بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

# Temporary Pacemaker






LT NASREEN

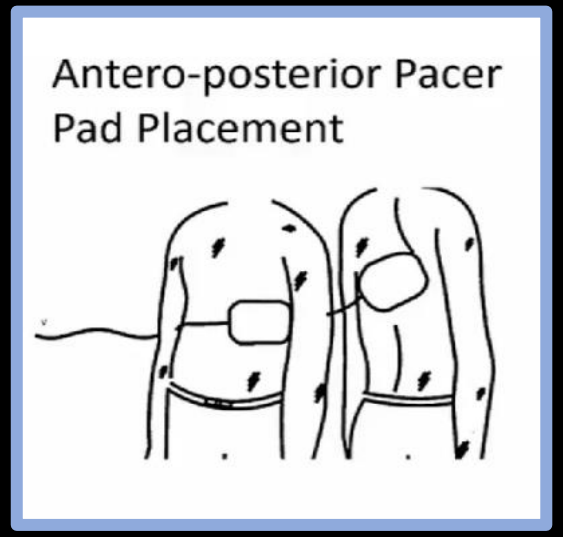
# LEARNING OBJECTIVES

After this presentation, you will be able to:

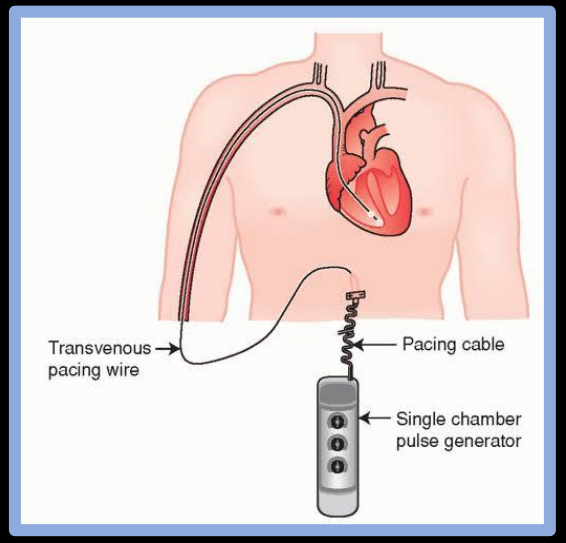
- Define a temporary pacemaker and its types
- Understand why it is used after CABG
- Describe basic pacemaker settings
- Define mode of pacing
- Identify nursing responsibilities
- Nursing care for temporary pacemaker after CABG

# DEFINITION

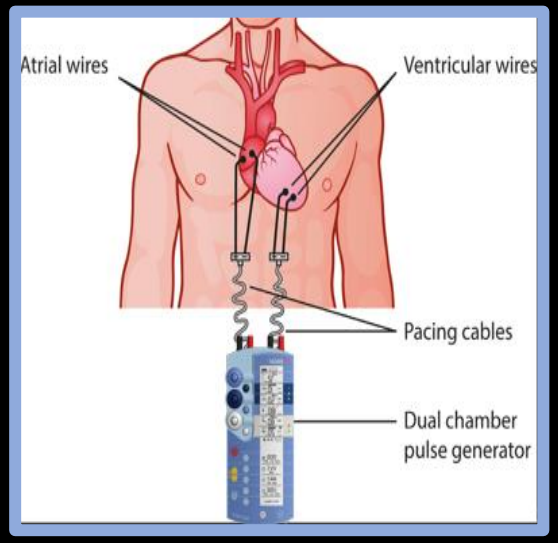
A **TEMPORARY PACEMAKER** is a device that gives electrical impulses to the heart when the heart rate is too slow or conduction is abnormal.
The three main types are….




2.Transcutaneous




1.Transvenous



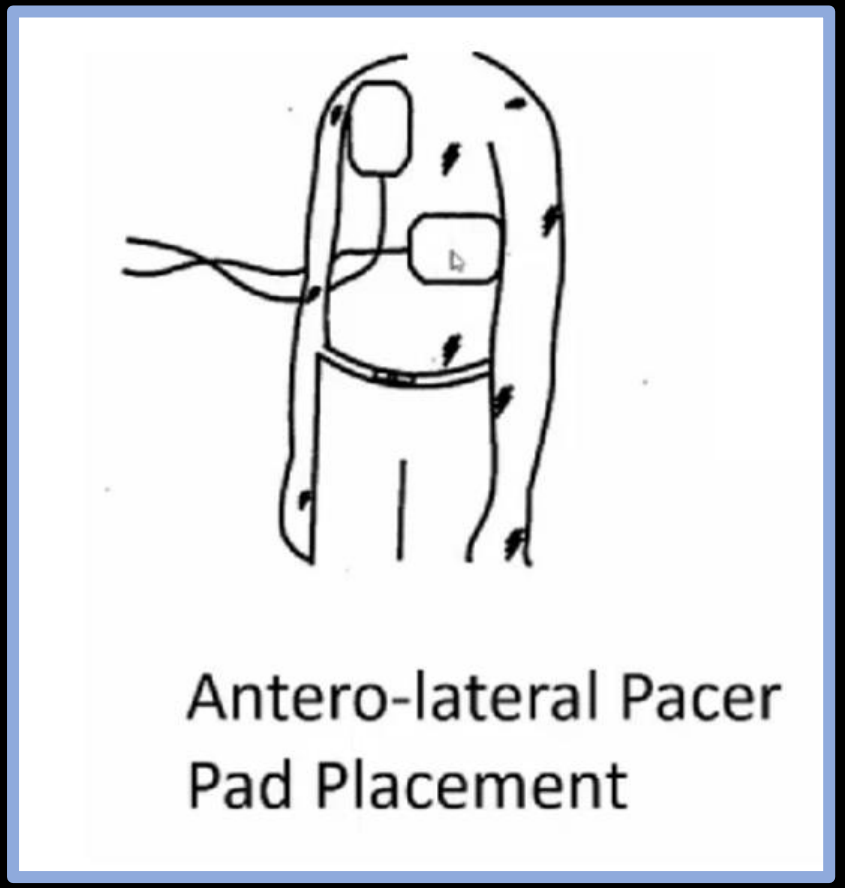

3.Epicardial

# WHY PACING COMMON AFTER CABG?

- Surgical Stress
- Bradycardia (slow heart rate)
- Atrioventricular (AV) Block
- Tachyarrhythmias (Fast Heart Rates)
- Optimize cardiac output

# TRANSCUTANEOUS PACING

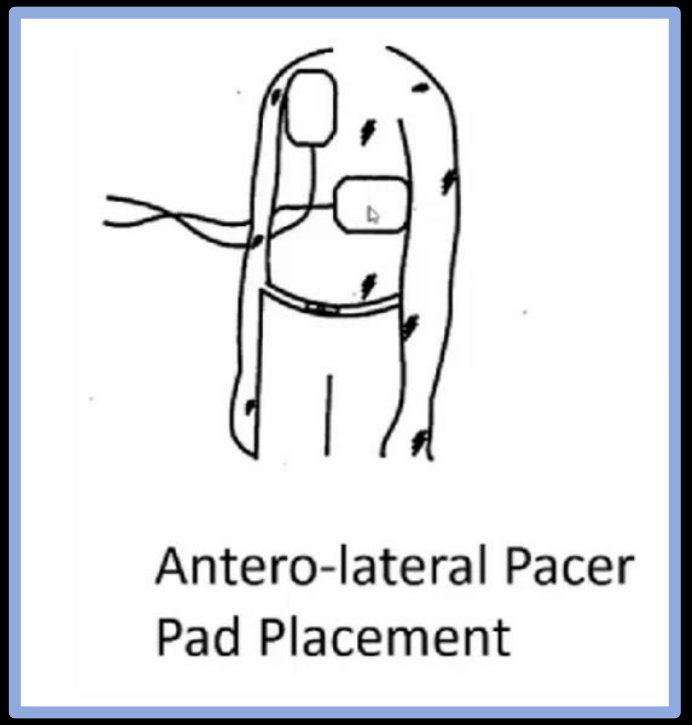
**Transcutaneous pacing (TCP)** is a temporary, **noninvasive procedure** used in emergency and critical care settings to treat hemodynamically unstable bradycardia and certain heart blocks that do not respond to medications like atropine. It works by delivering electrical impulses through **adhesive electrode pads** placed on the chest, stimulating the heart to beat at a controlled rate



# STEP 1:

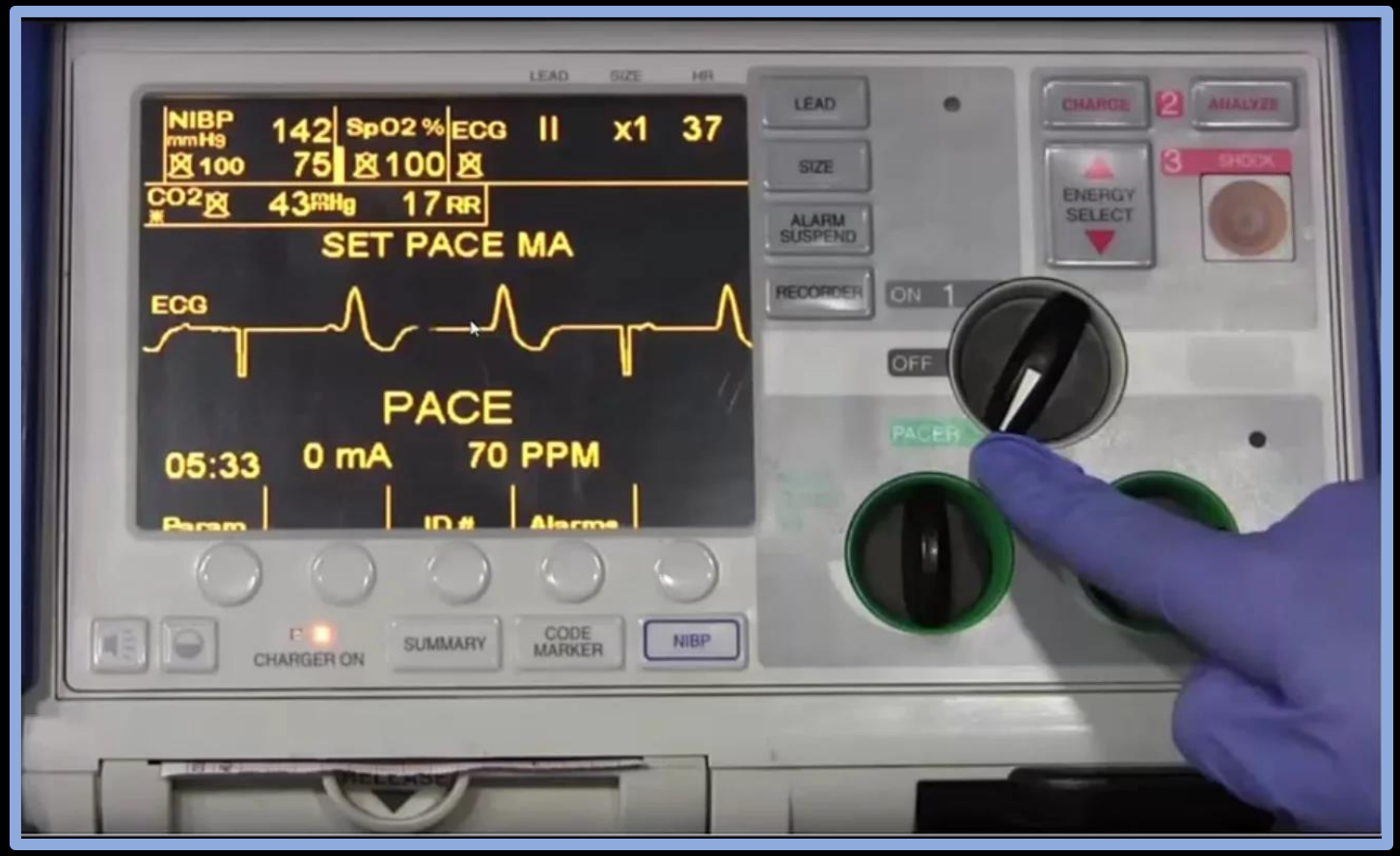
- Apply the pacing electrodes  and consider sedation
- Avoid placing the pads over an implanted device.



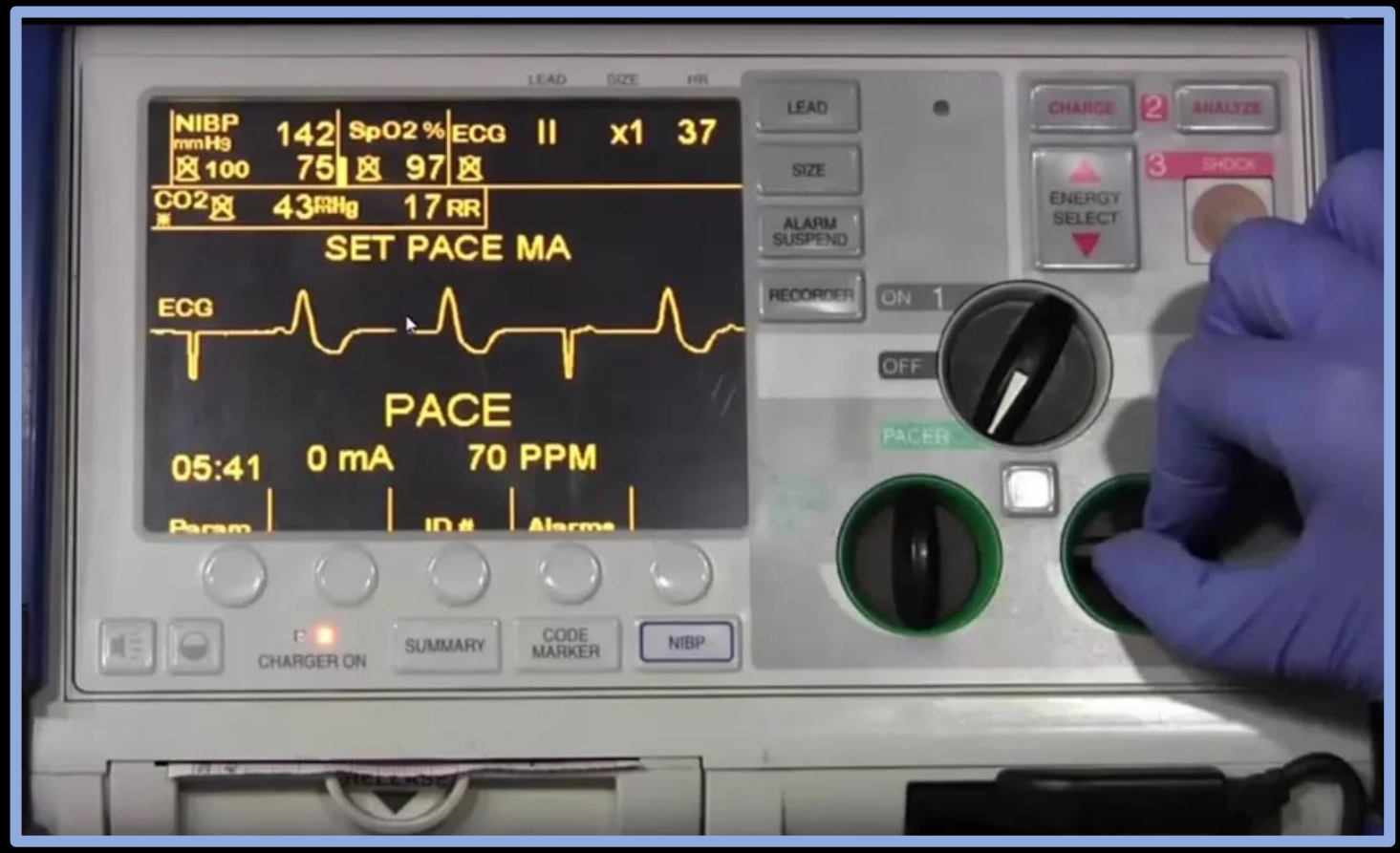
# STEP 2:

**Turn on the monitor and set it to "pacing mode"**



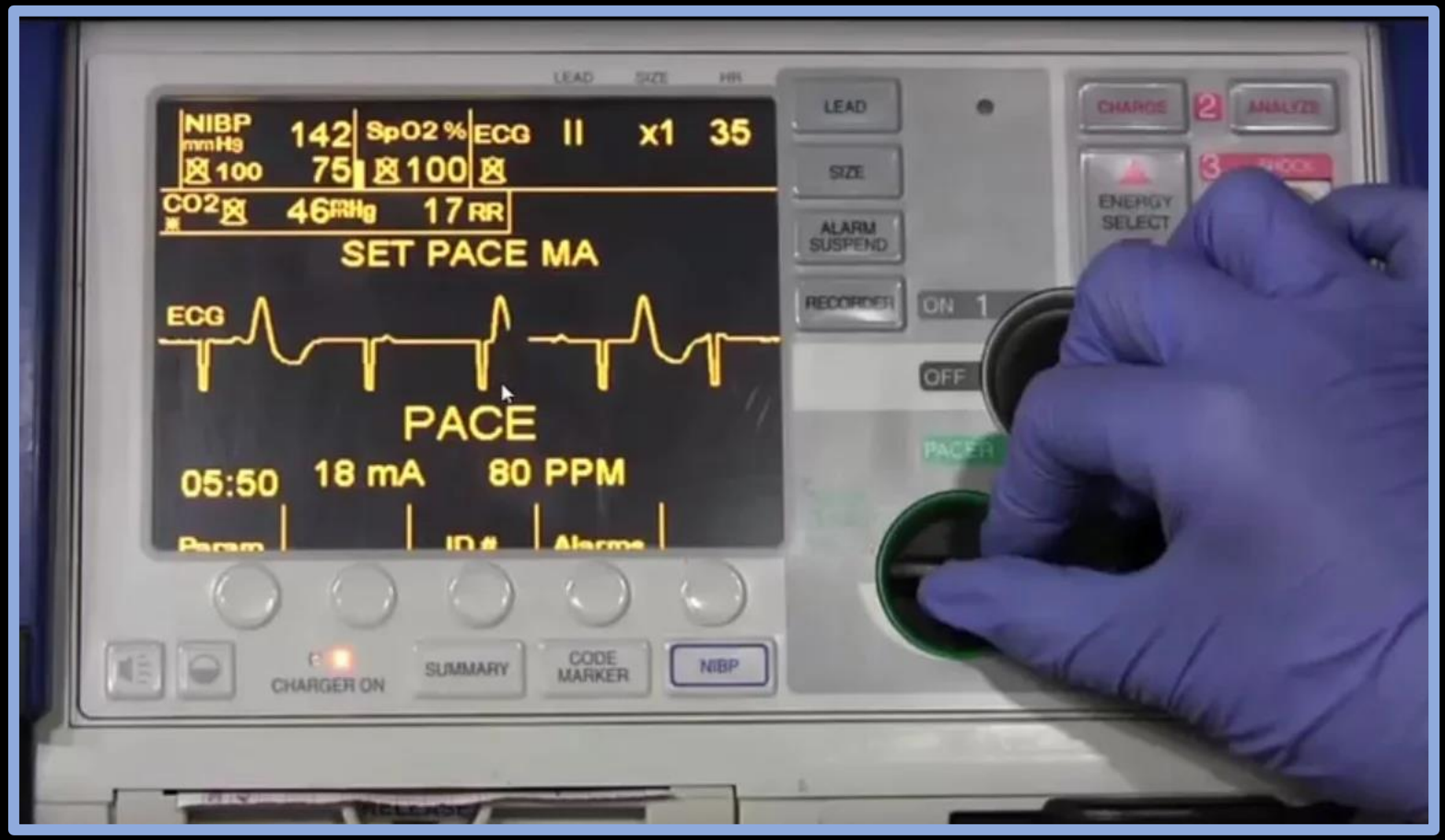
# STEP 3:

- Select the pacing rate using the rate button (generally 60-70 bpm is adequate)



# STEP 4:

- Increase current output from minimal until capture is achieved



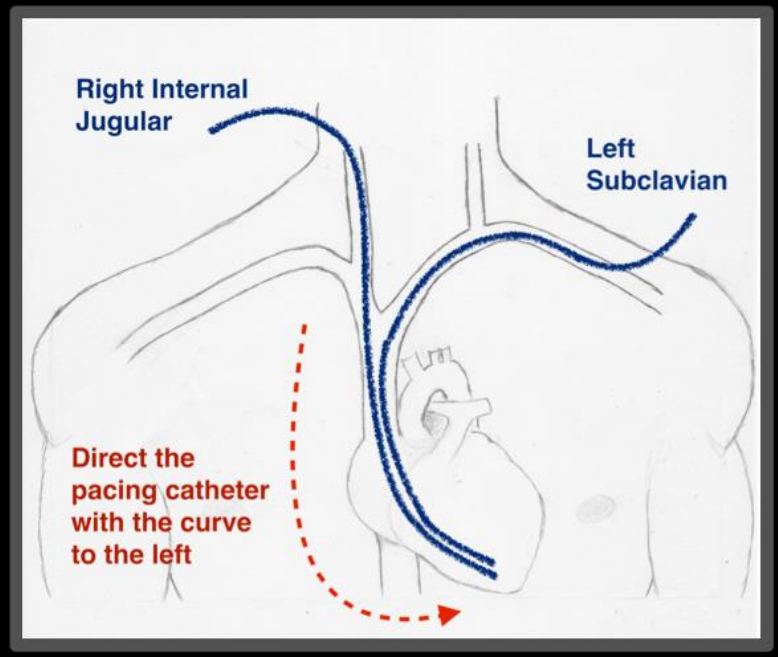
# STEP 5:

**Confirm mechanical capture with pulse or ultrasound**

- Transcutaneous pacing delivers A heavy electrical current through the chest wall, causing chest muscles to twitch. This twitching creates false pulses
- A heart monitor may show A clear electrical spike but the heart muscle itself might still fail to squeeze.
- Bedside ultrasound allows us to look directly at the heart chambers in real time to see if the heart wall is physically moving in sync with the device's.

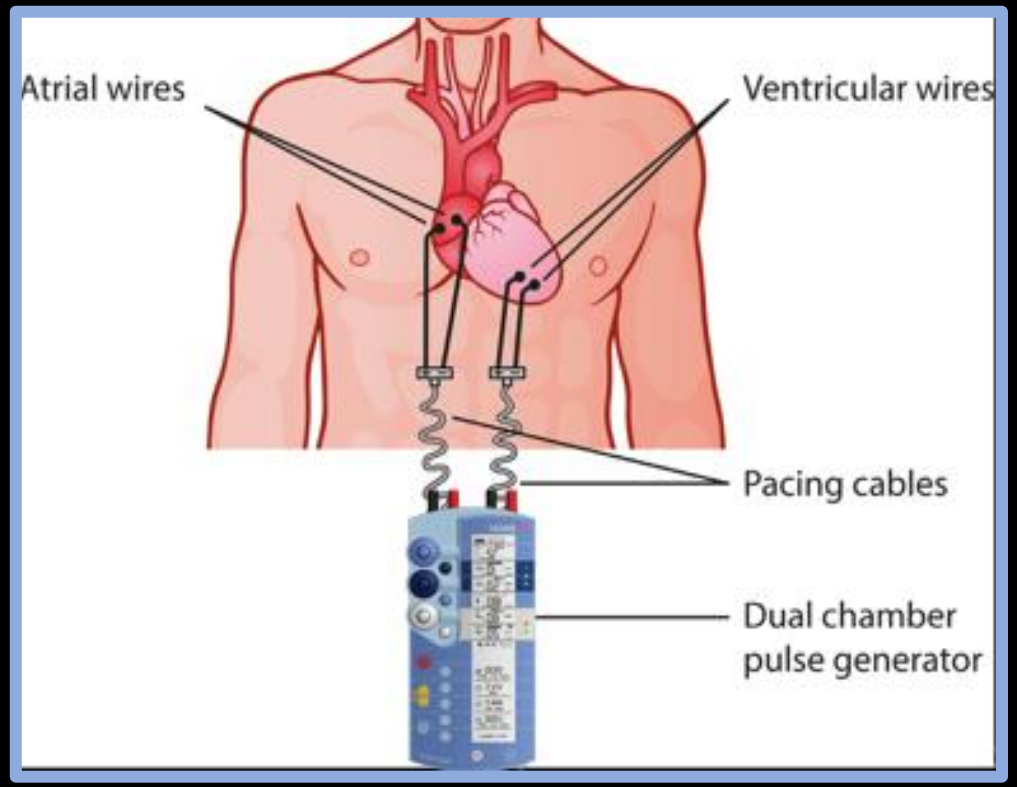
# Transvenous pacing

Transvenous cardiac pacing involves threading an electrode catheter through a central vein into the right ventricle or atrium to deliver electrical impulses to the heart. It is a temporary, life-saving procedure primarily used for patients with profound, symptomatic bradycardia or unstable tachydysrhythmias unresponsive to medication or non-invasive pacing



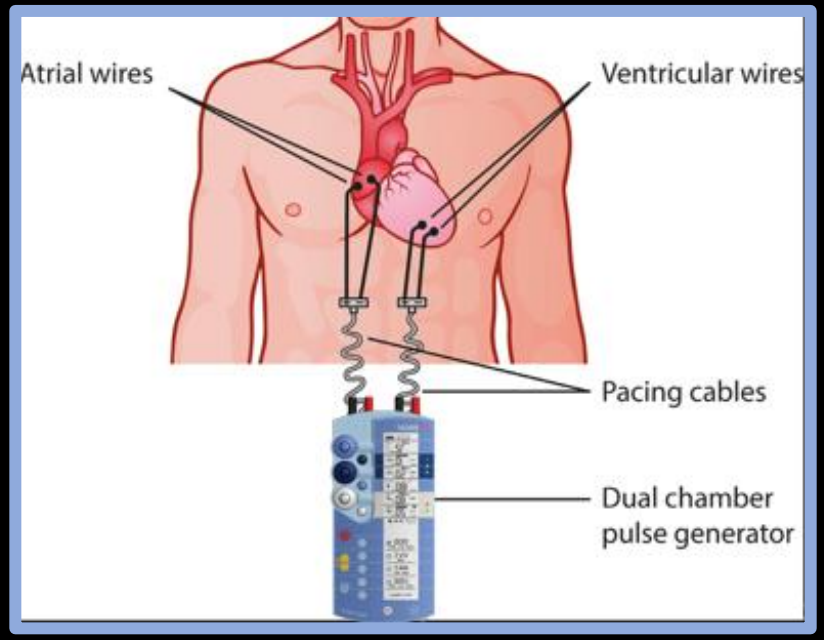
# EPICARDIAL PACING

Epicardial pacing involves placing temporary wires directly onto the outer surface of the heart (the epicardium) during open-heart surgery.



# COMPONENTS

- Epicardial pacing wires
- External pacemaker generator
- Connecting cables

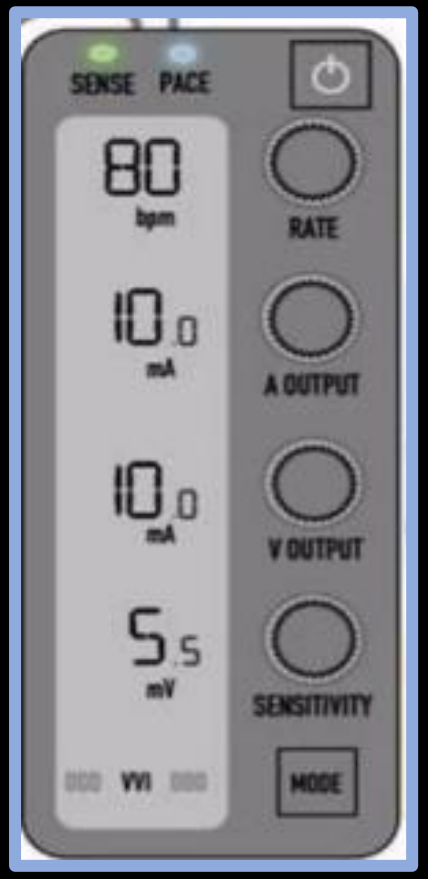


# Basic Pacemaker Settings

| SETTING | MEANING |
|---|---|
| Mode | how the device monitors and delivers electrical impulses to the heart |
| Rate | Heart beats per minute |
| Output | Strength of electrical impulse |
| Sensitivity | Ability to detect patient's own beats |

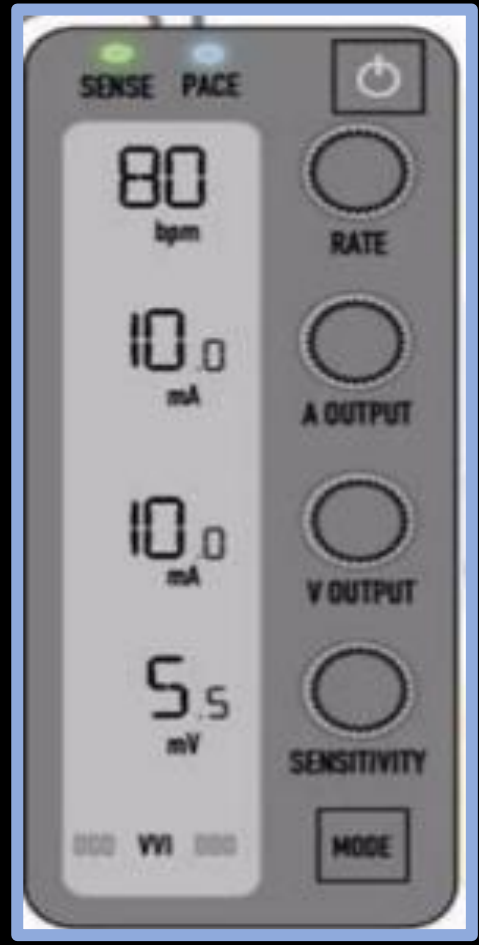
# RATE

In cardiac pacing, **rate** means the number of electrical pulses the device sends to the heart each minute, measured as beats per minute (bpm).



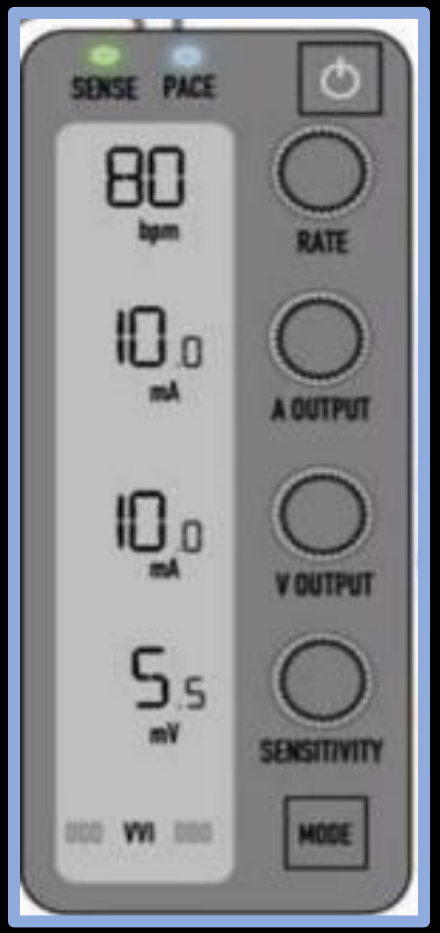
# OUTPUT/PACED

- Controls the energy sent to the heart.
- Measured in milliamperes (mA).
- Goal is forcing the heart muscle to depolarize and beat when intrinsic rates are too slow.
- Checked by adjusting the mA output down until a loss of capture occurs, then setting the operating output 2 to 3 times higher than that threshold.



# SENSE

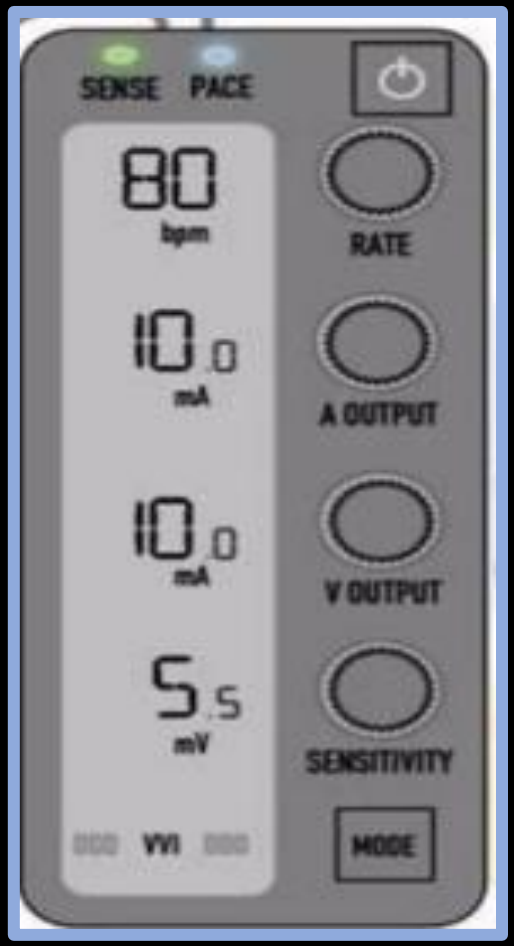
Controls what electrical signals the device listens to from the heart.
Measured in millivolts (mv).
Goal is **inhibition**: letting the natural heartbeat work by holding back a pacer spike when a native p wave or r wave is detected.



| Parameter | Typical Minimum | Typical Maximum |
|---|---|---|
| **Output (mA)** | 0.1–0.5 mA | 20–25 mA |
| **Sensitivity (mV)** | 0.5 mV | 20 mV |

# MODE OF PACING

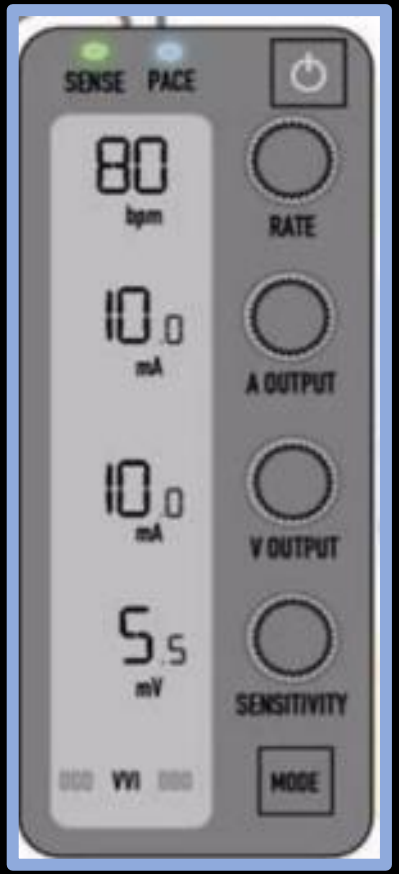
A pacemaker mode is the pre-programmed setting that dictates how the device monitors and stimulates the heart. These modes are described using standardized 3- to 5-letter codes (the NBG code), where the letters represent the **chamber paced**, **chamber sensed**, and the **device's response** to sensed heartbeats (e.g., inhibiting or triggering a pulse).



# NBG PACEMAKER CODE

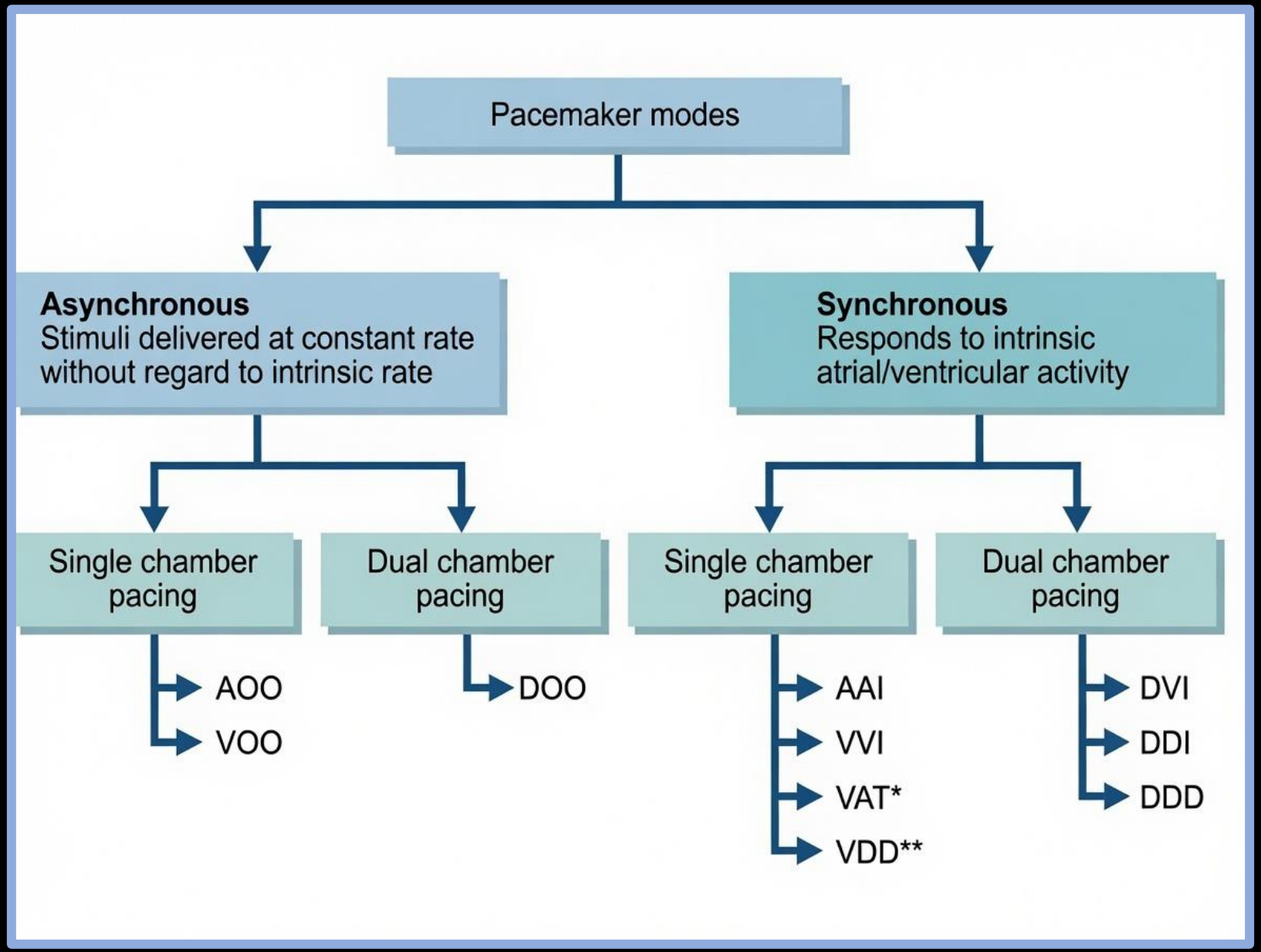
The NBG Pacemaker Code is a standardized five-letter classification system created by the North American Society of Pacing and Electrophysiology (NASPE) and the British Pacing and Electrophysiology Group (BPEG).

**O** = None
**T** = Triggered/delivering a pulse
**I** = Inhibited/holding back the pulse
**V** = Ventricle
**A** = Atrium
**D** = Dual (A+V)(T+I)
**R** = Rate Modulation



| Box 1. **NBG coding system for pacemaker mode** | | | |
|---|---|---|---|
| **I** | **II** | **III** | **IV** |
| **Chamber(s) paced** | **Chamber(s) sensed** | **Response to sensing** | **Rate modulation** |
| A = atrium | O = none | O = none | O = none |
| V = ventricle | A = atrium | I = inhibited | R = rate adaptive |
| D = dual | V = ventricle | T = triggered | |
| | D = dual | D = dual | |

NBG = NASPE (North American Society for Pacing and Electrophysiology) and BPEG (British Pacing and Electrophysiology Group) Generic


Pacemaker modes
Asynchronous
Stimuli delivered at constant rate without regard to intrinsic rate
Synchronous
Responds to intrinsic atrial/ventricular activity
Single chamber pacing
Dual chamber pacing
Single chamber pacing
Dual chamber pacing
AOO
VOO
DOO
AAI
VVI
VAT*
VDD**
DVI
DDI
DDD

# HANDING TAKING CHECK LIST

- Mode
- Heart rate & rhythm
- Blood pressure
- Pacemaker settings: Ensure output is set to 2 to 3 times the capture threshold and sensitivity detects intrinsic beats
- Pacing spikes on ECG
- Wire insertion site
- Battery Power

# Nursing Assessment

**ECG monitoring:** evaluate the rhythm strip for fundamental pacemaker functions, such as proper pacing (pacing spikes present), sensing (pacemaker waits if the heart beats on its own), and capture (spikes followed immediately by a P wave or QRS complex).

## Failure to Capture (No Capture)

### Causes

- Lead displacement
- Increased pacing threshold
- Battery depletion
- Electrolyte imbalance (especially hyperkalemia)
- Myocardial ischemia or infarction
- Loose cable connections

# Failure to Sense (No Sensing )

**Causes**

- Lead displacement
- Poor lead contact
- Sensitivity set too low
- Battery malfunction

# Immediate nursing actions if pacing is ineffective:

- Assess patient first (pulse, BP, consciousness).
- Check connections and wires.
- Verify rate, output, sensitivity.
- Notify physician/cardiac team.
- Prepare emergency pacing if needed.

# Nursing Care for Temporary Pacemaker After CABG

After **CABG surgery**, temporary epicardial pacing wires are commonly placed to manage postoperative bradyarrhythmias, heart block, or low cardiac output. The nurse plays a vital role in ensuring the pacemaker functions properly and in preventing complications.

## 1. Continuous Cardiac Monitoring

- Monitor ECG continuously.
- Assess heart rate and rhythm for bradycardia or arrhythmias.
- Verify that the pacemaker is functioning correctly.

# Nursing Care cont.…

## 2. Monitor Hemodynamic Status

- Blood pressure Heart rate
- Mean arterial pressure (MAP)
- Oxygen saturation ($SpO_2$)
- Central venous pressure (if available)
- Cardiac output/index (if monitored)

## 3. Check Pacemaker Settings: Verify and document:

- Pacing mode (e.g., VVI, DDD)
- Rate (beats/min)
- Output (mA)
- Sensitivity (mV)
- Battery status
- Alarm settings

# Nursing Care cont….

## 4. Inspect Epicardial Pacing Wires

- Ensure wires are securely connected.
- Prevent accidental pulling or dislodgement.
- Keep wires organized and clearly labeled (atrial and ventricular).
- Maintain a sterile dressing .

## 5.Correct Reversible Causes of Pacing Failure

Monitor laboratory values and correct abnormalities:

- Potassium ($K^+$): **3.5–5.0 mmol/L**
- Magnesium ($Mg^{2+}$): **1.7–2.4 mg/dL**
- Calcium ($Ca^{2+}$): (1.1 to 1.3 mmol/L)

Electrolyte imbalances can increase the pacing threshold and cause loss of capture.

# The devices we are using in ITC










THANK
YOU!


QUESTIONS?