What should a GP or physician learn about ear, nose and throat diseases? When, how and by whom should they be taught?

ENT UK Undergraduate Essay Prize 2020

Word count (excluding figures): 2996

Ear, Nose and Throat (ENT) diseases represent 10-20% (1) of adult consultations and up to 50% of children's consultations in general practice (2), a specialty that concentrates almost half of the UK medical workforce (3). There is also a high proportion of otorhinolaryngology conditions which are dealt by non-specialists in secondary care including nasal fractures (4), epistaxis (5), and foreign bodies in the ears and nose (6).

The population proportion of those above 85 years is projected to almost double over the next 25 years in the UK (7). Certain pathologies encountered in primary care such as age-related hearing loss will be more common (8) and need to be treated efficiently to reduce the associated risk of social isolation and depression (9). Moreover, chronic rhinosinusitis, a disease affecting around 10% of the UK population (10), has been described as the silent epidemic as its incidence and prevalence are predicted to rise in the coming years (11, 12). Escalating pollution levels (13) are one of the factors contributing to the predicted rise of both chronic rhinosinusitis and allergic rhinitis (14-17); two conditions commonly managed by General Practitioners (GPs) (18, 19).

The NHS has published an ENT Elective Care Transformation Programme aiming at reducing ENT related healthcare costs and elective services waiting times. The advice includes GPs referring directly to audiology services and using specific guidelines to manage minor ENT conditions in the community rather than in secondary care (20). Whether or not political promises to keep the primary care workforce afloat will be met (21), GPs will deal with an increasing number of ENT diseases to address the lack of capacity in secondary care (20).

Economic constraints and consistently increasing prevalence and incidence of ENT pathologies in the general population highlight why GPs and physicians need to be confident and competent in otorhinolaryngology. This essay suggests important topics to equip non-specialist clinicians in dealing with the ENT associated healthcare challenges mentioned above. It illustrates why both undergraduate and postgraduate ENT education for non-specialists has been inappropriate and it proposes effective tools to remedy these gaps in training.

What should a GP or physician learn about ear, nose, and throat diseases?

ENT in primary care:

The most common paediatric ENT conditions seen in primary care are infections such as otitis media, sinusitis, and tonsillitis (22). These infections are often viral and self-limiting and can be managed with simple analgesia and "watchful waiting" (23). Guidelines advise antimicrobial treatment only if the infection does not resolve after several days or if specific criteria are present, such as a high CENTOR score for tonsillitis (24) or otitis media in a child under 2 years old (25). Otoscopic examination skills are essential for the initial diagnosis of otitis media and screening of its complications (26). It is important to be aware of the complications associated with

these common infections as they can have rare but dramatic effects on patients, such as permanent sensorineural deafness following otitis media with effusion (27).

The commonest presentations in the adult population are otalgia, cough, rhinorrhoea, and deafness (28). Similarly to the paediatric diseases mentioned above, otalgia, cough, and rhinorrhoea are usually due to self-limiting infections managed by GPs (29). Antimicrobial prescription needs to be done carefully as randomized controlled trials have shown that antibiotics have a limited efficacy in treating those infections in both children and adults (30-34). Minimising antimicrobial prescriptions is also crucial in reducing antibiotic resistance, a major challenge facing modern medicine (35).

Deafness in the adult population is more often due to age-related degeneration than infections (36). Following an initial assessment with Weber's and Rinne's tests, and once impacted ear wax and infections are excluded, patients with progressive hearing loss should be referred directly to audiology services (37). Ototoxic medications, diabetes, atherosclerosis and kidney disease are all relevant risk factors that may guide management (38). In some cases, ear wax is the sole cause of deafness and simply removing it with either irrigation or instrumentation may relieve symptoms. These are useful skills for GPs and paediatricians as 2 million ear irrigations are performed in England and Wales each year (39).

Dizziness is a common primary care presentation generally classified in four categories: vertigo, presyncope, disequilibrium or light-headedness. Vertigo is associated with diseases of the inner ear or the vestibular nerve such as benign paroxysmal positional vertigo (BPPV) or vestibular neuritis. In addition to a close examination of the cardiovascular and neurological systems, clinicians may need to test vestibular components by performing the Dix-Hallpike test (40). In patients with a history of BPPV, this test may confirm the diagnosis and can be followed by the Epley manoeuvre to treat the condition (41). Other vertigo-associated conditions often need referral to ENT and/or vestibular rehabilitation services (42).

A rising concern in ENT is the emergence of human papillomavirus (HPV) related oropharyngeal tumours characterised by an increased prevalence of 225% between 1988 and 2004 in the USA (43). Although the HPV vaccine uptake in the UK has generally been good (83% uptake in Year 9 females in 2018 (44)), primary care workers and paediatricians need to be well informed on the vaccine's risk and benefits to counter the global anti-vaccine movement (45). By increasing the vaccine's uptake, physicians play a key role in the implementation and delivery of ENT disease service and prevention.

ENT related red flags:

Although most ENT-related conditions seen in primary care are self-limiting, physicians should be aware of red flag symptoms that may indicate more serious pathologies. Multiple symptoms related to different cranial nerves (e.g. hearing loss combined with facial weakness) should be taken seriously as it may illustrate intracranial pathologies such as acoustic neuromas (46).

Sudden sensorineural deafness should be referred immediately to ENT services to exclude malignancy and vascular events (47). Although no treatment shows significant effectiveness (48-50), prompt corticosteroid therapy is usually recommended to maximise the possibility of functional recovery (47).

Chronic rhinosinusitis is associated with rare but serious adverse events such as complete nasal obstruction due to polyposis (51), orbital abscess (52), and intracranial complications (53). Patients with persistent moderate-severe symptoms 3 months after initial medical treatment in primary care should be referred to ENT for further assessment (18). Nasal and paranasal malignancies are, on the other hand, rare (54). A persistent blocked nose, which only affects one side with or without nosebleeds and rhinorrhoea, requires referral (55). Although otoscopic examination of the nasal cavity may reveal polyps or ulcers, a precise diagnosis can only be achieved with nasoendoscopy and/or biopsy (56).

Hoarseness, stridor, dysphagia, oral ulceration, and neck masses are worrying symptoms associated with ENT malignancies. Oropharyngeal cancers can present with non-specific symptoms (e.g. sore throat) and diagnosis might easily be missed (57). If a neck mass is present, close examination and a thorough history may help clinicians differentiate between simple inflammatory processes and malignancy (58).

With the use of preventive tools such as motivational interviewing, GPs can elicit cost-effective and clinically relevant effects on the prevalence of morbid conditions associated with ENT red flags (59). The prevalence and incidence of hearing loss and ENT malignancies can be reduced by tackling poor cardiovascular health, alcohol intake and smoking (60-64). Focusing on preventable risk factors is one of the methods highlighted by the ENT Elective Care Transformation Programme to cost-effectively improve patients' clinical outcomes (20).

ENT in the Emergency Department:

Nasal fractures are the most common isolated facial fracture and may not need referral to specialist services (65). If a patient presents with a suspected fractured nose, physicians should assess for epistaxis, septal haematoma, and nasal obstruction (66). If none are present, the patient can wait until the swelling has settled down to visit an ENT surgeon for the nose to be manipulated or operated on (67). In more severe ENT trauma, airway obstruction is often a challenge and is dealt by a multidisciplinary team as intubation is needed in almost 50% and tracheostomy in around 15% of cases (65, 68).

In the paediatric population, foreign objects in the ear and nose are a common presentation. Batteries or sharp-edged shape objects' removal need to be done carefully, especially in the ear, to avoid any complications such as a perforated eardrum (69). Epiglottitis is a rare but life-threatening condition which presents with severe stridor in children. It is crucial for physicians to AVOID examining the throat and to contact a senior anaesthetist and ENT surgeon to secure the airway (70). Laryngotracheobronchitis (croup) may also present with stridor in the paediatric

population but severe cases can most often be managed with nebulised adrenaline and steroid treatment only (71).

Lastly, epistaxis is the most common ENT presentation to A&E and may present on the wards, especially in patients taking anticoagulant (72). Simple management with compression, cooling and packing constitute a useful set of skills for physicians across all specialties (66).

Even though a great number of ENT presentations in A&E will relate to those diagnosed and treated in primary care, staff are occasionally faced with serious conditions that need specialist input (73).

When, how and by whom should GPs and physicians be taught?

Undergraduate ENT training: the root of the problem

For GPs and physicians, an undergraduate attachment in ENT may constitute their only opportunity to experience otorhinolaryngology as only a quarter of GP trainees complete a postgraduate ENT rotation (74). However, 10 of 26 UK medical school still did not offer an ENT attachment in 2012 (75) and only 21 % of ENT undergraduate programmes incorporate a formal ENT examination (74). For students offered a formal ENT rotation, the mean mandatory placement is 3 days of pre-clinical exposure and 5 days of departmental experience, which is considered too short by students (76). Several studies illustrate that final year medical students and newly graduated foundation doctors do not feel confident in recognising common ENT conditions, performing basic ENT examination or taking an adequate ENT history (74, 76-78). The mismatch between poor ENT exposure at medical school and the high prevalence of otorhinolaryngology conditions in daily practice has been highlighted regularly since 1979 (79-82).

Lloyd et al (83) published an evidence-based ENT undergraduate curriculum using a Delphi process incorporating the opinion of ENT consultants and other professionals who frequently deal with ENT conditions such as GPs, paediatricians, and emergency physicians. In 2020, Mayer et al (84) evaluated if this curriculum had been implemented in UK medical schools. A high proportion of learning outcomes relating to ENT anatomy and physiology and adult otology were met. However, management of common conditions such as epistaxis and BPPV were taught by just under one third of medical schools (84). Currently, the GMC does not impose a standardised undergraduate curriculum for UK medical schools which explains these discrepancies (85). The introduction of the Medical Licensing Assessment for medical graduates in 2024 should reduce differences between undergraduate curricula and will force medical schools to have a fairer representation of ENT surgery in their teaching (86).

For UK medical schools that have a specific ENT curriculum, outpatient clinics and theatre sessions are the most common form of teaching (87). In both UK-based (76, 77) and foreign surveys (88), outpatient clinics score consistently highly for both clinical exposure and educational value. Problem-based learning sessions, seminars and formal teaching sessions involving patients are also perceived to have a high educational value (**Figure 1**) (76). Although theatre sessions have a perceived lower educational value (76), students still find them beneficial for their learning (89). Lloyd et al (83) highlight the importance of seeing a few common ENT procedures in theatre (e.g. tonsillectomy) as GPs commonly refer patients for ENT surgeries or deal with their post-op complications (90).

Teaching modality	Educational value (Likert Score) Median
Formal teaching session involving patients with ENT complaints	9
Informal ward-based teaching	8
Informal ward-based teaching	8
Formal, interactive teaching session involving other students or "well" people	8
Clinic session	8
Seminar	8
Formal interactive session involving models	8
Simulation session	7
Problem-based learning session	7
Lecture	7
Cadaver-based teaching session	7
On-line learning module	6,5
Exposure to ENT allied specialties	6
Theatre session	6

Figure 1 : Results for educational perceived value of different undergraduate teaching modalities for ENT surgery. Assessed by self-reported Likert scoring (1 = low, 10 = high). Adapted from Powell et al (76).

Newbegin et al (91) suggest using student-selected components (SSC), optional elements during the undergraduate medical syllabus, to increase students' exposure to otorhinolaryngology. ENT student societies, courses, and conferences are also a powerful adjunct to the undergraduate curriculum but, similarly to SSC, they require students to be interested in ENT in the first place (92). Simulation (93, 94), e-learning (95-98) and virtual reality (99) are described as flexible, pleasant, and effective undergraduate ENT teaching modalities which complement traditional methods. Considering the COVID-19 pandemic and its associated restriction on clinical teaching, online education may constitute an essential tool for teaching continuity in the coming years (100-102).

Postgraduate ENT training for GPs and physicians:

Unlike undergraduate programmes, The Royal Colleges of General Practitioners (103), Emergency Medicine (104) and Paediatrics and Child Health (105) have published GMC approved curricula detailing precise learning outcomes for different topics, including ENT, which are assessed in nationally standardised exams. The GP training program also includes at least 18 months of hospital training which can be in various specialties such as elderly care, paediatrics or ENT for example (103). Although it is an excellent way for trainees to have a diverse training experience, they may lack exposure to some specialties as they cannot rotate through every ward in 18 months. This explains why only around a quarter of GPs complete an ENT rotation in their postgraduate training (74).

A survey conducted on 357 GPs based in South-West England showed that only 45% of them considered their postgraduate ENT training adequate for primary care and 75% of them stated they would like further training in ENT (74). More recently, 75.8% of the 121 GPs surveyed by Easto and Reddy (106) stated they would have liked an ENT post during their post-graduate training. The GP community advocates for an extended generalist training which would allow GPs to have a broader experience and more time to assimilate an expanding curriculum (107). However, very few ENT posts are available (106) and funding for extended training remains uncertain (108).

Several studies have shown that junior trainees and GPs would rate a one-day course on ENT as beneficial to their clinical practice (106, 109-111). Acharya et al (110) organised a one-day ENT course for hospital-based GP trainees following a survey which highlighted the educational needs of this cohort. The teaching material was created by registrar-grade ENT doctors and the course was taught by junior doctors working in an ENT department at the time. The teaching format included a presentation followed by a demonstration of clinical examinations such as neck lump palpation and otoscopy. The participants' confidence in diagnosing and managing ENT conditions such as otitis media, epistaxis and stridor for example was significantly greater after the session (**Figure 2**). There was also a dramatic improvement in confidence to perform clinical examinations (**Figure 3**). This study highlights that ENT day courses can be taught by junior staff which is an important factor to consider when assessing the financial viability of those sessions. ENT day courses have also shown to improve both the confidence and the performance of junior doctors (112, 113).

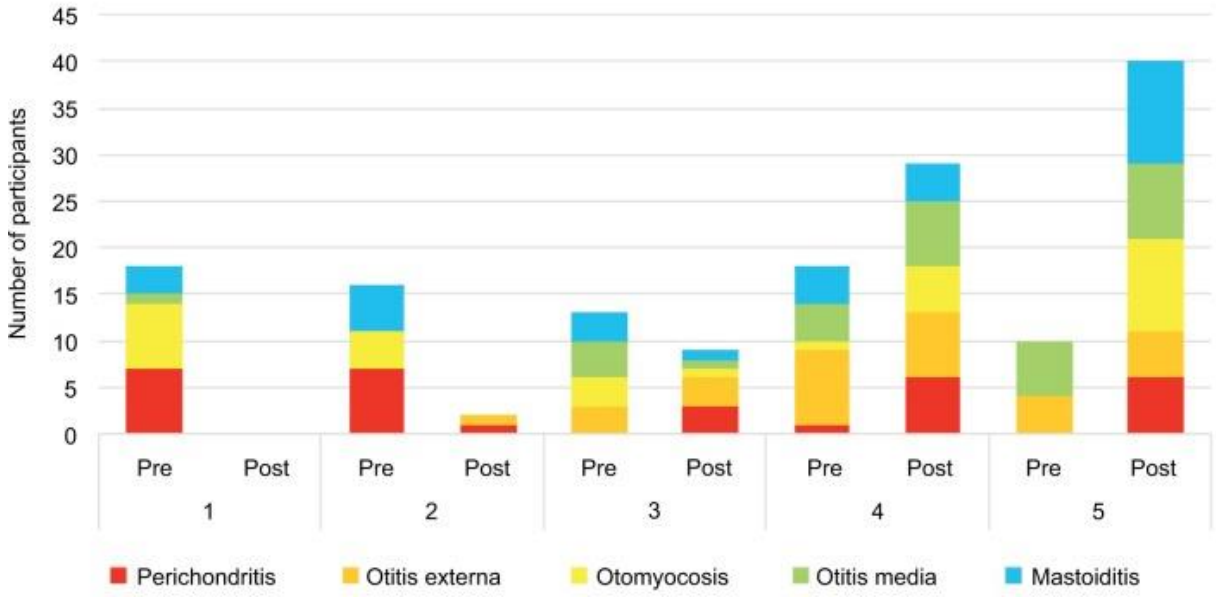

Figure 2: Pre- and post-teaching confidence scores in recognising and managing common ear pathologies following a one-day ENT course for GP trainees. 1 = Not confident; 5 = fully confident. Reproduced from Acharya et al (110).

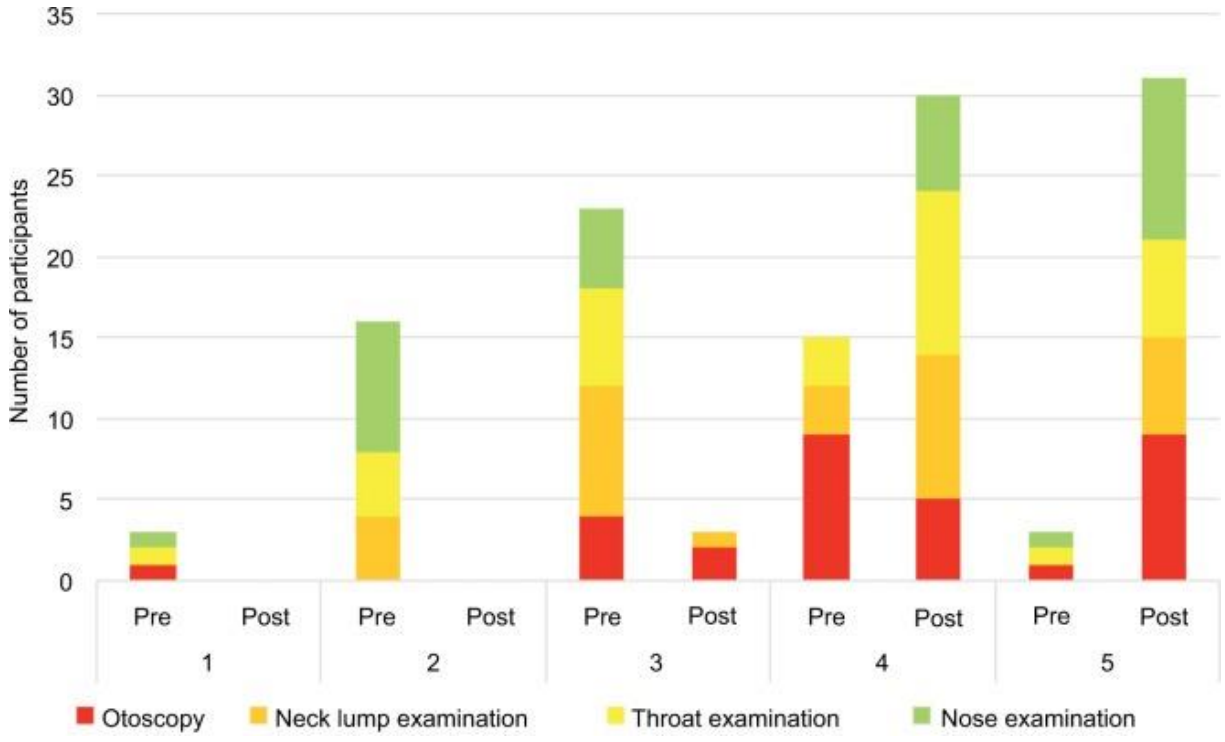

Figure 3: Pre- and post-teaching confidence scores in ENT examination following a one-day ENT course for GP trainees. 1 = Not confident; 5 = fully confident. Reproduced from Acharya et al (110).

E-learning courses are a more flexible option for trainees as they have the advantage of offering asynchronous learning. Online material is re-usable and can be easily updated which costs very little compared to traditional courses (114). The introduction of online modules in the otolaryngology specialist curriculum was perceived as beneficial by trainees in both the UK (115) and Denmark (116). Although trainees may enjoy this format, current literature suggests that e-learning may make "little or no difference in patient outcomes or health professionals' behaviours, skills or knowledge" (117). This may be explained in cases where online courses are not taught in conjunction with practical modules (114). In a COVID-19 era where e-learning is ubiquitous, it would be interesting to study the effect ENT e-learning courses have on GPs and trainees.

Some physicians sub-specialise and become GPs with Extended Roles following postgraduate diplomas in their area of interest. A randomized controlled trial comparing a GP with special interest service for skin problems with a hospital dermatology clinic illustrated that the GP service was more accessible and preferred by patients than hospital outpatient care while achieving similar clinical outcomes (118). There is no such randomized controlled trial for GPs with an interest in ENT. Nonetheless, Bhalla et al (119) illustrated that an ENT-trained partner was able to treat the difficult ENT cases of the practice, including severe otitis externa, hard wax, mastoid cavities maintenance and perforated tympanic membranes. The service was characterised by an apparent patient satisfaction and a reduced waiting time for treatment (119). A sub-specialised GP may also provide informal training and advice to colleagues.

However, the GP with special interest service for dermatology mentioned above was proven to be more costly than hospital outpatient services (120). Moreover, postgraduate courses and diplomas are expensive (121, 122) and require valuable time from GPs who are constantly keeping up to date with all areas of medicine. Martin Roland, Professor of Health Services Research, suggests that GPs with special interests are an effective way of increasing access to specialised treatment when hospital clinics' capacity cannot be extended. Nevertheless, cost may not balance its positive effects on improving access and patient satisfaction (123).

Conclusion:

In addition to demographic and economic pressures, pandemics like COVID-19 and its otorhinolaryngology complications (e.g. anosmia, dysgeusia) (124) may aggravate the important burden ENT diseases currently have on primary care. Therefore, it is increasingly important to ensure an up to date and relevant ENT training and curriculum for primary care physicians to deliver excellent patient care.

Keeping in mind that both undergraduate and postgraduate curricula are already vast and expanding, this essay non-exhaustively pinpoints some of the core ENT topics that are relevant to non-specialist clinicians. A better representation of ENT in the undergraduate curriculum would be a first step in preparing future GPs and physicians to their future practice. Time constraints and the emerging threat of COVID-19 challenge traditional ways of delivering ENT medical education such as direct clinical

exposure in clinics or theatre, face-to-face tutorials, and seminars. Instead, simulation and e-learning slowly take over in both undergraduate and postgraduate curriculums. Robust studies are much needed to understand if the lack of practical training associated with those educational tools will impact patients' clinical outcomes.

"I hear and I forget, I see and I remember, I do and I understand" Confucius

References:

1. Griffiths E. Incidence of ENT problems in general practice. J R Soc Med. 1979;72(10):740-2.
2. Donnelly MJ, Quraishi MS, McShane DP. ENT and general practice: a study of paediatric ENT problems seen in general practice and recommendations for general practitioner training in ENT in Ireland. Ir J Med Sci. 1995;164(3):209-11.
3. The state of medical education and practice in the UK: The workforce report. General Medical Council; 2019.
4. Chan J, Most SP. Diagnosis and management of nasal fractures. Operative Techniques in Otolaryngology-Head and Neck Surgery. 2008;19(4):263-6.
5. Eze N, Lo S, Toma A. Advice given to patients with epistaxis by A&E doctors. Emergency medicine journal : EMJ. 2005;22(10):724-5.
6. Davies PH, Benger JR. Foreign bodies in the nose and ear: a review of techniques for removal in the emergency department. J Accid Emerg Med. 2000;17(2):91-4.
7. National Population Projections: 2018-based. Office for National Statistics; 2018.
8. Ciorba A, Bianchini C, Pelucchi S, Pastore A. The impact of hearing loss on the quality of life of elderly adults. Clin Interv Aging. 2012;7:159-63.
9. Mulrow CD, Aguilar C, Endicott JE, Tuley MR, Velez R, Charlip WS, et al. Quality-of-life changes and hearing impairment. A randomized trial. Ann Intern Med. 1990;113(3):188-94.
10. Hastan D, Fokkens WJ, Bachert C, Newson RB, Bislimovska J, Bockelbrink A, et al. Chronic rhinosinusitis in Europe--an underestimated disease. A GA²LEN study. Allergy. 2011;66(9):1216-23.
11. Tan BK, Kern RC, Schleimer RP, Schwartz BS. Chronic rhinosinusitis: the unrecognized epidemic. Am J Respir Crit Care Med. 2013;188(11):1275-7.
12. Beule A. Epidemiology of chronic rhinosinusitis, selected risk factors, comorbidities, and economic burden. GMS Curr Top Otorhinolaryngol Head Neck Surg. 2015;14:Doc11.
13. Burnett R, Cohen A. Relative Risk Functions for Estimating Excess Mortality Attributable to Outdoor PM2.5 Air Pollution: Evolution and State-of-the-Art. Atmosphere. 2020;11(6).
14. Mady LJ, Schwarzbach HL, Moore JA, Boudreau RM, Kaffenberger TM, Willson TJ, et al. The association of air pollutants and allergic and nonallergic rhinitis in chronic rhinosinusitis. Int Forum Allergy Rhinol. 2018;8(3):369-76.
15. Wang IJ, Tung TH, Tang CS, Zhao ZH. Allergens, air pollutants, and childhood allergic diseases. Int J Hyg Environ Health. 2016;219(1):66-71.
16. Teng B, Zhang X, Yi C, Zhang Y, Ye S, Wang Y, et al. The Association between Ambient Air Pollution and Allergic Rhinitis: Further Epidemiological Evidence from Changchun, Northeastern China. Int J Environ Res Public Health. 2017;14(3).
17. Deng Q, Lu C, Li Y, Sundell J, Dan Norbäck. Exposure to outdoor air pollution during trimesters of pregnancy and childhood asthma, allergic rhinitis, and eczema. Environ Res. 2016;150:119-27.
18. Hopkins C, Philipott C, Carrie S, Blythe J, Thomas M, Little P, et al. Commissioning guide: Chronic Rhinosinusitis. ENT UK; 2016.
19. Wang dY. Management of allergic rhinitis in general practitioners. Asia Pac Allergy. 2012;2(4):233-6.
20. Transforming elective care services ear, nose and throat (ENT). NHS England; 2019.
21. Iacobucci G. Tories promise 6000 extra GPs by 2024. BMJ. 2019;367:l6463.

22. Uijen JH, Bindels PJ, Schellevis FG, van der Wouden JC. ENT problems in Dutch children: Trends in incidence rates, antibiotic prescribing and referrals 2002–2008. Scandinavian Journal of Primary Health Care. 2011;29(2):75-9.
23. Kullar P, Yates PD. Infections and foreign bodies in ENT. Surgery. 2012;30(11):590-6.
24. Fine AM, Nizet V, Mandl KD. Large-Scale Validation of the Centor and McIsaac Scores to Predict Group A Streptococcal Pharyngitis. Archives of Internal Medicine. 2012;172(11):847-52.
25. Hoberman A, Paradise JL, Rockette HE, Shaikh N, Wald ER, Kearney DH, et al. Treatment of Acute Otitis Media in Children under 2 Years of Age. New England Journal of Medicine. 2011;364(2):105-15.
26. Chang P, Pedler K. Ear examination--a practical guide. Aust Fam Physician. 2005;34(10):857-62.
27. Bluestone CD. Clinical course, complications and sequelae of acute otitis media. The Pediatric Infectious Disease Journal. 2000;19(5).
28. Rourke T, Tassone P, Philpott C, Bath A. ENT cases seen at a local 'walk-in centre': a one year review. The Journal of Laryngology & Otology. 2009;123(3):339-42.
29. (UK) CfCPaN. Respiratory Tract Infections - Antibiotic Prescribing: Prescribing of Antibiotics for Self-Limiting Respiratory Tract Infections in Adults and Children in Primary Care. 2008.
30. Venekamp RP, Sanders SL, Glasziou PP, Del Mar CB, Rovers MM. Antibiotics for acute otitis media in children. Cochrane Database Syst Rev. 2015(6):CD000219.
31. Smith SM, Fahey T, Smucny J, Becker LA. Antibiotics for acute bronchitis. Cochrane Database Syst Rev. 2017;6:CD000245.
32. Spinks A, Glasziou PP, Del Mar CB. Antibiotics for sore throat. Cochrane Database Syst Rev. 2013(11):CD000023.
33. Kenealy T, Arroll B. Antibiotics for the common cold and acute purulent rhinitis. Cochrane Database Syst Rev. 2013(6):CD000247.
34. Lemiengre MB, van Driel ML, Merenstein D, Liira H, Mäkelä M, De Sutter AI. Antibiotics for acute rhinosinusitis in adults. Cochrane Database Syst Rev. 2018;9:CD006089.
35. Andersson DI, Balaban NQ, Baquero F, Courvalin P, Glaser P, Gophna U, et al. Antibiotic resistance: turning evolutionary principles into clinical reality. FEMS Microbiology Reviews. 2020;44(2):171-88.
36. Cruickshanks KJ, Tweed TS, Wiley TL, Klein BEK, Klein R, Chappell R, et al. The 5-Year Incidence and Progression of Hearing Loss: The Epidemiology of Hearing Loss Study. Archives of Otolaryngology–Head & Neck Surgery. 2003;129(10):1041-6.
37. NICE Pathways: Hearing Loss Overview. In: NICE, editor. 2020.
38. Lasak JM, Allen P, McVay T, Lewis D. Hearing Loss: Diagnosis and Management. Primary Care: Clinics in Office Practice. 2014;41(1):19-31.
39. Loveman E, Gospodarevskaya E, Clegg A, Bryant J, Harris P, Bird A, et al. Ear wax removal interventions: a systematic review and economic evaluation. The British journal of general practice : the journal of the Royal College of General Practitioners. 2011;61(591):e680-e3.
40. S D, W G. Assessment of Dizziness. BMJ Publishing Group Ltd; 2020.
41. Wolf JS, Boyev KP, Manokey BJ, Mattox DE. Success of the modified epley maneuver in treating benign paroxysmal positional vertigo. The Laryngoscope. 1999;109(6):900-3.
42. Post RE, Dickerson LM. Dizziness: a diagnostic approach. Am Fam Physician. 2010;82(4):361-8, 9.

43. Pytynia KB, Dahlstrom KR, Sturgis EM. Epidemiology of HPV-associated oropharyngeal cancer. Oral Oncology. 2014;50(5):380-6.
44. E T, J W, V S. Human papillomavirus (HPV) vaccination coverage in adolescent females in England: 2017/2018 Report for England. In: England PH, editor. 2018.
45. Piltch-Loeb R, DiClemente R. The Vaccine Uptake Continuum: Applying Social Science Theory to Shift Vaccine Hesitancy. Vaccines. 2020;8(1).
46. Mathew GD, Facer GW, Suh KW, Houser OW, O'Brien PC. Symptoms, findings, and methods of diagnosis in patients with acoustic neuroma. The Laryngoscope. 1978;88(12):1893-903.
47. Schreiber BE, Agrup C, Haskard DO, Luxon LM. Sudden sensorineural hearing loss. The Lancet. 2010;375(9721):1203-11.
48. Wei BPC, Stathopoulos D, O'Leary S. Steroids for idiopathic sudden sensorineural hearing loss. Cochrane Database of Systematic Reviews. 2013(7).
49. Agarwal L, Pothier DD. Vasodilators and vasoactive substances for idiopathic sudden sensorineural hearing loss. Cochrane Database of Systematic Reviews. 2009(4).
50. Awad Z, Huins C, Pothier DD. Antivirals for idiopathic sudden sensorineural hearing loss. Cochrane Database of Systematic Reviews. 2012(8).
51. Fokkens WJ, Lund VJ, Mullol J, Bachert C, Alobid I, Baroody F, et al. EPOS 2012: European position paper on rhinosinusitis and nasal polyps 2012. A summary for otorhinolaryngologists. Rhinology. 2012;50(1):1-12.
52. Siedek V, Kremer A, Betz CS, Tschiesner U, Berghaus A, Leunig A. Management of orbital complications due to rhinosinusitis. European Archives of Oto-Rhino-Laryngology. 2010;267(12):1881-6.
53. Jones NS, Walker JL, Bassi S, Jones T, Punt J. The Intracranial Complications of Rhinosinusitis: Can They Be Prevented? The Laryngoscope. 2002;112(1):59-63.
54. Parkin DME. Cancer incidence in five continents. Vol 7. Lyon: International Agency for Research on Cancer; 1997.
55. Slinger CA, McGarry GW. Nose and sinus tumours: red flags and referral. The British journal of general practice : the journal of the Royal College of General Practitioners. 2018;68(670):247-8.
56. Chainansamit S, Chit-uea-ophat C, Reechaipichitkul W, Piromchai P. The Diagnostic Value of Traditional Nasal Examination Tools in an Endoscopic Era. Ear, Nose & Throat Journal. 2019:0145561319875711.
57. Mehanna H, Paleri V, West CML, Nutting C. Head and neck cancer—Part 1: Epidemiology, presentation, and prevention. BMJ. 2010;341:c4684.
58. Schwetschenau E, Kelley DJ. The adult neck mass. Am Fam Physician. 2002;66(5):831-8.
59. Rubak S, Sandbaek A, Lauritzen T, Christensen B. Motivational interviewing: a systematic review and meta-analysis. Br J Gen Pract. 2005;55(513):305-12.
60. Nomura K, Nakao M, Morimoto T. Effect of smoking on hearing loss: quality assessment and meta-analysis. Preventive Medicine. 2005;40(2):138-44.
61. Gates GA, Cobb JL, D'Agostino RB, Wolf PA. The Relation of Hearing in the Elderly to the Presence of Cardiovascular Disease and Cardiovascular Risk Factors. Archives of Otolaryngology–Head & Neck Surgery. 1993;119(2):156-61.
62. Bagnardi V, Blangiardo M, La Vecchia C, Corrao G. A meta-analysis of alcohol drinking and cancer risk. Br J Cancer. 2001;85(11):1700-5.
63. Hashibe M, Brennan P, Benhamou S, Castellsague X, Chen C, Curado MP, et al. Alcohol Drinking in Never Users of Tobacco, Cigarette Smoking in Never Drinkers, and the

Risk of Head and Neck Cancer: Pooled Analysis in the International Head and Neck Cancer Epidemiology Consortium. JNCI: Journal of the National Cancer Institute. 2007;99(10):777-89.
64. Caplan LS, Hall HI, Levine RS, Zhu K. Preventable Risk Factors for Nasal Cancer. Annals of Epidemiology. 2000;10(3):186-91.
65. Alvi A, Doherty T, Lewen G. Facial Fractures and Concomitant Injuries in Trauma Patients. The Laryngoscope. 2003;113(1):102-6.
66. Carter S, Laird C. 10 Assessment and care of ENT problems. Emergency Medicine Journal. 2005;22(2):128.
67. M J, N J. Nasal Injuries. In: UK E, editor. 2020.
68. Singhai J, Nigam R, Jain AK. The Demographic Study of Otorhinolaryngological Trauma Among Patients with Head and Neck Trauma and Their Management in a Tertiary Care Centre. Indian Journal of Otolaryngology and Head & Neck Surgery. 2018;70(2):249-55.
69. Prasad N, Harley E. The aural foreign body space: A review of pediatric ear foreign bodies and a management paradigm. International Journal of Pediatric Otorhinolaryngology. 2020;132:109871.
70. Cantor RM, Pollack Jr CV, Riese VG. Epiglottitis. In: Pollack Jr CV, editor. Differential Diagnosis of Cardiopulmonary Disease: A Handbook. Cham: Springer International Publishing; 2019. p. 391-404.
71. Smith DK, McDermott AJ, Sullivan JF. Croup: Diagnosis and Management. Am Fam Physician. 2018;97(9):575-80.
72. Walker TWM, Macfarlane TV, McGarry GW. The epidemiology and chronobiology of epistaxis: an investigation of Scottish hospital admissions 1995–2004. Clinical Otolaryngology. 2007;32(5):361-5.
73. Timsit CA, Bouchene K, Olfatpour B, Herman P, Tran Ba Huy P. [Epidemiology and clinical findings in 20,563 patients attending the Lariboisière Hospital ENT Adult Emergency Clinic]. Ann Otolaryngol Chir Cervicofac. 2001;118(4):215-24.
74. Clamp PJ, Gunasekaran S, Pothier DD, Saunders MW. ENT in general practice: training, experience and referral rates. J Laryngol Otol. 2007;121(6):580-3.
75. 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(4):340-4.
76. Powell J, Cooles FA, Carrie S, Paleri V. Is undergraduate medical education working for ENT surgery? A survey of UK medical school graduates. J Laryngol Otol. 2011;125(9):896-905.
77. Chawdhary G, Ho EC, Minhas SS. Undergraduate ENT education: what students want. Clin Otolaryngol. 2009;34(6):584-5.
78. Sharma A, Machen K, Clarke B, Howard D. Is undergraduate otorhinolaryngology teaching relevant to junior doctors working in accident and emergency departments? J Laryngol Otol. 2006;120(11):949-51.
79. Neil JF. Otolaryngology in the curriculum. Journal of the Royal Society of Medicine. 1979;72(8):551-2.
80. Lund VJ. Otolaryngology in the curriculum--10 years on: discussion paper. Journal of the Royal Society of Medicine. 1990;83(6):377-9.
81. Mace AD, Narula AA. Survey of current undergraduate otolaryngology training in the United Kingdom. J Laryngol Otol. 2004;118(3):217-20.
82. Ferguson GR, Bacila IA, Swamy M. Does current provision of undergraduate education prepare UK medical students in ENT? A systematic literature review. BMJ Open. 2016;6(4):e010054.

83. Lloyd S, Tan ZE, Taube MA, Doshi J. Development of an ENT undergraduate curriculum using a Delphi survey. Clinical Otolaryngology. 2014;39(5):281-8.
84. Mayer AW, Smith KA, Carrie S, Collaborative A. A survey of ENT undergraduate teaching in the UK. The Journal of laryngology and otology. 2020;134(6):553-7.
85. Standards, Guidance, and Curricula. In: Council GM, editor. 2020.
86. K M, P T. The new Medical Licensing Assessment being introduced by the General Medical Council for all UK medical students from 2023: The role of Ear Nose and Throat. In: UK E, editor. 2019.
87. Steven RA, Mires GJ, Lloyd SKW, McAleer S. An undergraduate Otolaryngology curriculum comparison in the United Kingdom using a curriculum evaluation framework. Clinical Otolaryngology. 2017;42(5):963-8.
88. Mishra P, Deshmukh S. ENT-HNS education: what undergraduate students want? European Archives of Oto-Rhino-Laryngology. 2013;270(11):2981-3.
89. Lee MSW, Montague ML, Hussain SSM. Student-perceived benefit from otolaryngology theatre attendance. The Journal of Laryngology & Otology. 2005;119(4):293-8.
90. Ghufoor K, Frosh A, Sandhu G, Hanif J. Post-tonsillectomy patient care in the community. International journal of clinical practice. 2000;54(7):420-3.
91. Newbegin RM, Rhodes JC, Flood LM, Richardson HC. Student-selected components: bringing more ENT into the undergraduate curriculum. J Laryngol Otol. 2007;121(8):783-5.
92. Spiers H, Enayati H, Moussa R, Zargaran A, Thomas A, Murtaza A, et al. Augmenting ENT surgery outside the medical school curriculum: the role of a 1-day otolaryngology course. The Journal of Laryngology & Otology. 2019;133(4):269-74.
93. Clifton N, Klingmann C, Khalil H. Teaching Otolaryngology skills through simulation. Eur Arch Otorhinolaryngol. 2011;268(7):949-53.
94. Abou-Elhamd KEA, Al-Sultan AI, Rashad UM. Simulation in ENT medical education. The Journal of Laryngology & Otology. 2010;124(3):237-41.
95. Kandasamy T, Fung K. Interactive Internet-based cases for undergraduate otolaryngology education. Otolaryngology–Head and Neck Surgery. 2009;140(3):398-402.
96. Alnabelsi T, Al-Hussaini A, Owens D. Comparison of traditional face-to-face teaching with synchronous e-learning in otolaryngology emergencies teaching to medical undergraduates: a randomised controlled trial. Eur Arch Otorhinolaryngol. 2015;272(3):759-63.
97. Tarpada SP, Hsueh WD, Gibber MJ. Resident and student education in otolaryngology: A 10-year update on e-learning. Laryngoscope. 2017;127(7):E219-e24.
98. Chin RY-K, Tjahjono R, Rutledge MJR, Lambert T, Deboever N. The evaluation of e-learning resources as an adjunct to otolaryngology teaching: a pilot study. BMC Medical Education. 2019;19(1):181.
99. Hardcastle T, Wood A. The utility of virtual reality surgical simulation in the undergraduate otorhinolaryngology curriculum. J Laryngol Otol. 2018;132(12):1072-6.
100. Li L, Lin M, Wang X, Bao P, Li Y. Preparing and responding to 2019 novel coronavirus with simulation and technology-enhanced learning for healthcare professionals: challenges and opportunities in China. BMJ Simulation and Technology Enhanced Learning. 2020;6(4):196.
101. Sun L, Tang Y, Zuo W. Coronavirus pushes education online. Nature Materials. 2020;19(6):687-.

102. Leigh J, Vasilica C, Dron R, Gawthorpe D, Burns E, Kennedy S, et al. Redefining undergraduate nurse teaching during the coronavirus pandemic: use of digital technologies. British Journal of Nursing. 2020;29(10):566-9.
103. The RCGP Curriculum: Being a General Practitioner. Royal College of General Practitioners; 2019.
104. Curriculum and Assessment Systems For Training in Emergency Medicine. The Royal College of Emergency Medicine; 2015.
105. Curriculum: Paediatric Specialty Postgraduate Training. Royal College of Paediatrics and Child Health; 2018.
106. Easto RH, Reddy V. A survey of ENT experience in South West Peninsula general practitioner trainees: how can post-graduate ENT training be improved? J Laryngol Otol. 2016;130(10):893-6.
107. Rughani A, Riley B, Rendel S. The future of GP specialty training: enhanced and extended. The British journal of general practice : the journal of the Royal College of General Practitioners. 2012;62(599):288-9.
108. Sabey A, Hardy H. Views of newly-qualified GPs about their training and preparedness: lessons for extended generalist training. The British journal of general practice : the journal of the Royal College of General Practitioners. 2015;65(633):e270-e7.
109. Veitch D, Lewis M, Gibbin K. General practitioner training in ENT in the Trent Region. J R Soc Med. 1992;85(3):156-8.
110. Acharya V, Haywood M, Kokkinos N, Raithatha A, Francis S, Sharma R. Does focused and dedicated teaching improve the confidence of GP trainees to diagnose and manage common acute ENT pathologies in primary care? Advances in medical education and practice. 2018;9:335-43.
111. Dimitrov L, Unadkat S, Khanna A, Rennie C, Saleh H. ENT training amongst general practitioners: results from a questionnaire. The Journal of Laryngology & Otology. 2020;134(2):109-15.
112. Swords C, Smith ME, Wasson JD, Qayyum A, Tysome JR. Validation of a new ENT emergencies course for first-on-call doctors. J Laryngol Otol. 2017;131(2):106-12.
113. Elloy M, Sama A. Does an ENT Introductory Course Improve Junior Doctors' Confidence in Managing ENT Emergencies? The Bulletin of the Royal College of Surgeons of England. 2010;92(9):1-5.
114. Gensichen J, Vollmar HC, Sönnichsen A, Waldmann UM, Sandars J. E-learning for education in primary healthcare--turning the hype into reality: a Delphi study. Eur J Gen Pract. 2009;15(1):11-4.
115. Fraser L, Gunasekaran S, Mistry D, Ward VM. Current use of and attitudes to e-learning in otolaryngology: questionnaire survey of UK otolaryngology trainees. J Laryngol Otol. 2011;125(4):338-42.
116. Fagö-Olsen H, Lynggaard CD, Aanæs K, Cayé-Thomasen P, Andersen SAW. Developing a national e-learning course in otorhinolaryngology: the Danish experience. European Archives of Oto-Rhino-Laryngology. 2020;277(6):1829-36.
117. Vaona A, Banzi R, Kwag KH, Rigon G, Cereda D, Pecoraro V, et al. E-learning for health professionals. The Cochrane database of systematic reviews. 2018;1(1):CD011736-CD.
118. Salisbury C, Noble A, Horrocks S, Crosby Z, Harrison V, Coast J, et al. Evaluation of a general practitioner with special interest service for dermatology: randomised controlled trial. BMJ. 2005;331(7530):1441.

119. Bhalla RK, Unwin D, Jones TM, Lesser T. Does clinical assistant experience in ENT influence general practitioner referral rates to hospital? The Journal of Laryngology & Otology. 2002;116(8):586-8.
120. Coast J, Noble S, Noble A, Horrocks S, Asim O, Peters TJ, et al. Economic evaluation of a general practitioner with special interests led dermatology service in primary care. BMJ (Clinical research ed). 2005;331(7530):1444-9.
121. Diploma in Otolaryngology – Head and Neck Surgery (DO-HNS): Royal College of Surgeons of England; 2020 [Available from: https://www.rcseng.ac.uk/education-and-exams/exams/search/do-hns/.
122. Postgraduate Diploma in ENT: Rila Institute of Health Sciences; 2020 [Available from: https://gpcourses.co/postgraduate-courses/postgraduate-diploma-in-ent/.
123. Roland M. General practitioners with special interests--not a cheap option. BMJ (Clinical research ed). 2005;331(7530):1448-9.
124. Mao L, Jin H, Wang M, Hu Y, Chen S, He Q, et al. Neurologic Manifestations of Hospitalized Patients With Coronavirus Disease 2019 in Wuhan, China. JAMA Neurol. 2020.