

# ECG100: ECG-Guided PICC Tip Confirmation

## Study Guide

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Completion education. No accredited nursing contact hours awarded.

## Course Description

Master intracavitary ECG (IC-ECG) tip confirmation for PICCs and CVADs: the P-wave method for locating the cavoatrial junction, equipment and setup, troubleshooting, contraindications, and documentation per INS 2024 standards.

## How to Use This Guide

This is a condensed, high-yield reference. Skim the key terms and the quick-reference tables, confirm you can explain each high-yield point, then read the section summaries to spot any gap. Return to the on-site lesson for full detail, and attempt the post-test cold. Passing score: 90%.

## Key Terms at a Glance

| Term                             | What it means                                                                                                     |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------|
| withdraw                         | until the P wave returns to its tall, positive maximum.                                                           |
| No P-wave change while advancing | suspect catheter malposition (e.g., into the jugular, axillary, or contralateral vein) — reposition and reassess. |
| Loss of signal                   | check the saline column for air/clot, connections, and that the exploring lead is selected.                       |
| Erratic tracing                  | reduce electrical interference;                                                                                   |

## Section-by-Section Summary

The key idea of each lesson section, condensed to the essentials. Use it to review fast and spot any gap before the post-test.

### ECG-Guided PICC Tip Confirmation

Estimated time: ~2 hours | Completion education; no accredited contact hours | Aligned to INS Standards of Practice (2024)

#### Why tip location matters

The single most important determinant of safe central venous access is correct catheter tip position. The target for a PICC or CVAD is the lower third of the superior vena cava (SVC) at or near the cavoatrial junction (CAJ) .

#### The principle: the P wave is your map

IC-ECG uses the catheter (a column of conductive saline or a dedicated electrode) as an exploring ECG lead. As the catheter tip advances down the SVC toward the sinoatrial node in the high right atrium, the P wave on the tracing grows taller .

#### Equipment & setup

- An IC-ECG–capable tip-location system (or an adapter that converts the guidewire/saline column into the exploring electrode).
- Standard 3- or 5-lead surface ECG to establish a baseline tracing and a reference P wave.
- Sterile column of 0.9% sodium chloride (or the dedicated guidewire electrode) to conduct the intracavitary signal.
- Confirm a clean baseline surface ECG with a clearly visible P wave before advancing — no usable baseline P wave is a contraindication (see below).

#### Procedure (overview)

- Place surface ECG leads and capture a baseline rhythm with a normal P wave.
- Switch to the intracavitary lead (saline column or guidewire electrode) once the catheter is in the venous system.
- Advance slowly, watching the P wave. It enlarges as the tip nears the CAJ.
- Position the tip where the P wave is maximal (just before any negative deflection appears).
- If a biphasic/negative P wave appears, the tip is in the atrium — withdraw until the P wave returns to its tall, positive maximum.
- Secure, then document the tracing/position.

#### Contraindications & when IC-ECG won't work

IC-ECG relies on an identifiable, reliable P wave. It is not appropriate (and a confirmatory chest x-ray or alternative method is required) when the patient has:

- Atrial fibrillation or atrial flutter (no discrete P wave).
- A paced atrial rhythm or other absent/abnormal P waves.
- Severe tachyarrhythmia obscuring the P wave.

In these cases, use the system's fallback (e.g., x-ray, fluoroscopy, or magnetic navigation per facility protocol).

## Troubleshooting

- No P-wave change while advancing: suspect catheter malposition (e.g., into the jugular, axillary, or contralateral vein) — reposition and reassess.
- Loss of signal: check the saline column for air/clot, connections, and that the exploring lead is selected.
- Erratic tracing: reduce electrical interference; confirm grounding and lead contact.

## Documentation

Record: the method used (IC-ECG), that a maximal positive P wave was obtained at final position (or the reason IC-ECG was not used and the alternative confirmation employed), final external catheter length, and the saved/printed tracing if your system supports it. IC-ECG with a confirmed maximal P wave is widely accepted as an alternative to confirmatory chest x-ray for tip location in patients with a suitable P wave.

## Key take-aways

- Target tip location is the lower SVC at the cavoatrial junction.
- The intracavitary P wave grows to its maximum at the CAJ ; a biphasic/negative P wave means the tip is in the atrium — withdraw.
- IC-ECG requires a reliable baseline P wave — atrial fibrillation/flutter and paced atria are contraindications.
- Real-time IC-ECG can replace confirmatory chest x-ray in appropriate patients and lets you correct malposition during the procedure.
- Document the method, the maximal-P-wave confirmation, and final catheter length.

## Concepts Tested on the Post-Test

Each item is a topic the post-test probes. Exact wording may differ; the underlying concept is what you must be able to reason through. If any feels unfamiliar, revisit that section above.

1. The target tip location for a PICC confirmed by IC-ECG is:
2. As the catheter tip advances toward the cavoatrial junction, the intracavitary P wave:
3. A biphasic or negative P wave during IC-ECG indicates:
4. Which conducts the intracavitary signal in a saline-column IC-ECG setup?
5. IC-ECG tip confirmation is CONTRAINDICATED in which rhythm?
6. Before advancing, the clinician should confirm:
7. If the P wave does not change at all as the catheter advances, you should suspect:
8. Final tip position by IC-ECG should be set where the P wave is:
9. A key clinical advantage of IC-ECG over routine confirmatory chest x-ray is:
10. Documentation after IC-ECG placement should include:
11. If the patient has a paced atrial rhythm, the appropriate action is:
12. Sudden loss of the intracavitary signal most likely indicates:

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