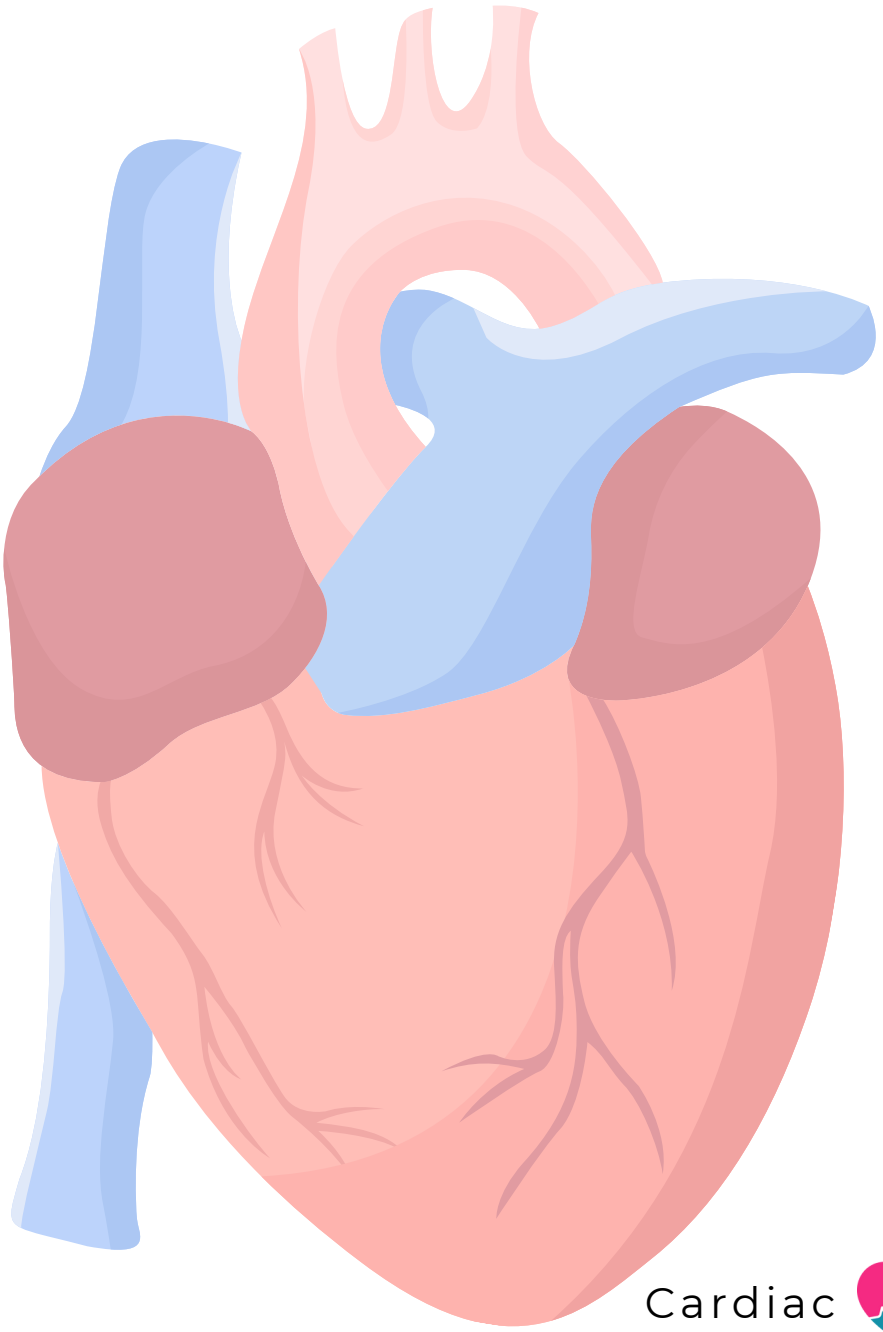
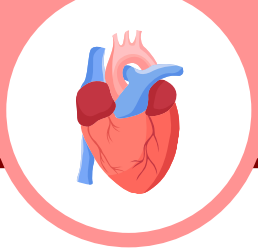
STUDY GUIDE

MYDOCARDIAL INFARCTION



Cardiac NursingSOS



MYOCARDIAL INFARCTION

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DEFINITION:

A myocardial infarction happens when there is a block in the blood flow to the heart. You might hear a myocardial infarction be called a heart attack, or an MI.

PATHOPHYSIOLOGY:

A myocardial infarction happens when there is a block in the blood flow to the heart, which is ischemia of the heart. Ischemia just means that there is not enough blood flow.

Step 1: One or more coronary arteries becomes blocked or narrowed
Step 2: Blood can't move past the blockage or narrowing of the vessel
Step 3: Ischemia (lack of blood flow)
Step 4: Necrosis (tissue death)

CAUSES:

Clot

If there is a blood clot or a buildup of fat or plaque inside a vessel, blood can't get through. So it can block the blood flow from getting to your heart.

Cardiac Arrhythmias

If the heart is not beating properly, it can't pump blood out like it normally would. This causes the coronary arteries and the heart itself not to get the blood they need. This can lead to a heart attack because, a heart attack happens simply when there is not enough blood flow to those coronary arteries and to the heart itself.

Low Blood Volume

Because a heart attack just means that the heart itself isn't getting enough blood flow, if you just don't have enough blood circulating in your body, you obviously won't have enough for your heart either. A heart attack can occur simply because there is not enough blood to keep the heart pumping.

Hypertension

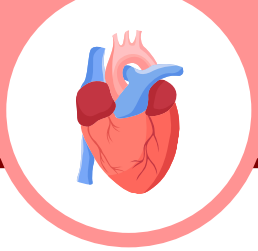
This is an increase in blood pressure and all of the blood vessels are narrowed. If there's hypertension in the body, in most cases there's hypertension in the coronary arteries as well, meaning that all of those coronary arteries around the heart are narrowed. This causes less blood from going through those coronary arteries and the heart tissue, just because not as much blood can get through because the vessel is smaller.

SIGNS AND SYMPTOMS:

Some people will actually develop early earning signs of a heart attack a few days or even weeks before they actually have the heart attack. These are little warning signals that something is going on that needs to be looked at. But not all patients get these early warning signs.

- Chest pain: once a heart attack occurs, there's usually a deep, aching pain or pressure in the chest that can radiate to the back, the jaw, the arms, or shoulders. If your patient does present with cheat pain, the biggest thing that sets a heart attack apart from just your run of the mill chest pain, is that the pain will not be relieved by nitroglycerine, which is the most common medication we give for chest pain.
- Fatigue
- Shortness of breath
- Radiating pain
- Difficulty breathing
- Sweating
- Restlessness
- Nausea
- Vomiting
- Or...no symptoms at all!

These symptoms come from the blocked blood flow to the heart muscle itself, affecting how the heart is able to effectively pump.



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DIAGNOSTIC TEST

There are 2 common diagnostic tests for a heart attack: an electrocargiogram and a coronary angiography.

Electrocargiogram (ECG)

The electrocargiogram (ECG): tracks the electrical system of the heart.

There are 2 main ECG traits that you'll look for to diagnose an MI: ST elevation and non-ST elevation.

In an ST elevation myocardial infarction (or STEMI for short), the ST segment of the heart rhythm is elevated. This is very indicative of a heart attack, but it doesn't always happen.

Some patients may have what we call a non-ST elevation myocardial infarction (an nSTEMI). This ECG rhythm, won't have ST elevation. The ST segment might be depressed, or the T wave may be inverted, or the Q wave might be wider or dropping too far down on the ECG.

Coronary angiography

Coronary angiography - This is an invasive procedure where there is a catheter inserted going up to the heart and contrast dye is used so you can see it on the x-rays. This test can visually show you where the problem is in the heart.

NURSING ASSESSMENT:

MI's can cause some, all, or NONE of these symptoms, very patient specific, so a thorough assessment is needed.

Labs & EKG

Cardiac markers & ECG rhythms

Patient History

Ask about their cardiac history (for example: if they've had a heart attack before, if they have any heart disease, and if anyone in their family has had any cardiac issues).

Pain Assessment

Specifically ask about any chest pain, jaw pain, arm pain, neck or shoulder pain, or back pain, because the pain from an MI looks different for everyone. Also, ask if their pain is radiating anywhere, and if it is relieved by anything. Pain from an MI will not be relieved by much (usually only by super strong medications).

Vital Signs

Blood pressure, heart rate, respiratory rate and blood oxygen levels. These vital signs will be different depending on where the problem is located on the heart.

Respiratory Assessment and Edema

Shortness of breath, difficulty breathing, peripheral edema, jugular venous distention, and crackles in the lungs.

Urinary Assessment and GI Assessment

Check for changes in urination, nausea and vomiting. The renal and GI system will slow down when they don't get blood.

IV Site

Flush their IV site regularly (per facility policy), to keep it open.

LAB VALUES (CARDIAC MARKERS)

Troponin

A protein that is released by the heart cells when they are damaged. It is the most common lab test for diagnosing an MI, because it is super sensitive and if it's elevated, it usually means the patient had, or is having, a heart attack. It's also the earliest cardiac marker that you can test for (it will start showing up in the blood only 1-4 hours after a heart attack). The levels will also stay elevated for up to 7 days. A normal troponin level is less than 0.03 ng/mL.

Creatinine kinase (or CK)

This is an enzyme that will rise if there is damage to the heart, brain, or muscle, so it's not specific to the heart. This one can be detected even before troponin can, but it's not super specific to a heart attack. A normal creatinine kinase value is between 30 and 135 units per liter for women, and 55-170 units per liter for men.

CK-MB

A subtype of the creatinine kinase enzyme, but this one is actually specific to the heart. Like creatinine kinase, CK-MB can be tested for very early after a heart attack, and will peak between 1- and 24 hours, and will go back to normal levels after 2 or 3 days. A normal CK-MB is less than 5%, so if it's elevated at all, it could indicate a cardiac event.

Myoglobin

The protein that carries oxygen molecules in muscle tissue. It's levels will be elevated faster than the other cardiac markers, but it is not specific to the heart. It becomes elevated if there is muscle damage anywhere in the body, not just in the heart. So the patient could have had something else going on in their body that elevated their myoglobin levels, not just a heart attack. So this test, like the creatinine kinase test and CK-MB tests, may be drawn alongside troponin levels to get a better picture of the heart attack. But it really can't be used on it's own to diagnose a heart attack. A normal myoglobin value is less than 90 micrograms per liter.

Lactate dehydrogenase (LDH)

LDH is an enzyme found in the heart, but it is also in other body tissues as well, so if it is elevated, it doesn't necessary indicate heart attack. LDH is elevated later than the other labs, it doesn't peak until about 72 hours after the heart attack happens, but it hangs around for about 7 days. A normal LDH value is between 100 and 190 units per liter.

NURSING INTERVENTIONS

Maintain IV Site

Put an IV in if they don't have one. If they do already have one, you need to flush it and make sure it's working properly.

Encourage Rest

We want to decrease the workload on the heart as much as possible while it is healing. If your patient is up and walking all over the place, their heart has to work harder than if they were just laying in bed and resting.

Position Changes

At least every 2 hours. This will help prevent fluid from settling in their lungs and causing pneumonia or other infections. It will also help prevent pressure ulcers from developing on those bony places.

Assess Vital Signs

Monitor their vital signs based on your facility policy, but really make sure you are taking them AT LEAST every hour (preferably much more frequently).

Physical Assessment

Regularly perform your head-to-toe and focused nursing assessments. Ask them about their chest pain (if they have it, if it's worse, better, or if its characteristics are changing), document their intake and output to monitor their fluid status and make sure they are not retaining too much fluid, and check to see how their respiratory status is holding up.

MEDICATIONS

Morphine

Given after a heart attack not only for pain reduction, but also because it dilates the blood vessels and lowers blood pressure. This reduces the workload on the heart and improves oxygenation to the heart and body.

Oxygen

Helps increase the oxygen level in the body and helps the heart get the oxygen it needs to keep pumping, and helps the body get the oxygen it needs, too.

Nitroglycerine (or nitro for short)

Used to treat chest pain. Nitro dilates the coronary arteries and improves blood flow to the heart. Nitro can be given 3 times, 5 minutes apart. So you will give it, wait 5 minutes, and if the chest pain doesn't go away, give it again. Wait 5 minutes, and if the chest pain still isn't gone, you can give it a third time.

Aspirin

Given to prevent blood clots, which can make the heart attack even worse. Aspirin helps prevent blood clots from forming and causing even more clots in the coronary arteries or other blood vessels.

Angiotensin Coverting Enzyme Inhibitors (also called ACE inhibitors or ACEI's)

These decrease the patients blood pressure by causing the kidneys to get rid of water and sodium. This decrease in blood pressure helps the heart to not have to work as hard, and helps it get more blood flow to the body.

Thrombolytics

These bust the blood clot; it eats it up and gets rid of it so blood can get through again. This can be really important in a heart attack caused by a blood clot. The sooner the patient receives a thrombolytic, the better off they will be because blood flow will be restored to the heart and the body sooner, rather than later.