

Main Article

Mr R A Steven takes responsibility for the integrity of the content of the paper

Cite this article: Steven RA, McAleer S, Jones SE, Lloyd SK, Spielmann PM, Eynon-Lewis N, Mires GJ. Defining performance levels in undergraduate otolaryngology education. *J Laryngol Otol* 2022;**136**:17–23. <https://doi.org/10.1017/S0022215121003893>

Accepted: 5 May 2021
First published online: 26 November 2021

Key words:
Medical Student; Undergraduate;
Medical Education; Otolaryngology; Education;
Needs Assessment

Author for correspondence:
Mr Richard A Steven,
Department of Otolaryngology,
University of Dundee, Dundee,
Scotland, UK
E-mail: richardsteven@doctors

Defining performance levels in undergraduate otolaryngology education

R A Steven¹, S McAleer², S E Jones³, S K Lloyd^{4,5}, P M Spielmann³,
N Eynon-Lewis⁶ and G J Mires⁷

¹Department of Otolaryngology, University of Dundee, Dundee, Scotland, ²Centre for Medical Education, University of Dundee, Dundee, Scotland, ³Department of Otolaryngology, Ninewells Hospital, Dundee, Scotland, ⁴Department of Otolaryngology Head and Neck Surgery, Manchester Royal Infirmary, Manchester, ⁵Manchester Academic Health Science Centre, University of Manchester, Manchester, ⁶Department of ENT, Barts Health care NHS Trust, London and ⁷School of Medicine, University of Dundee, Dundee, Scotland, UK

Abstract

Objectives. This study seeks the opinions of qualified doctors on what they feel medical students should learn about otolaryngology. It aims to identify both the content deemed relevant and the performance levels for medical students in otolaryngology.

Methods. A national survey developed from a content analysis of undergraduate otolaryngology curricula from the UK was undertaken, accompanied by a review of the literature and input from an expert group. Data were collected from a wide range of doctors.

Results. Participants felt that graduating students should be able to: recognise, assess and initiate management for common and life-threatening acute conditions; take an appropriate patient history; and perform an appropriate examination for the majority of otolaryngology clinical conditions but manage only a select few.

Conclusion. This study reports performance levels for otolaryngology topics at an undergraduate level. Participating doctors felt that a higher level of performance should be expected of students treating life-threatening, acute and common otolaryngology conditions.

Introduction

In undergraduate medical education, there has been a move away from teaching factual knowledge to placing an emphasis on lifelong learning skills.¹ This assumes that more specific knowledge will be acquired at a later stage, as the learner enters their chosen area of practice. There remains a need, however, for students to be exposed to a wide range of specialties at an undergraduate level. An important reason for this is that the majority of medical graduates will go on to become general practitioners.² General practitioners require their knowledge and skills to be wide-ranging, and yet their training remains the shortest of any post-graduate specialty.³ Additionally, the current political climate calls for increasingly versatile doctors who are able to care for the wide range of conditions seen in an ageing population.^{4,5} European working time regulations have also led to increasing ‘cross-cover’ between specialties.⁶ This necessitates junior doctors being able to provide cover for a variety of specialties, sometimes without any induction.⁷

A number of recent papers have highlighted the mismatch between the relatively small amount of time in the curriculum dedicated to undergraduate otolaryngology and the large volume of otolaryngology cases encountered in general practice.^{8–10} Studies report that 10–25 per cent of adult and up to 50 per cent of paediatric consultations in general practice relate to otolaryngology topics.^{9,11–13} Given the Department of Health’s target for 50 per cent of medical graduates to enter general practice,² otolaryngology forms an important part of the education of general practitioners. In addition, for the 50 per cent of graduates not entering general practice, medical school may be a doctor’s only exposure to otolaryngology; this has implications from both a careers and recruitment perspective and also in view of the emergency ‘cross-cover’ required of many newly qualified doctors.^{6,14}

Developing curricula that are comprehensive but not overwhelming is a challenge. The key is selecting what should be included in a curriculum and what should be left out. Outcomes frameworks such as CanMeds¹⁵ and the Scottish Doctor¹⁶ are rarely specific enough to be able to define competencies or outcomes at a specialty level. There are many methods described for developing curricula and for establishing curriculum content. Although there has been a move away from the subject ‘expert’ approach to curriculum development,¹⁷ individual specialty curricula are often still developed primarily by specialists overseeing that particular element of the course.¹⁸ A number of specialties have published standardised curricula developed using a variety of techniques.^{19–21}

For 20 years, outcomes-based education has been widely discussed in the medical education literature. More recently, competency-based medical education, entrustable

professional activities and milestones have come to the fore.^{22–24} Competency-based education has been defined as an ‘outcomes-based approach to the design, implementation, assessment, and evaluation of medical education programs’.²⁵ Competencies are often defined on a continuum, from novice through to expert or mastery.^{26,27}

Carraccio *et al.* describe a step-wise approach for developing competencies.²² This starts with identifying a competency, before moving onto defining the components of the competency and the performance level for this. This links to the features of a valid assessment. First, it must be possible to define a topic for which the student should be competent, and then identify what a student should be able to do with regard to that topic.²⁸ Carraccio *et al.* note that, despite this, many studies to date have focused on the first step of the curriculum design process: identifying a competency.²²

This study sought the opinions of qualified doctors on what they feel medical students should learn about otolaryngology. It aimed to identify both the content deemed relevant and the expected performance levels, for medical students in otolaryngology.

Materials and methods

A survey method was chosen to measure the perceived level of performance for medical students in relation to otolaryngology. Questionnaire content was defined utilising three inputs, to ensure a robust approach. These consisted of: a content analysis of undergraduate otolaryngology curricula from the UK;²⁹ a review of the literature for published otolaryngology ‘intended achievements’; and input from an expert group comprising four otolaryngologists, a senior lecturer in medical education and a medical school dean. Topics were then refined for the final questionnaire. Utilising work by Bloom³⁰ and Millar,³¹ performance levels were defined for use in the questionnaire.

The majority of the survey utilised Likert-type scales for data collection purposes.³² As such, ordinal data were collected and therefore the mode was used to represent the average response. Data collection was undertaken using Bristol Online Survey software.³³

The questionnaire was piloted prior to a full national survey. A convenience sampling technique was used for the pilot study, as the aims of this were along a qualitative line of enquiry.³⁴ A national survey was then undertaken and was considered essential to improve the generalisability of the results. The aim was to collect data from a wide range of doctors from a variety of backgrounds within the medical community. The full survey utilised a cluster sampling technique based on the geographical area; namely, London, North West England and East of Scotland.

Four groups of doctors were targeted: foundation year doctors, specialty trainee doctors (including core trainee doctors), general practitioners and consultants. Because of variations in local administrative processes, there were minor differences in exact distribution methods; however, e-mail was the main route employed. The timing of distribution was chosen to coincide with foundation year doctors’ and specialty trainees’ end of year. This was undertaken prior to August rotations.

A medical statistician was consulted for determining statistical analyses. Basic analysis was undertaken using MicrosoftTM Excel[®] spreadsheet software.

Ethical approval for this study was obtained from the University of Dundee Research Ethics Committee.

Results

An estimated 6496 doctors were contacted and 308 responses were received. An exact figure for the number of doctors contacted cannot be given, as there may have been some duplication due to cross-over between mailing lists. Based on this estimate, the overall response rate was 4.74 per cent. Doctors from a range of specialties and geographical locations, in various posts, participated (Table 1).

Fifteen specialties were represented within the consultant group and 26 within the specialty trainee group. Forty-two per cent of participants from the consultant group were from specialties other than otolaryngology.

Only 21 per cent of participants felt that current undergraduate otolaryngology teaching was adequate. When subgroups were analysed by the participants’ current post, results showed that 64 per cent of foundation year doctors and 53 per cent of specialty trainees disagreed or strongly disagreed that current undergraduate otolaryngology teaching was adequate.

In Tables 2–6, the mode responses are indicated by asterisks. Numerical data have been presented so that where clear consensus (taken as greater than 50 per cent) has not been achieved, the frequency of responses (as a percentage) is available.

Participants felt that graduating medical students should be able to perform the majority of the examination skills listed (Table 2). The exceptions were tests requiring specialist equipment or those which are more specialist in nature.

The mode response of participants indicated that a graduating medical student should be aware of the indications for the majority of otolaryngology procedures listed, but not necessarily have observed any procedures except for nasal packing and nasal cautery (Table 3). There were no procedures that respondents felt students should be able to perform.

Doctors felt that graduating medical students should be able to recognise, assess and initiate management for four acute conditions (Table 4). These were: common otolaryngology emergencies, namely epistaxis and tonsillitis; and serious otolaryngology emergencies that may be life- or sight-threatening, namely upper airway obstruction and peri-orbital cellulitis.

In just under half of the otological conditions, the mode response of participants was for students to simply be aware of the condition and to include it on a list of differential diagnoses (Table 5). For 50 per cent of the conditions, the mode response was that students should be able to take a patient history and examine a patient appropriately for the specific condition. For both acute otitis media and otitis externa, the majority of participants indicated that students should be able to manage the conditions.

Allergic rhinitis and acute rhinosinusitis were the only two rhinology conditions for which the mode response was for students to be able to manage the conditions (Table 6). The mode response indicated that doctors also felt that graduates should have the knowledge and skills to allow appropriate history-taking and examination of patients presenting with non-allergic rhinitis, chronic rhinosinusitis and septal deviation.

Table 7 shows that doctors felt that the aetiology of a cancer, how it presents and the ‘red flags’ of its presence were important for a student to know. Staging, management and prognosis were deemed less important.

Other subcategories, including investigations, psychosocial, non-technical skills, laryngology and other otolaryngology conditions, have been omitted for conciseness. The categories

Table 1. Number of responses by a participant's current post

Participants' current post	Responses (n (%*))
General practitioner	61 (20)
Consultant	55 (18)
Specialty doctor & associate specialist	3 (1)
Foundation doctor	76 (25)
Specialty trainee	111 (36)
Other	2 (1)

*Rounded to nearest 1 per cent

chosen are thought to be representative of the results in general, and give an overview of the main themes identified during analysis.

Discussion

This study goes further than previous studies by eliciting the level of performance expected of medical students by the point of graduation. It shows that doctors feel medical students should be able to perform the majority of otolaryngology examination skills. They should also be able to: recognise, assess and initiate management for both common and life-threatening acute conditions; take an appropriate patient history; and perform an appropriate examination for the majority of otolaryngology clinical conditions but manage only a select few.

Previous studies have investigated the perceived importance rating of otolaryngology topics. Similar areas emerge from each study as being deemed important. These include common topics such as ear infections, rhinosinusitis and throat infections, and life-threatening conditions such as airway compromise.^{35–38} A difficulty with rating the importance of a topic is relating this to clinical and teaching practice. For example, what does an otitis externa importance rating of 5 out of 5 mean compared to an importance rating of 4 out of 5 for neck mass examination? This study moves beyond rating topics in terms of importance and identifies the level of performance expected of medical students by the end of their undergraduate studies.

Studies have shown that many medical schools within the UK have limited exposure to otolaryngology at an undergraduate level.^{8,9} The findings from this study indicate that current medical school otolaryngology training is perceived as inadequate. What is striking is that it was the more junior participants (i.e. foundation year doctors and specialty trainees) who felt most strongly about this. These are the groups that have not only been through medical school most recently but are also those putting into practice what they have recently learned across a wide range of specialties.

One proposed theory for this perception is that the European Working Time Directive has led to an increased requirement by doctors in training to cross-cover other specialties.^{39,40} Otolaryngology is one of the specialties that commonly relies on cross-cover.⁴¹ In 2009, Sharpe *et al.* published a survey showing a lack of confidence amongst surgical trainees who cross-cover otolaryngology.⁴¹ Cross-cover has also been highlighted as an issue by the Association of Surgeons in Training, who have produced recommendations for doctors providing emergency cross-cover.⁶

Studies have highlighted a lack of confidence amongst junior doctors when managing otolaryngology conditions that

Table 2. Mode response for all respondents for examination skills, indicated by asterisks

Examination skill/level	Examination skill not required	Should know about examination skill	Should be able to perform examination
Laryngeal	11	71*	18
Dix–Hallpike	9	64*	26
Unterberger's	23	60*	17
Nasal cavity	4	37	59*
Oral cavity	1	10	89*
Throat	0	18	82*
Neck	0	8	92*
Salivary gland	6	40	54*
Otoscopy	1	6	93*
Tuning fork tests	3	19	78*
Romberg's test	2	20	78*
Test of hearing	3	19	78*

Data represent percentages

require the use of procedural skills, for example, epistaxis.⁴² Despite this, the general response in this survey indicated that most doctors did not feel it was necessary to be able to perform any otolaryngology procedure, including nasal cautery and packing. With increasing requirements of junior doctors to cross-cover other specialties, this is an educational need that may have to be met at the post-graduate level.⁶ To date, the evidence suggests that this is not happening, with only 35 per cent of core surgical trainees having received any teaching on otolaryngology emergencies before starting a post requiring otolaryngology cross-cover.⁴¹ Participants also did not feel that students should have observed any specific otolaryngology operations, including tonsillectomy. This is despite tonsillectomy being one of the most commonly performed operations in the UK.⁴³ It is acknowledged that the questionnaire asked about specific operations and not about experience in an operating theatre in general.

The results of this study show that the majority of participants felt medical students should be competent in performing most otolaryngology examinations. Participants also indicated that students should be able to manage a number of acute conditions, but only a select few other otolaryngological conditions, by the time of graduation. These conditions included acute otitis media, otitis externa, acute rhinosinusitis, allergic rhinitis, laryngitis, epiglottitis and croup; that is, the more commonly encountered or potentially serious conditions.^{44,45} For the majority of other otolaryngological clinical conditions, responses indicated that graduating students should be aware of a condition, or be able to take a patient history and examine a patient appropriately for the condition.

These findings are in keeping with the General Medical Council's *Outcomes for Graduates*, which emphasises the ability to 'carry out a consultation with a patient' (outcomes 2, The doctor as a practitioner).⁴⁶ This includes the ability to perform an examination and obtain a patient history. The document also states that graduates should be able to 'provide immediate care in medical emergencies', which includes the ability to 'diagnose and manage acute medical emergencies'.

The Scottish Doctor learning outcomes also correlate with the findings from this present study.^{16,47} For example,

Table 3. Mode response for all respondents for procedures, indicated by asterisks

Procedure/level	No need to have heard of procedure	Should have heard of procedure	Should be aware of indications for procedure	Should be aware of indications for, & have observed, procedure	Should be aware of indications for, have observed & can perform procedure
Videostroboscopy	31*	31	30	7	1
FESS	15	38*	38	8	1
Cricothyroidotomy	3	22	55*	16	4
Nasendoscopy	6	22	39*	31	1
Indirect laryngoscopy	10	33	36*	19	1
FNA	1	15	52*	29	3
Grommet insertion	1	15	62*	21	1
Mastoid surgery	6	40	47*	7	1
Tracheostomy	0	9	62*	27	2
Tonsillectomy	0	9	64*	25	1
Septoplasty	6	30	53*	11	1
Nasal packing	0	4	28	39*	29
Nasal cautery	0	6	38	42*	14

Data represent percentages. FESS = functional endoscopic sinus surgery; FNA = fine needle aspiration

Table 4. Mode response for all respondents for acute conditions, indicated by asterisks

Acute condition/level	No need to have heard of condition	Should be aware of condition to include it in differential diagnoses list	Should be able to recognise condition	Should be able to recognise & assess patient presenting with condition	Should be able to recognise, assess & initiate management for condition
Pinna haematoma	2	6	42*	39	11
Nasal trauma	0	3	29	51*	17
Acute vertigo	0	4	26	44*	26
Peri-tonsillar abscess	0	3	13	47*	37
Head & neck foreign body	0	5	24	56*	16
Upper airway obstruction	0	1	10	23	66*
Epistaxis	0	0	7	28	65*
Tonsillitis	0	0	6	13	81*
Peri-orbital cellulitis	0	3	19	34	44*

Data represent percentages

'undertake physical examination of patients' was included in the Scottish Doctor learning outcomes. However, these also state that students should be able to interpret the results of history-taking and physical examination, and make a diagnosis of 'life-threatening conditions requiring immediate treatment'.

The findings of this study emphasise diagnosis rather than management of the majority of otolaryngological conditions. The exceptions to this are conditions that are commonly encountered or potentially serious. Both the General Medical Council and Scottish Doctor documents differentiate 'routine' clinical conditions from life-threatening ones, and state that graduates should be able to recognise and manage medical emergencies. The Scottish Doctor document also highlights an 'important' conditions element. This is in keeping with the results obtained from this study, in which participants appeared to differentiate between life-threatening, acute, common and other more general clinical conditions.

Two organisations have published curricula specifically relating to otolaryngology: The Royal College of Surgeons of England, and the Student and Foundation Doctors in Otolaryngology subgroup of ENT UK.^{48,49} The Royal College of Surgeons of England, in 2015, published a surgical curriculum for use in medical schools that included six 'key surgical conditions' relating to otolaryngology. The topics were chosen following discussion with stakeholders. Topics were included on the basis of how common or important they were, and the likely influence of 'early recognition and potential surgical treatment' on outcomes.⁴⁹

The Student and Foundation Doctors in Otolaryngology subgroup of ENT UK also published an otolaryngology specific curriculum in 2015.⁴⁸ Curriculum objectives were extrapolated from Delphi study data.³⁶ The learning objectives produced stipulated a level of performance for each objective; however, these were produced as a guide rather than being

Table 5. Mode response for all respondents for some otology clinical conditions, indicated by asterisks

Otology clinical condition/level	Condition should not be included in undergraduate curriculum	Should be aware of condition to include it in differential diagnoses list	Should be able to take history & examine patient appropriately for condition	Should be able to organise appropriate investigations for condition (if required)	Should be able to manage condition
Ototoxicity	0	44*	34	19	3
Otosclerosis	9	48*	30	12	1
Auditory processing disorder	21	46*	24	9	0
Congenital hearing loss	2	46*	36	16	1
Eustachian tube dysfunction	7	37*	33	13	9
Tympanosclerosis	13	45*	28	12	2
Chondrodermatitis nodularis helices	32	38*	18	8	4
Presbycusis	5	34	35*	21	4
Noise-induced hearing loss	2	37	39*	21	2
Vestibular neuritis	0	25	37*	19	19
Ménière's disease	1	27	38*	24	10
BPPV	1	23	36*	20	20
Chronic otitis media	0	15	41*	34	9
Chronic otitis media with effusion	0	9	40*	36	15
Facial nerve palsy	0	6	48*	34	12
Tinnitus	0	21	40*	30	8
Tympanic membrane perforation	1	12	47*	27	13
Acute otitis media	0	6	21	18	55*
Otitis externa	0	6	27	16	51*

Data represent percentages. BPPV = benign paroxysmal positional vertigo

Table 6. Mode response for all respondents for rhinology clinical conditions, indicated by asterisks

Rhinology clinical condition/level	Condition should not be included in undergraduate curriculum	Should be aware of condition to include it in differential diagnoses list	Should be able to take history & examine patient appropriately for condition	Should be able to organise appropriate investigations for condition (if required)	Should be able to manage condition
Atypical facial pain	6	42*	31	18	3
Non-allergic rhinitis	1	15	34*	22	28
Chronic rhinosinusitis	1	23	39*	25	11
Septal deviation	4	24	47*	23	2
Allergic rhinitis	0	9	32	18	42*
Acute rhinosinusitis	1	16	31	18	34*

Data represent percentages

Table 7. Aspects of head and neck cancer deemed important for graduating medical students to know about

Site	Aetiology	Presentation	Red flags	Staging	Management	Prognosis
Laryngeal	62.3	81.5	96.4	17.5	29.9	22.7
Pharyngeal	54.9	79.6	94.5	10.4	19.8	16.2
Nasal	46.1	76	89.3	6.5	15.6	10.7
Salivary	41.9	78.3	88.3	6.2	16.5	12.3
Thyroid	50.3	80.8	92.5	16.9	32.5	25
Skin	62	81.8	93.2	24.7	38.6	29.9
Unknown primary	47.5	75.7	89	11	25.3	13.6

Data represent percentages of participants

derived directly from study evidence. The current study builds on this by providing evidence for the level of performance expected of graduating medical students.

Limitations

The low response rate to this questionnaire is acknowledged. It is known that survey response rates from doctors are generally low.⁵⁰ In 2014, a British Medical Association survey of general practitioners returned a 4 per cent response rate, and another on contract imposition returned a 10 per cent response rate.^{51,52} The 5 per cent response rate in our survey is therefore in keeping with findings from other UK-based physician surveys. The results are felt to be representative of the wider UK doctor population. Responses were received from all main target groups and a range of opinions were elicited.

The three areas chosen for survey distribution were felt to be representative of the UK. It is, however, possible that a different setting (e.g. a more rural setting) would produce alternative results because of varying population needs. Given that, by their very nature, hospitals and doctors' practices are generally located in more urban areas, the risk of bias is acknowledged but felt to be low.

- Developing curricula that are comprehensive but not overwhelming is a challenge
- Students should be able to recognise, assess and initiate management for common and life-threatening acute conditions
- Students should be able to take an appropriate patient history and perform an appropriate examination
- Students should be able to manage a select few clinical conditions

Conclusion

This study reports expected undergraduate performance levels for otolaryngology topics. Participating doctors feel that a higher level of performance should be expected of students treating life-threatening, acute and common otolaryngology conditions. The students should be able to: recognise, assess and initiate management for both common and life-threatening acute conditions; take an appropriate patient history; and perform an appropriate examination for the majority of otolaryngology clinical conditions but manage only a select few.

Acknowledgement. Simon Lloyd was financially supported by the NIHR Biomedical Research Centre, Manchester Academic Health Science Centre, University of Manchester, UK.

Competing interests. None declared

References

- 1 Riley SC. Student selected components (SSCs): AMEE guide no 46. *Med Teach* 2009;**31**:885–94
- 2 Department of Health. Delivering high quality, effective, compassionate care: Developing the right people with the right skills and the right values. A mandate from the Government to Health Education England: April 2013 to March 2015. In: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/203332/29257_2900971_Delivering_Accessible.pdf [18 November 2021]
- 3 NHS. Training and Development (GP). In: <https://www.healthcareers.nhs.uk/explore-roles/general-practice-gp/training-and-development> [18 November 2021]
- 4 Shape of Training. Securing the future of excellent patient care: final report of the independent review. In: http://www.shapeoftraining.co.uk/static/documents/content/Shape_of_training_FINAL_Report.pdf_53977887.pdf [18 November 2021]
- 5 Harries RL, Rashid M, Smitham P, Vesey A, McGregor R, Scheeres K *et al.* What shape do UK trainees want their training to be? Results of a cross-sectional study. *BMJ Open* 2016;**6**:e010461
- 6 Wild JR, Lambert G, Hornby S, Fitzgerald JE. Emergency cross-cover of surgical specialties: consensus recommendations by the Association of Surgeons in Training. *Int J Surg* 2013;**11**:584–8
- 7 Bird J, Biggs T, Bennett W, Reddy V, Counter P. Training junior doctors for out-of-hours cover in otolaryngology, are we doing enough? *Bull R Coll Surg Engl* 2014;**96**:e14–16
- 8 Khan MM, Saeed SR. Provision of undergraduate otorhinolaryngology teaching within General Medical Council approved UK medical schools: what is current practice? *J Laryngol Otol* 2012;**126**:340–4
- 9 Mace AD, Narula AA. Survey of current undergraduate otolaryngology training in the United Kingdom. *J Laryngol Otol* 2004;**118**:217–20
- 10 Lightbody KA, Wilkie MD. Current ENT training within the UK. *Clin Otolaryngol* 2012;**37**:84–5
- 11 Neil JF. Otolaryngology in the curriculum. *J R Soc Med* 1979;**72**:551–2
- 12 Lennon P, O'Donovan JP, O'Donoghue S, Fenton JE. The otolaryngology, head and neck training appraisal questionnaire: a national general practice perspective. *Ir J Med Sci* 2013;**182**:609–14
- 13 Griffiths E. Incidence of ENT problems in general practice. *J R Soc Med* 1979;**72**:740–2
- 14 Davis SJ, McDonald S. Covering ENT out of hours: how confident are senior house officers? *J Laryngol Otol* 2006;**120**:587–90
- 15 Frank JR, Snell L, Sherbino J. *CanMEDS 2015 Physician Competency Framework*. Ottawa: Royal College of Physicians and Surgeons of Canada, 2015
- 16 Scottish Deans' Medical Education Group. *The Scottish Doctor: Learning Outcomes for the Medical Undergraduate in Scotland: A Foundation for Competent and Reflective Practitioners*, 3rd edn. Dundee: Association for Medical Education in Europe, 2008
- 17 Dent J, Harden RM. *A Practical Guide for Medical Teachers*, 4th edn. London: Churchill Livingstone/ Elsevier, 2013
- 18 Grant J. Principles of curriculum design. In: Swanwick E, ed. *Understanding Medical Education*. Hoboken, NJ: John Wiley & Sons, 2013;31–46
- 19 Rohan D, Ahern S, Walsh K. Defining an anaesthetic curriculum for medical undergraduates. A Delphi study. *Med Teach* 2009;**31**:e1–5
- 20 Clayton R, Perera R, Burge S. Defining the dermatological content of the undergraduate medical curriculum: a modified Delphi study. *Br J Dermatol* 2006;**155**:137–44
- 21 Von Fragstein M, Silverman J, Cushing A, Quilligan S, Salisbury H, Wiskin C *et al.* UK consensus statement on the content of communication curricula in undergraduate medical education. *Med Educ* 2008;**42**:1100–7
- 22 Carraccio C, Wolfsthal SD, Englander R, Ferentz K, Martin C. Shifting paradigms: from Flexner to competencies. *Acad Med* 2002;**77**:361–7
- 23 ten Cate O. Entrustability of professional activities and competency-based training. *Med Educ* 2005;**39**:1176–7
- 24 Carraccio C, Englander R, Gilhooly J, Mink R, Hofkosh D, Barone MA *et al.* Building a framework of entrustable professional activities, supported by competencies and milestones, to bridge the educational continuum. *Acad Med* 2017;**92**:324–30
- 25 Frank JR, Snell LS, Cate OT, Holmboe ES, Carraccio C, Swing SR *et al.* Competency-based medical education: theory to practice. *Med Teach* 2010;**32**:638–45
- 26 Dreyfus SE, Dreyfus HL. *A Five-Stage Model of the Mental Activities Involved in Directed Skill Acquisition*. Berkeley: DTIC Document, 1980
- 27 Dreyfus SE. The five-stage model of adult skill acquisition. *Bull Sci Technol Soc* 2004;**24**:177–81
- 28 Newble D, Jolly B, Wakeford R. The certification and recertification of doctors: issues in the assessment of clinical competence. *BMJ* 1994;**309**:1096
- 29 Steven RA, Mires GJ, Lloyd SKW, McAleer S. An undergraduate otolaryngology curriculum comparison in the United Kingdom using a curriculum evaluation framework. *Clin Otolaryngol* 2017;**42**:963–8
- 30 Bloom BS, ed. *Taxonomy of Educational Objectives: The Classification of Educational Goals. Handbook 1: Cognitive Domain*. New York: McKay, 1956;20–4
- 31 Miller GE. The assessment of clinical skills/competence/performance. *Acad Med* 1990;**65**:S63–7
- 32 Likert R. A technique for the measurement of attitudes. *Arch Psychol* 1932;**22**:55
- 33 University of Bristol. Bristol Online Surveys 2016. In: <https://www.onlinesurveys.ac.uk/> [29 April 2016]

- 34 Mathers N, Fox NJ, Hunn A. *Surveys and Questionnaires*. NHS Executive Trent, 1998
- 35 Wong A, Fung K. Otolaryngology in undergraduate medical education. *Otolaryngol Head Neck Surg* 2009;**38**:38–48
- 36 Lloyd S, Tan ZE, Taube MA, Doshi J. Development of an ENT undergraduate curriculum using a Delphi survey. *Clin Otolaryngol* 2014;**39**:281–8
- 37 Carr MM, Brown DH, Reznick RK. Needs assessment for an undergraduate otolaryngology curriculum. *Otolaryngol. Head Neck Surg* 1999;**120**:865–8
- 38 Ganzel TM, Martinez SA. Are we teaching medical students what they need to know? *Otolaryngol Head Neck Surg* 1989;**100**:339–44
- 39 British Medical Association. What is the European Working Time Directive? 2016. In: <https://www.bma.org.uk/advice/employment/working-hours/ewtd> [27 April 2017]
- 40 Gov.uk. Maximum weekly working hours 2017. In: <https://www.gov.uk/maximum-weekly-working-hours> [18 November 2021]
- 41 Sharpe D, Farboud A, Trinidad A. 'Is that the ENT SHO?': concerns over training and experience of juniors expected to cross-cover ENT at night. *Clin Otolaryngol* 2009;**34**:275
- 42 Fox R, Nash R, Liu ZW, Singh A. Epistaxis management: current understanding amongst junior doctors. *J Laryngol Otol* 2016;**130**:252–5
- 43 ENTUK, Royal College of Surgeons of England. *Commissioning Guide: Tonsillectomy*. London: Royal College of Surgeons of England, 2016
- 44 Hannaford PC, Simpson JA, Bisset AF, Davis A, McKerrow W, Mills R. The prevalence of ear, nose and throat problems in the community: results from a national cross-sectional postal survey in Scotland. *Fam Pract* 2005;**22**:227–33
- 45 Centres for Disease Control and Prevention, National Center for Health Statistics. National Ambulatory Medical Care Survey: 1998 Summary: 2000. In: <https://www.cdc.gov/nchs/> [3 March 2017]
- 46 General Medical Council. *Outcomes for Graduates*. London: General Medical Council, 2015
- 47 Simpson JG, Furnace J, Crosby J, Cumming AD, Evans PA, Friedman Ben David M *et al*. The Scottish doctor--learning outcomes for the medical undergraduate in Scotland: a foundation for competent and reflective practitioners. *Med Teach* 2002;**24**:136–43
- 48 Student and Foundation Doctors in Otolaryngology. Ear, Nose and Throat Undergraduate Curriculum 2015. In: <http://sfo.entuk.org/services/undergraduate-curriculum> [3 March 2017]
- 49 Royal College of Surgeons of England. *National Undergraduate Curriculum in Surgery*. London: Royal College of Surgeons of England, 2015
- 50 Cunningham CT, Quan H, Hemmelgarn B, Noseworthy T, Beck CA, Dixon E *et al*. Exploring physician specialist response rates to web-based surveys. *BMC Med Res Methodol* 2015;**15**:32
- 51 British Medical Association. *GP Contract Imposition Survey 2013–2014*. London: British Medical Association, 2016
- 52 British Medical Association. *GP Practice Collaboration Survey 2014*. London: British Medical Association, 2016