NATIONAL INSTITUTE FOR HEALTH AND CLINICAL EXCELLENCE

GUIDANCE EXECUTIVE (GE)

Review of 49 Guidance on the use of ultrasound locating devices for placing central venous catheters

This guidance was issued in September, 2002
The review date for this guidance is April, 2010

Recommendation

- The guidance should remain on the 'static guidance list'. That we consult on the proposal.

Consideration of options for recommendation:

Options	Comment
A review of the guidance should be planned into the appraisal work programme.	There is insufficient new evidence to suggest any change to the existing guidance
The decision to review the guidance should be deferred [to a specified date].	There are no ongoing studies identified that would suggest an appropriate review date.
A review of the guidance should be combined with a review of a related technology and conducted at the scheduled time for the review of the related technology.	No related technology
A review of the guidance should be combined with a new appraisal that has recently been referred to the Institute.	No new appraisal
A review of the guidance should be incorporated into an on-going clinical guideline.	No relevant clinical guideline
A review of the guidance should be updated into an on-going clinical guideline.	No relevant clinical guideline
A review of the guidance should be transferred to the 'static guidance list'.	**There is insufficient new evidence to suggest any change to the existing guidance.**

Original remit(s)

To advise on the clinical and cost-effectiveness of ultrasonic locating devices for placement of central venous lines; and on the best strategy for implementation in the NHS, if the technology is found to be clinically and cost-effective.

Current guidance

1.1 Two-dimensional (2-D) imaging ultrasound guidance is recommended as the preferred method for insertion of central venous catheters (CVCs) into the internal jugular vein (IJV) in adults and children in elective situations.

1.2 The use of two-dimensional (2-D) imaging ultrasound guidance should be considered in most clinical circumstances where CVC insertion is necessary either electively or in an emergency situation.

1.3 It is recommended that all those involved in placing CVCs using two-dimensional (2-D) imaging ultrasound guidance should undertake appropriate training to achieve competence.

1.4 Audio-guided Doppler ultrasound guidance is not recommended for CVC insertion.

Relevant Institute work

Ultrasound-guided catheterisation of the epidural space Interventional procedure IPG249. Issued January 2008

[redacted]

Safety information

A patient at the Manchester Royal Infirmary died in August 2005 of a right haemothorax due to cannulation procedure puncturing the right jugular vein into the right pleural cavity. The central venous catheter had been sited using the landmark technique. The procedure was described as elective but urgent. It was not considered to be emergency surgery. The inquest hearing was in November 2008 and September 2009.

On-going trials

No relevant trials.

Proposed Timing for updating the guidance

If the guidance was updated as an appraisal it would be scheduled into the work programme accordingly.

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New evidence

The search strategy from the original assessment report was re-run on the Cochrane Library, Medline, Medline(R) In-Process and Embase. References from 2008 onwards were reviewed. The results of the literature search are discussed in the ‘Appraisals comment’ section below.

Implementation

A submission from Implementation is attached at the end of this paper.

Equality and diversity issues

No equality and diversity issues have been identified.

Appraisals comment:

A patient at the Manchester Royal Infirmary (MRI) died following a cannulation procedure which caused a puncture to the right jugular vein. The MRI had a local policy, based on their own research, to use the landmark technique (the technology identified as the comparator in the appraisal) for the placement of the catheter rather than the ultrasound technique recommended in TA49. Following the death of the patient, the coroner requested that NICE review the guidance issued in TA49 which was considered to be ambiguous. The coroner's report states that the guidance recommended that clinicians retain the skills to use the landmark technique, but also encouraged them to use ultrasound devices as a matter of course. The reference to retaining the skills of the landmark technique is in the considerations section of the guidance document (section 4.3.6) and is not part of the guidance. The consideration about the landmark technique is made with reference specifically to emergency situations where ultrasound equipment may not be available. The coroner suggested that NICE may want to issue new guidance which is clearer. For its part, the MRI was requested to review its CVC placement policy, any new evidence from NICE (sent to MRI in April 2010), as well as taking into account the most recent ultrasound devices available.

The coroner further suggested that NICE may wish to take account of the research undertaken by the MRI, in addition to any new evidence that has been published. As a result of the letter from the coroner, this review proposal paper for TA49 is being undertaken. In addition to new searches of the evidence, MRI was contacted to provide any further research. No response was received to requests for research. Review proposals for this topic have also been completed in 2005 when it was accepted following consultation that the guidance be placed on the static list. An additional review proposal was completed in October 2008 following a request to review from a stakeholder to reconsider the decision to put this guidance on the static list. Neither review proposals identified evidence that it was considered would change the recommendations in TA49.

The updated literature searches identified two new studies of ultrasound locating devices for the placement of CVCs. One of the studies was carried out in small infants (weighing less than 3 kg) which was an area of further research recommended in TA49. The study, in neonates with a median weight of 1 kg, concluded that 2D ultrasound, with or without colour Doppler, may assist with the localisation of CVCs in some infants (Kuschel et al Journal of Paediatrics and Child Health 2008; 44: 483-487). Another study in adults showed that ultrasound-guided insertion of the CVC resulted in lower access

time and a lower rate of immediate complications (Turker et al Clinics 2009; 64: 989-92). This new evidence does not suggest that the recommendations would change if the appraisal was subject to review.

Summary

Literature searches have revealed no new evidence on ultrasound methods for insertion of central venous catheters that would cause the original recommendations to change. The guidance should therefore remain on the static list.

This review proposal was prompted by the Institute receiving a 'Rule 43' report dated 28th September from HM Coroner for Manchester City district. A Rule 43 report is made if the coroner feels that the evidence gives rise to a concern that circumstances creating a risk of other deaths will occur or continue to exist. A recipient of a Rule 43 report must send a written response within 56 days. The Institute's response to the coroner did not accept that Technology Appraisal Guidance 49 is ambiguous or unclear, but proposed that NICE would now reconsider Technology Appraisal Guidance 49 for review.

The incident referred to in the coroner's report involved the use of a different technique that was a comparator in appraisal (see 'appraisals comment' above). To give advice on a technique other than that referred by the Department of Health is beyond the remit of a Technology Appraisal so the guidance section makes recommendations only on ultrasound methods and makes no reference to any other method. As the Coroner's report indicates, the considerations section notes that *"the landmark method would remain important in some circumstances, such as emergency situations, when ultrasound equipment and/or expertise might not be immediately available. Consequently, the Committee thought it important that operators maintain their ability to use the landmark method and that the method continues to be taught alongside the 2-D-ultrasound-guided technique."*

Guidance executive may wish to consider whether a clarification should be added to the guidance to indicate that the recommendations do not cover techniques that do not involve ultrasound nor the need to maintain skills in other techniques.

GE paper sign off:

Janet Robertson, Associate Director, Technology Appraisals

Commercial in confidence information has been removed

Contributors to this paper:

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NATIONAL INSTITUTE FOR HEALTH AND CLINICAL EXCELLENCE

IMPLEMENTATION DIRECTORATE

Guidance Executive Review

Technology appraisal 49: Central venous catheters - ultrasound locating devices

The NICE implementation directorate has not looked at any routinely collected data in order to determine the uptake of this technology appraisal (TA). However, Abacus International were commissioned to assess uptake of this TA. They looked at the manufacturers sales for specific ultrasounds and carried out a survey designed to assess the level of implementation and impact.

1. Abacus International

1.1 Abacus International (2004) A survey measuring the impact of NICE technology appraisal 49: ultrasound locating devices
Description: A qualitative approach was taken to measure the implementation of TA49 by Abacus International across England & Wales. A postal survey of 250 anaesthetists registered with the Royal College of Anaesthetists and anaesthetists registered as college tutors were selected to ensure a sample of respondents that covered a wide range of anaesthetic departments.

The survey received a 69% response (n=172) four were excluded as they were unaware of TA49 recommendations.

Of the sample, 87% of the respondents carried out 5 or less CVC placements per week, whilst the majority of the remaining respondents carried out 5-15 placements per week.

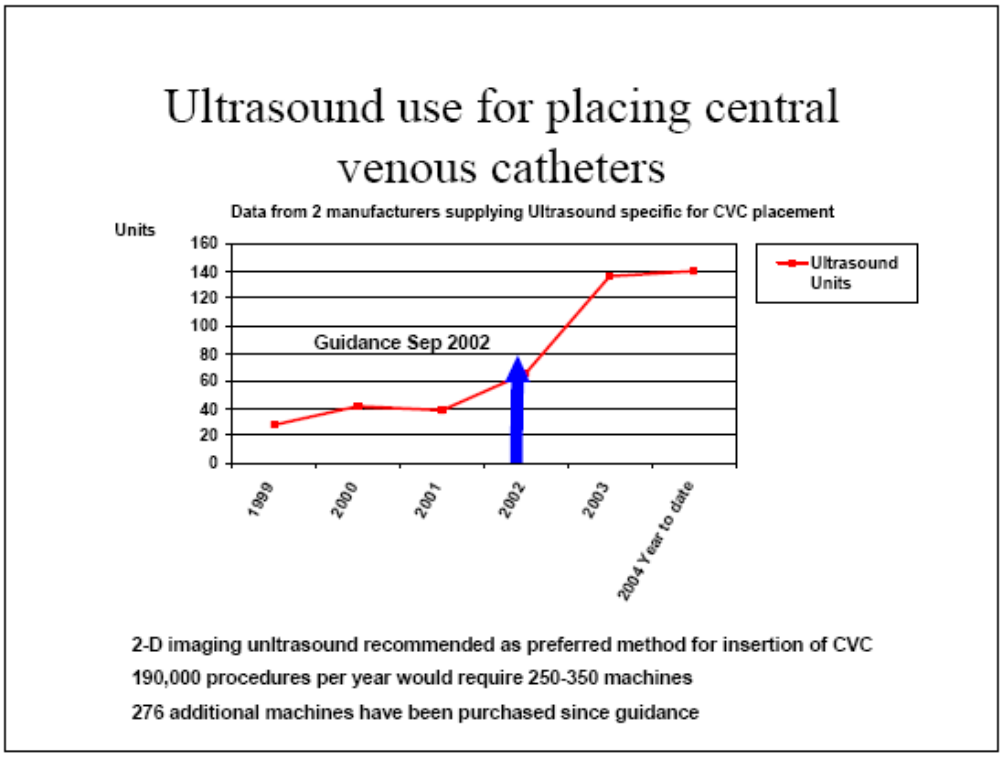
The survey was carried out approximately two years after the publication of the appraisal, and found that although TA49 has had some effect on the

increased use of 2-D imaging ultrasound for CVC placement, access to the ultrasound equipment and the necessary training is restricting full implementation.

1.2 Abacus International (2005) NICE guidance implementation tracking: data sources, methodology and results (Page 32)

Description: NICE guidance recommends two dimensional (2-D) imaging ultrasound as the preferred method for the insertion of central venous catheters (CVCs). The report used the sales of 2-D imaging machines from two specific ultrasound machines marketed specifically for the use of CVC placement as an indicator for uptake. An estimated 190,000 procedures per year would require 250-350 US machines. Figure 1 shows that an additional 276 2-D imaging machines have been purchased since guidance was published in September 2002.

Figure 1: Manufacturer sales of specific ultrasounds



2. External Literature

2.1 Wigmore TJ, Smythe JF, Hacking MB et al. (2007) Effect of the implementation of NICE guidelines for ultrasound guidance on the complication rates associated with central venous catheter placement in patients presenting for routine surgery in a tertiary referral centre. British Journal of Anaesthesia. 99(5): 662-5.

Description: This prospective, single centre audit looked at all patients in whom a central venous catheter was placed for surgery. Complication rates were assessed for procedures that were performed pre- and post-implementation of NICE guidance. In total, 438 patients were identified for the study. Results found that the implementation of NICE guidelines has been associated with a significant reduction in complication rates in the tertiary referral centre. The pre- and post- implementation complication rates were 10.5% and 4.6% respectively.

2.2 McGrattan T, Duffty J, Green JS & O'Donnell N (2008) A survey of the use of ultrasound guidance in internal jugular venous cannulation *Anaesthesia* 63 pp.1222-1225

Description: The authors carried out a postal survey of 2000 senior anaesthetists throughout the UK. Only 27% use 2D ultrasound as their first choice technique, although 35% use it as their first choice when teaching.

2.3 Bosman M et al (2006) Two Dimensional Ultrasound Guidance in Central Venous Catheter placement: A postal survey of the practice and opinions of consultant paediatric anaesthetists *Paediatric Anaesthesia*

Description: The authors found that the NICE guidelines recommending the use of ultrasound guidance for the placement of CVC's in children have not been universally accepted. Of 196 clinicians surveyed, 68% use ultrasound to assist in the insertion of CVC's. 3/4 respondents agree that all paediatric anaesthetists should have access to ultrasound training for CVC placement. Only 17 respondents agreed that 2-D ultrasound offers no advantage over a landmark technique.

2.4 Howard, Simon (2009) A survey measuring the impact of NICE guidance 49: The use of ultrasound locating devices for placing central venous catheters Abacus International Survey

Description: In September 2002, NICE published TA 49, reviewing the use of ultrasound locating devices for guiding central venous catheter (CVC) placement. This 2004 survey was designed to provide an indicator of the level of implementation and impact of TA 49. Results found that 87% of sample anaesthetists had read the guidance and only four individuals were unaware of the main recommendations. 83% found guidance easy to understand but 75% suggested it was difficult to implement.