



Chronic Diastolic (Congestive) Heart Failure

CLINICAL CASE

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Course Name: Hospital Pharmacy - Training

Course Code: 0204590



TABLE OF CONTENTS



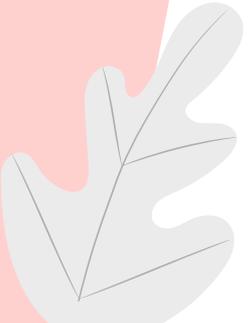
1 Demographics of HF

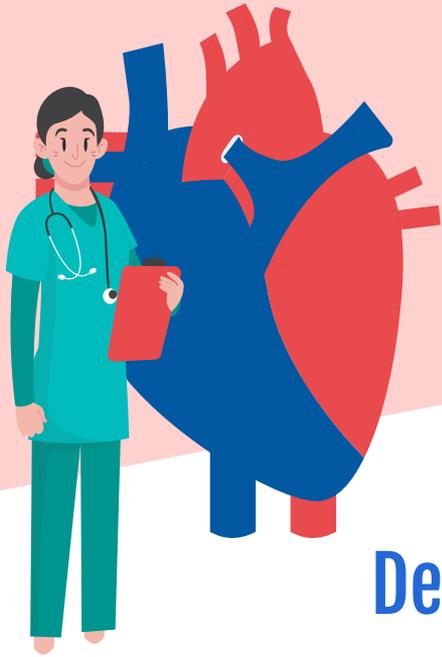
2 Patient presentation

3 Drug therapy problem

4 Treatment

5 Counseling and monitoring





1

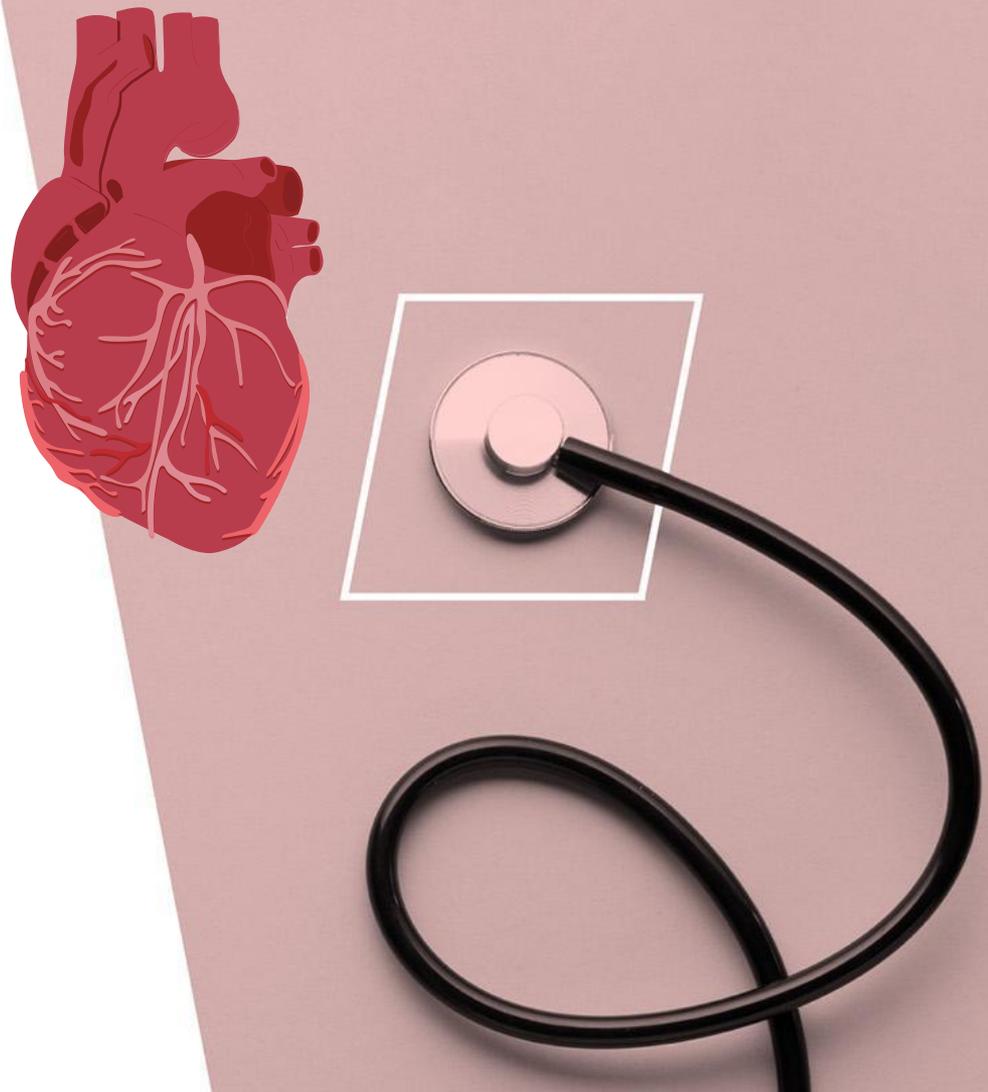
Demographics of Heart Failure



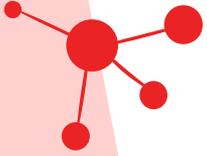
What is Heart Failure?



- Heart failure is a progressive clinical syndrome that can result from any disorder that impairs the ability of the ventricle to fill with or eject blood.

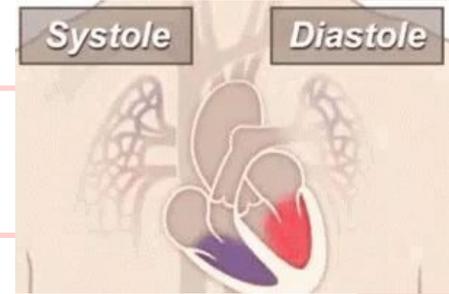


Etiology



Systolic Dysfunction (decreased contractility)

Diastolic Dysfunction (Restriction in ventricular filling)

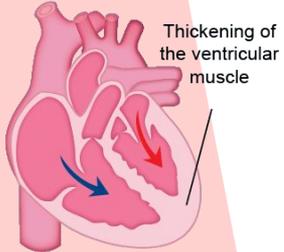


1. Increased ventricular stiffness

- Ventricular hypertrophy
- Infiltrative myocardial disease
- Myocardial ischemia and infarction

2. Mitral or tricuspid valve stenosis

3. Pericardial disease (e.g., pericarditis, pericardial tamponade)



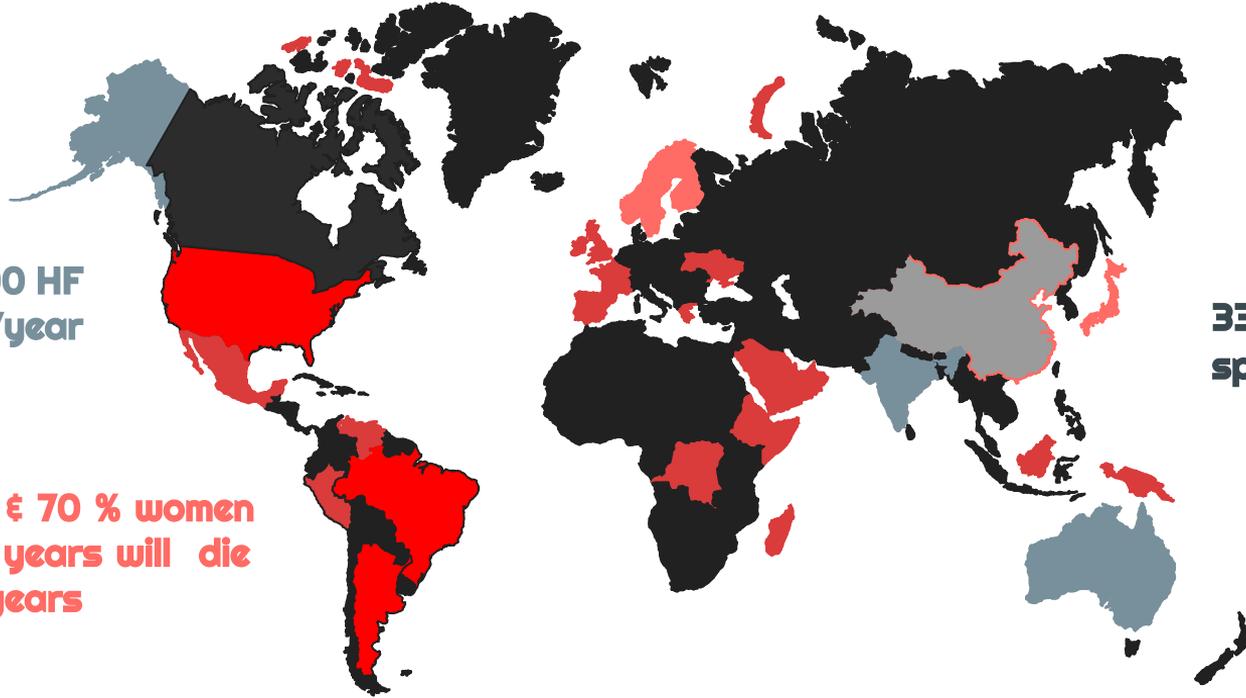
Epidemiology

Men > Women

~ 550,000 HF
cases /year

80% men & 70% women
up to 65 years will die
within 8 years

33 billion \$\$ are
spent /year



PATHOPHYSIOLOGY



- ✓ Heart **not providing** tissues with adequate blood.
- ✓ **Elevation** of pulmonary/systemic venous pressures.
- ✓ A **change** in cardiomyocyte function.
- ✓ can result from **diastolic/systemic function abnormalities**

- ✓ can be a **change** in cardiomyocyte function
- ✓ **Changes** in collagen turnover
- ✓ Cardiac **structural defects**
- ✓ **Rhythm** abnormalities
- ✓ **High** metabolic demands


$$\text{Cardiac output (CO)} = \text{HR} \times \text{SV}$$

Clinical representation of HF



Signs and symptoms



- ✓ SOB
- ✓ Fatigue
- ✓ Dizziness



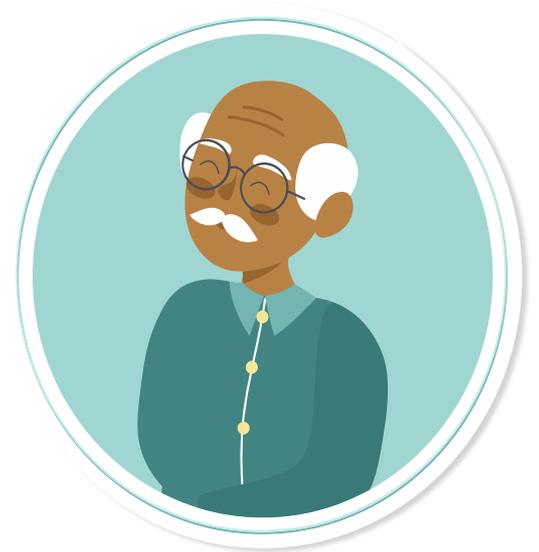
- ✓ Coughing
- ✓ Edema
- ✓ Lack of appetite
(nausea)



- ✓ S3 gallop
- ✓ palpitations
- ✓ Hepatojugular
reflux

2

Patient presentation



Chief complaint (CI)

A 62-year-old man is complaining of constant weight gain with SOB



HPI: history of present illness



AGE: 62 years

GENDER: male

ALLERGIES: NKA



1

A.K presents to the hospital with SOB and lower extremity edema.

2

Symptoms started 1-1.5 weeks ago.

3

Gaining 2 lb daily

4

Using albuterol/ipratropium MDI for his COPD symptoms

PMH, FH, SH



PMH

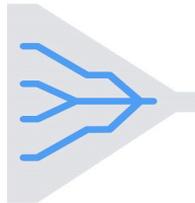
- CAD (s\p STEMI 6 years ago)
- COPD x3 years
- Diastolic HF x2 years
- Dyslipidemia x10 years
- HTN x20 years
- Type 2 DM x3 years

FH

- Father is 86 years old with type 2 DM
- Mother is 84 years old, had HTN and dyslipidemia
- Brothers (48 and 54 years old) both have type 2 DM and HTN

SH

- Tobacco use (30 pack-year) but quit 3 years ago
- Non-alcoholic
- Lives alone





PHYSICAL FINDINGS



Increased shortness of breath from baseline

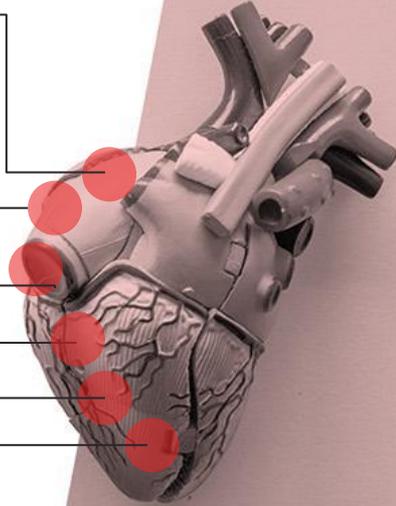
✓ Dyspnea on exertion **X** chest pain

20-lb weight gain over the past week

BP 156/92, P 80 (regular), RR 24, T 36.9°C; Wt 100 kg (usual weight 90 kg)

Obese with a nontender, nondistended abdomen

- Chronic venous stasis changes on bilateral lower extremities
- 2+ pitting pedal edema bilaterally



Laboratory results



Na 140 mEq/L	Hgb 15.3 g/dL	Mg 1.7 mEq/L	CK 20 IU/L
K 4.2 mEq/L	Hct 47.2%	Ca 9.1 mg/dL	CK-MB 0.8 IU/L
Cl 103 mEq/L	Plt 298 × 103/mm ³	AST 50 IU/L	PT 12.6 s
CO ₂ 26 mEq/L	WBC 6.4 × 103/mm ³	ALT 43 IU/L	INR 1.1
BUN 20 mg/dL	Troponin I 0.5 ng/mL	Alk phos 80 IU/L	TSH 2.01 mIU/L
SCr 0.9 mg/dL	HDL Cholesterol 1.15 mmol/L	GGT 24 IU/L	A1C 7.2%
Glucose (Fasting) 108 mg/dL	LDL Cholesterol 2.82 mmol/L	T. bili 0.2 mg/dL	
BNP 900 pg/mL	Triglycerides 1.70 mmol/L		

Imaging and other studies



1. **ECG** - Sinus rate of 70; **QRS** 0.08; **no** ST-T wave changes; **low voltage**
2. **CXR** - Interstitial edema and some early alveolar edema
3. **2D echocardiogram (2 Years ago)** - Diastolic dysfunction & preserved systolic function (EF 55%)
4. **Recent 2D echocardiogram:**
 - Impaired ventricular relaxation and elevated left atrial filling pressures (**Grade II diastolic dysfunction**)
 - EF = 44%
 - Dilated inferior vena cava



Drug therapy problems



- Adverse drug events that must be monitored:

- Aspirin + Amlodipine
- Metformin + furosemide
- Furosemide + Carvedilol
- Amlodipine + Carvedilol
- Aspirin + Carvedilol



- **Amlodipine** is contributing to the patient's pedal edema.

- Edema therapy should be **intensified**



- STATIN therapy should be **intensified**

- **High dose salicylate** is contributing factor to his HF



- Patient's **BP is uncontrolled** (>20\10 mmhg than the target), therapy should be intensified



- Needs **additional anticoagulant** agent for his STEMI CAD and low INR (risk of blood clot)

3

Treatment



DESIRED OUTCOME



- Improve quality of life
- Relieve / reduce the symptoms
- Prevent / minimize hospitalizations for exacerbations of heart failure
- Slow progression of the disease process
- Prolong survival



TABLE 14-6 Pharmacotherapy for Heart Failure with Preserved Ejection Fraction

Recommendations

Diuretics

- A loop or a thiazide diuretic should be considered for patients with volume overload. However, with more severe volume overload or inadequate response to a thiazide, a loop diuretic should be implemented. Caution is warranted not to lower preload excessively, which may reduce stroke volume and cardiac output.

ACE inhibitors

- ACE inhibitors may be considered in all patients.
- ACE inhibitors should be considered in all patients who have symptomatic atherosclerotic cardiovascular disease or diabetes and one additional risk factor.

Angiotensin receptor blockers

- Angiotensin receptor blockers may be considered in all patients.
- In patients who are intolerant of ACE inhibitors, an angiotensin receptor blocker can be considered an alternative.

Aldosterone antagonists

- Aldosterone antagonists can be considered to reduce the risk of hospitalization in patients that do not have contraindications or are at risk for hyperkalemia.

β -Blockers

- β -blockers should be considered in patients with one or more of the following conditions:
 - Myocardial infarction
 - Hypertension
 - Atrial fibrillation requiring ventricular rate control

Calcium channel blockers

- In patients with atrial fibrillation warranting ventricular rate control who either are intolerant to or have not responded to a β -blocker, diltiazem or verapamil should be considered.
- A nondihydropyridine or dihydropyridine calcium channel blocker can be considered for symptom-limiting angina.
- A nondihydropyridine or dihydropyridine calcium channel blocker can be considered for hypertension.



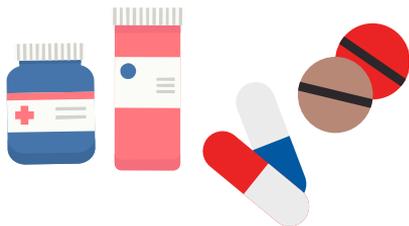
AMERICAN COLLEGE of CARDIOLOGY

In many older patients, the risks of over-treating diabetes outweigh the benefits. The American Geriatrics Society recommends a goal a1c of 7.5-8% in older patients with moderate comorbidities and life expectancy less than 10 years;⁷ the American Diabetes Association recommends a more relaxed goal of 8-8.5% for older patients with complex medical issues.¹ These recommendations are supported by evidence that low a1c targets did not reduce risk of macrovascular complications in VADT, ADVANCE and ACCORD.²⁻⁴ In fact, strict glycemic control increased cardiovascular events in patients who experienced hypoglycemic episodes. Secondary analysis of ADVANCE data found that participants with severe hypoglycemic episodes had significantly higher adjusted risk of major cardiovascular events and death from major cardiovascular events.¹⁰ This is explained by the

pathophysiology of hypoglycemia in patients with underlying cardiovascular disease, in whom low blood glucose and the resultant catecholamine surge can induce cardiac arrhythmias, contribute to sudden cardiac death, and cause ischemic cerebral damage.^{8,9}

<https://www.acc.org/latest-in-cardiology/articles/2018/02/28/12/19/diabetes-management-in-older-adults-with-cvd>

PHARMACOLOGICAL TREATMENT



Generic	Strength	Form	Pack Size	Dose	Route	Frequency	Duration
carvedilol	12.5 mg	Tablets		1 Tablet	oral	Every 12 Hour	For 90 day (s)
furosemide	80 mg	Tablets		80 mg	oral	Twice Daily	For 90 day (s)
amlodipine besylate	5 mg	Capsules		5 mg	oral	Once Daily	For 90 day (s)

Drug	Strength	Frequency	Duration	Comments
Bisoprolol			90 days	Core therapy (ACEI/ARB + selective beta 1 blocker)
Enalapril			90 days	Core therapy (ACEI/ARB + selective beta 1 blocker)
Bumetanide			90 days	High bioavailability loop diuretic Causes hypokalemia
Spironolactone			90 days	Better control Prevents hypokalemia caused by loop
Aspirin	81 mg	Once daily	90 days	STEMI CAD INR = 1.1 (low)

PHARMACOLOGICAL TREATMENT – CONT.



Allergies: No known allergies

Diagnosis: Primary: I50.32 - Chronic diastolic (congestive) heart failure
Secondary: E11.9 - Type 2 diabetes mellitus without complications, I10 - Essential (primary) hypertension, E78.5 - Hyperlipidemia

Generic	Strength	Form	Pack Size	Dose	Route	Frequency	Duration	Qty Ordered	Order Notes	Body Site	Repe
metformin HCL ✓	500 mg 1000 mg	Tablet, Extended Release 24 hr (TI)	Blister pack (30 Tablet, Extended release 24 hr)	1 Tablet Extended Release 24 hr	oral	Twice Daily	For 90 day (s)				
aspirin ✓	325 mg 81 mg	Tablet, Delayed Release (Enteric Coated)		325 mg	oral	Once Daily	For 90 day (s)				
rosuvastatin calcium ✓	10 mg 20 mg	Tablet		10 mg	oral	Once Daily	For 90 day (s)				

Physician Signature:

Pharmacist Signature:

Patient Signature:

NON-PHARMACOLOGICAL INTERVENTIONS



Weight loss plan (~ 5-10%)

Limit his physical activity

Stable & excess fluid removed? encourage physical activity



- **Restrict dietary sodium** (<2g/day)
- **Restrict fluid** intake (2L/day)
- DASH diet (fruit, vegetables, and fish, as well as poultry and nuts)
- Reduce intake of saturated fats <7% of total calories, trans fatty acids <1% of total calories and cholesterol <200 mg/day.



- **Avoid** tight socks or stockings that slow blood flow to the legs and cause clots.
- Use pillows to prop up head



4

Counseling and Monitoring



Counselling

Information should be provided to the patient about the medications used to treat his heart failure



ACEI (Enalapril)

- Take your **first dose** before bedtime
- When getting out of bed or standing up **move slowly**
- Restrict food rich in **potassium**

Bisoprolol



- After the first dose be careful operating heavy machinery or driving until are aware of how the drug affects you
- Move slowly when getting up
- Limit food rich in **SALTS (calcium, sodium, magnesium)**

Diuretics



- **Take the pill in the morning**

SL nitroglycer



- **1 tablet** may be used **every 5 minutes** **as needed** for chest pain, for up to 15 minutes.
- Do not take **more than 3 tablets** in 15 minutes
- place the tablet under your tongue and wait for it to dissolve.
- You may feel **burning or tingling in your mouth** as the tablet dissolves

Counselling

Information should be provided to the patient about the medications used to treat his heart failure

Clopidogrel plus low dose aspirin



- Take these **2 together daily**
- The most common side effects of Clopidogrel are **getting out of breath** and **bleeding** more easily than normal.

Monitoring (Non-laboratory parameters):



- Electrocardiogram (ECG)
- 2D Echocardiogram



Chest x-ray

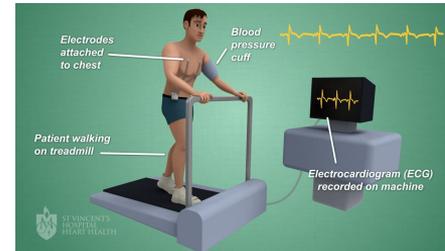


Physical examination



Pulmonary function testing (PFT)

- Blood pressure
- Weight



Exercise stress test

Monitoring (Laboratory parameters):

- Troponin
- BNP
- Electrolytes
- SrCr
- HbA1c
- PT/INR
- Lipid profile

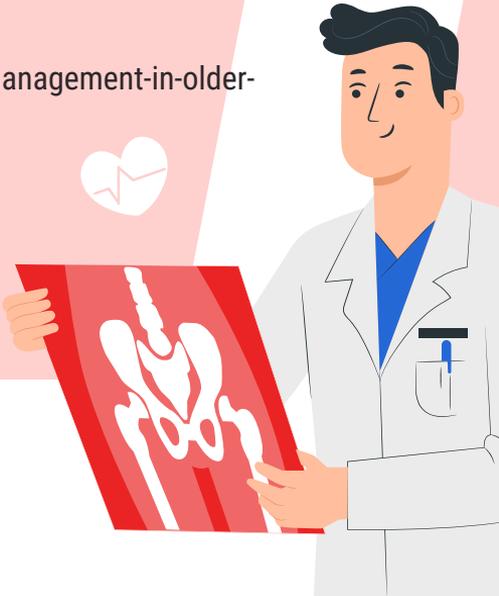


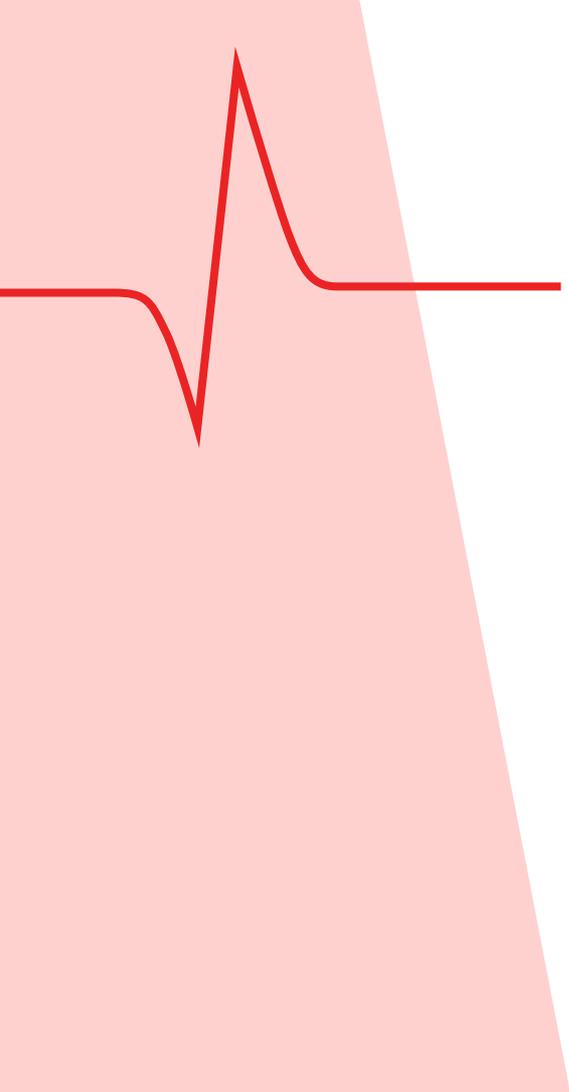
Drug (Brand)	Adverse Effects	Monitoring Parameters
Enalapril	<ul style="list-style-type: none"> - Angioedema - Cough - Hyperkalemia - Hypotension - Renal dysfunction 	<ul style="list-style-type: none"> - Blood pressure - Electrolytes - BUN - Serum Creatinine
Bisoprolol	<ul style="list-style-type: none"> - Bradycardia - Heart block - Bronchospasm - Hypotension - Worsening HF 	<ul style="list-style-type: none"> - BP - HR - ECG - S&S of worsening HF - Blood glucose
Spironolactone	<ul style="list-style-type: none"> - Hypovolemia - Hypotension - Hyponatremia - Hyperkalemia - Hypomagnesemia - Hypocalcemia 	<ul style="list-style-type: none"> - Electrolytes - BUN - BP - SrCr - Changes in weight
Bumetanide	<ul style="list-style-type: none"> - Hypovolemia - Hypotension - Hyponatremia - Hypokalemia - Hypomagnesemia - Hypocalcemia 	<ul style="list-style-type: none"> - Electrolytes - BUN - BP - SrCr - Changes in weight
SL Nitroglycerin	<ul style="list-style-type: none"> - Hypotension - Headaches - Lightheadedness 	<ul style="list-style-type: none"> - BP - HR
Clopidogrel	<ul style="list-style-type: none"> - Bleeding - Bradycardia - Hyperuricemia 	<ul style="list-style-type: none"> - HR - PT
Aspirin low dose	<ul style="list-style-type: none"> - gastrointestinal ulcerations - Bleeding 	<ul style="list-style-type: none"> - PT

REFERENCES

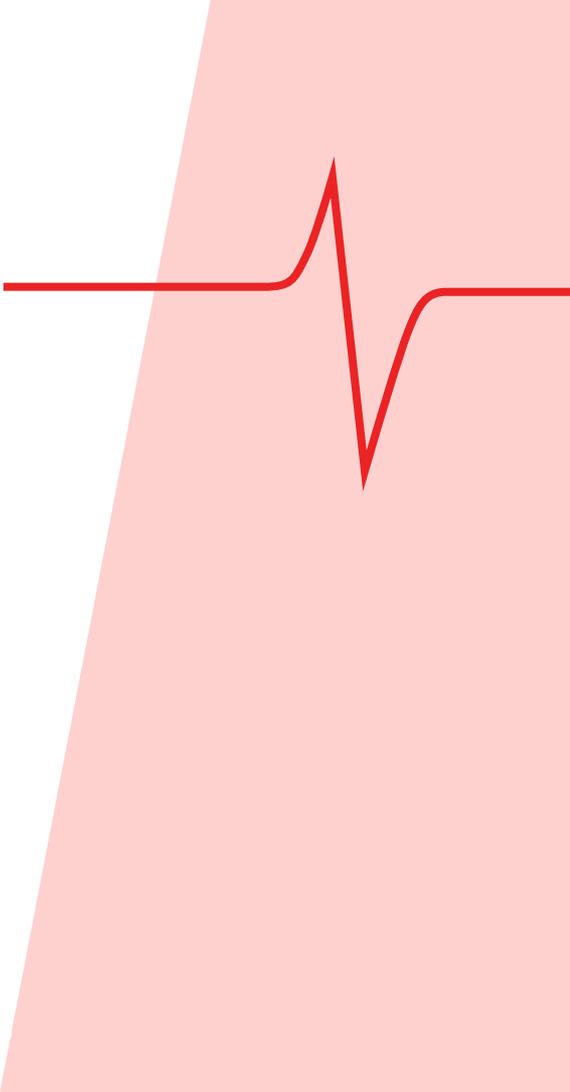


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A red ECG line is positioned on the left side of the image, set against a light red background. The line starts with a flat segment, followed by a sharp upward spike, a smaller downward dip, and then returns to a flat segment.

THANKS!

A red ECG line is positioned on the right side of the image, set against a light red background. The line starts with a flat segment, followed by a sharp downward dip, a smaller upward spike, and then returns to a flat segment.