



A survey of the use of ultrasound guidance in internal jugular venous cannulation★

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Summary

It has been suggested the use of two dimensional (2D) ultrasound to facilitate placement of central venous cannulae in the internal jugular vein improves patient safety and reduces complications. Since the introduction of the National Institute for Clinical Excellence Technology Appraisal Guideline Number 49 in 2002, promoting the use of ultrasound in placement of internal jugular venous cannulae, utilisation of ultrasound has increased throughout the United Kingdom. We report the findings of a postal survey of 2000 senior anaesthetists in the United Kingdom which enquired about their use of ultrasound for internal jugular vein cannulae placement. Only 27% use 2D ultrasound as their first choice technique, although 35% use it as their first choice when teaching. There was no significant difference in practice between those working within a sub specialty in anaesthesia. There continues to be discrepancies between the application of the guideline and how senior anaesthetists both site and teach the placement of internal jugular vein central venous cannulae.

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The National Institute for Clinical Excellence (NICE) has stated that two dimensional (2D) ultrasound guidance is the preferred method for insertion of central venous cannulae into the internal jugular vein (IJV) in the elective situation and should be considered in the emergency situation [1]. The impact of this recommendation on the clinical practice of senior anaesthetists in the United Kingdom (UK) is unknown. We report the findings of a survey identifying the preferred techniques for placing IJV cannulae among senior anaesthetists working within the UK. Respondents were also asked which techniques they taught to their trainees and about their ease of access to ultrasound machines. This was a follow on from a pilot survey of college tutors in 2004 that identified discrepancies between the methods used in practice and those recommended by NICE [2].

Method

A comprehensive list of senior members was provided by the Association of Anaesthetists of Great Britain and

Ireland (AAGBI) and numbered by the study team. A questionnaire, modified from the original version sent to college tutors, and a prepaid reply envelope were sent to 2000 senior AAGBI members resident in the UK (46% of senior members). Selection was by computer generated random number production. A reminder was sent six weeks later. Information from replies was entered on an Excel spreadsheet and analysed using a chi-squared test. A copy of the questionnaire is included in Appendix A.

Results

There were 1455 replies from 2000 questionnaires (73%). Ninety percent of respondents were consultants.

Ninety-three percent of respondents regularly insert IJV cannulae in their clinical practice. The preferred first choice technique for placement of cannulae is shown in Table 1. Where respondents indicated more than one preferred first choice method, both were recorded as first choice. The use of ultrasound as a first choice increases

Table 1 First choice of IJV cannulation.

Palpation/balloting	430 (30%)
Surface landmarks	728 (50%)
Two-dimensional ultrasound	391 (27%)

Table 2 First choice for teaching IJV cannulation.

Palpation/balloting	344 (23%)
Surface landmarks	702 (48%)
Two-dimensional ultrasound	508 (35%)

Table 3 Subspecialty interest of respondents.

None	733 (50%)
Intensive care medicine	341 (23%)
Paediatric anaesthesia	73 (5%)
Cardiac anaesthesia	139 (10%)

Table 4 Use of ultrasound as preferred method by sub-specialty interest.

None	167 (23%)
ITU	90 (26%)
Paediatric anaesthesia	13 (18%)
Cardiac anaesthesia	35 (25%)

Table 5 Availability of ultrasound within 5 min.

Theatres	1146 (78%)
Intensive care unit	1128 (77%)
Emergency medicine department	426 (29%)

Table 6 Use of ultrasound as first choice throughout UK.

England	253 (24%)
Scotland	38 (23%)
Wales	17 (26%)
Northern Ireland	5 (11%)

from 27% to 35% when trainee anaesthetists are being taught central venous catheter placement as shown in Table 2.

Any declared subspecialty interest is shown in Table 3. Subspecialty interest did not influence the use of ultrasound as preferred first choice method for cannula placement as demonstrated in Table 4. The availability of 2D ultrasound machines within five minutes in theatres, intensive care and accident and emergency departments is shown in Table 5. The use of ultrasound was similar in different parts of the UK (23–26%), apart from Northern Ireland as in Table 6.

Fifty-three percent of respondents routinely record the method of IJV cannulation used in the patient case notes.

Discussion

Ultrasound imaging provides visualisation of variable underlying anatomy and may reduce the risk of complications such as arterial puncture, haematoma and pneumothorax associated with central venous cannulation. Traditional methods for locating the IJV for cannulation include the use of anatomical landmarks and direct palpation/balloting of the vein. It is known that complications associated with placement of cannulae are related to operator experience and number of attempts to locate the IJV [3, 4]. The development of 2D ultrasound guidance provides an alternative method for locating the IJV, potentially reducing the complications and increasing patient safety [5]. The advice published by NICE in 2002 regarding guidance for the use of ultrasound locating devices in central venous cannulation created much debate in anaesthetic circles. A subsequent joint statement from the Royal College of Anaesthetists (RCOA) and AAGBI concluded that the use of 2D ultrasound was an acceptable aid to central venous cannulation but continued use of the landmark technique was acceptable practice [6]. A review of the original guidance by NICE in 2005 concluded there was to be no alteration to the published 2002 advice and as such it has remained unchanged [7].

Our survey found 73% of anaesthetists use traditional methods as their preferred first choice technique for internal jugular vein cannulation. This is despite the widespread availability of 2D ultrasound devices in theatres and intensive care demonstrated in our survey and the influence this has on utilisation of ultrasound [8]. Although our survey did not determine a reason for this, a survey conducted by NICE, in 2005, found that of 250 consultant anaesthetists questioned, 67% had received poor or no training in the use of 2D ultrasound devices [7]. However, training in use of 2D ultrasound devices appears to be increasing and comes from a variety of sources ranging from the manufacturers of the devices to informal teaching from experienced colleagues [9]. Overall, 75% of respondents stated they would use ultrasound as a first, second or third choice leaving us with the assumption the majority are comfortable with the technique. The lack of routine use of 2D ultrasound may reflect the fact that anaesthetists are both frequent and skilled providers of IJV cannulation. It may also reflect the necessity to learn and retain skill in the use of the landmark technique for use in circumstances where 2D ultrasound is not readily

available, as is more common in emergency medicine departments.

It is interesting to note that whilst only 27% of respondents use 2D ultrasound guidance as their preferred technique in placement of IJV cannulae, 35% stated it was their first choice when teaching placement of IJV cannulae to trainees. It has been shown the presence of a trainee positively influences the use of ultrasound in paediatric practice [10]. By allowing visualisation of the anatomy, teaching may be aided although questions about usefulness or the lack of senior anaesthetists trained in the use of ultrasound may influence the decision to use ultrasound when teaching internal jugular venous cannulation. The current generation of trainee anaesthetists are likely, in the future, to utilise ultrasound imaging routinely not only to facilitate vascular access, but also in cardi thoracic imaging and peripheral nerve blockade techniques. Current arrangements and guidance for training and competence in these areas is lacking [11] which may also discourage senior anaesthetists from the use of ultrasound imaging.

Our survey demonstrated consistency in use of 2D ultrasound throughout the UK, with the exception of Northern Ireland. The adoption of NICE recommendations are obligatory for NHS organisations in England and Wales and the Health Technology Board for Scotland advises the NICE guideline for placement of central venous catheters is as valid in Scotland as in England and Wales. We are unaware of the adoption of this guideline by a statutory body in Northern Ireland, which may reflect the less frequent use of 2D ultrasound.

The Royal College of Anaesthetists recommend the method used to cannulate the IJV be recorded [6]. Our survey found that only 53% of respondents were routinely recording the method used in IJV cannulation. This may reflect a feeling that it is an unnecessary requirement or that this recommendation went largely unnoticed. Recording of this information would facilitate audit of techniques used and taught as well as providing valuable information about complications and evaluation of alleged improvement in patient safety.

This survey suggests a discrepancy between 'best care' as promoted by NICE and everyday practice within the UK. It remains unclear whether patients are being harmed because of the lack of ultrasound imaging although there is emerging information to

support reduction in complications in routine anaesthetic practice [12]. NICE acknowledge that experienced operators can achieve relatively high success rates with few complications using the traditional techniques.

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Appendix A

Internal Jugular Vein Cannulation Questionnaire

Please circle or complete as appropriate.

1. Do you insert internal jugular vein (IJV) lines?

YES; please complete questionnaire NO; please circle & return form

2. What methods do you use to identify the IJV?

Technique	Tick if used	Rank in order (1 = most frequent)
Palpation/balloting		
Surface landmarks		
2D ultrasound		
Other (please state)		

3. What methods do you use when teaching IJV cannulation?

Technique	Tick if used	Rank in order (1 = most frequent)
Palpation/balloting		
Surface landmarks		
2D ultrasound		
Other (please state)		

4. Are you a Consultant Associate specialist Staff grade Other (please state)

5. Do you have a sub-speciality interest in any of the following?

Intensive care medicine Cardiac anaesthesia Paediatric anaesthesia

6. If so does this affect your choice of technique of IJV cannulation?

YES NO If yes, in what sense?

7. Within which Health Authority do you work?

8. Do you have 2D ultrasound rapidly available (within 5 mins) in the following places? (Please circle as appropriate)

Theatre YES/NO ITU YES/NO A&E YES/NO

9. Is the method used to identify the IJV recorded in the patient’s notes/anaesthesia form?

YES NO