Title: Overprescribing of antibiotics by UK ophthalmologists

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Antibiotic resistance is a universal public health threat yet healthcare professionals continue to prescribe antibiotics widely and often without a clear indication for doing so. In 2008 the National Institute of Health and Clinical Excellence (NICE) published guidelines stating that antibiotics should not be used as prophylaxis against surgical site infection in cases of clean surgical wounds healing by primary intention, where there has been no use of prostheses or implants.[1]

We suspected that UK ophthalmologists prescribe antibiotics widely for minor, self-limiting conditions and as post-surgical prophylaxis. We therefore decided to investigate this. An online survey consisting of four clinical vignettes based on simple, common presentations was emailed to all UK-based members of the Royal College of Ophthalmologists. Two related to minor, self-limiting conditions and two were based on minor operations. For the surgical scenarios, we asked all respondents to tick a box if they did not perform these procedures and in this case to respond hypothetically.

The survey was completed by 809 UK-based ophthalmologist members of the Royal College of Ophthalmologists. This represents 29.4% of the 2749 members who could be contacted successfully via email (a further 101 members could not be contacted by email). Of those who submitted responses, 345 were consultants (28·3% of all consultants contacted), 226 trainees (33·2%), 238 other ophthalmologists (28·1%).

In Question 1, a scenario about a chalazion with no signs of infection, 97·5% of respondents recommended lid hygiene / hot compresses and the majority managed with this alone. 29·0% (95% confidence interval (CI) 25·9-32·3) also recommended antibiotics: 19·2% topical antibiotic alone, 9·3% a topical antibiotic/steroid combination and 3·0% oral antibiotics.

Question 2 referred to a case of conjunctivitis, with the implication from the symptoms and signs that this was of viral aetiology. 83·7% of respondents recommended hygiene and prevention of contagion advice. Almost half of respondents (48·7%; 95% CI 45·2-52·2) would use antibiotics, of which the vast majority used a topical antibiotic alone.

Questions 3 and 4 were about post-operative use of medication after incision and curettage of a chalazion and shave excision of a papilloma, in terms of applying a stat dose at the end of surgery (3a and 4a respectively) and prescribing a course of treatment for use at home (3b and 4b respectively). 16·6% and 19·2% respondents ticked the box to state that they were responding hypothetically. Interestingly there was a difference between responses for the two procedures: 95·9% (95% CI 94·3-97·2) would give a stat dose of topical antibiotic for the chalazion whereas 83·6% (95% CI 80·8-86·1) would give it for the papilloma. 90·4% (95% CI 88·1-92·3) would

prescribe antibiotics for post-operative use at home after chalazion in contrast to 69·5% (95% CI 66·2-72·6) for the papilloma excision, in most cases this being topical antibiotic alone.

The summary results of any antibiotic use according to grade of ophthalmologist are shown in table 1.

Is there evidence that topical antibiotics reduce surgical site infections in clean, superficial wounds? The Cochrane collaboration published a review last year concluding that there is moderate quality evidence that topical antibiotics probably prevent surgical site infection when compared to no topical antibiotic in surgical wounds healing by primary intention.[2] However this covered clean, clean-contaminated and contaminated surgery and as they stated, "The baseline infection rate is low in clean surgery and thus one should question whether prophylactic antibiotics should be used in such cases". Indeed, if one looks at the conclusions of the three included trials that were just assessing clean surgery, they all conclude that there was no clinically significant benefit of topical antibiotics.[3,4,5] This is reflected in NICE guidelines, recommending prophylactic antibiotics are not used in clean surgery.[1]

There is no indication for antibiotics in the management of chalazia and NICE guidelines state that antibiotics are not recommended.[6] Some ophthalmologists might argue that antibiotics help address blepharitis that leads to chalazia. However, the scenario in the questionnaire stated that the blepharitis was mild and the symptoms had only been present for one week. In addition, there is little evidence in the literature of the benefit of antibiotics for blepharitis and the consensus opinion is that and in the first instance, eyelid hygiene should be used alone.[7]

Most cases of infective conjunctivitis in adults are probably due to virus infection and are self-limiting; even cases due to acute bacterial infection are usually self-limiting.[8,9] A Cochrane review looking at antibiotics vs placebo for acute bacterial conjunctivitis found that there was a modest improvement in the speed of resolution of symptoms when topical antibiotics were used compared to placebo but the overall rates of cure were similar.[10] NICE guidelines, last revised in 2015, have taken this into account.[11] Given the self-limiting nature of the condition, the modest benefit of antibiotics, the limitations of the study and the global call to reduce antibiotic use, they recommend that antibiotics are only used in severe cases.

The reason for the high rate of antibiotic prescribing may be due to lack of awareness of the evidence or NICE guidelines, institutionalised teaching and expedient or defensive practice. Of note, our study found that consultants were less likely to prescribe post-operative antibiotics than other ophthalmologists. This was particularly the case for the papilloma scenario, where the rate of prescription of antibiotics to take home varied

between 56% for consultants and 84% for trainees. This is perhaps because consultants are more confident, experienced and aware of the low risk of wound infections whereas trainees are more likely to be cautious.

In conclusion, the use of topical antibiotics amongst UK ophthalmologists is high and goes against NICE guideline recommendations. The NICE guidelines need to be promulgated to ophthalmologists and the culture of antibiotic prescribing must be tackled in order to reduce the consequences of antimicrobial resistance as well as the morbidity from side-effects and cost to the NHS and patients of unnecessary medication use.

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Table 1. Total number and percentages of respondents who used any antibiotic for each of the questions and p-values of chi-squared tests for heterogeneity*

Question	**Overall antibiotic use (n=809)**	Consultant antibiotic use (n=345)	Trainee antibiotic use (n=226)	SAS / Fellow antibiotic use (n=238)	Chi –squared p-value
1: One-week history of a lid lump, clinically consistent with a chalazion	**29.0%**	27·8%	25·2%	34·5%	0·073
2: Three-day history of watery, red, gritty eyes, stuck together in the mornings, clinically consistent with conjunctivitis	**48.7%**	51·3%	42·0%	51·3%	0·061
3a: Chalazion incision and curettage, stat dose at end of procedure	**95.9%**	94·5%	97·8%	96·2%	0·145
3b: Chalazion incision and curettage, post-operative prescription for home use	**90.4%**	87·0%	91·2%	94·5%	0·009
4a: Papilloma excision, stat dose at end of procedure	**83.6%**	76·2%	92·9%	85·3%	<0·001
4b: Papilloma excision, post-operative prescription for home use	**69.5%**	55·9%	84·1%	75·2%	<0·001

* Chi-squared tests for heterogeneity were applied in order to detect whether there were differences between one or more groups. These were highly statistically significant for questions 3b, 4a and 4b. Inspection of the proportions showed that in questions 4a and 4b, consultants were the lowest antibiotic users and trainees the highest. In question 3b, consultants were the lowest antibiotic users and SAS / fellows were the highest users.