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ABSTRACT

Nielsen, L. (2003) A cost-benefit analysis of training nurses for extended roles. *Nursing Times*; 99: 28, 34-37.

This study uses a questionnaire to assess the costs and benefits of a course to teach the extended roles of cannulation, venepuncture and intravenous drug administration.

The course had a positive influence on nurses' uptake of venepuncture and IV drug administration, but not cannulation. The cost of £916 to successfully train a single nurse in all three practices leads to the suggestion that the criteria for selecting nurses for the extended role are revised in order to achieve an improved cost-benefit ratio and methods for sustaining the newly acquired knowledge should be developed.

A cost-benefit analysis of training nurses for extended roles

PERIPHERAL intravenous cannulation is second only to diagnostic venepuncture as the most commonly performed procedure in the UK (Dougherty, 1996). It has become commonplace to administer drugs intravenously and well over 50 per cent of patients may receive IV intervention during their hospital stay (Clayton, 1999). According to Wilkinson (1996) 63 per cent of surgical patients in Europe will have an IV cannula inserted and at least 70 per cent of patients in acute care will receive IV therapy for at least part of their hospitalisation.

Nursing staff are increasingly performing venepuncture and cannulation and a sound understanding of the procedure is essential in order to accomplish the task skilfully and to prevent potential complications.

The need for training

Several recent studies emphasise the need for training in basic knowledge and skills. Rourke (2001) showed that 27 per cent of staff did not wear gloves for venepuncture, and only 42 per cent washed their hands both before and after venepuncture. There is, however, no shortage of literature giving guidance on this subject. Campbell et al (1999) provide an excellent practical guide to venepuncture and the management of its complications, while Millam (2000) has technical advice on how to perform venepuncture satisfactorily.

Since 1998 Peterborough Hospitals NHS Trust has offered a study course to all newly appointed nurses as part of their induction and to all nurses already in post. The objectives of this course of study are to:

- Teach the theory behind extended roles;
- Update staff who already perform the extended role;
- Teach cannulation, venepuncture and IV drug administration skills.

Related subjects such as accountability, health and safety, dose calculation and hygiene are also included.

The nurses' ratings of the course have been an average

of eight on a scale of 10. Comments and suggestions from participants have been of great support for the continuous development of the course.

Using extended role skills

The extended role carries with it new responsibilities. According to *The Scope of Professional Practice* (UKCC, 1992) nurses are professionally accountable for their practice. A nurse must act in such a manner as to promote and safeguard the interests and well-being of patients and clients. According to Campbell (1997) it means that IV therapy education can either be actively pursued by individual practitioners where it facilitates the delivery of holistic patient care, or be declined where it does not. However, these skills would normally be part of the job description for nurses undertaking this role.

Inwood (1996) states that nurses who learn new skills improve the total care of their patients by performing the skills when the patient needs them rather than calling another member of staff to carry them out. In Peterborough Hospitals NHS Trust 720 nurses have accepted these increased responsibilities by learning these new skills during the last three years.

Government policy

The Scope of Practice for Nurses (UKCC, 1992) has been strengthened by *The NHS Plan* (Department of Health, 2000), which encourages lifelong learning and the development of extended roles.

The NHS Plan urges nurses to focus on the care and needs of patients. Improving the quality of care may involve setting new standards. One such standard could be that nurses are themselves able to take a blood sample or change a cannula when necessary during the care of a particular patient.

Continuous education is needed in order to take re-

TABLE 1. THE DISTRIBUTION OF NURSES ACCORDING TO COURSE ATTENDANCE AND PRACTISING THE THREE EXTENDED ROLES: CANNULATION, VENEPUNCTURE AND IV DRUG ADMINISTRATION

Attended study day		Practise cannulation			Practise venepuncture			Practise IV drug administration		
		Yes	No	NR	Yes	No	NR	Yes	No	NR
Yes	39	8 (20%)	29 (74%)	2(%)	26 (66%)	11 (28%)	2(%)	39 (100%)	0	0(%)
No	23	4 (17%)	18 (78%)	1(%)	8 (35%)	11 (48%)	4(%)	18 (78%)	4 (17%)	1(%)
'p' value		1.00			0.04*			0.01*		

*Statistically significant difference between attendees and non-attendees of the study day

NR = no response

TABLE 2. THE DISTRIBUTION OF NURSES ACCORDING TO THEIR ATTENDANCE ON THE TRAINING COURSE AND THE FREQUENCY WITH WHICH THEY PRACTISE CANNULATION

Attended study day		Frequency of performing cannulation				
		7 days	30 days	80 days	Never	Don't know
Yes	39	2 (5%)	0	6 (15%)	29 (29%)	2 (5%)
No	23	0	2 (9%)	2 (9%)	18 (78%)	1 (4%)

TABLE 3. THE DISTRIBUTION OF NURSES ACCORDING TO THEIR ATTENDANCE ON THE TRAINING COURSE AND THE FREQUENCY WITH WHICH THEY PRACTISE VENEPUNCTURE

Attended study day		Frequency of performing venepuncture				
		7 days	30 days	180 days	Never	Don't know
Yes	39	12 (31%)	6 (15%)	8 (20%)	11 (28%)	2 (5%)
No	23	1 (4%)	3 (13%)	4 (17%)	11 (48%)	4 (17%)

TABLE 4. THE DISTRIBUTION OF NURSES ACCORDING TO THEIR ATTENDANCE ON THE TRAINING COURSE AND THE FREQUENCY WITH WHICH THEY PRACTISE IV DRUG ADMINISTRATION

Attended study day administration		Frequency of performing IV drug				
		7 days	30 days	180 days	Never	Don't know
Yes	39	34 (87%)	4 (10%)	1 (3%)	0	0

sponsibility for activities that are not included in basic nursing education. Obviously, such education needs resources and as the aim is to include all postregistration nurses a significant amount of money will be spent. For this reason an analysis of the costs and benefits of education should be a regular event.

Potential benefits of training

The training course for extended skills has a number of potential benefits, including:

- An increase in the number of skills that nurses can safely undertake;
- The standardisation and improvement of nurses' existing practice;
- An awareness of the responsibilities of the extended nursing role;
- The provision of more holistic nursing care;
- A reduction in the workload of junior doctors;
- Improved patient satisfaction;
- Improved job satisfaction for nurses able to undertake the extended role.

However, these benefits will only be achieved if nurses who have undertaken training for extended roles practise their new skills.

Objectives of the study

The objectives of this survey are to establish a baseline in order to determine:

- The course's impact on the daily routine;
- The amount of resources allocated;
- Recommendations for further progress.

Methodology

The survey took place in April 2001 at Peterborough Hospitals NHS Trust. It included all surgical nurses whether they had attended the course or not. Nurses from oral surgery and the eye clinic were not included as they did not use IV drugs. The design of the questionnaire accommodated a structured interview and the majority of questions used were closed.

The questionnaire design and the statistical analysis used the statistical package Epiinfo 6 (Dean, 1994). Proportions were compared by using the Chi Squared Test and for small numbers the Fisher's Exact Test. A 'p' value of less than 0.05 ($p < 0.05$) was regarded as being statistically significant.

Results

In total 139 questionnaires were distributed and 62 (45 per cent) were returned. Some nurses did not answer all of the questions and these have been recorded as 'no response' in the tables of results (Tables 1-4).

Sixty-three percent of the nurses who answered the questionnaire had attended the extended role study day. Their responses indicate that the course stimulates and motivates nurses to perform venepuncture and IV drug administration.

However, course attendance appeared to have no bearing on whether nurses perform IV cannulation. Only 12 nurses (19 per cent) reported that they had taken up the practice after attending the course (Table 1), with only two nurses (three per cent) reporting that they exercise it on a weekly basis (Table 2). In addition six nurses (10

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per cent) indicated that they have performed it 'countless' times. However, with one exception, nurses who perform all three procedures felt competent.

Thirteen (21 per cent) of the nurses indicated that they perform venepuncture regularly (Table 3), while 49 (79 per cent) of the nurses reported that they administer IV drugs on a weekly basis.

It is interesting that all 12 nurses performing cannulation also reported that they were competent in venepuncture and administering IV drugs.

The attributable effect

The attributable effect of the course on the weekly practices is defined as:

'The additional number of nurses performing the practice in the wards after attending the course measured against the number of nurses who also perform the practice without having attended the course.'

The attributable course effect for the respective procedures are:

- Cannulation 5 per cent;
- Venepuncture 27 per cent;
- IV drug administration 22 per cent.

For example, after the course 34 out of 39 attendees (87 per cent of attendees) performed weekly IV drug administration practice, but 15 out of 23 nurses not attending the course (65 per cent of non-attendees) also performed the practice (Table 4). This gives an attributable course effect of 22 per cent (87 per cent – 65 per cent) or in other words by running a course for 100 nurses only 22 more nurses are likely to take up the practice.

Forty-seven nurses reported that they have not per-

formed cannulation (Fig 2). The predominant reasons given were: 'a busy ward' and 'too little opportunity to practice'. Twenty-nine (74 per cent) of the 39 nurses who had attended the study day reported that they had 'never' performed cannulation. All 39 nurses who answered the question felt that the course was relevant for the ward, regardless of whether they had taken the course.

Cost

The costs of all courses over three years are mainly the time spent on the courses by attendees and teachers. A crude measure for cost may be estimated as follows: a course running for one day each month over three years consumes 36 'course days' for each of 20 attendees at D-grade level, each 'student' paid £80 per day (a few will be grade E or F) and three teachers at G-grade level, each paid £115 per day.

The cost can therefore be calculated approximately as:

$$36 \text{ (course days)} \times 20 \text{ (attendees)} \times £80 = £57,600 \\ + 36 \text{ (course days)} \times 3 \text{ (teachers)} \times £115 = £12,420 \\ \text{Total} = £70,020.$$

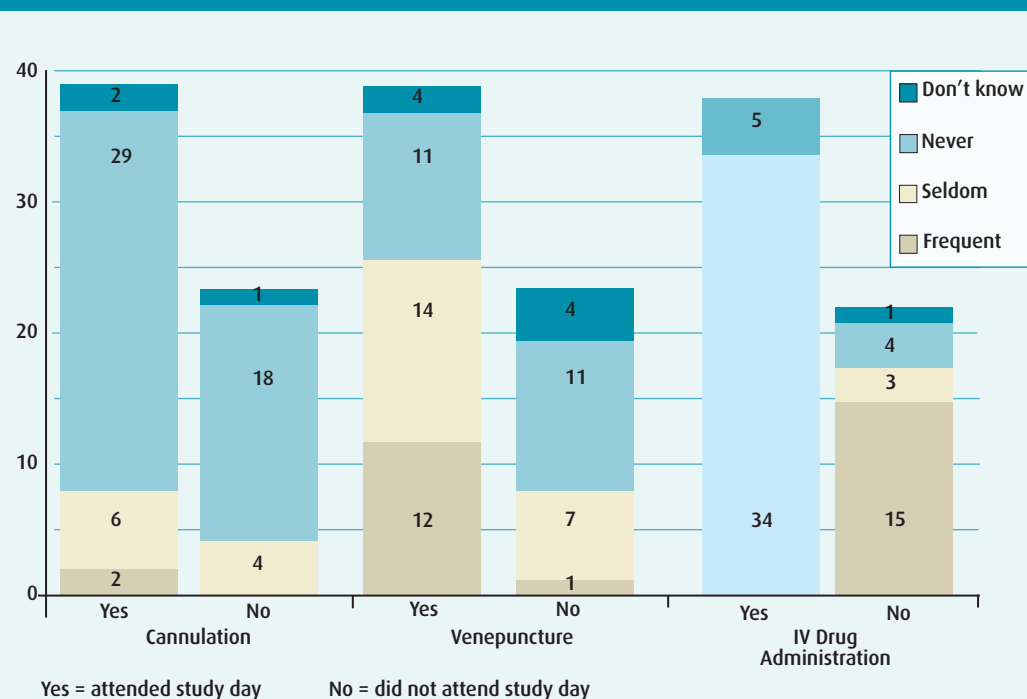
No consumable items or overheads have been included.

Assuming the cost of training is the same for each of the three IV interventions. Each will then have cost £23,340 (£70,020 ÷ 3).

The cost of educating one additional successful nurse will need to include all the unsuccessful nurses – based on the attributable course effect and, therefore, the success rates of 5 per cent, 27 per cent, and 22 per cent, for cannulation, venepuncture and IV drugs administration respectively. It may be calculated as follows:

Cannulation (5 per cent success rate)

FIG 1. NURSES' PERFORMANCE OF EXTENDED ROLE PRACTICE VERSUS STUDY DAY ATTENDANCE



720 nurses x 0.05 = 36 successful nurses
Each successful nurse cost £23,340 ÷ 36 = £648.33

Venepuncture (27 per cent success rate)
720 nurses x 0.27 = 194 successful nurses
Each successful nurse cost £23,340 ÷ 194 = £120.30.

Administering IV drugs (22 per cent success rate)
720 nurses x 0.22 = 158 successful
Each successful nurse cost £23,340 ÷ 158 = £147.72.

The cost of training a nurse in each of the practices is:

■ Cannulation practice	£648;
■ Venepuncture practice	£120;
■ IV Drug administration	£147;
■ All three roles	£915.

Discussion

This survey has been used to assess the costs and benefits of a course providing experienced nurses with the knowledge and skills needed to perform the extended role of IV intervention. The course was beneficial on the uptake of venepuncture and IV drug administration, but not on cannulation. The costs for educating one successful nurse in taking up cannulation, venepuncture and IV drug practice were £648, £120 and £147, respectively. This means it will cost £915 to educate one nurse to perform all three interventions.

The questionnaire had a response rate of 45 per cent. This allows us to estimate that the surgical departments have a maximum of 4, 26, and 98 nurses who regularly perform cannulation, venepuncture and IV drug administration, respectively.

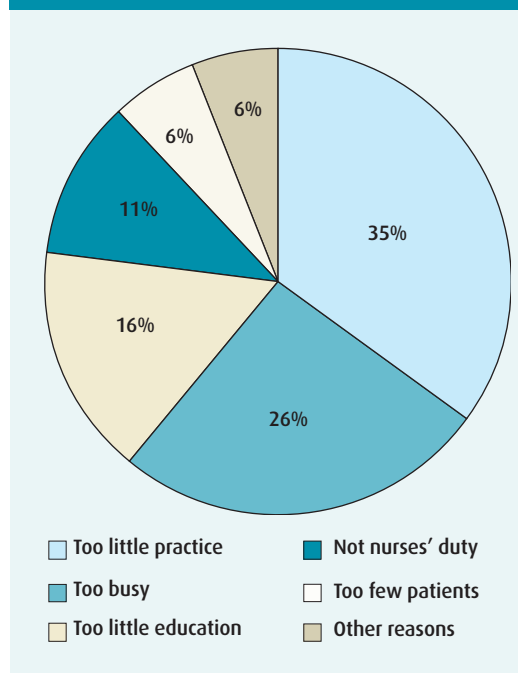
It is remarkable that of the 39 nurses who attended the course only 2 nurses regularly practice of cannulation and 12 perform the skill of venepuncture. The attributable course effect was in fact just 5, 27 and 22 per cent for cannulation, venepuncture and IV drug administration, respectively (Fig 1). The return from the course in terms of numbers of nurses taking up the practice of the these skills seems to be disappointingly low.

There are several reasons for nurses to take on the responsibility linked to this extended role. Firstly, the strategy of *The NHS Plan* to place the patient in the centre pivots on nurse functions, for example, the introduction of matrons, and nurses accepting the responsibility for agreed protocols. There is a need for more nurses to take on new responsibilities at more wards and clinics.

Secondly, *The NHS Plan* with the introduction of intermediate care centres will change the case mix of the acute hospital and it is foreseen that the proportion of patients who need intravascular access will increase significantly. In a recent prevalence study at Peterborough Hospitals NHS Trust it was shown that 34 per cent of all inpatients had one or more intravascular devices.

This survey has provided some useful data to develop a strategy for the future of extended roles. It may be useful to supplement the questionnaire with other au-

FIG 2. REASONS GIVEN FOR NOT ADOPTING THE EXTENDED ROLE OF CANNULATION



ditions, especially one to quantify the need for intravascular access. It would also be useful to know the profile of those nurses who are most successful in taking up all three practices, in order to improve the selection for the courses in future.

Only 11 per cent (Fig 2) of nurses indicated that they do not perceive cannulation as 'their duty' and nurses do not give it priority over other daily tasks. A 'change of culture' is needed to improve the uptake of the extended role. This questionnaire approach has limitations, as it is reliant on nurses self-reporting rather than monitoring their actual behaviour and it is possible that nurses may be under or overestimating the number of times that they use the skill.

Finally, other methods are needed to sustain nurses' newly acquired knowledge, including ward support for the newly acquired skills. Some of the reasons that nurses gave for not adopting the extended role of cannulation are shown in Fig 2.

Conclusion and recommendations

In conclusion, useful data on cost-effectiveness can be gathered through a questionnaire in order to facilitate evidence-based improvements. This is a good starting point for the next phase of analysis, which should include close ward supervision combined with a risk assessment for failure.

In addition it is suggested that the criteria for selecting nurses for the extended role and hence for training are revised in order to achieve an improved cost-benefit ratio. Finally, methods for sustaining the newly acquired knowledge should be developed. ■

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