

Hospital Practice

Use of intravenous cannulae by junior hospital doctors

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Summary: One hundred junior hospital doctors were surveyed to investigate their use of intravenous cannulae. Anaesthetists inserted more cannulae per day than non-anaesthetists and were more likely to use local anaesthetic and wear gloves, although most doctors never or rarely did so. Anaesthetists were also more knowledgeable than non-anaesthetists about the sizes of cannulae they used and the sizes available, although there was considerable ignorance overall in this regard. Many doctors regularly place themselves at risk and expose their patients to unnecessary pain during intravenous cannula insertion, and have little knowledge about the cannulae they use.

Introduction

Intravenous (i.v.) cannulae are crucial to the administration of parenteral fluids and thus to the management of hypovolaemia. However, there is usually little formal education for medical students and junior doctors about use of i.v. cannulae, most junior doctors learning as they 'go along'. The level of knowledge of i.v. cannulae amongst junior hospital doctors has not previously been studied. Anaesthetists are routinely responsible for peri-operative i.v. fluid replacement and are thus more directly involved with the immediate consequences of volume loss and replacement than doctors in other specialties. This survey was conducted to investigate the use of i.v. cannulae amongst junior hospital doctors (anaesthetists and non-anaesthetists).

Methods

A questionnaire (see Appendix) was shown to all house officers, senior house officers (SHOs), registrars and senior registrars in the following specialties in two different district general hospitals: accident and emergency (A&E), anaesthetics, general medicine, general surgery, obstetrics and gynaecology and orthopaedics.

The doctors were divided into two groups: anaesthetists and non-anaesthetists. The numbers of cannulae inserted were compared using the Mann-Whitney *U*-test, and other data were ana-

lysed using chi-square analysis or Fisher's exact test as appropriate. A value of *P* of 0.05 was used to denote statistical significance.

Results

All of the 100 doctors approached responded. There were 25 house officers, 44 SHOs, 29 registrars and two senior registrars. The number of cannulae inserted, use of local anaesthetic and gloves, choice of cannula for the patient described and knowledge of flow rates and cannula size are shown in Table 1. Suggested flow rates for the cannulae varied from 10 ml/minute to 2,000 ml/minute; these values were compared with flow rates for cannulae obtained under standard conditions.¹ Two doctors (both non-anaesthetists) said they would insert two 16G cannulae.

There were no differences in use of cannulae between surgical and medical specialties or according to seniority of doctor, apart from a greater number of cannulae inserted by non-anaesthetic house officers and SHOs compared with registrars and senior registrars (median (range) 2 (0–6) compared with 1 (0–4), respectively; *P* < 0.001). Median (range) estimated initial success rates for insertion of cannulae were similar in all specialties and grades (90 (10–100%)), although the two doctors that reported initial success rates of under 70% were both non-anaesthetist pre-registration house officers. Sixty-eight per cent of doctors always used alcohol skin cleansing swabs before insertion, whilst 17% never or rarely (>20% of occasions) used them; there was no difference between specialties in this regard.

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Table I Answers to questions concerning the use of intravenous cannulae

	<i>Anaesthetists</i>	<i>Non-anaesthetists</i>	<i>Total</i>	<i>P</i>
Number of respondents	17	83	100	
Number of cannulae/day (median (range))	8 (2–15)	2 (0–6)		<0.001
Use of local anaesthetic*				
Never	2 (12)	71 (86)	73	<0.001
1–20% occasions	7 (41)	5 (6)	12	0.001
>20% occasions	8 (47)	7 (8)	15	0.001
Use of gloves*				
Never	3 (18)	47 (57)	50	0.008
1–20% occasions	11 (65)	23 (28)	34	0.008
>20% occasions	3 (18)	13 (16)	16	NS
Cannula selected for hypothetical patient*				
Venflon (Viggo) selected	12 (71)	80 (96)	92	0.007
Size chosen				
18G	0	10 (12)	10	NS
16G	5 (29)	56 (67)	61	0.008
14G	12 (71)	17 (20)	29	0.001
Selected by colour without knowing correct size	4 (24)	61 (73)	65	<0.001
Flow rate correct to within 50% actual value ¹	7 (41)	9 (11)	16	NS
Biggest cannulae available*				
18G	0	4 (5)	4	NS
16G	0	35 (42)	35	0.001
14G	11 (65)	29 (35)	40	0.04
12G	4 (24)	12 (14)	16	NS
10G	2 (12)	3 (4)	5	NS

*Number (%). NS = not significant.

Discussion

The findings of this survey support the generally held impression that anaesthetists insert more cannulae than non-anaesthetists and are more likely to use local anaesthetics. They are also more likely to wear gloves and select large cannulae. However, they are only slightly more knowledgeable about cannula sizes, and are not significantly more knowledgeable about flow rates through cannulae (which are marked on the packaging of several makes of cannula including Venflons).

That 73% of doctors never use local anaesthetics, even for insertion of 16G and 14G cannulae, is disturbing. Pain increases with size of cannula,^{2–4} and a recent study has reported that subcutaneous injection of lignocaine is less painful than insertion of 18G, 20G or 22G cannulae.⁴ A common reason given for not using local anaesthetic is that it makes subsequent cannulation more difficult. However, a local anaesthetic often makes cannulation easier, because the patient is more comfortable and thus more likely to keep still. The greater use of local anaesthetics by anaesthetists may reflect their increased familiarity with these agents and their particular concern with pain, although it is difficult to see how any doctor cannot be concerned by the pain inflicted by a large i.v. cannula.

The wearing of gloves is a sensible precaution against blood-borne infections. Only 16% of doctors in the present study wear gloves on more than 20% of occasions, whilst 50% of doctors never wear them. This suggests a lack of concern which has been previously demonstrated with respect to contamination in operating theatres⁵ and immunization against hepatitis.⁶ Impaired manual dexterity is often given as a reason for not wearing gloves, but those that regularly wear them would dispute this.⁵ The incidence of injury or contamination was not assessed in the present study, although a recent American paper reported an 18% incidence of contamination during peripheral venous cannulation by anaesthetists.⁷

Use of cleansing solution such as propyl alcohol or chlorhexidine prior to insertion of i.v. cannulae is widely performed as it reduces skin and cannula contamination with bacteria and thrombophlebitis.^{8,9} The commonest reason given for not cleaning the skin in this study was that it is ineffective, but respondents were unable to support this claim.

The choice of large (16G or 14G) cannulae in most cases for the imaginary patient described is reassuring, although there was considerable ignorance about the sizes of cannulae used. The choice

of cannulae may be influenced by the availability of certain types and sizes of cannulae in the hospitals studied. For example, Venflons are widely available in the wards and A&E departments of many hospitals, but other types of cannulae are commonly used in operating theatres. Venflons are often considered earlier to insert than other cannulae, although this has not been investigated. Referral to cannulae by colour alone is only appropriate for a particular make of cannulae until a colour coding standard for i.v. cannulae is generally adopted.¹⁰ It might be argued that knowledge of flow rates through cannulae is not important. However, the difference between flow rates through cannulae of different sizes may be extremely important in a hypovolaemic patient requiring rapid volume replacement. For example, for Venflons under standard conditions, flow rates of 80 ml/minute (18G (green)), 180 ml/minute (16G (grey)) and 270 ml/minute (14G (brown)) are possible, with up to twice these values possible if pressure infusers are used.¹ Thus for severe hypovolaemia, the largest possible cannula should be

used. Several manufacturers supply 13G and 12G cannulae, and one supplies a 10G cannula.¹

None of the doctors questioned had received any formal training in insertion of i.v. cannulae. However, in the discussions prompted by this survey, several commented that they would change their practice, particularly with regard to use of local anaesthetic and gloves, and selection of larger cannulae.

This study demonstrates a need for education of junior hospital doctors about the use of i.v. cannulae, a task which is routinely performed many times a day. Although anaesthetists are more likely to use local anaesthetic and gloves, and are more knowledgeable about i.v. cannulae than non-anaesthetists, there is considerable room for improvement in all specialties.

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Appendix

The following questions were asked in the questionnaire:

1. What is your grade and specialty?
2. How many i.v. cannulae do you insert per day, on average?
3. How often are you successful first time?
4. How often do you use local anaesthetic in awake patients (excluding for cannulae smaller than 21G used for induction of anaesthesia)?
5. How often do you wear gloves?
6. How often do you clean the skin with alcohol?
7. What size, type and colour of cannula would you use for a patient with a perforated viscus admitted via A&E?
8. What is the approximate maximal flow rate (in ml/minute) through the cannula selected in the previous answer?
9. What is the biggest peripheral i.v. cannula available of any make?