Clinical Medicine 2013, Vol 13, No 3: 239–43

Getting the basics right: delays in phlebotomy and intravenous cannulation: a survey of foundation year 1 doctors

Pamela Sarkar and Richard Ibitoye

ABSTRACT – Junior doctors frequently experience delays in routine ward-based procedures. There is little published data on this subject, but it is clear that such delays can have implications in terms of costs, efficiency, length of patient stay, team working and patient safety and experience. We formulated an anonymous online survey to quantify the experiences of foundation year 1 (FY1) doctors with respect to phlebotomy services and intravenous (IV) cannulation. We gathered data on equipment availability, time taken to carry out these tasks and the factors thought to contribute to delays. The results were compared to clinically relevant standards. Between April and August 2012, 199 responses were received. For IV cannulation, 21% of doctors reported equipment availability as 'very good', but only 3% said that they were able to find all of the pieces of equipment they needed close to each other ('essentially in the same place'). Similar results were obtained for phlebotomy. Nevertheless, there appears to be significant room for improvement and we offer recommendations to address delays.

KEY WORDS: Phlebotomy, cannulation, delays

Background

Phlebotomy, cannulation and other bedside procedures are frequently performed by junior doctors. Personal experience and anecdotal reports demonstrate that delays in carrying out such procedures are very common. This loss of efficiency results in an opportunity cost, as other important tasks are delayed, and there can be consequential delays in diagnosis and treatment that amount to sub-standard care for patients.

Causes of delays include poor equipment availability, difficulties in finding equipment, physician factors, such as competence, and patient factors, such as cooperation. Of these, equipment factors are easiest to control and form the basis of this study. An audit by the authors on equipment availability and ease of retrieval across wards at local hospitals showed many wards did not meet clinically relevant standards (Fig 1).

We aimed to find out how common delays in routine ward-based procedures are across a variety of clinical areas and hospitals. To do this, we designed a survey of foundation year 1 (FY1) doctors across a range of hospitals. We are aware that the issues we consider affect not only cannulation and phlebotomy but also many procedures performed by doctors in hospitals.

Pamela Sarkar,[1] core medical trainee CT2; **Richard Ibitoye,**[2] core medical trainee CT2

[1]Department of Infectious Diseases, St George's Hospital, London, UK; [2]Department of Neurology, Royal Preston Hospital, Preston, UK

What do we already know?

- The NHS is changing structurally and there is a need to focus on improving quality in care.[1] All NHS organisations should provide opportunities to discuss service improvement.[2]
- More ward-based procedures are carried out by junior doctors than by other team members.[3] Time is wasted looking for equipment and there is no standardisation of storage across different clinical areas.[1]
- Lack of clarity about roles within multi-disciplinary teams contributes to delay.[1]
- Inefficiencies have implications for cost, efficiency, patient experience and patient safety.[1]
- A junior doctor may waste an hour each day looking for the correct clinical equipment.[1]

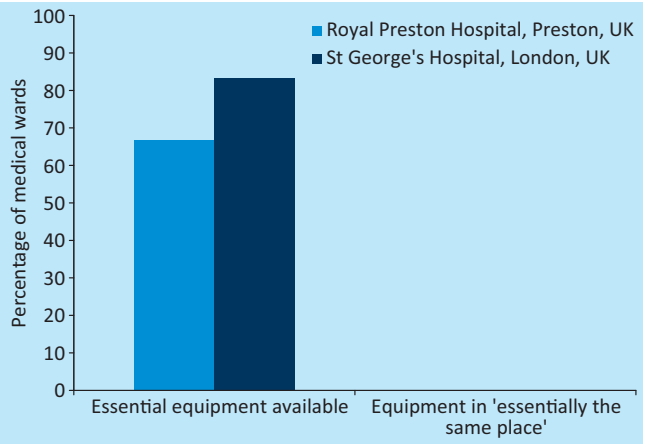


Fig 1. Audit results. Percentage of medical wards with cannulation and phlebotomy equipment available or in 'essentially the same place' at authors' local hospitals. No wards at either hospital had cannulation and phlebotomy equipment in 'essentially the same place'. PS = Dr Pamela Sarkar; RTI = Dr Richard Ibitoye.

Key points

- Difficulty finding equipment and lack of equipment availability are issues commonly seen across NHS Trusts and specialties.
- FY1 doctors who have difficulty in finding equipment take longer to perform cannulation and phlebotomy.
- Organisational issues such as limited phlebotomy services, poor equipment stock and limited access to locked utility rooms are commonly recurring features and add to diagnostic and treatment delays.

FY1 = foundation year 1

Method

We designed a survey to capture the practical experience of FY1 doctors in obtaining the equipment required for the safe performance of phlebotomy and cannulation (Fig 2). We left the respondent to determine which items they thought necessary for each procedure.

Areas of interest were defined as equipment availability, ease of retrieval and time taken to perform both procedures in an average day. A five-choice question format was selected to simplify result analysis.

Equipment availability was assessed by a five-choice rating question 'How would you rate the availability of equipment for i) cannulation and ii) phlebotomy on your ward?' Ratings for equipment availability were defined as follows:

- 'very good' — I can always or almost always find everything I need
- 'good' — I can usually find everything I need
- 'neither good nor poor' — somewhere in between 'good' and 'poor'
- 'poor' — I only sometimes find everything I need
- 'very poor' — I can never or almost never find everything I need.

Our ideal standard was 'very good'. We identified 'good' as a minimum acceptable standard.

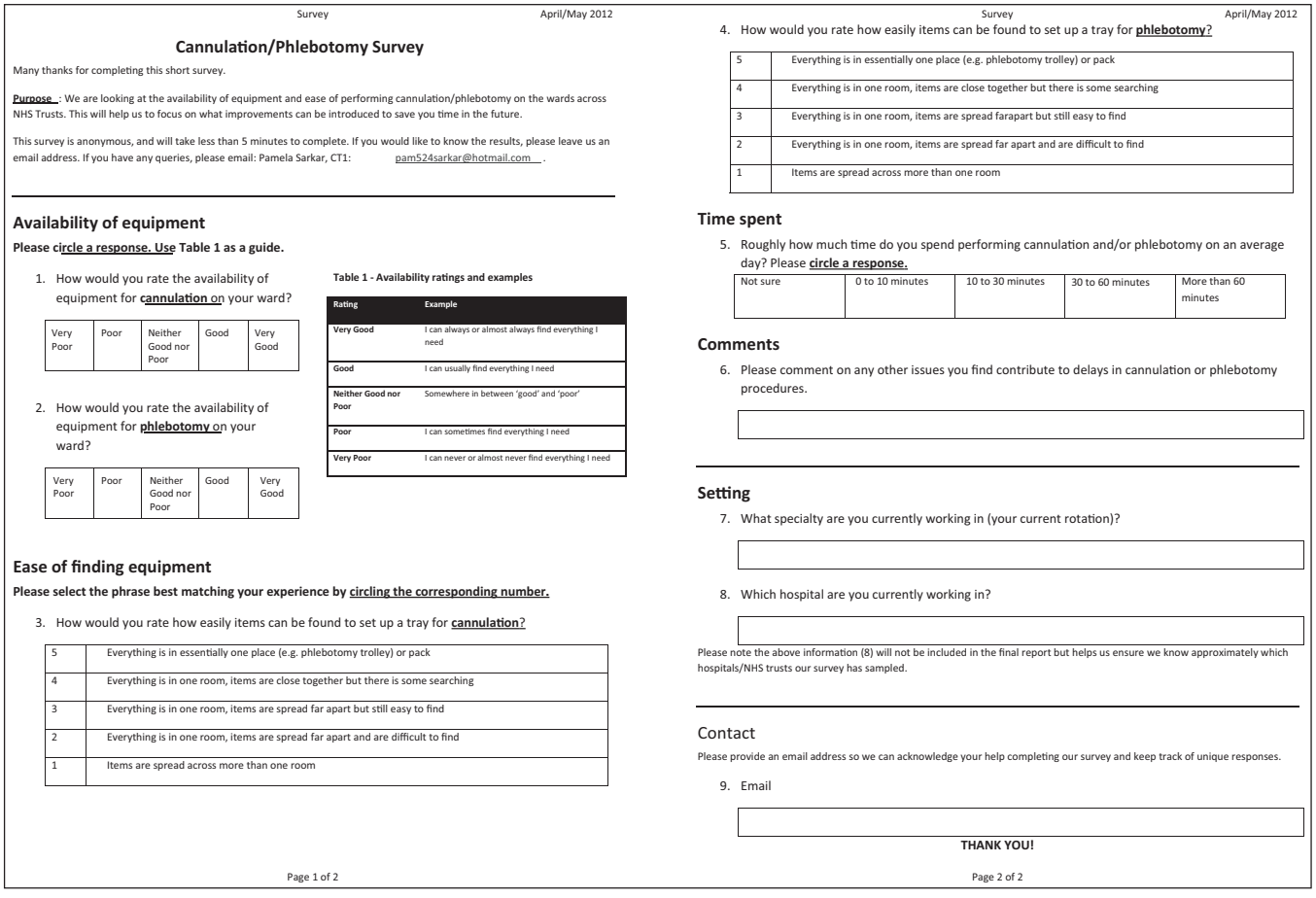
Ease of retrieval was assessed by a five-choice question based on 'standards of organisation' observed in an initial ward study of time taken to find equipment. We asked, 'How would you rate how easily items can be found to set up a tray for i) cannulation and ii) phlebotomy?' Respondents were asked to apply one of the following ratings (in order of increasing ease of retrieval):

1 items in more than one room, or some items in locked cabinets within one room
2 items in one room, spread apart and difficult to find
3 items in one room, spread apart but easy to find
4 items in one room, close together but a need to search before finding
5 all items in essentially the same place.

We identified '5' as the ideal standard and '3' as the minimum acceptable standard for ease of finding items.

Respondents were also asked to estimate how long they spend in an average working day performing both procedures. Again a five-choice response was offered (Fig 2). Finally, workplace details were requested and opportunity for comment provided (Fig 2).

A questionnaire was generated and translated to an online form using SurveyMonkey (www.surveymonkey.com). The survey was distributed locally to FY1s by the authors. Junior doctor colleagues were asked to share the survey more widely to



Survey April/May 2012

Cannulation/Phlebotomy Survey

Many thanks for completing this short survey.

Purpose: We are looking at the availability of equipment and ease of performing cannulation/phlebotomy on the wards across NHS Trusts. This will help us to focus on what improvements can be introduced to save you time in the future.

This survey is anonymous, and will take less than 5 minutes to complete. If you would like to know the results, please leave us an email address. If you have any queries, please email: Pamela Sarkar, CT1: pam524sarkar@hotmail.com .

Availability of equipment

Please circle a response. Use Table 1 as a guide.

1. How would you rate the availability of equipment for **cannulation** on your ward?

Very Poor	Poor	Neither Good nor Poor	Good	Very Good

2. How would you rate the availability of equipment for **phlebotomy** on your ward?

Very Poor	Poor	Neither Good nor Poor	Good	Very Good

Table 1 - Availability ratings and examples

Rating	Example
Very Good	I can always or almost always find everything I need
Good	I can usually find everything I need
Neither Good nor Poor	Somewhere in between 'good' and 'poor'
Poor	I can sometimes find everything I need
Very Poor	I can never or almost never find everything I need

Ease of finding equipment

Please select the phrase best matching your experience by circling the corresponding number.

3. How would you rate how easily items can be found to set up a tray for **cannulation**?

5	Everything is in essentially one place (e.g. phlebotomy trolley) or pack
4	Everything is in one room, items are close together but there is some searching
3	Everything is in one room, items are spread far apart but still easy to find
2	Everything is in one room, items are spread far apart and are difficult to find
1	Items are spread across more than one room

Page 1 of 2

Survey April/May 2012

4. How would you rate how easily items can be found to set up a tray for **phlebotomy**?

5	Everything is in essentially one place (e.g. phlebotomy trolley) or pack
4	Everything is in one room, items are close together but there is some searching
3	Everything is in one room, items are spread farapart but still easy to find
2	Everything is in one room, items are spread far apart and are difficult to find
1	Items are spread across more than one room

Time spent

5. Roughly how much time do you spend performing cannulation and/or phlebotomy on an average day? Please **circle a response.**

Not sure	0 to 10 minutes	10 to 30 minutes	30 to 60 minutes	More than 60 minutes

Comments

6. Please comment on any other issues you find contribute to delays in cannulation or phlebotomy procedures.

Setting

7. What specialty are you currently working in (your current rotation)?

8. Which hospital are you currently working in?

Please note the above information (8) will not be included in the final report but helps us ensure we know approximately which hospitals/NHS trusts our survey has sampled.

Contact

Please provide an email address so we can acknowledge your help completing our survey and keep track of unique responses.

9. Email

THANK YOU!

Page 2 of 2

Fig 2. Survey questions in paper format.

FY1s in other NHS Trusts and local administrators were asked to send out the survey to nearby NHS Trusts.

Results

We received 199 responses from doctors working in 27 NHS Trusts between 24 April 2012 and 1 August 2012 (the national trainee doctor change-over date). Of these, 176 were complete and included in our analysis. A wide range of specialties were surveyed. Results are considered overall, by NHS Trust (Fig 3) and by major specialty (Fig 4).

Cannulation

Across all valid responses, equipment availability for cannulation met the ideal standard being rated as 'very good' by 21.0% (CI 15.4–27.6%) of doctors. The minimum acceptable standard 'good' or better was reported by 73.8% (CI 66.6–80.1%) of doctors.

Equipment retrieval was described as meeting the ideal standard '5' in 2.84% (CI 1.05–6.86%) of reports and the minimum acceptable standard '3' in 65.9% (CI 58.3–72.8%) of reports.

Phlebotomy

Equipment availability for phlebotomy was described as meeting the ideal standard in 18.8% (CI 13.4–25.5%) of the responses. The minimum acceptable standard of was met 73.3% (CI 66.0–79.5%) of the time.

Equipment retrieval met the ideal standard in 7.39% (CI 4.16–12.6%) of responses and the minimum acceptable standard '3' in 71.6% (CI 64.2– 78.0%).

Time taken

Estimates of time taken to perform both procedures in an average day were analysed; '10 to 30 minutes' was the most common response (52.8%). 32.4% of respondents estimated spending over 30 minutes per day on cannulation and phlebotomy.

Combined equipment availability ratings and ease of retrieval ratings were tabulated against 'time taken' ratings. Association statistics were calculated using Kendall's tau-b. For availability, this statistic was 0.0594, p=0.380 and for retrieval 0.153, p=0.0155. Thus, a statistically significant association was found between difficulty finding items (poor retrieval ratings) and longer time spent on procedures per day. The association between equipment availability and time spent on procedures was not statistically significant.

Comments

A total of 83 respondents provided comments in response to the open-ended statement: 'Please comment on any other issues you

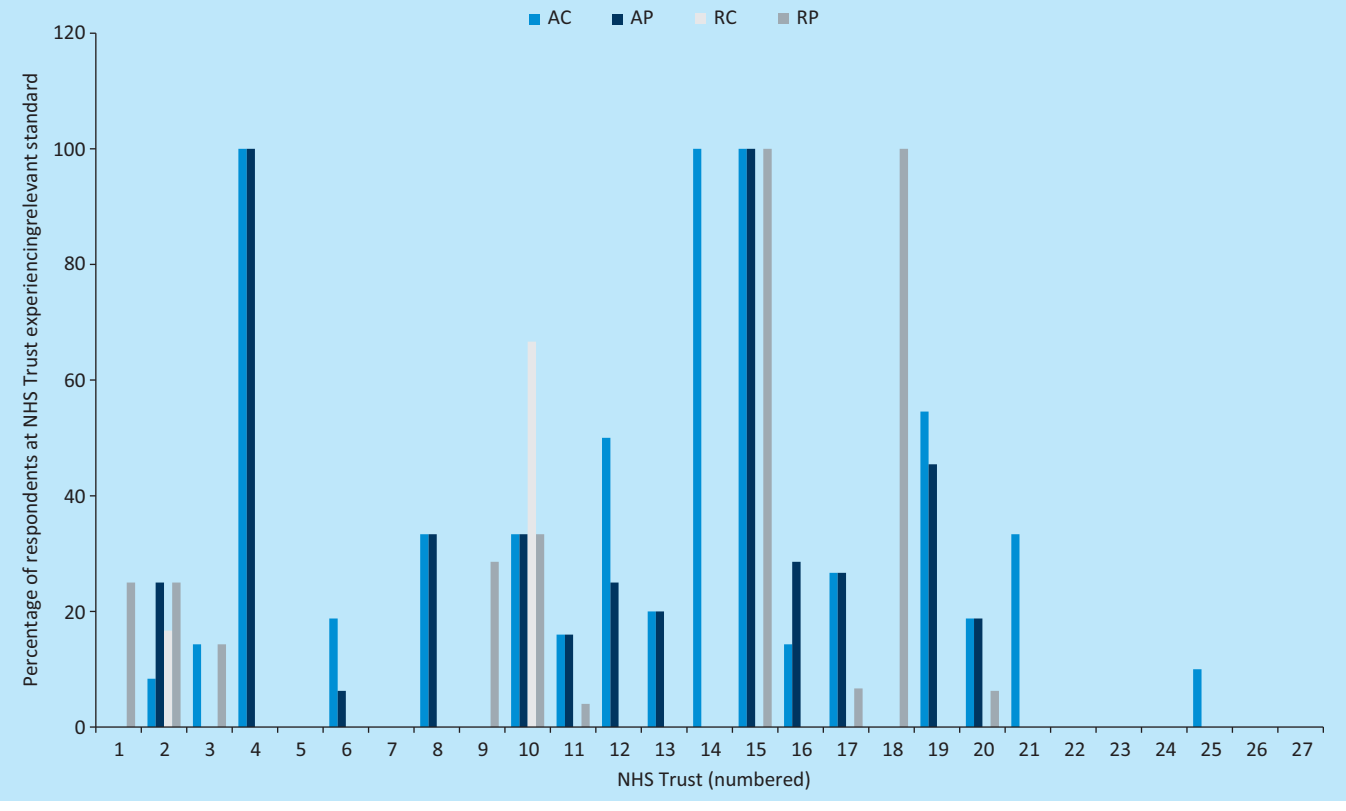


Fig 3. Percentage of respondents who experience ideal availability standards for cannulation and phlebotomy, and ideal retrieval standards for cannulation phlebotomy across NHS Trusts. NHS Trusts are numbered to preserve anonymity. Confidence intervals are not shown for clarity. AC = ideal availability standards for cannulation; AP = ideal availability standards for phlebotomy; RC = ideal retrieval standards for cannulation; AP = ideal retrieval standards for phlebotomy.

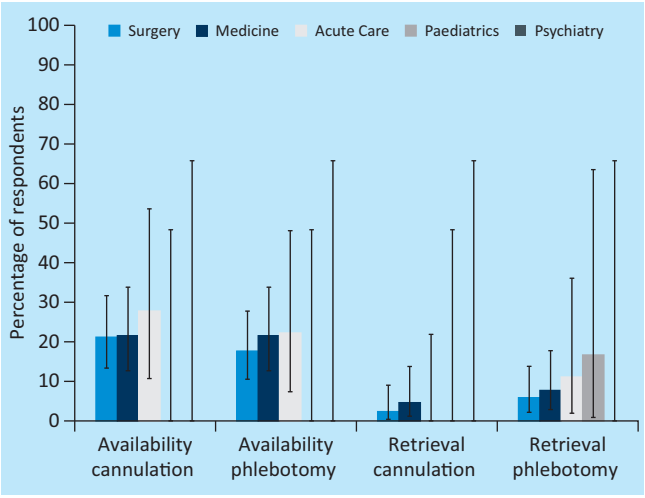


Fig 4. Percentage of respondents who experience ideal equipment availability and retrieval standards across specialty groups: surgery, medicine, acute care, paediatrics and psychiatry.

find contribute to delays in cannulation or phlebotomy procedures'. Responses fell across four themes: equipment factors, organisational issues, patient factors and safety.

Limitations

Our survey utilised non-probabilistic sampling for convenience and feasibility. Overall we sampled approximately 2% of the FY1 population. Respondent bias might favour those with a negative experience. These limitations can challenge the generalisablity of our findings. Nonetheless, the impact of such unknown variables should not detract from our findings. As personal experience, anecdote, audit, recent GMC survey results[4] and our survey results suggest, junior experience is remarkably similar across the NHS.

Discussion

Overall, our standards in equipment availability and retrieval are not met for either cannulation or phlebotomy. One could argue our standards mentioned earlier are too stringent. The 83 free-text responses suggest otherwise. They expressed difficulty, concern and frustration over a range of issues. Arguably, the delays assessed in this survey should not be routine or common, but should be the exception.

Individual results from individual NHS trusts suggest our standards are not only achievable, but have already been achieved in specific wards at specific hospitals. Improving outcomes may thus be a matter of spreading good practice principles from better-performing to poorer-performing units.

If our respondents are representative of the NHS as a whole, equipment issues are common and frequently cause delay in performing cannulation and phlebotomy. These issues are not local to particular specialties or NHS trusts, and recurring themes repeat across various organisational structures. Ultimately, they have significant consequences, costing junior doctors valuable time and delaying or compromising patient care.

Understanding the problem

Equipment availability is a recurring theme. Stocking and restocking is central to this. The layout of clinic rooms and trolleys is problematic, contributing to difficulties in finding equipment. Access and key codes are not always readily available to our respondents. Saline was frequently noted to be in locked cabinets, which might reflect a response to the recent incidents at Stepping Hill Hospital.[5] Sharps bins were also sometimes unavailable to respondents and the risk of needle-stick injury should not be understated.

Recommendations

Our survey results suggest significant room for improvement. We offer recommendations to minimise equipment factors that contribute to delay and offer suggestions to improve organisational aspects.

- Equipment for phlebotomy and cannulation should ideally be set out in the same way on every ward. A single 'trolley' for phlebotomy or cannulation should be used where feasible.
- A constant member of staff should be allocated to maintaining stock and storage of equipment. Stocking and re-stocking of equipment for procedures should be audited.
- Doctors should have immediate access to all equipment required. If access codes are to be used, they should be available to doctors working in that area or on call.

Conclusions

Equipment factors such as availability and retrieval contribute to significant delay in phlebotomy and cannulation procedures carried out by junior doctors. The contributing factors identified affect other bedside procedures and the degree of delay is likely to increase with the complexity of the procedure.

Few studies have considered the frequency, character and consequences of delays in bedside procedures performed by doctors. Our survey findings shed light on these issues. Further work on other procedures such as arterial blood gases and urethral catheterisation would be valuable in estimating the overall time costs of delays to junior doctors and the effects on patient care.

We hope our article is of interest to clinicians and managers alike in highlighting the frequency and importance of equipment factors in contributing to delay and providing workable recommendations on how they might be addressed. This survey will be used to support local quality improvement and forwarded to all respondents to support them in similar projects.

Contributorship statement

Dr P Sarkar and Dr R Ibitoye are joint first authors. The preliminary audit was designed by Dr R Ibitoye. The survey was designed by Dr P Sarkar. Both authors disseminated the survey, analysed results, wrote and edited the article.

Acknowledgements

We thank to our colleagues and postgraduate medical staff for disseminating the survey and all 199 respondents for their contributions.

References

1 Roueche A, Hewitt J. Wading through treacle: quality improvement lessons from the frontline. *BMJ Qual Saf* 2012;21:179–83.
2 BMJ Blogs Agents for change: collaboratin for quality. Recommendations for how managers and junior doctors can collaborate, 2011. http://blogs.bmj.com/agentsforchange/files/2011/04/FINAL-AfC-Collaborating-for-Quality-Recommendations.pdf [Accessed 25 April 2013].
3 Yentis SM. Use of intravenous cannulae by junior hospital doctors. *Postgrad Med J* 1993;69:389–91.
4 GMC National Training Survey, 2012. www.gmc-uk.org/education/surveys.asp [Accessed 6 September 2012].
5 Stepping Hill contamination: more than 800 hospital staff quizzed. *BBC News Online* 10 July 2010. www.bbc.co.uk/news/uk-england-manchester-18779799 [Accessed 4 April 2013].

Address for correspondence: Dr P Sarkar, St George's Healthcare NHS Trust, Blackshaw Road, Tooting, London SW17 0QT.
Email: pam524sarkar@hotmail.com