

## Is undergraduate otoscopy teaching adequate? – An audit of clinical teaching

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### Summary

Otoscopy is an important skill for the general practitioner, yet skill in the technique is rarely assessed formally at undergraduate level. This study aimed to assess the effect of teaching on the acquisition of otoscopic skill. Thirty-five medical students were assessed prospectively during their ENT attachments. Seventeen students were randomized to the standard course and 18 attended an additional seminar on otoscopy. Students' confidence was assessed for various aspects of otoscopy using a visual analogue scale, and clinical skill was assessed in examining four patients. Assessments took place at the beginning and end of the course.

Students gained in their confidence and skill for all parameters, although the clinical ability to distinguish normal from abnormal tympanic membranes changed little from baseline levels. Extra teaching produced better gains in confidence ( $P < 0.05$ ) and skill ( $P < 0.01$ ) in identifying specific features of the tympanic membrane and eliminated errors of the 'false negative' variety.

A minimal investment in teaching effort produces appreciable gains in students' otoscopic skills. This has implication for the planning of undergraduate ENT courses and vocational training for general practice.

### Introduction

The undergraduate curriculum aims to create a 'basic' doctor rather than a comprehensively trained practitioner<sup>1</sup>. In the case of ENT teaching it has been suggested that emphasis should be on basic skills and a knowledge of common or life threatening conditions<sup>2</sup>. This must be imparted in all-too-brief courses which recently averaged 57 hours<sup>3</sup>. Teachers should ideally strive to achieve specific goals in the curriculum and audit their performance<sup>4</sup>. The 45% or so of students that eventually become general practitioners will meet ENT problems in 10–20% of their consultations and otoscopic assessment is therefore an important skill. This is rarely assessed at any stage of the undergraduate or postgraduate curriculum<sup>5</sup> hence we examined two groups of medical students in order to assess the impact of specific otoscopy teaching on their skill acquisition.

### Subjects and methods

Thirty-five fourth year medical students of the University College Hospital, Middlesex Medical School were studied, who spent 4 weeks at the Royal National Throat, Nose and Ear Hospital, shared with dermatology. They were randomly allocated to two

groups: the first group of 17 students (group A) underwent the 'standard' course which included a teaching session on 'clinical examination'; the second group of 18 students (group B) received an additional seminar on otoscopy which constituted 50–100 min of teaching time. Sixteen additional students attended the course during the study period, but the staggered vacation system prevented them from undergoing full assessment and hence they were not analysed.

Each student was assessed at the beginning and near the end of the course, and the number of otoscopic examinations performed in outpatients during the interim was recorded individually on a card by each student. Two aspects of otoscopy were investigated: confidence and clinical skill.

### Assessment of confidence

Each student was asked to indicate his/her degree of confidence, using a recognized 100 mm long visual analogue scale<sup>6</sup>, relating to three aspects involved in otoscopy. These were (i) basic ability to visualize the tympanic membrane (ii) ability to distinguish a normal from an abnormal tympanic membrane and (iii) ability to recognize special features and abnormalities of the tympanic membrane. For each student a confidence score was measured from the visual analogue scale for each of these three aspects of otoscopy.

### Assessment of clinical skill

Four ears were examined by the group at the beginning of the course and four different but comparable ears at the end of each course. Two normal and two abnormal ears were included in each assessment. They were asked to state whether they could see the tympanic membrane, whether they considered it to be essentially normal or abnormal, and finally they were asked to draw and label every structure seen in each ear. This final aspect allowed them to label both normal visible structures and abnormal features. The authors agreed on a point scoring system for each ear drawing (5–8 points per ear) with the final score out of 20–25 being converted to a percentage.

### Statistical analysis

The results were compared using a Student's *t*-test (MINITAB, St Thomas's Hospital) with the criterion for significance at  $P < 0.05$ . Non-parametric tests (Wilcoxon rank sum test and Mann-Whitney test) were employed when the scatter of data did not approximate to a normal distribution.

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Table 1. Confidence and clinical skill scores in identifying the tympanic membrane (mean±SD)

	Group A: standard course (n=17)	Group B: Additional teaching (n=18)	P value
Confidence score (day 1)	45.9%±25.5%	39.8%±15%	NS*
Confidence score (day 22)	74.8%±20.3%	83.6%±13.5%	NS
Confidence gain	28.9%±21.6%	43.8%±15.6%	<0.05
Skill score (day 1)	82.4%±17.1%	94.4%±10.7%	<0.05
Skill score (day 22)	98.8%±4.8%	100%±0%	<0.001

\*NS=not significant ( $P>0.05$ ); Student's *t*-test

Table 2. Confidence and clinical skill scores distinguishing normal from abnormal tympanic membranes (mean±SD)

	Group A: standard course (n=17)	Group B: additional teaching (n=18)	P value
Confidence score (day 1)	22%±18.1%	20.7%±16.0%	NS
Confidence score (day 22)	62.2%±19.2%	66.7%±16.7%	NS
Confidence gain	40.2%±19.0%	46.0%±16.5%	NS
Skill score (day 1)	76.1%±26.8%	73.6%±19.0%	NS
Skill score (day 22)	82.4%±16.2%	77.5%±17.4%	NS

## Results

### Identifying the tympanic membrane

The two groups had a similar yet low level of confidence at the start of the course (Table 1), and those in group B experienced a significantly better gain in confidence as a result of their additional teaching. Both groups ended the course with a very low failure rate at identifying the tympanic membrane.

### Distinguishing normal from abnormal ears

Both groups achieved similar gains in their confidence in distinguishing normal from abnormal ears (Table 2). Their skills, which were impressive, changed very little in both groups and there were no statistically significant differences between the two groups.

Most errors were seen to be of the false positive variety (that is normal ears judged to be abnormal) the incidence of which remained unchanged in both

groups despite tuition (Table 3). However, additional teaching resulted in a lower incidence of false negative decisions, an important practical gain.

### Identification of specific features of the tympanic membrane

Students became much more confident as a result of the course (Table 4), and improved their clinical skills in a commensurate fashion. The extra teaching resulted in significantly better gains in both confidence and skills. Several students in group B achieved a degree of 'excellence' (skill score over 70% in 3/18) compared to just one in group A. More importantly, 'substandard' performance (for example scores below 40%) was seen in 8/17 of group A compared to only 1/18 of group B. Therefore the vast majority of group B were leaving the course 'competent' whereas this was not true of group A.

Table 3. False positive and false negative rates (mean%±SD) in student assessment of clinical cases

	Group A: standard course (n=17)	Group B: additional teaching (n=18)	P value
False positive rate (day 1)	11.7%±14.7%	16.2%±13.5%	NS
False positive rate (day 22)	13.5%±11.8%	22.5%±17.4%	NS
False negative rate (day 1)	6.4%±14.8%	7.4%±12.4%	NS
False negative rate (day 22)	4.1%±9.2%	0.0%±0.0%	<0.001

Table 4. Confidence and clinical skill scores in identifying specific features of the tympanic membrane (mean±SD)

	Group A: standard course (n=17)	Group B: additional teaching (n=18)	P value
Confidence score (day 1)	6.3%±5.7%	6.8%±10.9%	NS
Confidence score (day 22)	41.5%±21.1%	56.4%±20.2%	<0.05
Confidence gain	35.2%±18.7%	49.4%±20.5%	<0.05
Skill score (day 1)	15.6%±13.3%	13.9%±9.4%	NS
Skill score (day 22)	41.2%±17.6%	59.6%±13.2%	<0.01
Skill gain	25.5%±18.0%	45.6%±16.1%	<0.01

*Exposure to otoscopy in the outpatient clinic*

Analysis of students' record cards showed that group A students saw a mean of 18.8 ( $\pm 6.1$ ) ears each, (range 10-32) compared to 30.6 ( $\pm 12.5$ ) in group B (range 11-56). The difference was statistically significant ( $P=0.01$ ). The reason for this discrepancy is unclear, although 'enthusiasm' may have been raised in group B as a result of their extra teaching. Interestingly, several high scoring students in both groups had seen few ears in the clinic, and several low scoring students had seen a relatively large number of ears.

**Discussion**

The undergraduate curriculum aims firstly to educate and secondly to train for future practice, and the latter must include basic clinical skills. Despite increasing demands from 'minor' specialties to increase their representation in the curriculum, it is unlikely that in the case of ENT this will result in an appreciable increase in the current average of around 57 h. ENT teachers should therefore concentrate on achieving 'core' educational goals in this limited available time. Such goals were specified in only 5 out of 24 medical schools in a recent study and clinical skills were assessed in just one school<sup>2</sup>. A survey of students in Leeds suggested that feedback on examination skills could be improved upon and that practical skills should receive more attention<sup>7</sup>. The argument that omissions in undergraduate ENT teaching can be rectified in vocational training schemes for general practice would cushion the implications of the paucity of current teaching. Evidence that this occurs in most schemes is lacking<sup>8</sup>, despite the universal agreement concerning the prominence of ENT problems in general practice consultations<sup>9</sup>.

Modification of the teaching programme with respect to otoscopy resulted in a more confident and able product, despite an already respectable average achievement after the standard course. This was achieved with a very modest investment of teaching time. A student primed in this way we feel will be better placed to learn from future exposure to otoscopy in subsequent postgraduate training where feedback may be limited or absent. One interesting finding from our study is that errors in distinguishing normal from abnormal ears are predominantly of the 'false positive' variety and this changes little after the short course. This is reassuring in that serious disease is unlikely to be missed, although it may translate to overtreatment and over-referral when the student enters general practice. The number of otoscopic examinations performed by the student was seen to be of some importance in our study, although many high scoring students had seen relatively few ears,

and it is likely that the quality of supervision, nature of the case mix and receptiveness of the individual is of comparable importance<sup>10</sup>.

Unlike teaching abstract knowledge, clinical skill teaching should aim for a 'competent' student population above a set minimum, rather than a wide spread about an 'acceptable' mean<sup>11</sup>. The achievement of a brief teaching session suggests that students were previously leaving the course too early on their learning curve.

Effective undergraduate programmes require committed teachers, sufficient time and adequate planning. The principles of audit should be applied to teaching as well as to clinical care in order to make best use of the limited resources available. Finally we can only reiterate the words of one of Oxford's great medical educators, Sir George Pickering<sup>1</sup>:

'... the mastery of such clinical methods is perhaps the most important objective of the clinical curriculum. Today it is mostly badly done. This requires more attention by teachers.'

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