



Blood pressure (BP) is the pressure exerted by circulating blood against the walls of the arteries.

BP is mainly influenced by:

$$\text{BP} = \text{Cardiac Output (CO)} \times \text{Systemic Vascular Resistance (SVR)}$$

Component	Definition/Effect on Blood Pressure
Cardiac Output (CO)	Amount of blood pumped by the heart per minute. $\text{CO} = \text{HR} \times \text{SV}$
Systemic Vascular Resistance (SVR)	Resistance or opposition to blood flow through the systemic blood vessels.
Vasoconstriction	Blood vessels narrow $\rightarrow \uparrow \text{SVR} \rightarrow \uparrow \text{BP}$
Vasodilation	Blood vessels widen $\rightarrow \downarrow \text{SVR} \rightarrow \downarrow \text{BP}$

HYPERTENSION

HTN is a persistent elevation in arterial blood pressure. Long-term uncontrolled HTN increases stress on blood vessels and major organs.



BP Classification

Category	Blood Pressure
Normal	SBP <120 and DBP <80 mmHg
Elevated	SBP 120–129 and DBP <80 mmHg
Stage 1 HTN	SBP 130–139 or DBP 80–89 mmHg
Stage 2 HTN	SBP ≥ 140 or DBP ≥ 90 mmHg
Hypertensive Crisis	SBP >180 and/or DBP >120 mmHg

Types of Hypertension

Primary (essential) hypertension

- Most common form.
- No single identifiable underlying disease.
- Develops from a combination of genetic, environmental, and lifestyle factors.

Secondary hypertension

- Results from another condition or identifiable cause.

Possible causes include:

- Chronic kidney disease
- Obstructive sleep apnea
 - Endocrine disorders (primary aldosteronism, pheochromocytoma, Cushing's)



Complications of Chronic Hypertension



Stroke: Chronic pressure damages cerebral vessels.



Myocardial infarction (MI): Vascular damage contributes to reduced coronary blood flow.

Heart failure (HF): The heart continuously pumps against increased resistance. This increases cardiac workload and can cause left ventricular hypertrophy (LVH). Eventually, the heart may become unable to compensate.



Chronic kidney disease (CKD): Hypertension damages renal blood vessels. Progressive vascular injury decreases kidney function and filtration.

Other possible complications

- Peripheral arterial disease
- Retinopathy
- Aortic aneurysm/dissection

Assessment Findings

Hypertension is often asymptomatic, especially during its early stages.

Remember: That is why it is commonly called the “silent killer.” A client may feel completely well despite having ongoing vascular damage.

Possible manifestations when BP becomes significantly elevated include:

- Headache
- Dizziness
- Visual disturbances
- Fatigue
- Chest discomfort
- Shortness of breath

Remember: Do not diagnose chronic hypertension from one elevated BP reading alone.

Accurate BP Measurement

Before measuring BP:

- Have the client rest quietly for about 5 minutes.
- Avoid smoking and caffeine for at least 30 minutes beforehand.
- Use the correct cuff size.
- Place the cuff on bare skin, not over clothing.
- Support the arm at heart level.
- Keep both feet supported and legs uncrossed.
- The client should remain quiet and still.

Cuff Size

Too small: falsely HIGH BP

Too large: falsely LOW BP

Confirming Hypertension

BP should be evaluated over multiple readings/visits, rather than relying on a single abnormal measurement.

General Nursing Considerations

Before giving antihypertensives:

- Check BP and HR as appropriate for the medication.
- Monitor for hypotension.
- Assess for dizziness or syncope.
- Teach the client to change positions slowly.
- Reinforce medication adherence.
- Do not abruptly discontinue medications unless specifically instructed.

Hypertensive Crisis

A hypertensive crisis occurs with a markedly elevated BP, commonly >180 systolic and/or >120 diastolic. Urgency = no acute end-organ damage (oral agents); emergency = end-organ damage (IV, ICU).



Hypertensive Emergency

Severely elevated BP with acute target-organ injury.

Possible manifestations:

- Severe headache
- Confusion or altered mental status
- Seizures
- Visual changes
- Chest pain
- Dyspnea
- Neurologic deficits
- Acute kidney injury

Nursing Priorities

- Continuous BP and cardiac monitoring
- Frequent neurologic assessments
- Assess for chest pain and respiratory distress
- Monitor urine output and renal function
- Administer prescribed IV antihypertensive therapy
- Monitor response to treatment

Remember:

DO NOT rapidly normalize BP.

In a hypertensive emergency, BP is generally lowered gradually and in a controlled manner.

AORTIC ANEURYSM

An aortic aneurysm is an abnormal widening or ballooning of a weakened section of the aortic wall.

Normally, the aortic wall withstands the pressure of blood flowing through it. When the wall becomes weakened, the constant pressure can cause the affected area to dilate and enlarge.

Risk Factors

Modifiable

- (#1) Smoking
- Hypertension
- Atherosclerosis
- Hyperlipidemia
- Obesity

Non-modifiable

- Older age
- Male sex
- Family history
- Genetic/connective tissue disorders

Assessment Findings

Aneurysms may remain asymptomatic and are often discovered incidentally during imaging or routine examinations, or may only produce signs and symptoms when large enough.

Assessment focuses on:

- Pain
- Pulses and circulation
- BP
- Abdominal or chest findings
- Signs of rupture or dissection

Diagnostic Procedures

Ultrasound

Commonly used to detect and monitor abdominal aortic aneurysms.

CT scan

Provides detailed visualization of the aorta.

Useful for evaluating aneurysm size, location, and complications.

CT angiography (CTA)

Provides detailed images of the aorta and surrounding vessels.

Commonly used when planning treatment.

MRI/MR angiography

Another option for detailed vascular imaging when appropriate.



TYPES OF ANEURYSM

Type	Description	Remember
Fusiform aneurysm	The vessel wall expands around the entire circumference , creating a spindle-shaped dilation.	Can enlarge progressively and may rupture as it increases in size.
Saccular aneurysm	A localized pouch-like bulge develops on one side of the vessel wall.	Often considered more prone to rupture than a fusiform aneurysm, depending on location and size.
Aortic Dissection	A tear in the inner aortic wall allows blood to enter and separate the layers of the vessel wall.	Medical emergency ; can rapidly progress to rupture.
Ruptured aneurysm	The weakened vessel wall breaks open , causing internal bleeding.	Life-threatening emergency → severe sudden pain, hypotension, tachycardia, possible shock.

TYPES BY LOCATION

Type	Location	Remember
Thoracic aortic aneurysm (TAA)	Aorta within the chest (thorax)	May affect the ascending aorta, arch, or descending thoracic aorta
Abdominal aortic aneurysm (AAA)	Aorta within the abdomen	Most commonly occurs below the renal arteries



ABDOMINAL AORTIC ANEURYSM (AAA)

May be asymptomatic.

Possible findings:

- Persistent or deep abdominal pain
- Back or flank pain
- Pulsating abdominal mass
- Abdominal discomfort

Remember: Do NOT palpate a pulsating abdominal mass.

THORACIC AORTIC ANEURYSM (TAA)

Possible manifestations depend on which structures are compressed.

- Chest or upper back pain
- Hoarseness
- Difficulty swallowing
- Cough
- Shortness of breath

RUPTURED ANEURYSM

Sudden severe pain + shock = possible rupture

Possible findings:

- Sudden, severe abdominal/back/chest pain
- Hypotension
- Tachycardia
- Pallor
- Diaphoresis
- Weakness or syncope
- Signs of hypovolemic shock

This is a life-threatening emergency.

PRIORITY INTERVENTIONS:

Fluid resuscitation and emergency surgery. (Initially permissive hypotension until surgical control.)

Medical & Surgical Management

Small/Stable Aneurysm

Management may include:

- Regular imaging surveillance
- Strict BP control

- Smoking cessation
- Lipid management
- Management of cardiovascular risk factors

The goal is to slow aneurysm enlargement and reduce rupture risk.

Surgical/Endovascular Repair

Repair may be considered when the aneurysm:

- Becomes sufficiently large (AAA ≥ 5.5 cm in men / ≥ 5.0 cm in women, or growth >0.5 cm in 6 months)
- Enlarges rapidly
- Causes symptoms
- Shows evidence of complications

Endovascular Aneurysm Repair (EVAR)

A stent graft is inserted through the blood vessels and positioned inside the aorta.

The graft creates a new pathway for blood flow and reduces pressure against the weakened aneurysm wall.

Advantages:

- Less invasive
- Smaller incision
- Generally faster recovery

Open Surgical Repair

The diseased section is surgically repaired or replaced with a graft.

Nursing Interventions

For Stable Aneurysm

- Monitor BP closely.
- Administer prescribed antihypertensives.
- Encourage smoking cessation.
- Monitor for changes in pain.
- Maintain scheduled imaging follow-up.
- Avoid activities that cause excessive straining when instructed.
- Teach the client to report new or sudden severe pain immediately.