A new look at learning needs in general practice

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SUMMARY. Over a period of 18 months, trainees in the West Midlands were given a multiple choice questionnaire at the start of the general practice year to assess their factual knowledge in 14 areas of medicine and were given the opportunity to take the same test six months later. Sixty-five trainees who completed the test twice are the basis of the study, and their results are compared with 99 trainers who completed the paper once. In the pre-training test, the trainees' scores were significantly lower than their trainers' in total and in most individual subjects. In the mid-training test, the trainees' knowledge of most subjects had improved significantly over the six months. These results indicate that the teaching and assessment of factual knowledge should not be dismissed as unimportant in general practice training.

Introduction

IN 1979, Pereira-Gray wrote:[1]

"In the past medical education has concentrated on imparting and subsequently testing factual knowledge. In our department now, a relatively small proportion of assessment time is devoted to factual knowledge. The educational evidence for this has been provided by Freeman and Byrne who . . . have shown that the factual knowledge of diseases by the trainee entering vocational training is not greatly different from experienced general practitioner trainers."

This view is also held by some trainees, such as Donohoe and Courtney[2] who maintain that trainees should try and establish what their strengths and weaknesses are; but as the gap between trainees and trainers is not in factual knowledge but in problem-solving skills and attitudes, these are the areas to concentrate on. Now that general practice is recognized as a speciality with its own core content of factual knowledge,[3] is it really possible that inexperienced doctors have already acquired all this knowledge when they enter their training year?

After a decade of rapid change—in which vocational training for general practice has become mandatory—there has been a dramatic increase in the number of trainees and trainers. Nearly 50 per cent of all medical graduates in this country will enter general practice,[4] and we must ensure that they have adequate training if standards in general practice are to improve. Concentrating on the acquisition of skills and attitudes could be quite inappropriate if a firm base of factual knowledge is lacking.

This study presents a new look at the assessment of trainees' knowledge and a comparison with the results of Freeman and Byrne.[5]

Method

Over the past eight years, the author has been developing a multiple choice questionnaire (MCQ) to assess clinical and administrative knowledge appropriate to general practice and has been using it to test factual recall in trainees and trainers.[6] There has been extensive experience of the construction and use of this type of test in general[7,8] and medical[9,10] education.

The questions used in this study were reviewed by advisers, course organizers and consultants to ensure their validity. The MCQ consisted of 180 questions, each one containing a question stem with a choice of five possible answers, only one of which is appropriate. One mark was scored for a correct answer, and no marks for an incorrect answer. All questions were attempted and there was no negative marking.

A computer marking program was developed for this paper, to meet the special requirement for providing information about individual subject areas. The 180 questions were sorted by the computer into 14 different subject areas and the scores in each area were calculated (Figure 1). Extensive statistical analysis was also part of the computer program, with item analysis of all questions and, during pilot studies, removal of questions which were poor discriminators.

Various procedures have been developed for assessing the reliability of a test. Rather than comparing scores on multiple administrations of a test with the same subjects, it is easier to estimate reliability by comparing scores on the individual items of the test. Kuder Richardson formula 21 is a method for approximating the degree of achievement or correlations among items in a test.[11] With this procedure, the reliability of a test can vary between 0 (no reliability) and 1 (perfect reliability). Neither of these results is likely; an acceptable reliability would be 0.6 or above. The reliability of the test in

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Group trainees Date 09-02-82

Subject	Max. mark	Marks scored	Group mean score (percentages in brackets)	Standard deviation (percentages in brackets)	Range
Medicine	15	9	11.0 (73)	2.1 (14)	3–15
Paediatrics	15	4	7.9 (52)	2.0 (13)	4–14
Community medicine	15	6	9.4 (62)	2.0 (13)	3–13
Infectious diseases	15	5	7.8 (52)	2.0 (13)	4–13
Psychiatry	15	6	10.6 (70)	2.4 (16)	3–15
Practice management	15	4	6.9 (45)	2.4 (15)	2–13
Therapeutics	15	8	11.1 (73)	2.4 (15)	4–15
Surgery	15	11	10.3 (68)	2.2 (15)	2–15
ENT	10	3	4.9 (48)	1.7 (16)	0–8
Ophthalmology	10	6	6.1 (61)	1.7 (16)	2–9
Dermatology	10	6	5.9 (58)	1.6 (16)	2–10
Obstetrics	10	6	6.8 (68)	1.5 (14)	3–10
Gynaecology	10	2	5.1 (50)	1.5 (15)	2–8
Human development	10	6	7.0 (70)	1.4 (13)	3–10
Total MCQ	180	82	110.7 (61)	15.8 (8)	59–136

Figure 1. *Multiple choice question paper.*

the present study was 0.8, which compared favourably with other MCQs of this type.

During the period August 1980 to February 1982, trainees completed the MCQ on entering their general practice year of training and six months later completed the same paper. Over the same period of the study, trainers and potential trainers attending teaching courses in the West Midlands completed the paper.

Results

The results of the MCQs were given to individuals in the form of a computer printout (Figure 1) and the trainees also received a comparison sheet showing the scores of a group of trainers with whom they could compare their marks. Results of tests on 99 trainers and potential trainers, and 65 trainees who completed the paper twice in their training year are shown in Table 1.

It can be seen that there was an improvement in the scores of the trainees in all individual subjects and in the total scores for the test over the period. The trainees started the general practice year with total scores and scores in most subject areas below those of the trainers, but in the second test they had overtaken the trainers in total scores and in scores in most areas. The statistical significance of these group differences is shown in Table 2. The number of questions was different in some of the individual subjects of the MCQ. When the subject scores were standardized to give an equal number of marks, the results of the statistical comparisons remained the same.

Discussion

The results obtained by Freeman and Byrne[5] using a multiple choice questionnaire showed that at the beginning and end of a three-year course of vocational training, there was no significant difference in the total scores of trainees as compared with a group of trainers. However, the trainees did show an improvement in their overall scores in their group over the three years. The present study tested factual recall in the general practice year, when trainees had completed two years of hospital posts. The results do not support the view of Freeman and Byrne[5] that trainees would have acquired appropriate factual knowledge during their hospital years because of the comprehensive nature of the clinical posts they had held. Nor do the results support the view that it is not necessary to concentrate on factual knowledge in the general practice training year. For trainees are not only entering the year with a degree of knowledge that is significantly worse than the trainers', but there is a significant improvement during the year, which suggests that they do have much to learn of the core content of general practice.

Why are the results of these two studies different? First, it can be argued that the present study tested a different content of factual knowledge from that tested by Freeman and Byrne. Certainly, the greatest difference in raw scores between trainers and trainees in the present MCQ is in the area of practice management, where trainees in both tests have scores well below those

of the trainers. Freeman and Byrne did not include this area in their study and this raises the question as to which individual areas can be thought of as forming the core content of general practice knowledge, and whether changing these in a test affects the value of comparing total scores of trainers and trainees.

When the results were recalculated with the practice management section removed, it was found that a comparison of the trainees' pre-training and mid-training test scores were still significantly different at the 0.001 level. However, when the trainees' scores were compared with the trainers' scores, there was no statistical difference in spite of the fact that trainees' pre-training scores were lower than the trainers' and higher than the trainers' at the mid-training test. This demonstrates the problems of drawing conclusions from a comparison of the total scores of trainers and trainees; trainees' scores (total and in individual subjects) showed

Table 1. Mean scores in MCQ testing of trainers and trainees at entry and six months later.

Subject	Trainers (n = 99)		Trainees (pre-training) (n = 65)		Trainees (mid-training) (n = 65)	
	Mean	SEM	Mean	SEM	Mean	SEM
Medicine	10.9	0.20	10.8	0.32	11.1	0.28
Paediatrics	7.6	0.22	7.8	0.23	8.4	0.25
Community medicine	9.4	0.18	8.9	0.25	9.7	0.21
Infectious diseases	8.5	0.19	7.8	0.25	8.3	0.22
Psychiatry	10.1	0.27	9.9	0.29	10.7	0.30
Practice management	8.9	0.19	5.5	0.19	7.7	0.25
Therapeutics	10.5	0.20	10.6	0.27	10.9	0.25
Surgery	10.2	0.18	9.5	0.26	10.3	0.29
ENT	5.1	0.18	4.6	0.20	5.1	0.29
Ophthalmology	6.2	0.14	5.4	0.21	6.2	0.20
Dermatology	6.1	0.15	5.3	0.22	6.1	0.22
Obstetrics	6.9	0.15	6.7	0.17	7.3	0.18
Gynaecology	5.3	0.16	5.1	0.18	5.5	0.18
Human development	6.5	0.16	6.9	0.16	7.2	0.15
Total	112.0	1.38	104.8	1.67	114.4	1.72
Total excluding practice management	103.2	1.34	99.3	1.64	106.7	1.67

Table 2. Student's 't' test for significant difference of results.

Subject	Comparison between trainees' pre-training and mid-training scores	Comparison between trainers' scores and trainees' pre-training scores	Comparison between trainers' scores and trainees' mid-training scores
Medicine	NS	NS	NS
Paediatrics	$P<0.05$	NS	$P<0.05$
Community medicine	$P<0.01$	NS	NS
Infectious diseases	NS	$P<0.05$	NS
Psychiatry	$P<0.001$	NS	NS
Practice management	$P<0.001$	$P<0.001$	$P<0.001$
Therapeutics	NS	NS	NS
Surgery	$P<0.001$	$P<0.05$	NS
ENT	$P<0.05$	NS	NS
Dermatology	$P<0.001$	$P<0.01$	NS
Ophthalmology	$P<0.001$	$P<0.01$	NS
Obstetrics	$P<0.01$	NS	NS
Gynaecology	$P<0.05$	NS	NS
Human development	NS	NS	$P<0.01$
Total	$P<0.001$	$P<0.001$	NS
Total excluding practice management	$P<0.001$	NS	NS

NS, not significant.

a significant improvement with or without the inclusion of the practice management section. The value of comparing the total scores of trainees and trainers is therefore related to a consideration of what constitutes core content whereas it is the trainees' improvement in individual areas which is important.

Second, it is worth considering whether the results from this study were affected by changes in trainers or trainees. The standards for appointing trainers are steadily being raised by the Joint Committee on Postgraduate Training for General Practice and by regional general practice education committees. There may not have been enough time yet for higher standards of selection or for vocational training to affect the main body of general practitioners. However, the nature of the trainees has changed. The well motivated UK graduates in Freeman and Byrne's study were not necessarily representative of the whole group of doctors who enter general practice. Now that vocational training is mandatory, the present study reflects the wide differences in training and experience of both UK and overseas graduates who enter training schemes.

Implications

The present study may have important implications for vocational training:

1. Trainees in this study came from hospital posts in all parts of the country as well as in West Midlands hospitals, suggesting that the findings of gaps in individual and group knowledge are applicable to other regions of the country.

2. It has been shown that formative assessment can, at this stage, identify these gaps in knowledge and should be recognized as an essential part of the general practice year. However, the assessment must be in individual subjects and trainees' scores must be compared with those of trainers', so that trainees can aim to reach or overtake them.

3. Trainees, with the co-operation of their trainers, should use the information from the formative assessment to plan the teaching during the general practice year.

4. Trainees are improving their knowledge of most subjects during the year and the trend is to overtake the trainers in recall of factual knowledge, thus showing that this aspect of vocational training is effective.

5. If a trainee shows major gaps in knowledge towards the end of the training period, then extra time in a practice to improve his knowledge is justifiable.

6. If the acquisition of a core of knowledge is essential for improving skills and attitudes in general practice, then a larger proportion of the three years of training should be in the practice setting.

The aim of vocational training is to improve the standard of primary health care, and the evidence suggests that future general practitioners are gaining knowledge during their training and may even become better informed than those already in practice. The time has come to abandon the idea that assessment and teaching of factual knowledge is not an important part of the training year.

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Acknowledgements

I am grateful to the following people for their help with this study: Mrs S. Cooper, Statistician, West Midlands Regional Health Authority; Dr R. Flinn, Director of Computer Studies, Medical School, University of Birmingham; Mr E. J. Ross, Lecturer in Education, University of Warwick; Dr D. G. Scott, Regional Adviser in General Practice, West Midlands; Mrs M. Knight and Mrs C. Parker, Secretarial and Administrative Staff.

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New megavitamin syndrome

Although consumption of large doses of pyridoxine has gained wide public acceptance, a report indicates that it can cause sensory neuropathy or neuronopathy syndromes and that safe guidelines should be established for the use of this widely abused vitamin. Seven adults had ataxia and severe sensory nervous system dysfunction after daily high-level pyridoxine (vitamin B_6) consumption. Four were severely disabled; all improved after withdrawal. Weakness was not a feature of this condition, and the central nervous system was clinically spared.

Source: Schaumburg H, Kaplan J, Windebank A *et al.* Sensory neuropathy from pyridoxine abuse. *New Engl J Med* 1983; **309:** 445-448.