A structured learning programme for venepuncture and cannulation

Summary
This article discusses a structured learning programme that offers a standardised assessment for all healthcare staff to learn venepuncture and/or cannulation. Nurses from four NHS trusts in London and the south east, with a special interest and expertise in cannulation and venepuncture, devised the programme to reduce the need for repeated training and assessment when staff take up new posts within these trusts. The authors in their respective trusts have used the tool over a four-year period and findings from a study in Chelsea and Westminster Healthcare NHS Trust are presented to demonstrate its use by staff. The tool has recently been reviewed by its authors and is being disseminated to organisations across the United Kingdom (UK). These organisations will evaluate it, with a long-term objective to standardise the training and assessment of venepuncture and cannulation across the UK.

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Cannulation; Intravenous therapy; Venepuncture

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Background
The driving force behind this project was a group of nurses with a special interest and expertise in cannulation and venepuncture. Representative from six trusts met to discuss the need to standardise training and assessment of all healthcare staff across trusts. Representatives from four of the initial six trusts continued to meet and formed the Vascular Access Network – London and South East. The meetings were facilitated by the Johnson & Johnson ‘In Vein’ group.

Government health policy has sought to improve the quality of health services and develop an equipped workforce in the right numbers, with the right skills organised in the right way (Department of Health (DH) 1997, 1998, NHS Executive 1999).

Documents such as the Scope of Professional Practice (United Kingdom Central Council (UKCC) 1992) and Junior Doctors: The New Deal (NHS Management Executive 1991) provided an incentive and a need for nurses, healthcare assistants (HCAs) and physician/team assistants to practise the skills of venepuncture and/or cannulation to meet the demands of clinical areas while maintaining a quality health service.

A more recent change for nursing and allied health professionals is the requirement to demonstrate knowledge and competence to perform skills related to their job and to meet the practice criteria set out in the Standards for Infusion Therapy (Royal College of Nursing (RCN) 2005). The standards for infusion therapy were developed to provide criteria for nursing accountability in infusion therapy. These standards are evidence based and can be incorporated into local infusion-related policies, procedures and educational approaches. The standards are supported by practice criteria, which provide specifications for the direct implementation of the standards in the clinical environment. This reinforces the government ethos that: ‘intravenous cannula insertion will be carried out by trained and competent staff using strictly aseptic techniques’ (DH 2003).

Furthermore, the Nursing and Midwifery Council (NMC) states that: ‘To practise competently, you must possess the knowledge, skills and abilities required for lawful, safe and effective practice without direct supervision’ (NMC 2004). The Health Professions Council (HPC) echoes this: ‘You must act within the limits of your knowledge, skills and experience and, if necessary, refer the matter to another professional’ (HPC 2003). This expectation was highlighted by Gray (1997) who advocated teaching that addressed competent and accountable practice.
The group found that it was difficult to determine individuals’ level of knowledge and skill, especially when a certificate of study day attendance was the only evidence. Conversely, there were examples of staff with an abundance of evidence that had either been gathered from moving between trusts or from one trust where the learner had to produce a large quantity of evidence. This varied approach across hospitals and professions raised concerns about the implications for standards of practice, so the group began to examine how to improve the process.

The structured learning programme

The aims of the structured learning programme were to:
- Provide evidence of adherence to post-registration education and practice requirements.
- Negate the need for reassessment when commencing work at a new NHS trust, thereby standardising a structure for the safe, effective delivery of cannulation and venepuncture (UKCC 2001).

With these two aims in mind, the group devised a standard statement: ‘The practitioner will receive the appropriate training to perform each procedure safely and successfully, while minimising physical and psychological discomfort and avoiding complications to the patient’ (Vascular Access Network (VAN) 2005).

The current tool was compiled after a review of documentation from the initial six trusts. Aspects of the assessment process used in Rotherham General Hospitals NHS Trust (record of supervision of skill(s), objective structured clinical examination (OSCE) and completion checklist) were merged with the assessment process used in the Royal Berkshire and Battle Hospitals NHS Trust. The result is a standardised methodical learning tool, which takes the learner through a pathway to competence (Figure 1).

The structure of the programme allows easy application across all professional groups, so that all practitioners have the same standard of agreed competence for these skills. The programme was deliberately aimed at multidisciplinary assessment; the learning outcomes and assessment criteria apply to nursing, medical or allied health professionals. Interprofessional learning is part of the political agenda for NHS modernisation and the programme afforded nurses the opportunity to observe and assess medical students, phlebotomists and radiographers in clinical areas (Beecham 2000, Radcliffe 2000, DH 2001).

The level of expertise of the professional is assessed using a framework adapted from Benner’s (1984) novice to expert continuum. The learner assesses him or herself initially, and then progresses from the self-assessed level of ability through to competency achievement (Figure 2). Regulatory bodies such as the NMC, General Medical Council (GMC) and HPC value self-assessment as crucial for professional competence. The GMC states that: ‘graduates must be able to reflect on their practice, be self-critical and carry out an audit of their own work’ (GMC 2002).

The structured learning programme assesses the learner’s theoretical knowledge and practical skill(s). Learners self-assess their skill(s), complete questions relevant to the skill(s), include a piece of reflective work and take a final OSCE (Figure 3). The OSCE is assessed by a healthcare worker who is competent in the skill(s) of venepuncture and/or cannulation. The

![Learning pathway for venepuncture and cannulation](image-url)
as an assessment criterion (Figure 4) to facilitate a fair, accurate and reliable assessment. As an assessment tool, the structured learning programme is designed to be useful to future learning and to promote professional development, values of an assessment method endorsed by Dannefer et al (2005).

The structured learning programme includes a workbook that remains the property of the healthcare professional, acting as his or her record of evidence and enabling the transfer of skills across healthcare organisations. When the programme was initially designed, it was intended for use with healthcare staff working with adult patients. However, it can be adapted to encompass competency achievement in more specialised areas. In Chelsea and Westminster Healthcare NHS Trust, for example, an additional knowledge section has been included for the neonatal intensive care unit and pre-course questions for HCAs learning venepuncture. Following a recent 15-month pilot at Royal Berkshire and Battle Hospitals NHS Trust, the programme is now fully implemented for assessing all healthcare professionals within the trust.

**Implementing the learning programme**

The structured learning programme has been used across all four hospitals for the past four years. To date, more than 500 nurses, HCAs and radiographers at Chelsea and Westminster Hospital have been assessed as competent using the programme. It has also been used to assess more than 600 medical students at Imperial College School of Medicine, London.

As part of a larger project, Chelsea and Westminster Healthcare NHS Trust collated data, which are presented to provide a snapshot of how the programme has been implemented and its effect on service delivery in an acute NHS

**FIGURE 2**

**Novice to expert learning outcomes continuum**

<table>
<thead>
<tr>
<th></th>
<th>Novice</th>
<th>Competent</th>
<th>Expert</th>
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</thead>
<tbody>
<tr>
<td>Professional</td>
<td>Demonstrates knowledge and understanding of professional and legal issues in relation to venepuncture and cannulation</td>
<td>Able to apply their knowledge and understanding of professional and legal issues in relation to venepuncture and cannulation</td>
<td></td>
</tr>
<tr>
<td>Anatomy and physiology</td>
<td>Demonstrates knowledge and understanding of normal anatomy of the arm including major arteries, veins and nerves and abnormal anatomy of the veins in the arm</td>
<td>Able to apply their knowledge and understanding of the significance of abnormal venous anatomy in relation to venepuncture and cannulation site selection and clinically distinguish the anatomy of the arm</td>
<td>Performing an adequate number of practices each week (that is, five to ten) to maintain skills</td>
</tr>
<tr>
<td>Infection control</td>
<td>Demonstrates knowledge and understanding of the rationale for infection control precautions and the appropriate measures to be taken</td>
<td>Able to apply knowledge of infection control precautions before, during and after venepuncture and cannulation</td>
<td>Constantly evaluate technique, recognising cause and future preventive measures</td>
</tr>
<tr>
<td>Equipment</td>
<td>Demonstrates knowledge and understanding of the rationale for the selection and use of the different types of equipment</td>
<td>Able to select appropriate equipment in different situations</td>
<td></td>
</tr>
<tr>
<td>Patient preparation</td>
<td>Demonstrates knowledge and consideration of the individual requirements of psychological and physical preparation of patient/family/carer in relation to venepuncture and cannulation</td>
<td>Able to appropriately prepare the patient psychologically and physically with consideration of the family and/or carer</td>
<td></td>
</tr>
<tr>
<td>Complications</td>
<td>Demonstrates knowledge and understanding of the causes of potential complications and the techniques for their prevention</td>
<td>Able to recognise and manage any complications which may arise during venepuncture and cannulation. Seeks assistance and/or advice where appropriate</td>
<td>Able to support, teach and supervise others as a proficient role model in all circumstances of venepuncture and cannulation</td>
</tr>
<tr>
<td>Troubleshooting</td>
<td>Demonstrates safe and effective use of equipment using simulation arm. Supervised practice of venepuncture and cannulation technique with a proficient colleague offering appropriate rationale for actions</td>
<td>Able to apply knowledge to procedures under supervision. Technique, recognising difficulties, their cause and future preventive measures. Able to take appropriate care of any blood samples. Seek assistance and/or advice where appropriate</td>
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trust. This retrospective review carried out in 2003 indicates positive responses following its introduction as part of a practical training project for nurses. To assess the benefit of the skills for patient care, quantitative data were collected over a two-week period and to assess learners’ experience, qualitative data were collected over two days. Staff training records (n=250) were reviewed to ascertain competency achievement following introduction of the programme and compared to 63 training records of study day attendance before the programme. Quantitative responses were collected using a survey tool (n=405) to establish the level of application of skills following competency achievement, and 40 nurses were interviewed. Of 250 staff who undertook the structured learning programme, 245 (98 per cent) achieved competence in venepuncture and 75 (30 per cent) achieved competence in cannulation. This compared favourably to training before the introduction of the programme when only 26/63 (41 per cent) achieved competence following study day attendance.

Nurses and medical students using this programme were encouraged to use the workbook to access competent staff in their area in addition to the support provided centrally by the skills supervisor. This led learners to seek out knowledge and expertise inherent in the clinical area, for example, HCAs, medical staff and nurses. Through optimal use of these resources nurses were observed to gain competence more easily and quickly. For medical students, the achievement of competence supported them in passing their third year OSCE examinations and transferring their skills. For example, through demonstrating clear evidence of competency, medical students were able to work in the phlebotomy department during the summer holidays.

The learning programme opened access to training support from a range of professional groups. The nurses who were interviewed (n=40) were asked to identify preferences for training support from the skills trainer, phlebotomist, own team or doctor, using ratings of high, medium, medium-low or low. The highly rated responses (n=55, some nurses gave more than...
one rating) revealed that even with a dedicated trainer available, staff valued the opportunity to learn from their own professional team within their department. Twenty four nurses (44 per cent) rated the dedicated skill trainer highly, while 18 (33 per cent) rated their own team highly, despite the limitations of time and availability, with 6 (11 per cent) highly rating phlebotomists and 7 (13 per cent) medical staff. Many comments from learners and senior managers questioned the need to use such a structured pathway to assess competence. However, when questioned, the nurses who were interviewed stated that they found it helpful, identifying different reasons including:

- ‘Needed to support skill’ (Respondent A).
- ‘Gives focus and direction’ (Respondent G).

### FIGURE 4

**Assessment criterion for venepuncture**

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Guidance</th>
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<tbody>
<tr>
<td>1. Appropriate communication with patient</td>
<td>Provides patient with a full explanation of the procedure. Obtains verbal consent from the patient for the procedure. Demonstrates a caring and sensitive manner at all times. Employs methods to reduce patient anxiety.</td>
</tr>
<tr>
<td>2. Demonstrates safe technique throughout the whole procedure</td>
<td>Confirm patient identity against request form. Demonstrates safe practice to reduce the risk of complications. Aware of personal safety and that of colleagues. Avoids causing damage to the vein. Bottles labelled at immediately at bedside once procedure completed. Safe disposal of sharps. Aware of needlestick injury policy. Tourniquet not left on for too long (less than two minutes). Aware of policy for number of attempts at procedure before referral to another colleague (normally two attempts). Considers risk associated with patient variants, that is, drug therapy (clotting) and disease processes.</td>
</tr>
<tr>
<td>3. Familiar with equipment</td>
<td>Demonstrates knowledge of different venepuncture equipment available. Considers the patient’s veins and indications for device selection before selecting appropriate equipment. Collects all equipment together before beginning procedure.</td>
</tr>
<tr>
<td>4. Aseptic technique throughout</td>
<td>Correct hand washing technique conducted before the procedure. Checks packaging and dates of equipment to ensure sterility. Correct skin preparation. Maintains non-touch, aseptic technique during procedure.</td>
</tr>
<tr>
<td>5. Chooses appropriate vein and site for venepuncture</td>
<td>Demonstrates knowledge of anatomy and physiology of veins and related structures. Assesses veins visually and by palpation. Considers the patient’s individual physiological and psychological needs, able to state indications or contraindications for venepuncture site selection.</td>
</tr>
<tr>
<td>7. Provides local anaesthesia (as required)</td>
<td>Applies local anaesthetic if required, and ensures this is prescribed if necessary. Allows time for anaesthesia to take effect.</td>
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<tr>
<td>8. Completes venepuncture correctly and safely</td>
<td>Skin is cleaned according to local infection control policy and skin traction applied. Needle is inserted and stabilised with minimal discomfort to the patient. The correct volume of blood is obtained, in the appropriate bottle, in the correct order of draw. Tourniquets released, and needle removed with minimal discomfort. Digital pressure is applied to minimise bruising and bleeding. Universal precautions observed throughout, and sharps disposed of correctly. Bottles labelled at the patient bedside. Sample despatched correctly and timely. Demonstrates smooth psychomotor skills throughout the procedure.</td>
</tr>
<tr>
<td>9. Disposes of sharps and equipment correctly and safely</td>
<td>Sharps and equipment disposed of according to local healthcare organisation infection control policy.</td>
</tr>
<tr>
<td>10. Completes documentation in line with local policy</td>
<td>Documents venepuncture procedure/attempt or any problems, and labels bottles by the bedside and correctly (as per healthcare organisation policy).</td>
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</tbody>
</table>
Continual practice – very helpful’ (Respondent H).

‘Essential to have a sign off’ (Respondent L).

‘Objectives – known expectations’ (Respondent P).

Of the 242 records for venepuncture, 140 (58 per cent) procedures were for patients pre-treatment and of 163 records for cannulation, 93 (57 per cent) were for patients awaiting treatment. While these data cannot confirm that quality is assured, they suggest that the patient experience is improved as these patients would otherwise have been waiting for treatment. The audit tool used for the survey included a text box for comments to elicit some of the effects of this new way of working for patients and staff. Boxes 1 and 2 show samples of some of the experiences noted.

Regular practice in enhanced clinical skills is essential (Lavery 2003). In the authors’ opinion, findings from the retrospective review indicate that nurses are working towards this goal. Of the 40 nurses interviewed, 33 were competent in venepuncture and 30 in cannulation. Only 1 (3 per cent) of the 33 interviewees competent in venepuncture no longer practised the skill weekly, while 32 (97 per cent) practised the skill every week, with 16 (48 per cent) stating that they did so between one and three times per week, 10 (30 per cent) between four and six times per week, 5 (15 per cent) between seven and 14 times per week and 1 (3 per cent) more than 14 times per week.

Cannulation results revealed a lower application of skills following competency achievement. Ten (33 per cent) did not practise the skill weekly, while 20 (67 per cent) practised the skill every week, with ten (33 per cent) practising between one and three times per week, 4 (13 per cent) between four to six times per week, 2 (7 per cent) between seven and 14 times per week and 4 (13 per cent) more than 14 times per week. However, the design of the retrospective review offered limited opportunity to analyse the correlation between competency maintenance and opportunity to practise.

Indeed, the review raised questions that could be answered through research. Evidence-based guidance on the optimum number of staff trained in cannulation to offer timely service delivery while ensuring adequate exposure to practice skills, would be helpful. However, irrespective of such guiding principles, healthcare delivery necessitates a flexible approach that is responsive to its dynamic environment. The onus of regulation lies with the practitioner.

The authors feel that the structured learning programme empowers the practitioner to reflect on his or her own level of skill and ability, using it not only to gain competence, but also as a resource for revision and further supervised practice. During the retrospective review, anecdotal evidence suggested that the learning programme was being used for revision purposes. This was supported by Respondent Q, who stated: ‘It [the learning pack] was useful for revision’.

The future

The structured learning programme was presented at the RCN Intravenous (IV) Therapy Forum conference in October 2003. Several requests followed from various organisations, for further development and implementation. The future of the structured learning programme is promising, with potential for wider rollout and adaptation to different clinical settings.

BOX 1
Open comments from the survey on cannulation

- ‘To keep her hydrated, she’s not drinking much.’
- ‘To ensure sliding scale of insulin is not interrupted due to phlebitis (regular re-site).’
- ‘Patient receiving a blood transfusion, cannula re-sited.’
- ‘Improves quality and therapy delivery.’
- ‘Patient anxious with unknown professionals... patient knows me so that was better.’
- ‘Fitted in with the junior doctors’ working hours – during the bleep-free period a catheter could be put in and the antibiotics started... easier than bleeping a doctor.’
- ‘Team in theatre. Cross match not taken before theatre. Able to oblige.’

BOX 2
Open comments from the survey on venepuncture

- ‘Patient went home earlier as doctors busy and had missed the phlebotomy round.’
- ‘Post-operative bloods to allow the patient to be discharged on time.’
- ‘Rapid results of cardiac markers ensures correct treatment.’
- ‘She was my allocated patient.’
- ‘Needle phobic – knows me. Sat with patient and explained necessity for blood test.’
- ‘Patient relieved and appreciated the technique adopted for her, that is, butterfly.’
- ‘Patient has been in hospital since this morning. Could not wait another hour in phlebotomy.’
including the private sector, to participate in an evaluation of the programme. The distribution of the tool to these interested organisations was delayed while it was reviewed and updated. An educational grant has been secured from Becton Dickinson UK Ltd to support the first print run of 5,000 copies of the learning pack. The hospital representatives who expressed an interest at the conference will now be given the structured learning programme for use in their organisation, free of charge, so that they can evaluate how it can be used and, if required, adapted to incorporate local policy. The updated learning programme was presented as a poster at the RCN IV Therapy Forum conference in November 2005. Sample copies were given to conference participants.

Discussions with individuals involved in IV therapy across the UK have enabled educational and audit material to be shared, and challenges and experiences to be examined. This work will support other organisations interested in developing a venepuncture and cannulation education programme. The project will help the move away from de-skilling and the need for training repetition in addition to variable standards of learning towards a common goal of a seamless process of education, supervision and assessment, until independent practice is acquired and maintained by the practitioner.

**Conclusion**

The key to developing high quality, knowledgeable healthcare workers is not only theory but also guided, self-directed and supervised practical training. The changing face of the NHS requires rounded healthcare workers who are competent in many skills. In light of the mounting service pressures in clinical environments, there is a reduced ability for staff to attend courses. Therefore, employers need a tool that is practically based, with clear guidance for the learner and assessor, and adaptable for assessment of any member of the healthcare team as a competent practitioner in delivering patient care.

The reported findings from Chelsea and Westminster Healthcare NHS Trust indicate that this structured learning programme is effective in the assessment of medical students and nurses in the clinical environment, with clear guidance for the learner and assessor. A workforce of autonomous learners, equipped with transferable skills ultimately leads to a more flexible, patient-centred health service. This is fundamental to improving service quality and encapsulates the government’s modernisation agenda.

Fostering strong working relationships based on a culture of open and shared learning through free exchange of information has been a feature of this project and a philosophy of collaborative work across the four trusts has made a vision a reality. There have been many challenges during the project, and it has not been a quick process, but the work can now be shared with the wider healthcare network to standardise the training and assessment of venepuncture and cannulation across the UK.

For copies of the workbook, please contact Mary Collins: mary.collins@st-marys.nhs.uk

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**References**


