aortic dissection is a tear or separation of the inner layers of the aorta, the main artery that leads from the heart. This can lead to a buildup of blood in the artery.

An aortic aneurysm refers to an enlargement in the aorta.
Both conditions Trusted Source can cause the aorta to rupture or burst.

Aortic dissection and a severe aortic aneurysm are emergencies and require immediate medical help.

A stable aortic aneurysm may not need emergency treatment.

5. Coronary artery dissection

Coronary artery dissection is when tearing occurs in the coronary artery wall. If the innermost layer tears, blood can seep through and build up, causing a bulge. It can lead to a heart attack.

Sudden intense pain that appears to “tear” across the chest, neck, back, or abdomen can be a symptom of coronary artery dissection.

This is a rare but serious condition. The American Heart Association (AHA)Trusted Source notes that experts do not know exactly why it happens, but it can affect people without the usual risk factors for heart disease.

6. Pericarditis

Pericarditis is inflammation of the sac around the heart.

It can result Trusted Source in:

- severe chest pain behind the breast bone
- a buildup of fluid around the heart
- cardiac tamponade, when fluid presses on the heart
- obstructive shock, when the heart cannot fill Trusted Source withblood effectively.

Pain may be worse when a person breathes in or is lying down but improves when they sit up or lean forward.

It usually results from a viral infection, but there are many other possible causes.

7. Mitral valve prolapse

A mitral valve prolapse is when a valve in the heart is unable to close fully. In mild cases, this condition may have no obvious symptoms.
If symptoms occur, they include Trusted Sources are rapid heartbeat, chest discomfort, fatigue.

Average Exercise Angina During Chest Pain

What Causes Angina?

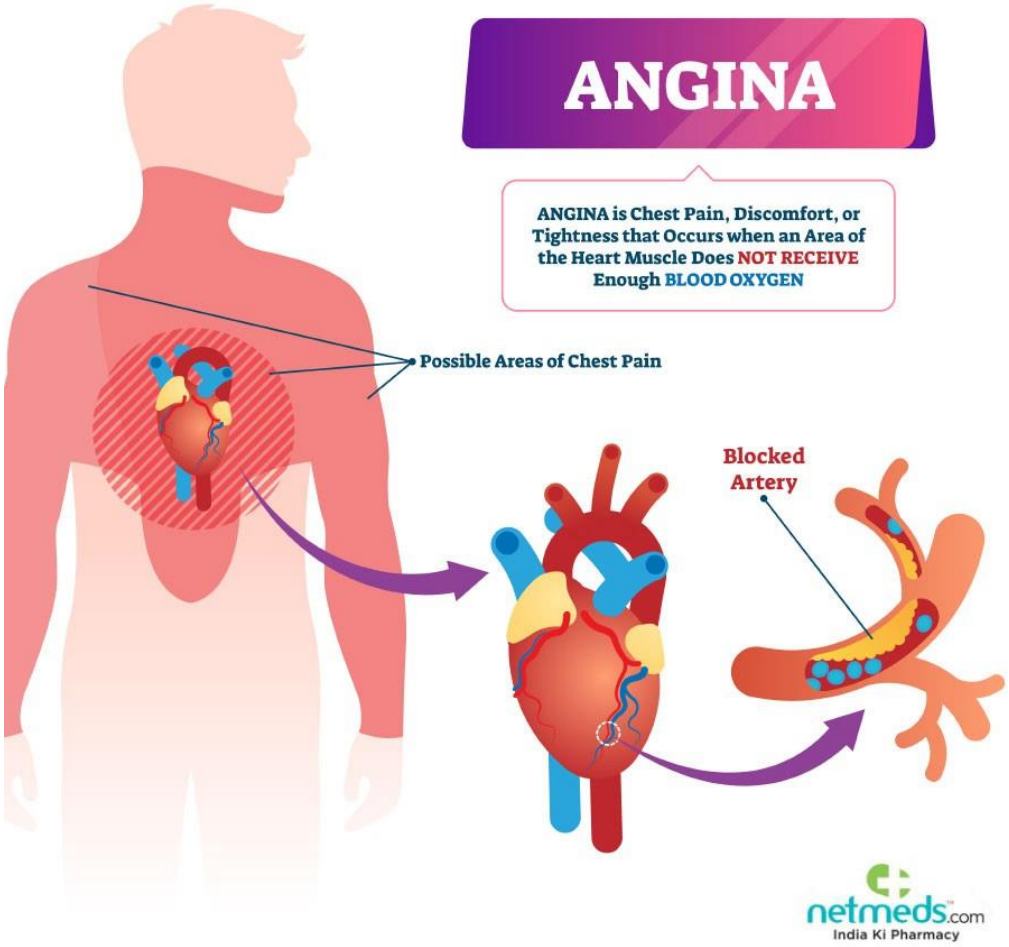
The heart is a muscle that must receive oxygen all the time. Angina means that the heart muscle starts to hurt from not receiving all of the oxygen that it needs. The most common type of angina is called ***stable angina***. Stable angina means that you develop chest pain when you exercise and the pain goes away soon after you stop. While at rest, narrowed arteries leading to the heart can supply enough blood flow to the heart, but during exercise, the heart muscle does not get all of the extra oxygen it needs. When the blood flow through the narrowed arteries does not supply enough oxygen to the heart muscle, it hurts.

Exercising in cold weather can cause chest pain in some people who have no problems when they exercise in warm weather. When cold windblows on your face, your heart rate slows down. This decreases the blood flow to the heart and can cause pain in people with blockedcoronary arteries. See my report on cold weather exercise (below).

Unstable angina means that you get heart pain even when you are not exercising or excited. Unstable angina is far more serious than stable angina, and puts you at greater risk for a heart attack.

What Causes Narrowing of Arteries Leading to the Heart?

When you are born the inner linings of your arteries are completely clean. Gradually over time, plaques develop and narrow the channels through which blood flows. The most common cause of plaques isinflammation, where your own immunity punches holes in the inner linings of arteries. The holes bleed, clot and then start to heal. With healing, a plaque forms and covers the inner lining of the artery. Anything that turns on your immunity and keeps it on can cause plaques. This includes chronic infections and diseases of inflammation, an unhealthful diet, being overweight, not exercising or vitamin Ddeficiency.



What Causes a Heart Attack?

Heart attacks are not caused by narrowed arteries. They are caused by a sudden breaking off of a plaque from the inner lining of an arteryleading to the heart. After the plaque breaks off, the area bleeds and clots. Then the clot extends to block the flow of blood to the heart muscle. If the blood flow is completely blocked the heart muscle willdie.

If You Have Chest Pain If your doctor thinks that you have unstable angina (chest pain when youare not exercising), a heart attack or heart pain other than stable angina, he may hospitalize you. If he thinks that you have stable angina, he may order the following tests:

- EKG (Electrocardiogram that measures the electrical activity of your heart)
- Stress Test (an EKG in which you exercise to make your heart work hard and beat fast)
- Chest X Ray (pictures of your heart, lungs, and blood vessels)
- Coronary Angiography (injecting dyes into your bloodstream to see if the arteries leading to your heart are narrowed or blocked)
- Cardiac Catheterization (a thin, flexible catheter is put into a blood vessel in your arm, groin, or neck and is threaded into your coronary arteries)
- Blood Tests (cholesterol, triglycerides, sugar, CRP, proteins in your blood and so forth)

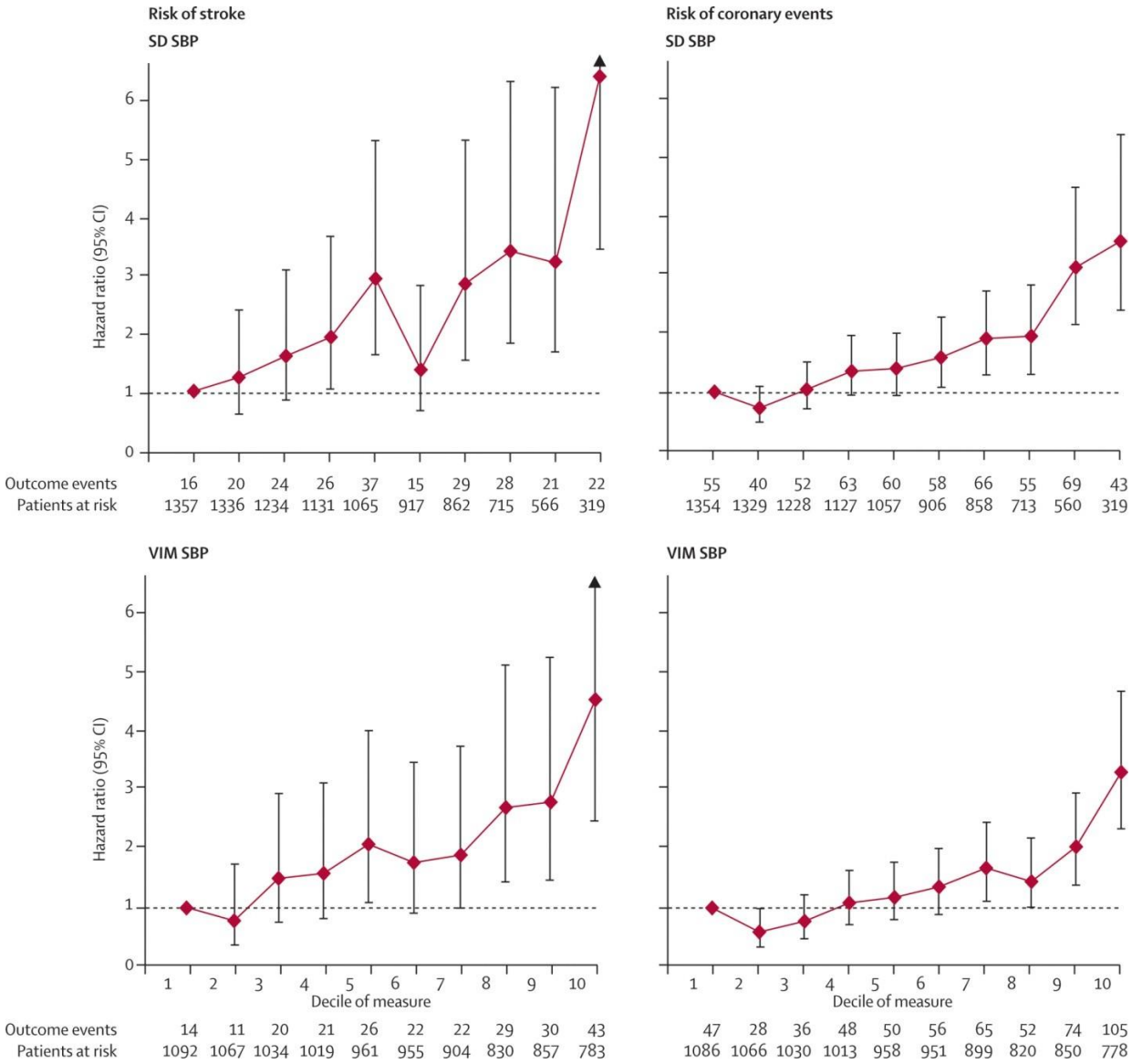
BP Variation with Respect To Age

Blood pressure variability has been considered a physiological marker of autonomic nervous system control, with short- and long-term fluctuations from intricate interactions among behavioral, environmental, neural central or reflex influences, along with other potential contributing factors.

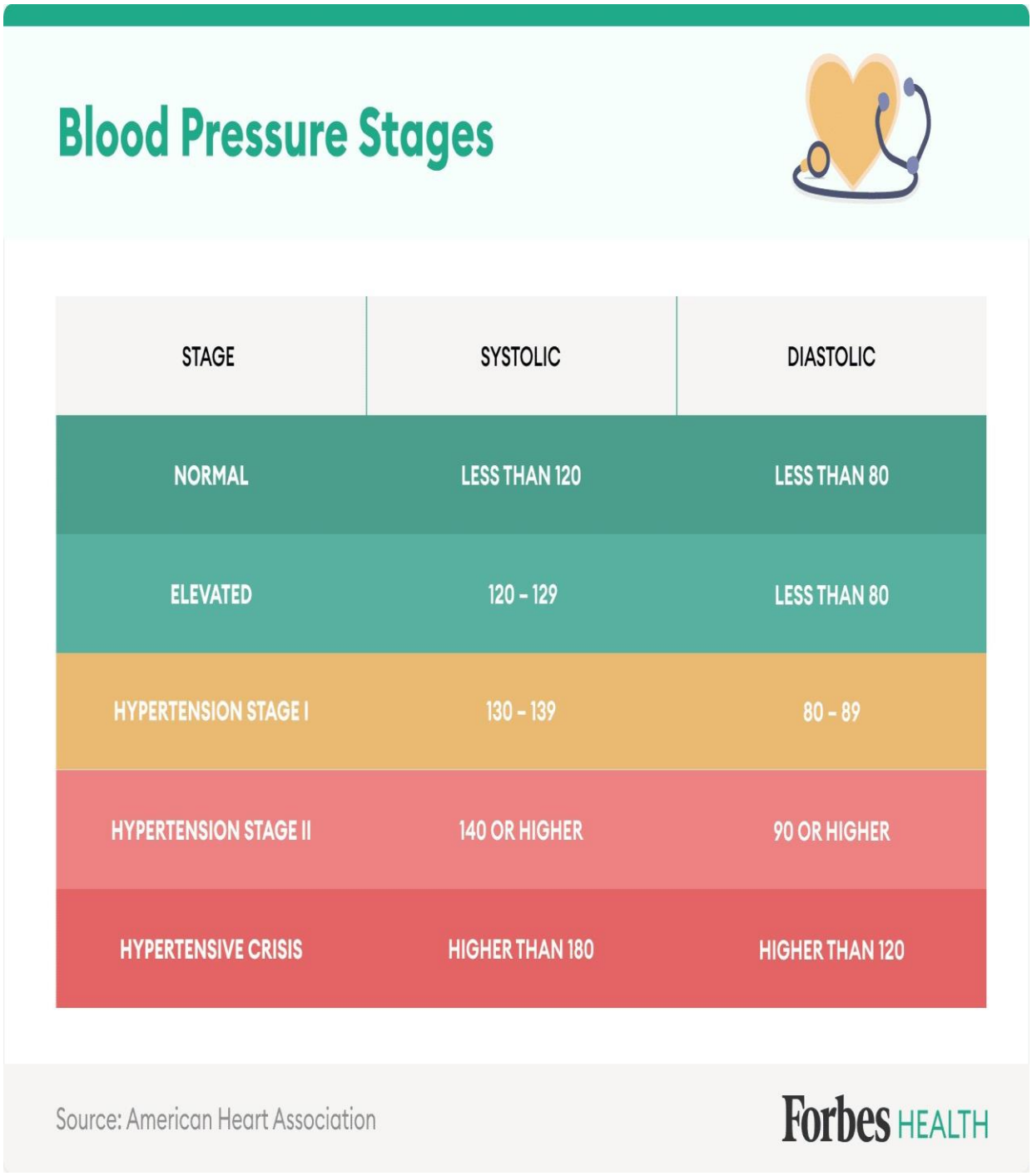
Current indexes of blood pressure variability raise methodological issues related to their poor reproducibility, their interdependence, and their association with the level of blood pressure. Besides methodological problems, the prognostic significance of blood pressure variability remains controversial. Some studies reported association of end-organ damage (Paratiet al., 1987a; Tatasciore et al., 2007; Matsui et al., 2011), cardiovascular events (Kikuya et al., 2000; Rothwell et al., 2010a,b; Rothwell, 2010; Webb et al., 2010; Johansson et al., 2012; Shimbo et al., 2012), or mortality (Muntner et al., 2011) with blood pressure variability, whereas others failed to find any association or found variability to be inferior to the level of blood pressure (Pierdomenico et al., 2006; Hansen et al., 2010; Schutte et al., 2012).This review addressed to what extent blood pressure.

Increased BP variability causes target organ damage, e.g., endothelial dysfunction, vascular and cardiac hypertrophy, disease and cerebral. and different BP variabilities, both occurring in ASCOT, are obviously difficult to dissociate, even with complex statistical adjustments, a lower BP variability may be an additional property of CCBs contributing to their established effectiveness in preventing CV outcomes. Analyses of individual data from trials comparing CCBs with placebo and other agents are desirable

Central command continuously modulates the baroreflex- and chemoreflex-mediated cardiovascular and autonomic functions.[33,34] This modulation is important for BP variability during sleep and daytime activities. Several cortical and subcortical brain sites have direct neural projections to the autonomic centers located in the brainstem and modulate their functions.



Dashboard Showing Different Types of Visuals



Normal Blood Pressure

People with a blood pressure range of 90 to 120 systolic and 60 to 80 diastolic have normal blood pressure, says Dr. Wong. A systolic reading below 90 signifies low blood pressure.

Elevated Blood Pressure

A blood pressure reading of 120 to 129 systolic and less than 80 diastolic signifies elevated blood pressure and, thus, a higher probability of developing hypertension.

“As blood pressure elevates, there is increased workload on the heart and arteries,” says Dr. Desai. “This results in [the] thickening of theheart muscle (hypertrophy), which can lead to heart failure. It alsoresults in [the] micro-tearing of the artery wall, leading to cholesterol deposition (atherosclerosis). This leads to [the] narrowing of the vessel and further elevation of blood pressure.”

Hypertension Stage I

Hypertension Stage I is defined by a systolic reading of 130 to 139 and a diastolic reading of 80 to 89.

Dr. Wong says while doctors initially treat this stage of hypertension by suggesting a healthier lifestyle—eating more vegetables and whole grains, using less salt, increasing physical activity and controlling stress—medications may be needed if blood pressure falls in this range on multiple readings over a period of time in people with other cardiovascular risk factors.

Dr. Wong adds that, per 2017 ACC/AHA guidelines, adults with Hypertension Stage I should consider medication after three to six months of nonpharmacologic therapy. There’s also a risk of

atherosclerosis—thickening or hardening of the arteries caused by a buildup of plaque in the inner lining of an artery—if it isn't treated. Risk factors for atherosclerosis may include high cholesterol and triglyceride levels, high blood pressure, smoking, diabetes, obesity, physical activity and eating saturated fats.

1. **Age**: Age of subject
2. **Sex**: Gender of subject:0 = female 1 = male
3. **Chest-pain type**: Type of chest-pain experienced by the individual:
   1 = typical angina
   2 = atypical angina
   3 = non-angina pain
   4 = asymptomatic angina
4. **Resting Blood Pressure**: Resting blood pressure in mm Hg
5. **Serum Cholesterol**: Serum cholesterol in mg/dl
6. **Fasting Blood Sugar**: Fasting blood sugar level relative to 120 mg/dl: 0 = fasting blood sugar <= 120 mg/dl
   1 = fasting blood sugar > 120 mg/dl
7. **Resting ECG**: Resting electrocardiographic results
   0 = normal
   1 = ST-T wave abnormality
   2 = left ventricle hyperthrophy
8. **Max Heart Rate Achieved**: Max heart rate of subject

9. **Exercise Induced Angina**:0 = no 1 = yes

10. **ST Depression Induced by Exercise Relative to Rest**: STDepression of subject

11. **Peak Exercise ST Segment**: 1 = Up-sloaping 2 = Flat3 = Down-sloaping

12. **Number of Major Vessels (0-3) Visible on Flouroscopy**:Number of visible vessels under flouro

13. **Thal**: Form of thalassemia: [3] 3 = normal 6 = fixed defect7 = reversible defect.

Effect Of Existing Heart Disease on Average of Exercise Angina

Angina (pronounced ANN-juh-nuh or ann-JIE-nuh) is pain in the chest that comes on with exercise, stress, or other things that make the heart work harder. It is an extremely common symptom of which is caused by cholesterol-clogged coronary arteries. This is the network of arteries that nourish the heart muscle.

Symptoms

Angina tends to appear during physical activity, emotional stress, or exposure to cold temperatures, or after big meals. Symptoms of angina include:

- pressure, aching, or burning in the middle of the chest
- pressure, aching, or burning in the neck, jaw, and shoulders (usually the left shoulder) and even down the arm
- a sense of anxiety or uneasiness

The pain of angina usually isn't sharp. Instead, it is more a sense of pressure or squeezing. Sometimes it is just an uncomfortable sensation, not really a pain. Angina is not affected by the position of your body or by taking a deep breath, while other causes of chest pain, such as pleurisy or pericarditis, often are.

Diagnosing angina

Your doctor can suspect a diagnosis of angina based on your description of your symptoms, when they appear and your risk factors for coronary artery disease.

Your doctor will likely first do an electrocardiogram (ECG) to help determine what additional testing is needed to confirm the diagnosis.

Treatment for angina

Treatment for angina depends on how severe it is, whether it has recently become more severe (even if it is still mild), how much it interferes with your life, and your expectations and goals. Lifestyle changes are sometimes enough to make angina go away, though most people need one or more medications to ease or prevent angina. Some people need a procedure to open or bypass blocked coronary arteries.

Lifestyle changes for angina

Some of the following may help ease angina:

Reduce risk factors. Stopping smoking, losing weight if needed, and lowering high blood pressure, high cholesterol, and high blood sugar can help control angina.

Adjust your daily activities. If certain kinds of activity regularly cause angina, try performing the activity more slowly. Your heart is under

more stress in the mornings and after meals, so try reducing physical activity at those times.

Reduce stress and anger. If anger and stress regularly bring on your angina, a stress-reduction program or meditation can help.

Exercise. Even though exercise can bring on angina, a supervised program of exercise can safely strengthen the heart and eventually reduce angina. Start slowly, and gradually build up your level of exercise during optimal times of the day. Your physician can tell you what you can and cannot do.

Heart-healthy eating. Adopting a Mediterranean or other heart-healthy eating strategy can help fight the cholesterol-filled plaque that is responsible for angina.

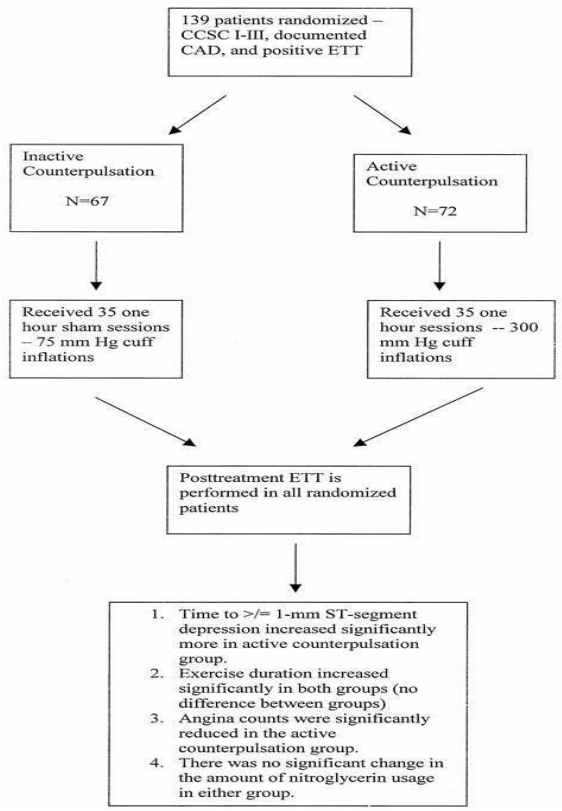
Medications for angina

Medication also plays an important role in treatment. Several types of medication are to ease or prevent angina. These include:

- nitrates
- beta blockers
- calcium-channel blockers
- aspirin
- statins
- ACE inhibitors
- ranolazine

Nitrates cause the coronary arteries to widen, increasing blood flow through the coronary arteries. They come in several forms. One kind (nitroglycerin) is a pill that you place under your tongue when you first feel pain or discomfort. It should relieve angina within 5 minutes. Long-acting nitrates, taken every day by pill or patch, help prevent angina attacks.

Beta blockers slow the heart rate so the heart doesn't have to work so hard. They reduce the risk of abnormal heart rhythms and lower blood pressure.



Maximum Heart Rate in Existing Heart Disease by Exercise Angina

Talk to your doctor. Before starting any type of exercise program when you have chronic angina, talk to you doctor. They will be able to give you the clearance to exercise and also give you safety tips.

- Before starting to exercise, ask your doctor if regular physical activity is safe and appropriate for you. Although exercise can help improve angina in many patients, this isn't true for everyone.
- Ask you doctor what types of exercise are best for you. Are you allowed to do cardiovascular exercise? Should those exercises be low intensity or can you do more moderate or high intensity exercises?
- Ask you doctor about what signs and symptoms are dangerous. For example, if you experience chest pain while walking on the treadmill, what should your plan of action be?

Track your heart rate during exercise. Tracking your heart rate may be a beneficial practice when you're exercising with angina. It can give you an idea of how hard your heart is working.

- Purchase a heart rate monitor for yourself. You can choose to get a wrist band or watch monitor, however it's best to purchase a chest strap monitor. These are the most accurate.
- When you first start an exercise program after being diagnosed with angina, it's typically recommended to do low intensity exercises that keep your heart rate at about 50% of your maximum heart rate.
- To find your maximum heart rate, subtract your age from 220. For example, if you're 60 years old, your maximum heart rate would be 160 beats per minute.

- Using your heart rate tracker, keep you heart rate right at 50% during your exercise routine. In this example, you'd aim for your heart rate to be around 80 beats per minute.
- If cleared by your doctor, you can slowly build up your aerobic endurance and increase to 60 or 70% of your maximum heart rate. However, don't aim to reach your max heart rate during exercise.
- People with angina can adapt to exercise in a way that allows them to improve their exercise performance. Sometimes, you can take nitroglycerin to improve your exercise performance, but also, sometimes the exercise by itself helps you adapt.

Consider starting with a cardiac rehab program. If you have been just diagnosed with angina, your doctor may suggest attending a regular cardiac rehab program. These are great medically supervised programs that can help you get back into regular exercise.

- A cardiac rehab program is provided on an outpatient basis to those who have suffered from a cardiac event or have chronic cardiac conditions. They are designed to help improve fitness levels while reducing symptoms and side effects.

Start with short bouts of low intensity exercises. Many people that have angina, are at lower fitness levels. This may especially be true if you've been required to take several weeks or months off from your exercise routine when you were initially diagnosed.

- If you are trying to recover and rebuild your cardiac strength and endurance, it's recommended to start with short bouts of lower intensity exercises.
- Restarting with higher intensity exercises, or trying to go for a longer period of time could cause symptoms to reoccur or for your condition to get worse.
- Aim to start with just 15-20 minutes of low intensity activity each day. If this feels too easy, increase the time to 25-30 minutes the next day, but do not increase the intensity.

Choose exercises that are low in intensity like walking, water walking, cycling or using the elliptical.

- As your endurance gets better and your fitness improves, you can very slowly increase first the length of your exercises and then the intensity as well.
- These exercises can increase your heart rate, but you are in full control of how high your heart rate increases during your exercise routine.

Serum Cholesterol Levels Vs Age

Serum cholesterol level was studied in normal subjects in Kasakake Village. The serum cholesterol levels increased significantly with age, from the third to the fifth decade in males and from the third to the seventh decade in females. Thereafter, the levels were maintained in males while declined in females. The mean peak values (+/- SD) were 178 +/- 31 mg/100 ml in males and 207 +/- 37 mg/100 ml in females. The presumptive values of the zero-year-old obtained from theregression lines calculated from the plot of serum cholesterol values against age were 129 mg/100 ml and 112 mg/100 ml in males and females respectively. Throughout the age-range examined in females,the serum cholesterol level was well correlated with the relative body weight determined with modified Broca's method. A similar, but less obvious correlation was demonstrated in males. However, there was not comparable change in the relative body weight against the trend of the serum cholesterol level in both sexes. In the babies normally delivered with full term, the mean cholesterol level (+/- SD) in the umbilical cord blood serum was 65 +/- 13 mg/100 ml and it increased to 150 +/- 46 mg/100 ml during one to three months after birth which was very close to the presumptive values obtained from the regression lines in theadults. There also was significant correlation between the cholesterol value and the body weight. It is concluded that in normal people, age and relative body weight are major and independent determinants of serum cholesterol level from the start of their life.

Cholesterol in adults

Sex and gender exist on spectrums. This article will use the terms“men,” “women,” or both to refer to sex assigned at birth.

Your total cholesterol level is the overall amount of cholesterol found in your blood. It consists of:

- low-density lipoproteins (LDLs)
- high-density lipoproteins (HDLs)
- triglycerides

LDL is also called “bad” cholesterol because it blocks your blood vessels and increases your risk for heart disease. HDL is considered “good” cholesterol because it helps protect you from heart disease. The higher your HDL, the better.

Total cholesterol also includes a triglyceride count. These are another type of fat that can build up in the body and are considered the “buildingblocks” of cholesterol.

High levels of triglycerides and low levels of HDL raise your risk for heart disease.

The American Heart Association Trusted Source recommends that all adults have their cholesterol checked every 4 to 6 years, starting at age 20, which is when cholesterol levels can start to rise.

As we age, cholesterol levels tend to climb. Men are generally at ahigher risk than women for higher cholesterol. However, a woman’s riskgoes up after she enters menopause.

For those with high cholesterol and other cardiac risk factors, such as diabetes, more frequent testing is recommended.

Cholesterol in children

Children who are physically active, eat a nutrient-dense diet, are not overweight, and do not have a family history of high cholesterol are at a lower risk for having high cholesterol.

Current guidelines Trusted Source recommend that all children have theircholesterol checked between ages 9 and 11 years, and then again between ages 17 and 21 years.

Children with more risk factors, such as having diabetes, obesity, or a family history of high cholesterol, should be checked between ages 2 and 8 years, and again between ages 12 and 16 years.