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Improving otitis externa management in secondary care through a standardised treatment algorithm

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Main Article

Waseem Hasan takes responsibility for the integrity of the content of the paper

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Abstract

Objective. Otitis externa is a common condition managed by junior doctor-led ENT clinics in secondary/tertiary care, but no national guidelines exist for presentations in these settings. The aim of this study was to implement a treatment algorithm to support junior doctors and improve otitis externa management.

Methods. Baseline data were retrospectively collected for 16 weeks. A standardised otitis externa treatment algorithm was then implemented, and 16 weeks of data prospectively gathered. A second improvement cycle was completed thereafter focusing on topical antibiotics and water precaution advice.

Results. Overall, 202 cases of otitis externa managed between November 2021 to October 2022 were reviewed. Following the interventions, topical antibiotic prescribing improved ($p = 0.01$) as well as the provision of water precaution advice ($p < 0.01$). Junior doctors trended towards reviewing patients more frequently but required less senior support.

Conclusion. Our treatment algorithm empowers junior doctors to become more independent in their management of otitis externa and improves overall otitis externa treatment.

Introduction

Acute otitis externa is a common ENT condition encountered in primary care,[1] and the most frequent condition referred to ENT emergency clinics.[2]

Guidelines provided by the National Institute for Health and Care Excellence and the American Academy of Otolaryngology—Head and Neck Surgery Foundation provide advice in managing this condition,[3,4] but are not tailored towards secondary care management.

The purpose of this project was two-fold: to design and implement a simplified treatment algorithm to support juniors doctor working in emergency clinics, and to improve the management of otitis externa patients presenting to a busy ENT emergency clinic.

Materials and methods

This quality improvement project was undertaken at a regional referral centre for ENT. Its emergency clinic/treatment room provides a pathway for primary care, the emergency department and surrounding hospitals to refer a patient for rapid review. It is run by junior doctors (at the senior house officer grade), with support of the on-call senior ENT specialist.

The project was reported based on the Standards for Quality Improvement Reporting Excellence 2.0 guidelines. The audit was registered and approved by the centre's audit and clinical research department.

Patient selection

Patients referred to the ENT treatment room between November 2021 and October 2022 with otalgic symptoms or suspected otitis externa were screened. Cases where the diagnosis of otitis externa was clinically confirmed were included and their clinical journey reviewed. Patients who re-presented to the service more than 14 days after their last review were considered to have a new acute presentation of otitis externa.

Data collection and intervention

Baseline data were collected for 16 weeks through a retrospective audit of practice. The first cycle (Cycle 1) introduced the new otitis externa treatment algorithm (Figure 1), with 16 weeks of prospective data collected. The second cycle (Cycle 2) provided additional emphasis on correct topical antibiotic prescribing (Table 1) and water precaution advice after the first audit found these to be areas that required further support.

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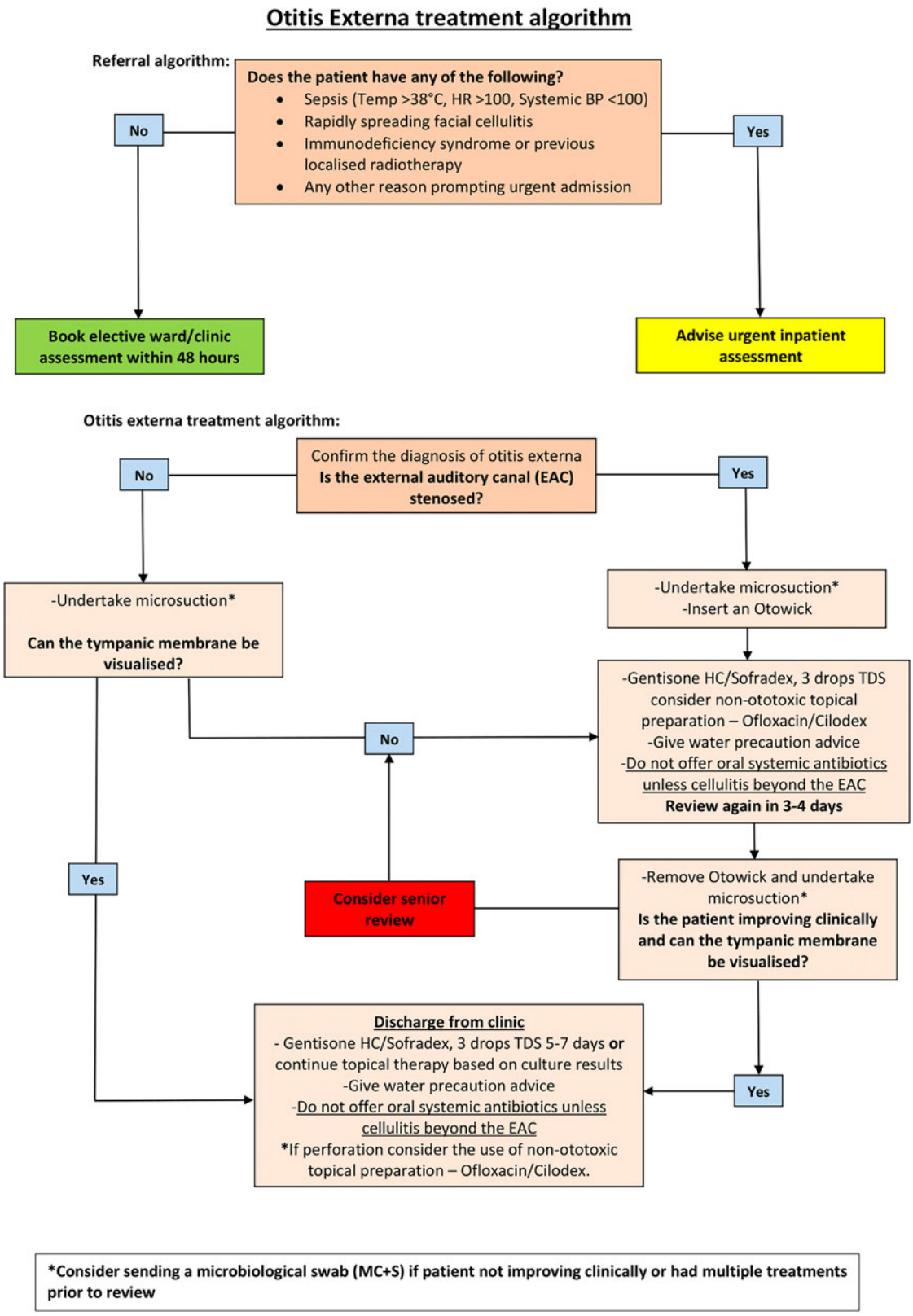


Figure 1. Otitis externa treatment algorithm (adapted for legibility). The guidelines used to create this algorithm and sources of further information can be found in Rodenfeld *et al.*[4] and the National Institute for Health and Care Excellence.[5] HR = heart rate; BP = blood pressure; TDS = three times a day

Statistical analysis

Data were collected and analysed using Excel® (Microsoft, Redmond, WA, USA). Statistical significance was set at a p value of <0.05. Numerical data were compared with a Kruskal–Wallis test, and categorical data were compared with either a chi-square test or Fisher's exact test.

Results

Overall, 202 cases of otitis externa managed in the treatment room were reviewed (baseline 58 cases *vs* Cycle 1 57 cases *vs* Cycle 2 87 cases). The proportion of cases involving female patients was 54.46 per cent, and the mean age was 42.70 years. The patient demographics remained

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Table 1. Topical antibiotic guide for otitis externa

Name	Dosage (number of drops)	Frequency	Length of treatment (days)
Sofradex	3	TDS	7
Gentisone	3	TDS	7
Cilodex	4	BD	7
Clotrimazole	2	TDS	14

TDS = three times a day; BD = twice a day

Table 2. Baseline characteristics of the study population

Characteristic	Baseline ($n = 58$)	Cycle 1 ($n = 57$)	Cycle 2 ($n = 87$)
Female (%)	43.10	63.16	56.32
Age (years)	45.98	44.58	39.29
Laterality of otitis externa (%)			
– Bilateral	20.69	26.32	17.24
– Left	41.38	33.33	50.57
– Right	37.93	40.35	32.18
Patients with wicks (%)	36.21	35.09	29.89

relatively consistent across each cycle and are detailed in Table 2.

Topical antibiotic prescribing and water precaution advice

The prescriptions and guidance provided to patients across each intervention period are shown in Table 3.

The incidences of topical antibiotic prescriptions being fully detailed in the documentation of treatment room reviews fluctuated, but were noted to be rising following second-cycle intervention (baseline 35.09 per cent *vs* Cycle 1 29.09 per cent *vs* Cycle 2 45.78 per cent, $p = 0.12$). The correct dosing of topical antibiotics increased significantly (baseline 30.00 per cent *vs* Cycle 1 56.25 per cent *vs* Cycle 2 72.22 per cent, $p = 0.01$).

The proportion of cases where water precaution advice was given improved significantly (baseline 44.83 per cent *vs* Cycle 1 52.63 per cent *vs* Cycle 2 82.76 per cent, $p = <0.01$).

Deviation from the recommended treatments specified in the algorithm differed significantly across the implementation cycles (baseline 5.17 per cent *vs* Cycle 1 7.02 per cent *vs* Cycle 2 17.24 per cent, $p = 0.04$). Further analysis showed there was a larger incidence of fungal otitis externa during the second cycle (baseline 3.45 per cent *vs* Cycle 1 1.75 per cent *vs* Cycle 2 9.20 per cent, $p = 0.26$). Non-guideline treatment with clotrimazole showed a generally increasing trend towards Cycle 2 (baseline 3.45 per cent *vs* Cycle 1 1.75 per cent *vs* Cycle 2 9.20 per cent, $p = 0.15$), and non-treatment guideline excluding clotrimazole exhibited a similar pattern (baseline 1.72 per cent *vs* Cycle 1 5.26 per cent *vs* Cycle 2 8.05 per cent, $p = 0.27$). Of the cases who received clotrimazole, only three in the second cycle had aspergillus or yeast grown on their microbiology swab (baseline 0 per cent *vs* Cycle 1 0 per cent *vs* Cycle 37.5 per cent).

Review patterns and senior involvement

The number of days between reviews was significantly lower amongst patients with pope wicks inserted by the end of the second cycle (baseline 3.50 *vs* Cycle 1 3.53 *vs* Cycle 2 3.00 days, $p = 0.01$).

Table 3. Summary of care delivered to patients with otitis externa in the ENT urgent treatment room

Parameter	Baseline ($n = 58$)	Cycle 1 ($n = 57$)	Cycle 2 ($n = 87$)	*p* value
Treatment quality statistics				
Full topical antibiotic dosing specified (%)	35.09	29.09	45.78	0.12
Correct topical antibiotic dosing prescribed (%)	30.00	56.25	72.22	**0.01**
Microsuction performed (%)	86.21	82.46	86.21	0.80
Oral antibiotics prescribed (%)	18.97	19.30	28.74	0.28
Water precaution advice given (%)	44.83	52.63	82.76	**<0.01**
Patients who received non-guideline treatment (%)	5.17	7.02	17.24	**0.04**
Patients whose non-guideline treatment included clotrimazole (%)	3.45	1.75	9.20	0.15
Patients whose non-guideline treatment did not include clotrimazole (%)	1.72	5.26	8.05	0.27
Clinical review statistics (*n*)				
Number of reviews across all cases (mean)	2.10	2.39	2.47	0.69
Number of reviews in patients without a pope wick (mean)	1.84	2.00	1.98	0.83
Number of reviews in patients with a pope wick (mean)	2.57	3.10	3.62	0.49
Number of days between reviews across all cases (mean)	4.93	4.79	4.90	0.64
Number of days between reviews in patients without a pope wick (mean)	6.23	5.83	6.22	0.83
Number of days between reviews in patients with a pope wick (mean)	3.50	3.53	3.00	**0.01**
Cases with senior/ENT specialist review (%)	32.76	28.07	25.29	0.62
Review number at which senior/ENT specialist input occurred (mean)	1.95	1.81	1.77	0.46
Reason for in-patient admission				
Suspicion of necrotising otitis externa (***n***)	1	1	5	
Involvement of facial cellulitis (***n***)	2	0	2	
Other reason for admission (***n***)	0	1	2	

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The mean number of reviews required to treat each case showed an overall increasing trend (baseline 2.10 *vs* Cycle 1 2.39 *vs* Cycle 2 2.47, $p = 0.69$), with similar patterns in the review numbers amongst patients who required pope wicks (baseline 2.57 *vs* cycle 1 3.10 *vs* cycle 2 3.62, $p = 0.49$).

Instances where the on-call senior ENT specialist had to be involved in a case showed a general pattern of reduction following the interventions (baseline 32.76 per cent *vs* Cycle 1 28.07 per cent *vs* Cycle 2 25.29 per cent, $p = 0.62$).

Admission rates

The proportion of cases requiring in-patient admission for otitis externa was 7.43 per cent across the study period and did not differ significantly across the three cycles (baseline 5.17 per cent *vs* Cycle 1 5.26 per cent *vs* Cycle 2 10.34 per cent, $p = 0.48$). The most common reasons for an admission were either suspicion of necrotising otitis externa (50.00 per cent) or involvement of facial cellulitis (28.57 per cent).

Microbiology results

Culture results in cases where a microbiology swab was taken demonstrated minimal variation and are shown in Table 4. Over half of the swab results grew *Pseudomonas aeruginosa* (baseline 55.81 per cent *vs* Cycle 1 68.97 per cent *vs* Cycle 2 53.45 per cent) and up to almost a third of swabs grew either skin flora or had no growth (baseline 27.91 per cent *vs* Cycle 1 13.79 per cent *vs* Cycle 2 31.03 per cent).

Discussion

This study has effectively introduced a simplified treatment algorithm of otitis externa management for use by junior doctors running emergency clinics in ENT. Its use has improved documentation, correct antibiotic use and dosing, and reduced senior ENT specialist input, with a trend towards more independent practice. A secondary care otitis externa algorithm is unique within the literature and provides a useful resource for junior doctors in managing this common condition.

The treatment algorithm was designed through departmental discussion and review of the current available guidance from National Institute for Health and Care Excellence and American Academy of Otolaryngology—Head and Neck Surgery Foundation.[3,4] Its utility stems from its provision of a clear pathway for patients to be managed in a secondary and/or tertiary centre with access to microscopy, pope wick insertion and on-site ENT specialist review, thus providing junior ENT doctors and ANPs with guidelines that can better make use of all the available resources to deliver care. Moreover, it advocates leaving 3 or 4 days between reviewing patients, in a bid to reduce unnecessary clinical reviews and give topical therapy the chance to work effectively.

Implementation of the treatment algorithm in conjunction with topical antibiotic guidance was shown to increase the instances in which topical antibiotics are correctly prescribed. The change both drives safer care and improves antibiotic stewardship. The algorithm further acts as a prompt to ensure basic, yet crucial, water precaution advice is given to each patient to prevent prolonged illness and recurrence of otitis externa.

The interventions have further been shown to be a useful educational tool, empowering junior ENT doctors to manage otitis externa independently and reducing the requirement for senior input. Pope wicks indicate more severe disease and the decrease in the number of days between reviews and a general trend towards more reviews within this subgroup likely represents an expected level of caution taken by junior doctors as they work more independently.

Ibrahim *et al.* reported that introduction of an established protocol for otitis externa alongside education of the larger healthcare team resulted in a reduction in patient follow ups.[6] Similarly, other groups have noted an increase in discharges after a first review following implementation of an otitis externa pathway.[7] Whilst our results showed a general trend towards increasing reviews, the focus of our study was also different in that its primary objective was to promote independent practice amongst more junior doctors by designing more complete guidance.

In comparison to both the otitis externa flow chart by the American Academy of Otolaryngology—Head and Neck Surgery Foundation[4] and that published by Ibrahim *et al.*,[6] our guidelines provide a more detailed overview, including when to escalate to a senior clinical member, and an emphasis on providing water precaution advice. The latter is very important because a recent study reported that only 39 per cent of patients referred into an ENT tertiary centre had received water precaution advice, and thus missed the opportunity for a cost-effective and side-effect-free intervention.[8]

- Otitis externa is an extremely common condition presenting to primary care and specialist ENT services, and often managed by junior doctors
- Guidelines to manage the condition exist, but none are tailored towards ENT junior doctors working in emergency clinics
- The treatment algorithm improved documentation and antibiotic prescribing, and reduced the requirement for senior specialist review
- Junior doctors became more independent in managing otitis externa following the introduction of the algorithm
- The algorithm provides a useful framework to follow, allowing inexperienced junior doctors to become more confident in managing otitis externa

A challenging aspect of otitis externa management that remains is the diagnosis and treatment of otomycosis; a modified version of the algorithm that accounts for this condition enables it to help manage the various presentations of otitis externa. Fungal otitis externa is reported to be increasing potentially as a result of the use of broad-spectrum antibiotics.[9] Although hallmarks of its presentation are thick white fluid or black hyphae,[10] its common symptoms, including serous drainage, erythema and oedema, make it challenging to distinguish from bacterial otitis externa.[9]

This difficulty is reflected in the results of the cases managed as otomycosis in our cohort, where either no or only a minority of cases were confirmed to have grown fungus on their microbiology swabs. In addition, the absence of guidance

Table 4. Culture results of the cases where a microbiology swab was taken

Microbiology species	Proportion of microbiology swabs whose culture results included the species (%)		
	Baseline ($n = 43$)	Cycle 1 ($n = 29$)	Cycle 2 ($n = 58$)
Pseudomonas aeruginosa	55.81	68.97	53.45
Staphylococcus aureus	32.56	24.14	10.34
Aspergillus species	0.00	10.34	6.90
Yeast	2.33	6.90	3.45
Only skin flora or no growth	27.91	13.79	31.03

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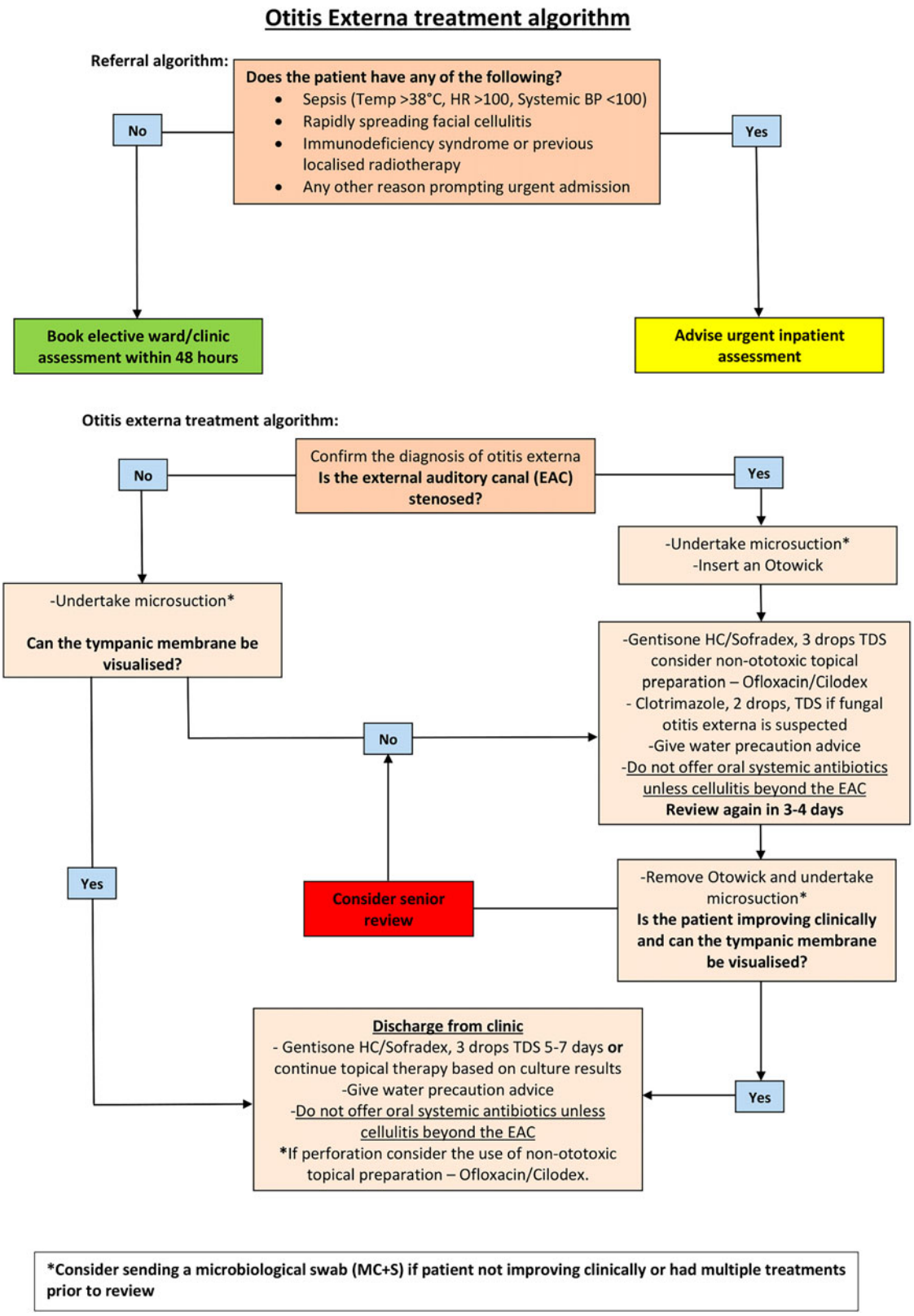


Figure 2. Modified otitis externa treatment algorithm accounting for fungal otitis externa. The guidelines used to create this algorithm and sources of further information can be found in Rodenfeld *et al.*[4] and the National Institute for Health and Care Excellence.[5] HR = heart rate; BP = blood pressure; TDS = three times a day

in the treatment algorithm for fungal otitis externa resulted in cases treated with clotrimazole being coded as non-guideline treatment in our dataset.

A rise in presumed otomycosis in our third cycle likely exacerbated natural variation in the use of other non-guideline treatments such as Tri-adcortyl ointment, and resulted in the significant increase in non-guideline management across the cycles. We have devised a modified treatment algorithm to account for this and help manage fungal otitis externa presentations (Figure 2). The addition allows for the algorithm to help manage otitis externa across both bacterial and fungal causes.

Limitations

The approach to coding cases of acute otitis externa means that patients with multiple presentations who would be more

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accurately described as suffering from chronic otitis externa are included in the dataset and could skew results.

Conclusion

Our experience shows that implementation of an otitis externa treatment algorithm alongside topical antibiotic guidance advice results in a marked improvement in the treatment of this condition and empowers junior doctors to manage otitis externa effectively. Further incorporation of guidance on managing otomycosis in the modified treatment algorithm enables it to help manage otitis externa across its spectrum of bacterial and fungal causes. Adopting these tools in other centres has the potential to bring about similar benefits and help upskill the ENT workforce.

Competing interests. None declared

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