

Otitis externa in UK general practice: a survey using the UK General Practice Research Database

Sam Rowlands, Hassy Devalia, Chris Smith, Richard Hubbard and Alan Dean

SUMMARY

Background: Otitis externa is a common clinical problem in general practice and yet there are remarkably few data available on the demographic characteristics of patients with this condition and the approaches used by general practitioners (GPs) in the United Kingdom (UK) to manage it.

Aim: To define the descriptive epidemiology of otitis externa in the general population, to describe the first-line drug treatment used by UK GPs, and to determine factors related to second disease episodes.

Design of study: Epidemiological data survey.

Setting: All cases of otitis externa occurring in 1997 in practices contributing data to the UK General Practice Research Database

Method: Data were extracted on age, sex, date of episode of otitis externa, treatment prescribed, co-existing diagnoses of eczema and diabetes, referral to ear, nose, and throat departments and occurrence of subsequent episodes of disease. Arbitrarily a second episode of disease was defined as persistence if it occurred at 28 days or fewer after the first episode and recurrence if it occurred at more than 28 days after the first episode.

Results: A diagnosis of otitis externa was common in all age groups and, except in the elderly, was more common in females than males. There was an increase in disease episodes at the end of the summer in all age groups except the 60 years and over group. In the majority of cases GPs prescribed ear drops (85%), but a significant proportion of patients were also prescribed oral antibiotics (21%). Referral to secondary care was uncommon (3%). Among patients prescribed ear-drop formulations, those containing both steroid and antibiotic or steroid alone were used most commonly and were associated with the lower rates of disease persistence but not recurrence. Among patients prescribed antibiotics, penicillins were prescribed most commonly. Disease persistence rates, and to a lesser extent disease recurrence rates, were higher in patients prescribed oral antibiotics.

Conclusion: Otitis externa is a common condition and GPs can expect to see an excess of cases at the end of the summer. Topical ear drops are the most common treatment used in the UK. Patients prescribed steroid or steroid/antibiotic combination ear drops have fewer subsequent consultations for otitis externa over the following 28 days.

Keywords: otitis externa; drug therapy; epidemiology; prescriptions; referral.

S Rowlands, MD, MRCP, MFFP, medical director; H Devalia, MRPharmS, operations director; and A Dean, MB BS, FFP, chairman, EPIC, York Way, London. C Smith BA, research assistant; and R Hubbard, DM, MSc, MRCP, lecturer in respiratory medicine, Division of Respiratory Medicine, Clinical Sciences Building, City Hospital, Nottingham.

Address for correspondence

Dr Sam Rowlands, EPIC, Regeneration House, York Way, London, N1 0BB. E-mail: sam.rowlands@epic-uk.org

Submitted: 23 March 2000; Editor's response: 10 July 2000; final acceptance: 30 November 2000.

©British Journal of General Practice, 2001, 51, 533-538.

Introduction

Otitis externa is not usually considered to be a serious medical condition, but it is often sufficiently unpleasant to lead people to consult their general practitioner (GP). Since the condition is common the workload generated by otitis externa is likely to be considerable, and yet there are no large-scale studies on the incidence of the condition and its management in general practice. For some patients otitis externa seems to be a recurring problem; but the reasons why this is so are unclear.

We set out to provide basic epidemiological data on the period prevalence and drug treatment of otitis externa in the United Kingdom (UK) using data derived from the General Practice Research Database (GPRD). In addition, we have examined the influence of a number of factors that might be associated with repeated episodes of this condition.

Methods

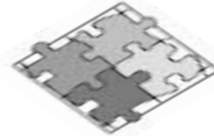
The GPRD contains computerised medical records of GPs in the UK derived from In Practice Systems (formerly VAMP) software and has demographic information, clinical events, prescription details, and specialist referrals for 8 000 000 patients.¹ Data entries are internally validated by cross-checking within the practice and by comparisons with external statistics and only data from practices that pass these quality controls are included in the database. Previous validation studies have demonstrated that GPRD data are accurate across a wide range of diagnoses and drug prescriptions.²⁻⁶

We identified all occurrences of otitis externa recorded in the GPRD during 1997 from practices that provided validated data for the whole of the study period. We truncated our data by age to exclude children under the age of five years to avoid the possibility that the high incidence of otitis media in this age group might decrease the validity of the diagnosis of otitis externa. We defined the date of the first otitis externa diagnosis in 1997 as the index date and the drugs prescribed on the index date as the treatment. We identified all subsequent consultations for otitis externa and calculated the time interval between the first and second consultation. Arbitrarily, we defined a second episode within 28 days as disease persistence and a second episode after this point as disease recurrence. Since we were not able to distinguish between different categories of second episode (follow-up of initial consultation, further consultation before resolution or further consultation after resolution), and since patients with a first episode late in 1997 will only have a short duration of follow-up, we use these terms loosely in this study. In addition we extracted data on referrals for inpatient or

HOW THIS FITS IN

What do we know?

Otitis externa is rarely a serious condition. For some patients, however, there is considerable morbidity.



What does this paper add?

Precise estimates of prevalence for otitis externa are now known: 1.3% for females and 1.2% for males in a 12-month period. Very few patients with otitis externa are referred to secondary care: only 3%. The use of steroid or antibiotic/steroid drops is associated with a decrease in disease persistence.

outpatient ear, nose, and throat (ENT) care within 28 days of an episode of otitis externa and co-existing diagnoses of eczema.

In the analysis we used age and sex stratified population data from the GPRD for 1997 to estimate age- and sex-specific 12-month period prevalence for any diagnosis of otitis externa, and for patients who had two diagnoses or more. We chose 12-month prevalence rather than disease incidence because we could not be sure that the first recorded diagnosis of otitis externa was the first episode that the individual had had. Next we plotted the day of the year on which the diagnosis of otitis externa was made to examine the seasonal distribution of the disease by four age groups (5 to 19, 20 to 39, 40 to 59 and 60 years and over). We then summarised the treatment used for otitis externa in terms of ear drops and oral antibiotics and determined the proportion of cases referred for an ENT opinion.

To determine the influence of age (in 10-year age bands), sex, treatment (class of oral antibiotic or ear drop), diabetes, and eczema on the rates of both disease persistence and disease recurrence, we used a series of Cox regression models. For the disease persistence analysis only the first 28 days of data after the index date were analysed and for the recurrence analysis the first 28 days of data were ignored. Initially each exposure was considered in turn in a series of univariate analyses. Then all variables that appeared to be related to rate of persistence or recurrence ($P < 0.1$) were included together with age and sex (*a priori* confounders) in a multivariate model. We carried out all analyses using STATA (version 5.0), used likelihood ratio tests for all model hypothesis tests, and used the *phtest1* command within STATA to test the proportional hazards assumption of each of our Cox regression models.

Results

We identified 40 661 episodes of otitis externa in 30 412 patients for practices with research quality data for the whole of 1997. A total of 6515 patients had had more than one episode of otitis externa, 2203 patients had consulted three times or more and the maximum personal number of consultations during the 12-month study period was 18. An age and sex breakdown of the 12-month period prevalence for having a diagnosis of otitis externa is given in Table 1. Overall the period prevalence of otitis externa was higher for females than males (1.30% versus 1.16%, $P < 0.001$ for χ^2)

and this female predominance was present in all age groups up to the age of 65 years. Our plots of frequency of diagnosis by week suggested that there was an increase in the number of episodes of otitis externa at the end of the summer (Figures 1 to 4). This effect was most marked in the youngest age group (5 to 19-year-olds) where the weekly episodes roughly doubled from 100 to 200 in weeks during the second half of August. The effect was far less prominent in the 20 to 39 and 40 to 59 year age groups and absent in the 60 years and over age group.

The most common mode of treatment used by the GP was topical ear drops: 25 933 (85%) of patients were prescribed an ear-drop formulation for their first episode of otitis externa. The most commonly prescribed ear drops contained a combination of a corticosteroid and an antibiotic (64%), followed by corticosteroids alone (35%). A more detailed breakdown of topical treatments is given in Table 2, and of note is that 34% of steroid/antimicrobial drop formulations used contained neomycin. GPs prescribed oral antibiotics for 6363 (21%) of first episodes of otitis externa. A penicillin

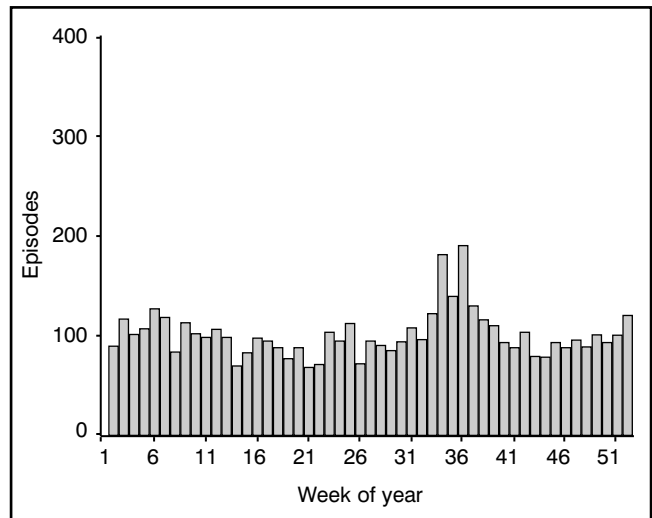


Figure 1. Weekly plot of frequency of diagnosis: five to 19-year-olds.

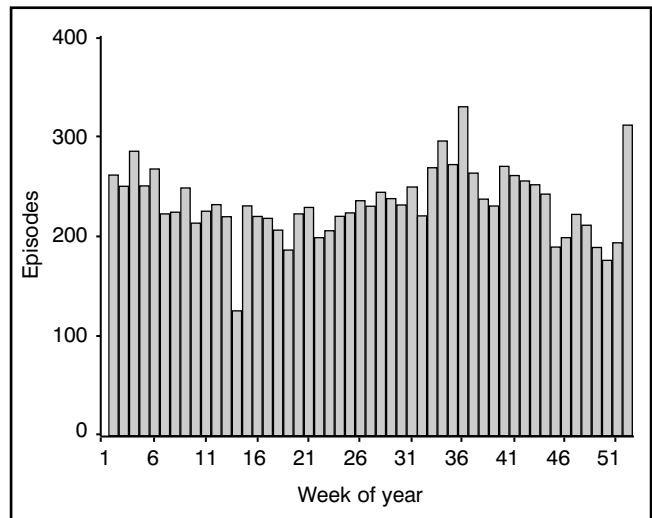


Figure 2. Weekly plot of frequency of diagnosis: 20 to 39-year-olds.

Table 1. Twelve-month period prevalence for otitis externa by age and sex. Percentages are rounded to one decimal place.

Age group	Number of male patients with one or more episodes of otitis externa	12-month period prevalence of otitis externa for males (%)	Number of female patients with one or more episodes of otitis externa	12-month period prevalence of otitis externa for females (%)
5-14	1247	0.8	1473	0.9
15-24	1173	0.8	1742	1.2
25-34	2170	1.1	2740	1.4
35-44	2435	1.3	2698	1.4
45-54	2446	1.4	2697	1.6
55-64	1884	1.4	1940	1.4
65-74	1745	1.7	1622	1.4
75-84	844	1.3	1061	1.1
685	169	0.8	326	0.6
Total	14 113	1.2	16 299	1.3

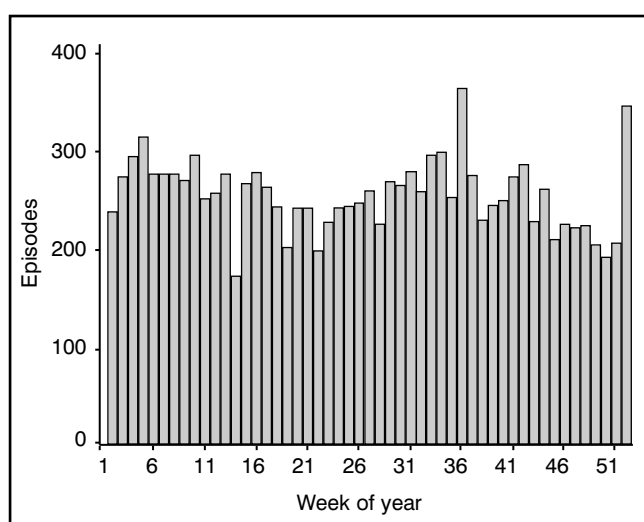


Figure 3. Weekly plot of frequency of diagnosis: 40 to 59-year-olds.

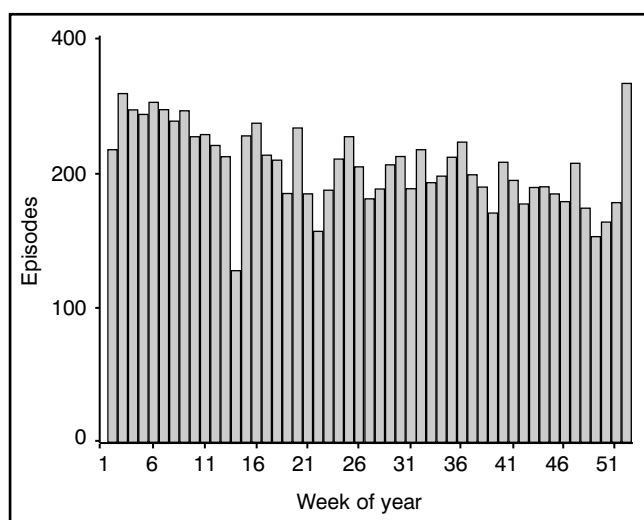


Figure 4. Weekly plot of frequency of diagnosis: 60 years and older.

was the most popular choice, with amoxicillin/ampicillin being the drug most frequently prescribed (34% of all antibiotic prescriptions). A more detailed breakdown of the antibiotics prescribed is given in Table 3. A total of 4646 (15%)

patients received both ear drops and antibiotics. Finally, 807 (3%) patients were referred to ENT for a specialist opinion.

Disease persistence was marginally more common in women than men (Table 4). Disease persistence was also more common in all age groups over the age of 5 to 14 years (P -value for heterogeneity <0.001), although the risk of persistence did not increase progressively with increasing age (Table 4). The use of ear drops containing steroid alone, or steroid combined with an antibiotic, was associated with a decrease in disease persistence while use of oral antibiotics was generally associated with an increase in disease persistence. A co-existing diagnosis of eczema did not increase the risk of disease persistence. The risk of disease recurrence was also higher in older age groups but in contrast to disease persistence men were more likely than women to have recurrent disease. There was no association between the use of ear drops and recurrent disease but there was a marginal increase in recurrent disease associated with the use of oral antibiotics. The rate of recurrent disease was increased among patients with a co-existing diagnosis of eczema (Table 4). There was no evidence to suggest that our final multivariate models for disease persistence and recurrence did not fulfil the proportional hazards assumption ($P = 0.13$ and 0.92 respectively).

Discussion

Our findings demonstrate that otitis externa is a common condition with a 12-month period prevalence of greater than 1%. Females present more commonly than males in all age groups prior to retirement, and the peak period prevalence occurs in late middle age for females and in the 65 to 74 years age group for males. Among younger patients there is a seasonal effect with an increase in disease incidence at the end of the summer. Four-fifths of patients had only one record of an otitis externa diagnosis indicating lack of severity and/or chronicity of the condition — at least over a 12-month period. GPs commonly prescribe ear drops for this condition; a significant proportion of patients are also prescribed oral antibiotics. Referrals to ENT are uncommon. The use of both steroid and steroid/antibiotic eardrops was associated with lower rates of disease persistence.

The GPRD is the largest longitudinal primary care dataset in the world, containing over 35 million patient years of data.¹ The GPRD is thus an immensely powerful epidemiological resource and can provide detailed information on the

Table 2. Use of ear drops to treat otitis externa. Percentages are rounded to one decimal place.

Type of ear drop	Number of prescriptions	Percentage
Steroid drops		
Betamethasone drops	483	1.9
Dexamethasone drops	7808	30
Prednisolone drops	339	1.3
Triamcinolone drops	400	1.5
Sub total	9030	35
Steroid/antimicrobial drops		
Betamethasone/Neomycin	1065	4.1
Flumethasone/Clioquinol	4313	17
Hydrocortisone/Gentamicin	6621	26
Hydrocortisone/Neomycin	94	0.4
Hydrocortisone/Neomycin/Polymyxin	3543	14
Triamcinolone/Neomycin	834	3.2
Sub total	16470	64
Antimicrobial drops		
Chloramphenicol	58	0.2
Clotrimazole	58	0.2
Gentamicin	301	1.2
Subtotal	417	1.6
Astringent drops		
Aluminium acetate	16	0.1
Total	25 933	

Table 3. Use of oral antibiotics to treat otitis externa. Percentages are rounded to one decimal place.

Oral antibiotic	Number of prescriptions	Percentage
Penicillins		
Penicillin V	117	1.8
Amoxycillin or ampicillin	2190	34
Co-amoxiclav	1186	19
Amoxycillin/flucloxacillin	155	2.4
Flucloxacillin	924	15
Subtotal	4572	72
Macrolides		
Azithromycin	10	0.2
Clarithromycin	153	2.4
Erythromycin	715	11
Subtotal	878	14
Cephalosporins		
Cefaclor	213	3.4
Cephalexin	288	4.5
Cefadrine	84	1.3
Others	42	0.7
Subtotal	627	9.9
Tetracyclines		
Doxycycline	70	1.1
Oxytetracycline	91	1.4
Others	34	0.5
Subtotal	194	3.1
Others		
Ciprofloxacin	1	0.02
Trimethoprim or co-trimoxazole	90	1.4
Subtotal	91	1.4
Total	6363	

descriptive epidemiology and current general practice management of a large number of medical conditions. However, one limitation of our study is that mild cases of otitis externa may not be recorded and so our data may underestimate

the true period prevalence of the condition as well as giving an inflated estimate of prescribing. A further limitation of our design is the restricted study period since some cases diagnosed early on in 1997 may represent persistent or recurrent disease from 1996, and second episodes of disease occurring in 1998 will not have been identified. It is unlikely, however, that this will have resulted in systematic misclassification and so if anything our estimates of the factors influencing disease persistence and recurrence will tend to be underestimates. We are not aware of any other community-based epidemiological surveys of otitis externa, or any quantification of disease persistence/recurrence. One study has been reported from the USA based on two public databases: one of office-based doctors' practices and the other of outpatient and emergency room cases.⁷ Only 190 cases of otitis externa were found in 1993; these cases were seen by family physicians, paediatricians, internal medicine specialists, and ENT specialists. Family physicians treating adult patients used systemic antibiotics in two-thirds of cases, mainly cephalosporins, ciprofloxacin and macrolides; one-third of adults were given antibiotic/steroid drops. The smaller number of cases and the difference in health care systems may explain the differences between the findings of this study and our study. There have been studies of patients attending hospital ENT clinics, but these have all been small with sample sizes of 100 or fewer. The findings suggest a wide age distribution with a preponderance in those in their 20s and 30s.^{8,9} Our finding of a higher period prevalence in females may reflect the greater consultation rate in women aged 15 to 74 years compared with men in that age group, although interestingly excessive hair washing has been identified as a potential aetiological factor.⁹ and this is likely to be more common in females.

The increase in episodes we observed at the end of the summer has been alluded to previously.¹⁰ One study of 126 cases in a hot climate showed a significant increase in incidence in July and August in swimmers only.¹¹ It is not clear whether the increase in cases in summer is owing to warmer ambient temperature, increased humidity or increased exposure to water. There is a range of possible water exposures: tap water in baths and showers,⁹ fresh water in rivers, lakes and reservoirs,¹⁰ seawater or chlorinated water in swimming pools,¹² and whirlpools.¹³ Another potential explanation is that the increase may be an artefact relating to patients delaying consultation because they are on holiday. Further aetiological research is needed, but in the meantime both GPs and pharmaceutical companies should be prepared for this annual increase.

Eczema has long thought to be a predisposing factor for otitis externa.¹⁴ but the association with disease recurrence has not been shown before — but is perhaps not surprising. The likely mechanism here is compromise of the protective factors of the canal lining, narrowing of the canal which traps water and the tendency of eczema to become infected.

There is some debate about the best treatment for otitis externa. The only randomised controlled trials of eardrop formulations for GPs to refer to are very small.^{11,15-18} and not surprisingly show no difference between treatments. It has been considered doubtful whether oral antibiotics should be

Table 4. Factors associated with disease persistence and recurrence.

	Disease persistence			Disease recurrence		
	Rate ratio	95% CI	P-value ^b	Rate ratio	95% CI	P-value ^b
Sex ^a	1.08	1.00–1.16	0.06	0.90	0.84–0.96	0.001
Age group						
5–14 years		Reference			Reference	
15–24 years	1.47	1.22–1.77		1.60	1.34–1.90	
25–34 years	1.54	1.30–1.83		1.64	1.39–1.92	
35–44 years	1.50	1.26–1.77		1.74	1.48–2.04	
45–54 years	1.54	1.30–1.83		1.89	1.62–2.21	
55–64 years	1.37	1.14–1.65		2.06	1.75–2.42	
65–74 years	1.55	1.29–1.87		2.15	1.82–2.53	
75–84 years	1.42	1.14–1.76		2.03	1.70–2.43	
≥85 years	1.80	1.32–2.46	<0.001	1.43	1.06–1.94	<0.001
Ear drops						
None		Reference			Reference	
Steroid drops	0.66	0.59–0.73		1.19	1.07–1.32	
Steroid/antibiotic drops	0.64	0.58–0.71		1.08	0.98–1.20	
Antibiotic drops	1.00	0.75–1.34	<0.001	1.24	0.95–1.64	0.20
Oral antibiotics						
None		Reference			Reference	
Penicillins	1.56	1.41–1.72		1.03	0.94–1.13	
Macrolides	1.91	1.59–2.28		1.15	0.95–1.40	
Cephalosporins	1.90	1.53–2.35		1.28	1.03–1.58	
Tetracyclines	0.89	0.52–1.54		1.19	0.84–1.69	
Others	1.58	0.87–2.86	<0.001	1.21	0.70–2.08	0.006
Eczema	1.14	0.95–1.35	0.20	1.47	1.30–1.66	<0.001

^aFemales compared with males. ^bLikelihood ratio test.

used unless there is a severe infection.¹⁹ The observation of frequent use of drops containing neomycin is of interest because of the potential for this treatment to cause contact hypersensitivity.²⁰ Datasets such as the GPRD contain 'real life' observational data and not data from randomised controlled trials, so there will always be a bias towards treatment being associated with more severe disease. Thus the likely explanation for the association between the use of oral antibiotics and disease persistence, and to a lesser extent disease recurrence, is that GPs tend to use oral antibiotics for patients with more severe disease. Given the presence of this selection bias it is interesting that the use of steroid or antibiotic/steroid ear drops was associated with a decrease in disease persistence and no impact on disease recurrence. These findings may in part reflect treatment efficacy; they may also reflect an impact of prescribing rather than not prescribing on patient satisfaction and hence re-consultation.

The very small proportion of cases referred to ENT emphasises that the cases seen in hospital are highly selected and therefore unlikely to represent the full spectrum of disease encountered in the community. Thus the results and recommendations of hospital-based studies need to be interpreted in this light.²¹

In summary, our findings suggest that otitis externa is common and contributes significantly to the workload of GPs. An excess of disease is present in younger people at the end of the summer. The optimal treatment for the condition remains unclear but, until further evidence is available from randomised controlled trials, our findings support the use of steroid or steroid/antibiotic combination ear drops.

References

- Walley T, Mantgani A. The UK general practice research database. *Lancet* 1997; **350**: 1099.
- Anonymous. *Key Health Statistics from General Practice*. London: The Stationery Office, 1996.
- Nazareth I, King M, Haines A, et al. Accuracy of diagnosis of psychosis on general practice computer system. *BMJ* 1993; **307**: 32–34.
- van Staa TP, Abenhaim L. The quality of information recorded on a UK database of primary care records: a study of hospitalization due to hypoglycaemia and other conditions. *Pharmacoepidemiol Drug Saf* 1994; **3**: 15–21.
- Hollowell J. The General Practice Research Database: quality of morbidity data. *Population Trends* 1997; **87**: 36–40.
- Hansell A, Hollowell J, Nichols T, et al. Use of the General Practice Research Database (GPRD) for respiratory epidemiology: a comparison with the 4th Morbidity Survey in General Practice (MSGP4). *Thorax* 1999; **54**: 413–419.
- Halpern MT, Palmer CS, Seidlin M. Treatment patterns for otitis externa. *J Am Board Fam Pract* 1999; **12**: 1–7.
- Agius AM, Pickles JM, Burch KL. A prospective study of otitis externa. *Clin Otolaryngol* 1992; **17**: 150–154.
- Russell JD, Donnelly M, McShane DP, et al. What causes acute otitis externa? *J Laryngol Otol* 1993; **107**: 898–901.
- Hoadley AW, Knight DE. External otitis among swimmers and non-swimmers. *Arch Environ Health* 1975; **30**: 445–448.
- Lambert IJ. A comparison of the treatment of otitis externa with 'Otosporin' and aluminium acetate: a report from a services practice in Cyprus. *J R Coll Gen Pract* 1981; **31**: 291–294.
- Reid TMS, Porter IA. An outbreak of otitis externa in competitive swimmers due to *Pseudomonas aeruginosa*. *J Hyg Camb* 1981; **86**: 357–362.
- Havelaar AH, Bosman M, Borst J. Otitis externa by *Pseudomonas aeruginosa* associated with whirlpools. *J Hyg Camb* 1983; **90**: 489–498.
- Peterkin GAG. Otitis externa. *J Laryngol Otol* 1974; **88**: 15–21.
- Slack RWT. A study of three preparations in the treatment of otitis externa. *J Laryngol Otol* 1987; **101**: 533–535.
- Kime CE, Ordonez GE, Updegraff WR, et al. Effective treatment of acute, diffuse otitis externa: II. A controlled comparison of hydrocortisone-acetic acid, non-aqueous and hydrocortisone-neomycin-clistin otic solutions. *Current Ther Res* 1978; **23**: SS15–

SS28.

17. Bain DJG. A double-blind comparative study of Otoseptil ear drops and Otosporin ear drops in otitis externa. *J Int Med Res* 1976; **4**: 79-81.
18. Ruth M, Ekström T, Åberg B, Edström S. A clinical comparison of hydrocortisone butyrate with oxytetracycline/hydrocortisone acetate-polymyxin B in the local treatment of acute external otitis. *Eur Arch Otorhinolaryngol* 1990; **247**: 77-80.
19. Mirza N. Otitis externa. *Postgraduate Med* 1996; **99**: 153-158.
20. Smith IM, Keay DG, Buxton PK. Contact hypersensitivity in patients with chronic otitis externa. *Clin Otolaryngol* 1990; **15**: 155-158.
21. Robertson DG, Bennett JDC. The general practice management of otitis externa. *J R Army Med Corps* 1992; **138**: 27-32.