

The effect of antibiotic treatment on active trachoma and ocular *Chlamydia trachomatis* infection

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Abstract

Antibiotics are one of four arms of the SAFE strategy for the control of trachoma, an eye infection that is responsible for more cases of blindness than any condition other than cataract. The evidence for the use of topical tetracycline and oral tetracycline, doxycycline, erythromycin, cotrimoxazole and azithromycin in trachoma are reviewed here and a number of issues are nominated as research and policy priorities.

Synopsis prepared by Drs. Solomon & Mabey

Active trachoma has been treated with antibiotics since the late 1930s. Many different topical and systemic antibiotics have been used. The two regimens recommended by the World Health Organization are (a) 1% topical tetracycline ointment placed in both eyes twice daily for six weeks, or (b) one oral dose of 20mg/kg azithromycin (maximum dose 1g). The effect of antibiotic treatment on active trachoma and ocular *Chlamydia trachomatis* infection was the subject of a review by Denise Mabey and Anthony Solomon published in *Expert Review of Anti-infective Therapy* in 2003 (1(2): 209-16).

On pages 212-3 of that paper, a number of priority issues for research and policy for the next five years were identified. This synopsis revisits those priority issues and considers them in the light of new guidelines for antibiotic use in trachoma control and research findings that have become available since the paper's publication.

1. The World Health Organization now recommends mass antibiotic treatment (treatment of all residents of a community) in places where the prevalence of TF in 1-9 year-old children is 10% or more. If the prevalence of TF in 1-9 year-old children is 5% or more, but less than 10%, targeted treatment (identification and treatment of families in which there are one or more members with TF or TI) is recommended. In communities in which the prevalence of TF in 1-9 year-old children is less than 5%, antibiotic distribution is not recommended. The problem is that in low prevalence areas, and following one or more antibiotic distribution rounds, the presence or absence of TF is known to be a poor indicator for the presence or absence of ocular *C. trachomatis* infection. Giving communities with very few *C. trachomatis* infections mass treatment with anti-chlamydial antibiotics wastes drugs and other resources that are needed elsewhere. A cheap, rapid, accurate test of infection that could be used in the field to estimate the community prevalence of *C. trachomatis* conjunctival infection is required. Such tests are currently in development.
2. Children have the highest prevalence of active trachoma, and harbour the bulk of the ocular *C. trachomatis* load. However, suggestions that antibiotic treatment only be given to, for example, children under 10 years old, do not yet have any support from controlled studies. Community-randomised trials comparing the effect of treatment only of children to the effect of mass community treatment should be undertaken before such strategies are implemented at programme level. The cost-effectiveness and community acceptance of each strategy should be considered as part of those studies.
3. Mathematical models suggest that mass antibiotic treatment is needed every 6-12 months in populations where >50% of children have clinical evidence of active trachoma, and every 12-24 months where <35% of children have active trachoma. The prediction that hyperendemic communities will need biannual treatment has recently received support from a study in Ethiopia, in which the rate of return of ocular *C. trachomatis* infection after mass azithromycin treatment was determined. The prediction that mesoendemic communities may need treatment less frequently than once yearly has recently received support from a study in Tanzania, in which high coverage mass treatment with azithromycin, perhaps aided by periodic re-treatment of active cases with tetracycline eye ointment, appeared to have interrupted transmission of ocular *C. trachomatis* and

reduced the prevalence of infection to virtually zero two years after treatment. However, the comparative effect of different dosing intervals still needs to be tested by controlled trials.

4. Where azithromycin is available, for logistical reasons, it should be given by height rather than weight. Azithromycin doses given by height are likely to be both safe and effective. Height-based dosing is now used by a number of national trachoma control programmes.
5. Strategies to improve uptake of antibiotics should be sought: the proportion of the community given antibiotics may be critical in determining the impact of the antibiotic component of SAFE.
6. Despite decades of use of tetracycline eye ointment in trachoma control programmes, tetracycline-resistant ocular strains of *C. trachomatis* have not yet been identified. There is some concern that mass treatment of trachoma-endemic communities with azithromycin may lead to the emergence of resistant strains of *C. trachomatis* or other human pathogens. Further studies are warranted.
7. It seems likely that implementation of the 'F' and 'E' components of the SAFE strategy will enhance or prolong antibiotic-driven reductions in the prevalence of active trachoma and ocular *C. trachomatis* infection. However, 'F' and 'E' are expensive and difficult to implement, and good evidence of their effectiveness (which is presently lacking) would be of great benefit in advocating their use. The cost effectiveness of various strategies should be considered as part of any studies of the impact of 'F' and 'E' interventions.