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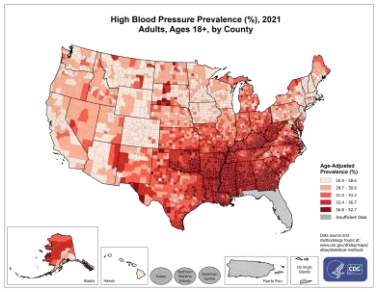
The Vitals and the Verdict: Investigating the Case of Hypertension

Nearly half (46.7%) of adults in the U.S. have higher-than-normal blood pressure = 120 million

Recent analysis 41% of U.S. adults with hypertension are *unaware* they have it



Roughly 100,000 times a day 35 million times a year moving 2000 gallons of blood a day

Pulse Pressure: Difference between systolic & diastolic pressures. Reflects the force the heart generates each time it contracts Normal around 40mmHg

Wider PP = stiffer, less compliant arteries = vascular aging & inflammation

Narrow PP = reduced stroke volume → less blood ejected into the aorta with each contraction

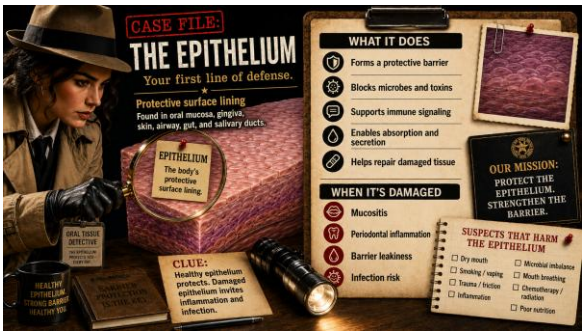
Metabolic Syndrome: Common clinical cluster where elevated BP often coexists w/abdominal obesity, dyslipidemia, & impaired glucose regulation—raising long-term risk for diabetes & ASCVD

Any 3 of 5: Central adiposity (waist men >40 women >35), Triglycerides ≥150 mg/dL Low HDL <40 mg/dL- men <50 mg/dL – women BP ≥130/85 mm Hg Fasting glucose ≥100 mg/dL

People with MetS were more likely to have periodontitis. A meta-analysis reporting roughly 1.7–2.1 higher odds of periodontitis in those with MetS compared with those without MetS

The 2025 AHA/ACC guideline recommends considering BP-lowering medication in lower-risk adults when BP remains ≥130/80 mm Hg after 3–6 months of lifestyle therapy.

In pregnancy, severe-range blood pressure requires urgent action! If systolic BP is ≥160 mm Hg or diastolic BP is ≥110 mm Hg and remains elevated on repeat measurement within 15 minutes, antihypertensive therapy should be started promptly. The goal is to lower BP below 160/110 mm Hg within 30 to 60 minutes to reduce the risk of maternal and fetal complications.



Endothelial Dysfunction: Inflammation damages the endothelium — the vessel's smooth inner lining — reducing nitric oxide (NO) production. Without NO, vessels can't dilate, and pressure rises.

Cytokine Signaling: Proinflammatory cytokines like IL-6, TNF-α, and IL-1β activate endothelial and immune cells, leading to oxidative stress and vascular remodeling.

Innate Immune Activation: The immune system mistakes pressure-related shear stress for tissue injury, recruiting macrophages and T-cells into the vessel wall. These cells release more cytokines, perpetuating the cycle.

ROS (Reactive Oxygen Species): Hypertension increases ROS, which further oxidizes lipids and inactivates NO — a vicious circle of oxidative stress and constriction.

Gut–Brain–Kidney Crosstalk: Chronic inflammation from poor diet, dysbiosis, or sleep apnea can activate the renin–angiotensin–aldosterone system (RAAS) and sympathetic tone, reinforcing hypertension.

Dehydration: Leads to low blood pressure, dizziness, weakness, dry mouth, & increased fall risk. When layered on top of antihypertensive medications, dehydration can trigger orthostatic hypotension—a drop of ≥20 mm Hg systolic or ≥10 mm Hg diastolic when standing. Even mild dehydration can cause sudden instability & elevate the risk of fractures. **Up to 30% of the elderly community**

Menopause: Estrogen normally keeps arteries flexible and supports nitric oxide production, which helps vessels relax. Post menopause, arterial stiffness increases, and blood pressure tends to rise even if weight and lifestyle stay the same. Sympathetic activity ramps up, and so does sodium sensitivity, so BP becomes more reactive to stress, salt, and sleep disruption. Hypertension prevalence rises after menopause; later in life, women's rates often approach or exceed men's.

Estrogen and progesterone don't just influence blood vessels—they affect the upper airway muscles and breathing control. Progesterone is a respiratory stimulant, helping maintain tone in the genioglossus and pharyngeal dilator muscles. When it falls, the airway is more prone to collapse. Postmenopausal women are up to three times more likely to develop obstructive sleep apnea (OSA) than premenopausal women, even after adjusting for body weight. OSA is underdiagnosed in women because it often presents as insomnia, fatigue, or morning headaches, not classic snoring or apnea reports.

Resistant hypertension is defined as BP that remains above goal despite use of 3 antihypertensive medications from different classes, ideally including a long-acting calcium channel blocker, an ACE inhibitor or ARB, and a diuretic, at maximally tolerated doses. It also includes patients whose BP is controlled but requires 4 or more medications.

Wound Healing:

1. Impaired microcirculation: Chronic hypertension thickens and stiffens arterial walls (arteriosclerosis). The smaller the vessel, the worse the impact. Capillaries in skin and soft tissue lose elasticity and narrow, reducing oxygen and nutrient delivery to healing tissue. Less perfusion = slower granulation and epithelialization.
2. Endothelial dysfunction: The endothelium (the inner vessel lining) normally releases nitric oxide (NO) to promote vasodilation and tissue repair. Hypertension damages these cells, limiting NO production and increasing oxidative stress, which stalls angiogenesis—the formation of new microvessels critical for wound healing.

3. Inflammatory imbalance: Wound repair relies on a controlled inflammatory response. Hypertension keeps cytokines and reactive oxygen species chronically elevated, causing prolonged inflammation and delayed transition to the proliferative phase. The result: wounds stay "stuck" in early healing stages.

4. Collagen and fibroblast dysfunction: Studies show hypertensive states impair fibroblast migration and collagen synthesis, leading to weaker scar formation and reduced tensile strength. The wounds close slower and are more likely to reopen or become chronic.

5. Compounding risks: Hypertension rarely travels alone. It often coexists with diabetes, obesity, and vascular disease, which further compromise healing. Add in medications such as beta-blockers or diuretics (which can alter perfusion and hydration), and recovery slows even more.

Moderate to severe periodontitis - twice as likely to have hypertension compared to those with healthy gums, even after adjusting for age, BMI, smoking, & socioeconomic factors.

Those with periodontitis had 4.5 mmHg higher systolic & 2 mm Hg higher diastolic BP on average

Best Practice
Use validated upper-arm oscillometric device (wrist only if arm unsuitable)
Patient seated, feet flat, back supported, arm at heart level
No talking; avoid caffeine, nicotine, or exercise 30 min prior
Empty bladder
Rest 5 min. before reading
Use correct cuff size
Take 2 readings, 1–2 min apart, & average

Cuff Size
Cuff length: The inflatable part of the BP cuff should cover about 75% to 100% of the distance around your upper arm
Cuff width: The cuff should be wide enough to cover from 40% to 80% of the distance from your elbow to your shoulder
"Upper-arm, oscillometric devices are preferred method for BP measurement. Wrist monitors are **not** recommended except when upper-arm measurement is not feasible due to arm size, shape, or medical conditions" AHA Scientific Statement

Why?
Proximity to the Heart: Bicep closer to the heart -more direct reflection of central blood pressure compared to the wrist
Less Sensitivity to Position: Wrist cuffs are more sensitive to arm positioning. For accurate readings with a wrist cuff, the arm must be held precisely at heart level

Larger Arteries: The arteries in the upper arm (brachial artery) are larger, more stable & provide a more consistent & reliable reading. Less variability

Low Blood Pressure
Less than 90/60 mm Hg
Signs: Confusion, dizziness, fatigue, headache, blurred vision, heart palpitations

Underlying Causes: depression, Parkinsons, pregnancy, dehydration, certain medications (diuretics, narcotics, beta blockers), endocrine problems, heart conditions, nutritional deficiencies
Life threatening scenarios: Septic Shock, allergic reaction, decreased blood volume

White Coat Syndrome
40-50% of white coat patients will progress to sustained hypertension - Amy Doneen DNP

Patients with WCH have roughly double the risk of CV death & triple the risk of future heart attack compared with those with normal or well-controlled blood pressure

A stress-induced BP rise can occur with or without tachycardia

Trends
≥180/110 mmHg is the more common level where elective care is frequently postponed & urgent medical evaluation considered
≈160/100 mmHg: caution zone—recheck BP, assess risk, consider delaying non-urgent care
Risk stratification (history of organ damage, CVD, functional status) rather than a single universal cut-off
2022 - 273 pts 18–85, 50.1% had elevated BP 38% not diagnosed by physician
2021 - 200 pts 49% had HBP ~84% were unaware of status

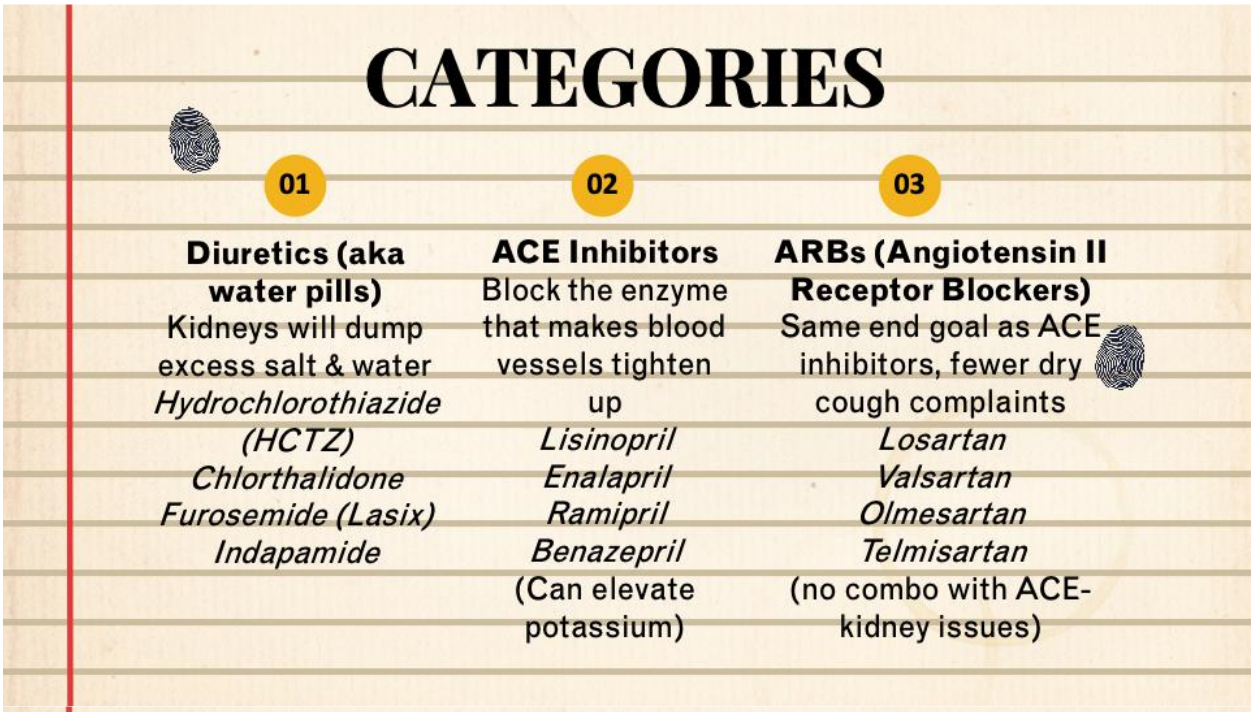
Concerning Clinical Patterns
Large differences between arms (>10–15 mmHg difference)
Orthostatic drops (>20 mmHg systolic fall when standing)
High heart rate + high BP suggesting possible CV instability
Signs of fluid retention, edema, or shortness of breath
Failure of BP to improve after repeated measurements

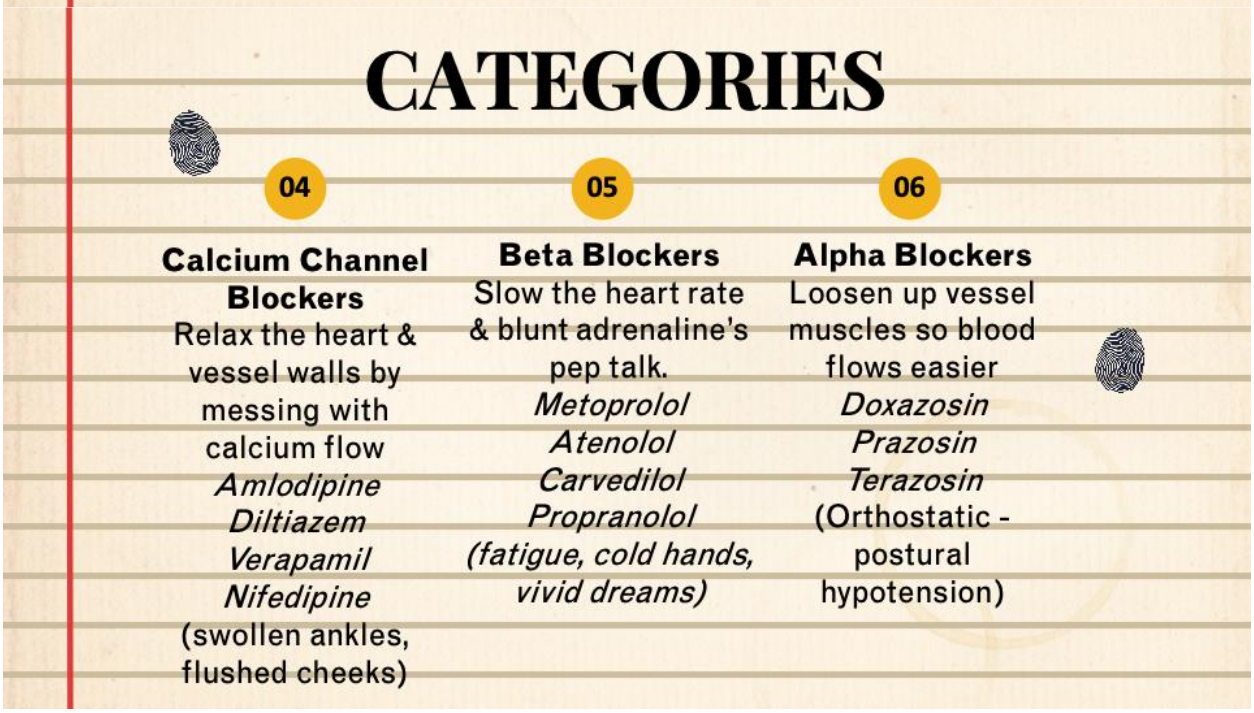
Symptoms that should trigger deferral and urgent/emergency evaluation
Chest pain or pressure, Shortness of breath, Back pain, Numbness or weakness
Vision changes, Difficulty speaking, Confusion or altered mental status, Severe headache, especially sudden or unusual, Dizziness, fainting, or neurologic symptoms
The American Heart Association specifically lists chest pain, shortness of breath, back pain, numbness, weakness, vision change**,** and difficulty speaking as symptoms that warrant calling 911 when BP is >180/120

Stroke Data
50–60% of all strokes are directly attributable to hypertension

Risk starts climbing at 130/80, doubles by 140/90, and multiplies several-fold at higher levels

(AHA/ASA, Lancet Global Burden of Disease, WHO) consistently report that 1 out of every 2 strokes would not occur w/out elevated BP





CATEGORIES

07

Combinations

Lisinopril/HCTZ

Losartan/HCTZ

Amlodipine/Benazepril

ORAL CAVITY EFFECTS

Xerostomia

Not anticholinergic, but some—particularly centrally acting agents like clonidine—can produce anticholinergic-like side effects like dry mouth

Dysgeusia

30% of patients prescribed antihypertensive & antihyperlipidemic drugs

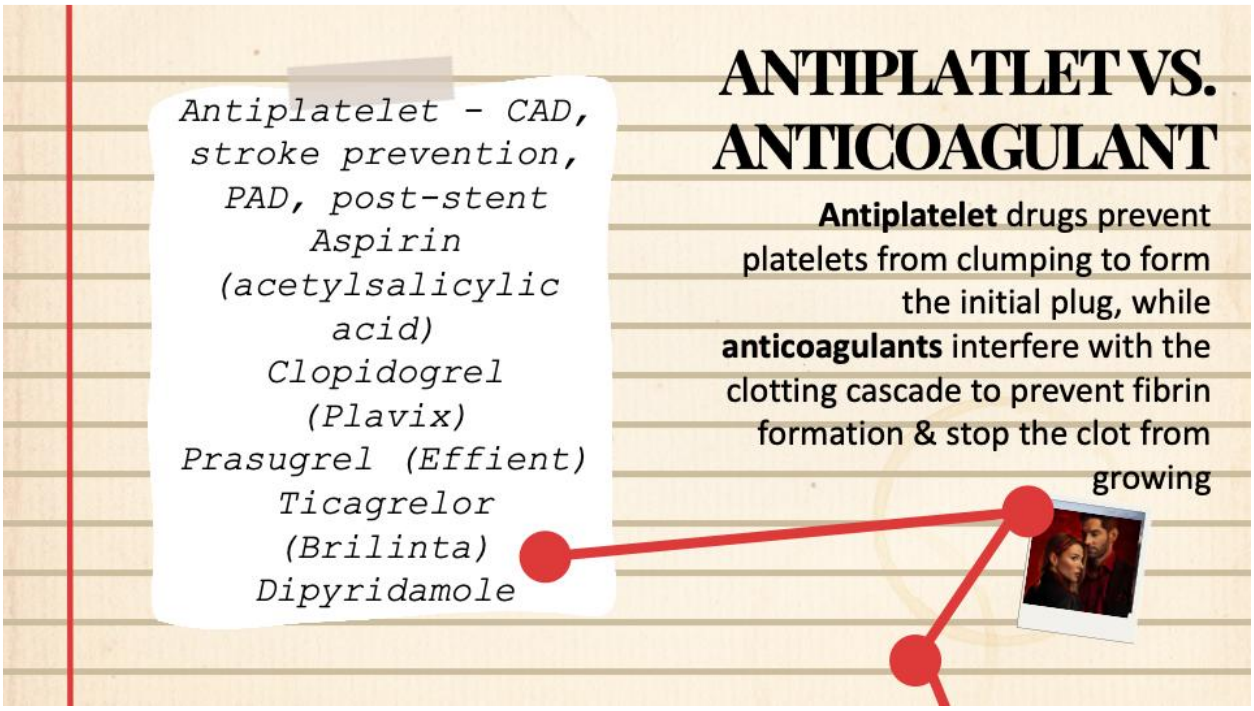
Gingival Hyperplasia

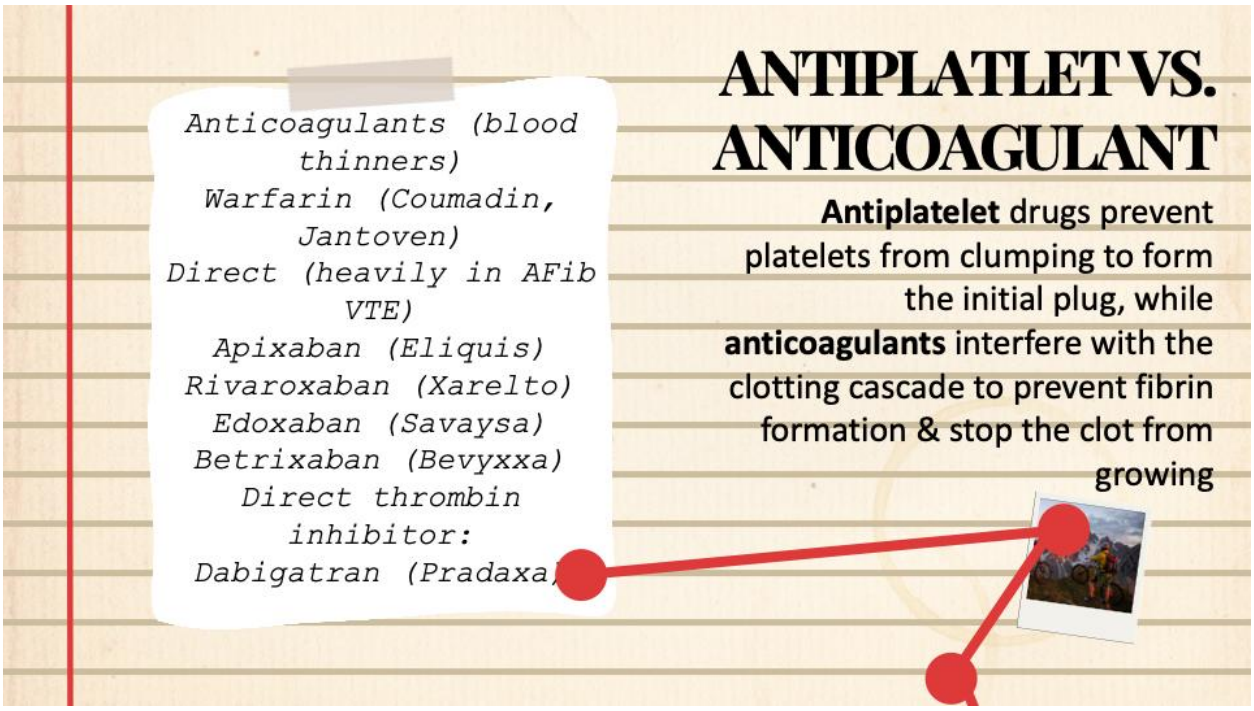
Adverse reaction to calcium channel blockers, affecting 20–75% of patients

Oral Lichenoid Reactions (OLR)
A known side effect of common blood pressure medications (Lisinopril – ACE inhibitor, HCTZ – Diuretics)
NSAIDS
BP rise average 5mmHg
Anesthetic and Vasoconstrictors

Controlled hypertension or stable CVD-precautionary limit often cited is 0.04 mg of epinephrine
~2 cartridges of 1:100,000 epi
~4 cartridges of 1:200,000 epi
AHA & ADA acknowledge vasoconstrictors like epinephrine are *safe in controlled doses* for most hypertensive patients, but caution against their use in those with uncontrolled hypertension (>180/110 mm Hg) *or cardiac status unstable*

Anesthetic with no or little vasoconstrictor
Articaine or lidocaine with a 1:200,000 epinephrine concentration instead of 1:100,000
Mepivacaine 3% plain for short procedures
Retraction Cord
Aluminum chloride 5 to 25%, aluminum sulfate, ferric sulfate e.g 15.5% ViscoStat





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