

Trachoma control: the SAFE strategy

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Abstract

• **As a contagious bacterial infection that affects the conjunctival covering of the eye, the cornea and the eyelids, trachoma is controlled by an endorsed integrated strategy consisting of surgery for trichiasis, antibiotic therapy, facial cleanliness and environmental improvement, namely, the SAFE strategy developed by World Health Organization. Developed based on evidence from previous field trials and constantly modified in practice, SAFE strategy has greatly boosted the progress in trachoma control. Regardless of the fact that there are still many pending questions, national program coordinators are convinced that trachoma control initiative based on SAFE strategy would be effective.**

• **KEYWORDS:** SAFE strategy; trachoma; chlamydia trachomatis

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INTRODUCTION

Trachoma is an infectious blinding eye disease caused by chlamydia trachomatis. It has a long history and was once prevalent all over the world. Epidemiological studies found that trachoma was prevalent in 57 countries around the world, and about 1.2 billion people were living in trachoma endemic areas, mainly the poorest communities in low and middle income countries^[1-2]. Before the foundation of new China and in its early years, the average prevalence of trachoma was about 55%. At that time, more than 50% of blindness was caused by trachoma, making it the leading cause of blindness in China^[3]. In 1980s, China made great progress in the fight against trachoma through the implementation of the SAFE strategy developed by the World Health Organization (WHO). The proportion of blindness caused by trachoma fell to 10.75% in 1987 and trachoma became the 3rd leading

cause of blindness^[3]. At the end of 2014, the evaluation results showed that the prevalence of active trachoma in children aged 1 to 9 was less than 5%, while that of trichiasis caused by trachoma in adult was less than 1%, which have met the WHO's standard for eliminating blinding trachoma, indicating that trachoma is no longer a public health issue that imposes threat on the visual health of Chinese residents^[4]. However, some epidemiological investigations reported that there are still some sporadic cases in remote mountainous areas of China^[5-6]. The clinical symptoms of trachoma infection are actually the immunological and pathological responses to Chlamydia trachomatis^[7]. The incubation period after infection is 5-14d. The WHO has developed trachoma simple grading system that is used to report the prevalence of active trachoma and the sequelae in the population: trachomatous inflammation follicles (TF); trachomatous inflammation intense (TI); trachomatous conjunctival scarring (TS); trachomatous trichiasis (TT); corneal opacity (CO)^[8]. Trachoma is a chronic keratoconjunctivitis caused by repeated infection of the ocular serovars A, B, Ba and C of Chlamydia trachomatis^[9]. A study on the etiological characteristics of chlamydia trachoma conjunctivitis in Qinghai Tibetan area reported two novel Chlamydia trachomatis B serotypes (GenBank accession numbers KU737520 and KU737521) based on a sequence analysis of the ompA gene^[10-11].

The prevention and treatment of trachoma has always been the priority for the international community. The WHO developed SAFE strategy for the prevention and treatment of trachoma based on community intervention: Surgery for trachomatous trichiasis, aiming at reducing trachomatous trichiasis caused by eyelid entropion (Surgery, S); Application of antibiotics, especially the highly effective azithromycin, so as to eliminate infection of chlamydia trachomatis in trachoma patients (Antibiotic, A); Facial cleanliness for better personal hygiene (Facial cleanliness, F); Environmental improvement, in order to reduce the risk of infection and reinfection of Chlamydia trachomatis (Environmental improvement, E). These efforts have created favorable conditions for the elimination of blinding trachoma globally.

Surgical Treatment of Trachoma Trachomatous trichiasis often occurs due to repeated trachoma infection for years, and if not corrected in time, corneal opacity will gradually develop, leading to vision loss, and even blindness. More than 8 million people worldwide are currently suffering from trachomatous trichiasis, and most of whom are living in poor rural areas in trachoma endemic countries. There are various surgical

methods for the correction of trichomatous trichiasis, and WHO recommends bilamellar tarsal rotation (BLTR) for trichomatous trichiasis^[12]. Although trichomatous trichiasis can be treated surgically, the recurrence rate will gradually increase with the passage of time. Studies have reported that the average recurrence rate of trachoma after surgery was 28%-73%^[13]. The recurrence rate hinges on the duration and severity of the disease, surgical incision and postoperative care. Hence, the treatment of TT is also the key to accomplishing the Global Alliance for the Elimination of Blinding Trachoma (GET2020) on schedule.

Antibiotics for Trachoma Trachoma can be classified as the community-level eye disease, thus the fight against it should also start at the community level. Antibiotics for trachoma in WHO SAFE strategy not only aims at individual medication, but also focuses on topical antibiotic treatment within households and antibiotic treatment in communities, which plays an essential role in controlling the transmission of trachoma^[14]. At present, azithromycin is the first choice for the treatment of trachoma, with a single oral dose of 20 mg/kg to 1 g. As azolactone complex, azithromycin is the ideal antibiotic for *Chlamydia trachomatis* as its concentration in tissue is higher than that in plasma and it has a relatively long half-life. The final intervention target set by WHO for trachoma is that the prevalence of TF in children aged 1 to 9 should be less than 5%, and the threshold of collective treatment for trachoma should be set at 10%. When the prevalence of TF is lower than 5%, community-based collective antibiotic therapy could be ceased. However, surgery for trichomatous trichiasis and improvement of hygiene should continue.

Facial Cleanliness *Chlamydia trachomatis* would attach to the eye secretions, thereby being transmitted to other people through various ways. It can be transmitted by water contaminated by secretions of trachoma patients or by contaminated toiletry kit, and cause cross infection through contaminated fingers. Therefore, the improvement of facial cleanliness is closely associated with the spread of trachoma. To start with, hygiene education should be carried out to help people develop the habits of proper facial cleansing. Wiping or rubbing eyes with fingers should be strictly forbidden; Handkerchiefs and hand towels should be washed frequently and dried under sunshine, meanwhile, it is important to make sure everyone uses their own towel; Everyone should have their own toiletry kit and use running water to wash their faces.

Environmental Improvement Prevention of trachoma is an important public health issue. The infection rate and severity of trachoma are closely related to overcrowded living conditions, insufficient water sources and inadequate facial cleanliness. In addition, health management over businesses in service industries, such as barber shops, bathhouses and hotels, should be strictly carried out to guarantee disinfection of all goods and supplies. Efforts must be made in terms of the proper classification and disposal of rubbish according to the

regulations, the sanitation of the toilets and elimination of the flies. The route of transmission of trachoma should be directly cut off by protecting the water sources, which could minimize the spread of infection and reduce the infection rate of trachoma.

In conclusion, the SAFE strategy provides a feasible way to eliminate trachoma. More resources should be invested in "S". The quality of surgery should be closely followed through education and postoperative follow-up. Substantial increase in antibiotic input is needed for "A" and antibiotics should be widely distributed in all regions, such as distribution of oral azithromycin of 1-2-year dose. "F" should be a long-term behavior so as to consolidate the elimination of blinding trachoma as a public health issue. Strategic alliances and collaboration between "E" and other strategies are the key to achieving environmental changes.

REFERENCES

- 1 Global alliance for the elimination of blinding trachoma by 2020. *Wkly Epidemiol Rec* 2013;88(24):242-251.
- 2 Dye C, Mertens T, Hirschall G, Mpanju-Shumbusho W, Newman RD, Raviglione MC, Savioli L, Nakatani H. WHO and the future of disease control programmes. *Lancet* 2013;381(9864):413-418.
- 3 Wang NL, Deng SJ, Tian L. A review of trachoma history in China: research, prevention, and control. *Sci China Life Sci* 2016;59(6):541-547.
- 4 Hu AL, Wang NL. Enlightenment of blinding trachoma elimination in China. *Sci China Life Sci* 2017;60(12):1453-1456.
- 5 Wu M, Hu ZL, He D, Xu WR, Li Y. Trachoma in Yunnan province of southwestern China: findings from trachoma rapid assessment. *BMC Ophthalmol* 2018;18(1):97.
- 6 Liang QF, Lu XX, Wang M, Tian L, Labbé A, Hu AL. Study of infectious conjunctivitis among children in rural areas of Qinghai province. *Sci China Life Sci* 2016;59(6):548-554.
- 7 Hu VH, Holland MJ, Burton MJ. Trachoma: protective and pathogenic ocular immune responses to *Chlamydia trachomatis*. *PLoS Negl Trop Dis* 2013;7(2):e2020.
- 8 Wright HR, Turner A, Taylor HR. Trachoma. *The Lancet* 2008;371(9628):1945-1954.
- 9 Weir E, Haider S, Telio D. Trachoma: leading cause of infectious blindness. *CMAJ* 2004;170(8):1225.
- 10 Wang M, Lu XX, Hu AL, Zhang MX, Li X, Deng SJ, Wang NL. Etiological characteristics of chlamydia trachoma conjunctivitis of Primary Boarding School students in the Qinghai Tibetan area. *Sci China Life Sci* 2016;59(6):555-560.
- 11 Li X, Zhang SY, Liang QF, Wang M, Hu AL, Li XY, Yang BS, Zhang MX, Wang NL, Lu XX. Molecular characteristics of the ompA gene of serotype B *Chlamydia trachomatis* in Qinghai Tibetan primary school students. *Sci China Life Sci* 2016;59(6):561-570.
- 12 Reacher MH, Muñoz B, Alghassany A, Daar AS, Elbualy M, Taylor HR. A controlled trial of surgery for trichomatous trichiasis of the upper lid. *Arch Ophthalmol* 1992;110(5):667-674.
- 13 Burton MJ. A randomised controlled trial of azithromycin following surgery for trichomatous trichiasis in the Gambia. *Br J Ophthalmol* 2005;89(10):1282-1288.
- 14 Mathew AA, Turner A, Taylor HR. Strategies to control trachoma. *Drugs* 2009;69(8):953-970.