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A study of the knowledge of radiological anatomy of senior house officers in accident and emergency medicine

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SUMMARY

Senior house officers working in 10 major accident units were tested on their ability to name normal anatomical features seen on radiographs of commonly X-rayed areas. The results show that, overall, those tested could only identify 77% of the areas correctly. The discussion considers these results and also considers whether it is important to be able to identify the anatomical features presented.

INTRODUCTION

There are 12 major accident units in the Mersey region. Of these, 10 had a staff of full time SHOs. All 10 units were visited by the author during the period May to July 1987 and a total of 44 SHOs tested on their ability to identify normal anatomical features on X-ray. All doctors were given the opportunity to decline the test but only two actually refused when asked. All SHOs had completed between 3 and 6 months of their accident unit appointment.

METHODS

A number of normal X-rays had been selected at the start of the study. A list appears in Table 1. None had any abnormality apparent and all were considered good quality films as regards definition and orientation. The candidates were examined individually by the

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author, who presented them with each film in turn and asked them to identify the points as listed in Table 2. Two points were given for each of the tarsal or carpal bones named and correctly positioned (one point was given for simply naming a bone). For the remaining features the area under question was pointed out by the author and the candidate asked to identify the points indicated; one point was scored for each of these questions answered correctly. This allowed a maximum score of 32.

Table 1 X-rays used

Region	Orientation
Wrist	Anteroposterior, lateral and oblique
Foot	Anteroposterior, oblique
Shoulder	Anteroposterior
Skull	Lateral
Elbow	Anteroposterior, lateral
Facial bones	30 Occipitomental

Table 2 Anatomical features to be identified

Region	Area for identification
Wrist	All carpal bones & radial styloid
Foot	All tarsal bones
Shoulder	Coracoid process
Skull	Sphenoidal air sinus
Elbow	Capitulum and trochlea
Facial bones	Zygomatic arch

RESULTS

A total of 44 SHOs were tested. Their scores ranged between 14 and 32 with a mean of 25 (44–100%, mean 77%). The number of correct answers for each area tested are shown in Table 3. In the carpal and tarsal bones the first figure is the number of candidates simply naming the relevant bone while the second figure indicates the number of candidates correctly identifying its position. The remaining figures record the number of candidates identifying the area when it was pointed out.

The experience of the SHOs is illustrated indirectly in Figure 1, which shows the distribution of SHOs by year of qualification. Twenty-three were in their first post-registration year and had taken no postgraduate examinations or courses. Fourteen of these stated that they would be entering general practice in the future. Twenty-one SHOs had been in at least two previous SHO posts. Only 11 of these were hoping to enter general practice. Of these 21, two candidates had over 10 years' surgical experience and had gained their FRCS. The remaining 19 had between 1 and 6 years' experience in various specialties including paediatrics, anaesthetics and general surgery.

The results for those who were in their first post-registration year are: score range 17–32 (mean 25); and for the more experienced SHOs: range 14–32 (mean 24). There was no statistical difference between these two groups (Mann Whitney U-test, $P > 0{\cdot}1$). Similarly, there was no statistical difference between the scores of those intending to be GPs and those remaining in hospital practice (Mann Whitney U-test, $P > 0{\cdot}1$).

Table 3 Total scores for each individual anatomical feature

Carpus											
Scaphoid			Lunate			Triquetral			Pisiform		
44		42	41		36	38		25	40		35
Hamate			Capitate			Trapezoid			Trapezium		
40		31	36		30	36		30	37		28
Tarsus											
Calcaneum			Talus			Navicular			Cuboid		Cuneiforms
42	42		42	40		37	33		35	29	32 29
Other areas											
Coracoid process			Sphenoid sinus			Radial styloid					
29			20			41					
Capitulum			Trochlea			Zygomatic arch					
17			10			37					

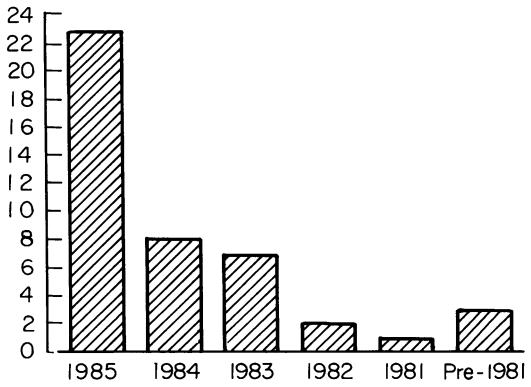

Fig. 1 Distribution of SHOs by year of qualification.

DISCUSSION

This study suggests that there is a poor standard of anatomical knowledge displayed by the accident and emergency SHOs. The mean score of 25 (77%) cannot be considered high when viewed against the difficulty of the test. Of the areas tested it would be expected that only the capitulum and trochlea (and possibly the sphenoid sinus) should have proved any problem at all. This would suggest a 'pass mark' of 29 (90%). On this basis only 13 candidates (30%) would have achieved a satisfactory standard.

Such a standard is by necessity artificial and subjective. There are no strict guidelines laid down for the anatomy or radiological anatomy that should be known by undergraduates. Similarly the regulations for the primary examinations of the three Royal Colleges of Surgery do not address the problem of exactly what knowledge is required. The Royal College of Radiologists specifically excludes any such listings from its regulations and clearly it would be impractical to produce vast lists of all areas of anatomy that should be known by doctors at various stages of their careers. However, this may be of value in the teaching of undergraduates who generally have little idea of the relative clinical importance of different anatomical areas. By concentrating teaching and learning on those areas of clinical importance and relating them to real clinical problems the quality of anatomical knowledge will be improved. At present examination standards are laid down by tradition and examiners' own ideas of what should be known.

Several authors have commented on the reduction in the time allowed for anatomy teaching in general (*BMJ* Editorial, 1976; Moosman, 1980) and radiological anatomy in particular (Golberg, 1978; Swinburne, 1979) and these results may be one consequence of this trend. An increase in both undergraduate and postgraduate teaching of these subjects by both radiologists and clinicians is suggested (Golberg, 1978; Moosman, 1980).

The main recurring difficulties are:

(1) the correct naming and positioning of the three 'Ts' in the wrist i.e. triquetral, trapezoid and trapezium;
(2) the naming of the capitulum and trochlea;
(3) and the identification of the sphenoidal air sinus (Table 3).

A number of candidates had considerable difficulty in naming *any* of the bones of the carpus or tarsus.

If these scores are representative then the question arises of whether this anatomical inability is important or not. The reasons for correctly identifying anatomical features are to ensure correct treatment, to facilitate accurate communications with colleagues, and to enable accurate records to be kept, for example for medicolegal purposes or statistical analysis.

Most of the SHOs tested said that although they did not know the names of the areas tested they would know what to do if an abnormality was seen! For example, many SHOs failed to name correctly the sphenoidal air sinus: but many of them knew that a fluid level may be found in this area in a base of skull fracture. Similarly, in fractures of the capitulum or trochlea a number of SHOs would have described a fracture of 'the lower end of the humerus medially (or laterally)'. In both these examples it was most likely that correct treatment would be given.

Where the patient is subsequently reviewed with the X-rays any error in the initial description of the injury should be rectified and treatment will be continued correctly. However, in the case of a telephone consultation there is obviously a risk of incorrect treatment being given since the injury may be wrongly described by the referring doctor.

CONCLUSION

This study shows that the level of anatomical knowledge in accident and emergency SHOs is not high. This is especially important since the areas chosen for study are encountered daily by the doctors tested and should not have proved problematic.

Many accident and emergency departments hold teaching sessions for their junior staff and, in some cases, undergraduate students and it is suggested that rather than assume a level of anatomical knowledge, a revision of the anatomy of the area in question should be undertaken prior to discussing the pathology.

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