

Ultrasound-Guided Vascular Access: A Practical Clinical Guide

Audience: Anaesthesia, ICU, ED and acute care clinicians | Educational resource for focused bedside ultrasound practice

A concise guide to vessel selection, short-axis and long-axis techniques, needle-tip control and documentation for safer central and peripheral access.

Important: These guides are educational summaries. Clinical use should follow local scope of practice, credentialing, infection-control policies, image archiving rules and escalation pathways.

Why ultrasound guidance matters

- Real-time ultrasound guidance improves first-pass success and reduces complications, especially for internal jugular central access and difficult peripheral access.
- Best practice is not simply locating the vessel - it is confirming vessel identity, patency and real-time needle entry.

Technique fundamentals

- Use a high-frequency linear probe whenever anatomy allows. Optimise depth and gain so the target vessel occupies the centre of the screen.
- Short-axis out-of-plane is often easier to learn; long-axis in-plane can improve continuous needle visualisation. Many operators combine both.
- The crucial safety step is continuous awareness of the needle tip, not just the needle shaft.

A practical checklist

- Confirm indication, consent and asepsis.
- Assess vessel size, compressibility and surrounding structures before puncture.
- Use dynamic real-time imaging during cannulation.
- Document the site, ultrasound guidance, vessel patency and number of attempts according to local policy.

When to escalate

- Escalate or change site if anatomy is distorted, the vessel is thrombosed, the patient is profoundly unstable or repeated attempts are occurring.
- Ultrasound reduces but does not eliminate risks such as arterial puncture, haematoma, pneumothorax, malposition and infection.

Technique comparison

Approach	Strength	Watch-out
Short-axis / out-of-plane	Rapid vessel identification	Needle tip can be lost if only the shaft is seen

Long-axis / in-plane	Continuous needle visualisation	More difficult alignment in small vessels
Oblique	Useful hybrid approach	Requires good hand-eye coordination

Selected references

- NICE Technology Appraisal TA49. Guidance on the use of ultrasound locating devices for placing central venous catheters. Last reviewed 2016.
- Spencer KT, et al. Guidelines for Performing Ultrasound-Guided Vascular Cannulation. J Am Soc Echocardiogr. 2025 update / ASE statement.
- American College of Emergency Physicians. Emergency Ultrasound Imaging Criteria Compendium.