



Title	Effectiveness and Cost Effectiveness of Ultrasound Locating Devices for Central Venous Access: A Systematic Review and Economic Evaluation
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Aim

To investigate the clinical effectiveness and cost effectiveness of ultrasound locating devices (ULD).

Conclusions and results

Twenty RCTs of variable methodological quality were identified. Trial evidence suggests that 2-D US is significantly better than landmark for all 5 outcome variables measured for insertions into the internal jugular vein (IJV) in adults. The results also favor 2-D US for insertions into the subclavian vein (SV) and femoral vein (FV) in adults (based on only 1 RCT each). Results of the 3 infant studies on insertion into the IJV suggest that 2-D US has a statistically significant beneficial effect. For Doppler US, only insertions into the IJV in adults (4 RCTs) indicated improved failure and complication rates over landmark. The other 3 Doppler US RCTs for SV insertions in adults and IJV insertions in children offer little support for Doppler over landmark methods. For operators proficient with the landmark method, Doppler US increased the number of failed catheter placements in attempts to catheterize the SV. A spreadsheet decision-analytic model was used to assess cost effectiveness. Because Doppler US is less common than 2-D US, and the effectiveness evidence suggests Doppler is less effective compared with 2-D US, 2-D US compared with landmark was the focus. Costing analysis indicates that the marginal cost of using US for CVA is less than £10 per procedure. Economic modeling indicates that 2-D US in CVA is likely to save NHS resources and improve failure and complication rates. A saving of £2000 per 1000 procedures has been estimated. Sensitivity analysis suggests that the resource saving holds for the three main insertion sites in adults and children.

Recommendations

Evidence suggests that 2-D US-guided CVA particularly via the IJV in adults and children is effective and cost effective. Implications of wider use of 2-D US for CVA are identifiable. Training implications are significant if the

US-guided procedure is to be advocated. In emergencies, landmark insertions may still be appropriate. Training in US-guided access should allow operators to remain skilled in the landmark methods.

Methods

Major bibliographic databases were searched up to October 2001 for references on ULDs and central venous lines. Randomized controlled trials (RCTs) were targeted. Only studies with the following features were included: 2-D US or Doppler US compared with the landmark method or a surgical cut-down procedure; study populations requiring placement of central venous lines; and measuring the outcomes listed below. A systematic review of economic analyses was also undertaken.

Further research/reviews required

No RCT evidence was found for the effectiveness of using US for peripherally inserted central catheters or for US versus surgical cut-down. Possible economic and clinical implications of CVA by nurse operators in the NHS may be another area for further research since feasibility has already been demonstrated.