

REPORT OF THE 4TH GLOBAL SCIENTIFIC MEETING ON TRACHOMA

GENEVA, 27–29 NOVEMBER 2018



**World Health
Organization**

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WHO/CDS/NTD/PCT/2019.03

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Suggested citation. Report of the 4th Global Scientific Meeting on Trachoma, Geneva, 27–29 November 2018. Geneva: World Health Organization; 2019 (WHO/CDS/NTD/PCT/2019.03).

Cataloguing-in-Publication (CIP) data. CIP data are available at <http://apps.who.int/iris>.

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Summary of outcomes

The 4th Global Scientific Meeting on Trachoma:

1. Recommended that the World Health Organization not change the existing trachomatous inflammation—follicular elimination prevalence threshold [paragraph 2.8];
2. Requested the global trachoma programme to continue to investigate, in national programmes, the role of alternative technical indicators of elimination of trachoma as a public health problem [paragraph 2.8];
3. Recommended that the definition of *trachomatous trichiasis* be changed to “at least one eyelash from the upper eyelid touches the eyeball, or evidence of recent epilation of in-turned eyelashes from the upper eyelid”. (The change here is the exclusion of trichiasis that affects only the lower eyelid.) [paragraph 3.8];
4. Noted that in circumstances where there is evidence of upper eyelid trichiasis with little or no evidence of current or past active trachoma, cases of trichiasis should be assessed (by clinicians with appropriate training and expertise) for alternative aetiologies. This may take into account evidence such as trachomatous scarring of the conjunctiva, superior pannus, Herbert's pits and entropion, in order to determine whether upper eyelid trichiasis is due to trachoma or not [paragraph 3.9];
5. Recommended that trichiasis surgeons target a cumulative incidence of post-operative trachomatous trichiasis of < 10% by six months for cases that had minor trachomatous trichiasis (≤ 5 eyelashes touching the eyeball) pre-operatively, and < 20% by six months for cases that had major trachomatous trichiasis (> 5 eyelashes touching the eyeball) pre-operatively [paragraph 4.10];
6. Recommended that in order to improve the outcomes of trachomatous trichiasis surgery, *Trichiasis surgery for trachoma (1)* be revised to include: (i) a section on day one assessment, by the operating surgeon, for under- and over-correction, with instructions on how these conditions should be managed; and (ii) guidance on undertaking audits of trichiasis surgery outcomes at 6 months [paragraph 4.11]; and
7. Agreed that to assess whether the elimination prevalence target for trachomatous trichiasis has been reached, national programmes may use: (i) population-based prevalence surveys powered at evaluation-unit level (i.e. populations of 100 000–250 000 people); (ii) house-to-house case searches (which could be integrated with other public health activities); or (iii) a combination of data from multiple adjacent evaluation units. Professional statistical advice should be sought on how best to combine data from multiple evaluation units, with guidance subsequently given to national programmes and their partners [paragraph 5.4].

1. Background

1.1 Trachoma is the leading infectious cause of blindness (2). It is characterized by repeated conjunctival infection with particular strains of *Chlamydia trachomatis*. This scars the conjunctivae and, in some cases, leads to trichiasis with or without entropion. The abrasive action of eyelashes can damage the cornea. In 2018, trachoma affected the poorest residents of the poorest communities of 43 countries (3, 4).

1.2 The World Health Organization (WHO) convened the 1st Global Scientific Meeting on Trachoma in June 1996 to review the evidence for interventions against trachoma and set the technical framework for establishing, in November 1996, the WHO Alliance for the Global Elimination of Trachoma by 2020 (5). In 1998, the World Health Assembly adopted resolution WHA51.11 calling for increased implementation of the SAFE strategy¹ to support elimination of trachoma as a public health problem worldwide (7).

1.3 As national programmes began to implement the SAFE strategy and conduct impact surveys, formal delineation of the criteria for elimination of trachoma as a public health problem was required. In addition, a new estimate of the global burden of trachoma was needed in order to plan the work ahead. In August 2003, the 2nd Global Scientific Meeting on Trachoma completed those tasks (8).

1.4 By 2009, the need for further clarification of technical indicators for elimination and review of new evidence from operational research was identified. WHO convened the 3rd Global Scientific Meeting on Trachoma in July 2010 (9).

1.5 Since then, considerable advances have been made. As of November 2018, baseline mapping of suspected trachoma-endemic districts (10) had been nearly completed worldwide (11), more than half of all districts requiring interventions were participating in trachoma elimination programmes (4), and a total of eight countries had been validated as having eliminated trachoma as a public health problem (12).

1.6 During the course of these advances, several technical questions arose, notably:

1. Are the technical indicators for *elimination of trachoma as a public health problem* appropriate for the WHO Western Pacific Region, or should they be changed?
2. For the purposes of defining the technical indicators for elimination of trachoma as a public health problem, how should *trachomatous trichiasis* be defined?
3. How and when should trichiasis surgery outcomes be assessed, and what should the targets be?
4. How should the prevalence of trachomatous trichiasis unknown to the health system be measured for the purposes of establishing that trachoma has been eliminated as a public health problem?

1.7 The 4th Global Scientific Meeting, convened by WHO in Geneva on 27–29 November 2018, considered these questions and determined whether new evidence should lead to refinement of recommendations made at previous global scientific meetings (5, 8, 9) and consultations (13–15).

1.8 Participants are listed in Annex 1. Professor Allen Foster and Dr Rabebe Tekeraoi were nominated as the meeting's Chair and Vice-Chair, respectively; they were approved for these roles by acclamation.

1.9 No participant declared interests that were considered to require partial or complete exclusion from the meeting. Potential conflicts of interest that were considered necessary to be publicly declared are listed in Annex 2.

1.10 The meeting agenda, adopted without amendment, is presented in Annex 3.

¹ SAFE represents Surgery, Antibiotics, Facial cleanliness and Environmental improvement (6).

1.11 A list of trachoma programme terms, compiled to help standardize and improve scientific communication about trachoma, was agreed by the participants and is presented in Annex 4.

1.12 After the main meeting closed, and at the request of several participants, the management of post-operative trichomatous trichiasis (PTT) was discussed. This topic had not been included on the meeting agenda, and not all the participants remained for the discussion. The notes from this discussion are included in Annex 5.

2. Technical indicators for elimination

2.1 In June 2016, WHO published standard operating procedures for validation of elimination of trachoma as a public health problem (16), which include the three previously established (8, 9) technical indicators for elimination of trachoma as a public health problem, namely:

(i) a prevalence of trichomatous trichiasis unknown to the health system in ≥ 15 -year-olds of $< 0.2\%$ (where the phrase *unknown to the health system* excludes individuals with PTT, individuals who have refused surgery, and individuals who have not yet received an operation but for whom a surgical date has been set), in each formerly-endemic district;

(ii) a prevalence of trichomatous inflammation—follicular (TF) in 1–9-year-olds of $< 5\%$, sustained for at least two years in the absence of antibiotic mass drug administration, in each formerly-endemic district; and

(iii) written evidence that the health system can identify and manage incident cases of trichomatous trichiasis, using defined strategies, with evidence of appropriate financial resources to implement those strategies.

In this context, a *district* is defined as the normal administrative unit for health care management, which for the purposes of clarification consists of a population unit between 100 000 and 250 000 persons (9). In some countries, the term *district* has a different meaning. This document will therefore use the generic term *evaluation unit* instead.

2.2 The first two of these three technical indicators incorporate elimination prevalence thresholds for trichomatous trichiasis and TF, respectively.

2.3 The elimination prevalence threshold for trichomatous trichiasis is intended to reflect the current public health impact of trachoma on progressive trichomatous visual impairment. The elimination prevalence threshold for TF is intended to reflect the future public health impact of trachoma within the current cohort of 1–9-year-olds. In the absence of previous interventions (or evidence of socioeconomic changes) that could have altered the intensity of population-level transmission of ocular *C. trachomatis*, it is generally assumed that current TF prevalence reflects the historical TF prevalence; that is, the intensity of ocular *C. trachomatis* transmission is in an approximately steady state. This assumption may or may not be valid.

2.4 In the 1950s, trachoma was widely endemic in the Western Pacific (17). Since 2008, it has been shown to remain endemic in at least four countries of Melanesia (Fiji, Papua New Guinea, the Solomon Islands and Vanuatu) (18, 19). In most evaluation units of these countries surveyed by November 2018 using internationally standardized approaches, moderate to high baseline prevalences of TF (6.0–22.0% in 1–9-year-olds) were accompanied by very low baseline prevalences of (or no) trichomatous trichiasis (0.0–0.16%) in ≥ 15 -year-olds (19–22). Conversely, in Kiribati, which lies in the Pacific but outside Melanesia, moderate to high baseline prevalences of TF in children (21.3–38.2%) were accompanied by moderate baseline prevalences of trichomatous trichiasis in adults (0.2–1.5%) (23, 24). The evaluation unit-level relationship between TF and trichomatous trichiasis prevalence in Kiribati is similar to that seen in Africa (23–25).

2.5 Extensive research has been undertaken to better understand the epidemiology of trachoma in Melanesia (21, 24, 26–31), including a series of detailed investigations in the Solomon Islands and Vanuatu recommended by a January 2018 Expert Consultation convened by WHO's Regional Office

for the Western Pacific (15). In intensively studied evaluation units in Melanesia with moderate to high baseline prevalences of TF, there are low prevalences of ocular *C. trachomatis* infection in 1–9-year-olds, low prevalences of serological markers of previous *C. trachomatis* infection in 1–9-year-olds, and low prevalences of conjunctival scarring, superior limbal pannus and Herbert's pits in 10–14-year-olds. These findings have been interpreted by different observers as being consistent with several different scenarios: trachoma may be gradually disappearing or gradually re-emerging, or a proportion of TF may be due to or prolonged by some as-yet-unidentified factor. Regardless of the explanation, the observed TF does not seem to be concurrently associated with the blinding sequelae of trachoma in the same populations.

2.6 Unpublished data suggest that similar disparities between the prevalence of TF in children, the prevalence of ocular *C. trachomatis* infection in children, and the prevalence of trachomatous trichiasis in adults may occur beyond Melanesia, including in some populations in Australia and South America.

2.7 There was consensus among the group that (i) trachoma is a public health problem in Kiribati, and (ii) further population-based survey data on the prevalence of TF and trachomatous trichiasis are required from Fiji and Papua New Guinea. Opinion was divided on whether the TF elimination prevalence threshold is appropriate throughout the Western Pacific Region; however, there was consensus that at present there is insufficient evidence to recommend the use of an alternative technical indicator (based on, for example, prevalence of ocular *C. trachomatis* infection or serological markers) or a different TF prevalence threshold for the purposes of validation of elimination of trachoma as a public health problem.

2.8 The group: (i) recommended that WHO not change the existing TF elimination prevalence threshold; and (ii) requested the global trachoma programme to continue to investigate, in national programmes, the role of alternative technical indicators of elimination of trachoma as a public health problem.

3. The definition of *trachomatous trichiasis*

3.1 Not all trichiasis is caused by trachoma (13). Trichiasis can also be caused by blepharitis, Stevens–Johnson syndrome, burns, trauma, tumours, herpes zoster and ocular cicatricial pemphigoid. It is likely that some trichiasis in trachoma-endemic settings is non-trachomatous.

3.2 There are no published population-based data on the background prevalence of non-trachomatous trichiasis in any environment. Unpublished whole-population data obtained from one non-trachoma-endemic country in northern Europe show a national prevalence of trichiasis in ≥ 15 -year-olds steadily increasing from 0.025% in 2000 to 0.044% in 2017.² During that period, the annual incidence of trichiasis was reasonably constant, varying between 0.20 and 0.26 per thousand ≥ 15 -year-olds. Details of the aetiology and phenotype of these cases, including whether the trichiasis affected the upper and/or lower eyelids, are not known. The majority of people with trichiasis in this dataset first presented at 60 years of age or older. (The point of making this set of observations is that there is a measurable incidence of trichiasis in non-trachoma-endemic countries that is, like trachomatous trichiasis, age-related. Trichiasis due to involutional entropion of the lower eyelid is also age-related.)

3.3 Unpublished data were presented from the first three months of observation from a 12-month prospective audit of the phenotype, causes and correlates of trichiasis at the Dr Rajendra Prasad Centre for Ophthalmic Sciences, All India Institute of Medical Sciences, New Delhi. This national referral eye hospital has a wide catchment area that includes parts of the country recognized to be trachoma-endemic and parts that are recognized to be non-trachoma-endemic. The dataset analysed had information on 100 self-presenting patients, 93% of whom lived in trachoma-endemic states of India. According to the assessment of the treating ophthalmologist, only 35% of trichiasis presenting between

² Because they are derived from a whole-population dataset, these estimates are inherently age- and gender-standardized (32).

August and October 2018 was due to trachoma. In those 100 patients, 23% had only lower lid trichiasis, without upper lid trichiasis in either eye.

3.4 In most trachoma-endemic countries, trachoma prevalence surveys are undertaken by trained graders who are not ophthalmologists (33). Such graders are believed to be reliable in diagnosing the presence or absence of trichiasis but are not necessarily trained to diagnose the underlying cause using the accepted clinical approach. Definitive assessment of the aetiology of cases of trichiasis identified in routine population-based trachoma prevalence surveys would therefore be problematic.

3.5 In its third report, published in 1962 (34), WHO's former Expert Committee on Trachoma suggested that clinical diagnosis of trachoma *required* the presence of at least two of the following signs: (a) follicles on the upper tarsal conjunctiva, limbal follicles or their sequelae (Herbert's pits); (b) epithelial or subepithelial keratitis, most marked in the upper third of the cornea; (c) pannus, most marked superiorly; and (d) scars of characteristic configuration. Trichiasis was mentioned as a diagnostic feature only as a more severe manifestation of "Trachoma Stage IV", cases of which were said to range "from those with minimal signs of scarring and no visual impairment or other disability to those with trichiasis, entropion, corneal opacities and gross impairment of vision" (34). Similarly, in the next evolutionary step for standardized trachoma grading systems, the 1973 *Field methods for the control of trachoma*, the feature "trichiasis and/or entropion" was included only as a sign within the domain "conjunctival scars" (35). The grading systems in these publications (34, 35) have since been superseded by others that place trichiasis (with or without entropion) in its own diagnostic domain (36, 37). However, the structure of the older grading systems prompted a 2014 recommendation (13) that graders undertaking population-based trachoma prevalence surveys should assess eyes with trichiasis for the presence or absence of trachomatous scarring (TS) of the conjunctiva (37), with the presence of TS being taken to indicate that the trichiasis was trachomatous; if the grader could not evert the eyelid, TS was to be assumed to be present (13). The purpose of collecting these data was to better understand the phenotype of eyes with trichiasis identified within trachoma prevalence surveys. The Second Global Scientific Meeting on Trachomatous Trichiasis, held in 2015, considered that there was insufficient evidence to recommend that the sign *trachomatous trichiasis* be formally redefined as the presence of trichiasis plus the presence of TS in the same eye; instead, it requested further research (38).

3.6 Unpublished cross-sectional data were presented from a highly trachoma-endemic area of Ethiopia in which a trachomatous trichiasis surgery programme had been active for more than 10 years. Using findings from population-based surveys, 400 unoperated eyes with trichiasis and 100 age-, gender- and community-matched comparison subjects without trichiasis were recruited and re-examined by expert graders. Survey grading had been done by certified trachoma graders using the WHO simplified trachoma grading scheme (37), which requires scar to be "easily visible"; the expert graders re-examined using the more detailed "FPC" grading system (36), with tarsal conjunctival scarring classified using an even more detailed system that quantifies the dimensions of individual scars and the proportion of the area of the tarsal conjunctiva affected by scarring (39). During the surveys, the certified graders had diagnosed TS in 81% of eyes with trichiasis. The expert graders diagnosed some degree of trachomatous conjunctival scar in 95% of eyes with trichiasis, and 70% of eyes of comparison subjects. These data suggest that assessment by certified graders of the presence or absence of TS in eyes with trichiasis in this context failed to detect a significant proportion of cases of conjunctival scar. Collection of similar data in other countries is planned.

3.7 Characteristically, trachomatous trichiasis affects the upper eyelid. About 10% of eyes with trachomatous trichiasis in the upper eyelid also have lower eyelid trichiasis (40). Involutional (age-related) entropion characteristically affects only the lower eyelid. Conditions such as Stevens–Johnson syndrome and ocular chemical injuries may cause scarring and trichiasis of the upper and/or lower eyelids.

3.8 The group therefore recommended that the definition of *trachomatous trichiasis* be changed to "at least one eyelash from the upper eyelid touches the eyeball, or evidence of recent epilation of in-turned eyelashes from the upper eyelid". (The change here is the exclusion of trichiasis that affects only the lower eyelid.)

3.9 The group noted that in circumstances where there is evidence of upper eyelid trichiasis with little or no evidence of current or past active trachoma, cases of trichiasis should be assessed (by

clinicians with appropriate training and expertise) for alternative aetiologies. This may take into account evidence such as trichomatous scarring of the conjunctiva, superior pannus, Herbert's pits and entropion, in order to determine whether upper eyelid trichiasis is due to trachoma or not.

4. Assessment of trichiasis surgery outcomes

4.1 High-quality trichiasis surgery is critical. The 3rd Global Scientific Meeting on Trachoma recommended that national programmes "report a recurrence rate as part of the health management information system, with a target of achieving 10% or less recurrence at one year after surgery" (9).

4.2 A systematic review presented at the current meeting identified 35 published articles from 22 unique studies conducted in Africa in which PTT (the presence, after surgery for trichomatous trichiasis, of ≥ 1 eyelash touching the eyeball, or evidence of epilation) was an outcome measure; nine of the 22 were interventional studies and 13 were observational. The reported incidence of PTT ranged from 2% (Ethiopia, 6 weeks' follow-up after bi-lamellar tarsal rotation) to 69% (Egypt, 3 weeks' follow-up after anterior lamellar repositioning). The reported incidence of PTT was generally higher in observational studies than in interventional studies (where surgeons may be more likely to be highly selected and re-trained before the study intervention).

4.3 Routine follow-up of trichiasis surgery patients in programmes is logistically challenging. Many patients do not re-present to health facilities or outreach teams, and it becomes more difficult to actively trace patients as the interval between surgery and the planned follow-up visit gets longer. In any case, the recommended routine follow-up schedule concludes 3–6 months after surgery, making it impractical to routinely estimate the cumulative incidence of PTT at one year after surgery.

4.4 When patients are followed up, health management information systems often fail to capture and appropriately channel the resulting data for optimal programmatic decision-making. Use of an mHealth tool is being piloted in several countries (14) and may help to solve this problem.

4.5 In April 2018, the 29 countries of WHO's African Region in which trachoma is considered to be a public health problem were surveyed by email to identify national targets for good surgical outcomes (defined as the percentage of patients undergoing surgery for trichomatous trichiasis remaining free of PTT for a defined interval after surgery). Two countries had not yet commenced implementation of a trichiasis surgery programme. Of the remaining 27, 24 reported having a national target for good surgical outcomes, ranging from 80% to 100%, determined at an interval that was either 3–6 months after surgery or by the last scheduled follow-up point.

4.6 The group recognized that PTT, over-correction and eyelid contour abnormalities are significant causes of poor outcome following surgery for trichomatous trichiasis (41-47). Routine follow-up is expected to benefit both patient and surgeon by facilitating further intervention (if required) and professional development, respectively.

4.7 PTT occurring within six months of surgery is likely to be due to inadequate surgical technique, whereas trichiasis developing more than one year after surgery is more likely to be due to progression of the cicatricial process.

4.8 The second edition of *Trichiasis surgery for trachoma* (1) addresses the need to manage under- or over-correction at the time of surgery. The surgeon should examine every trichiasis surgery patient for under- or over-correction on the first post-operative day; if present, these issues should be corrected immediately by revising the surgery, with replacement of the sutures so as to achieve the desired correction.

4.9 The group emphasized the need for good training, monitoring and auditing of results to optimize surgical outcomes. It noted that in some countries, trichiasis surgery is performed by ophthalmologists, whereas in most highly endemic countries, surgery is performed by specially-trained non-physician trichiasis surgeons. Supportive supervision (48, 49) of surgeons is critical.

4.10 The group recommended that surgeons should target a cumulative incidence of PTT of $< 10\%$ by six months for cases that had minor trichomatous trichiasis (≤ 5 eyelashes touching the eyeball)

pre-operatively, and < 20% by six months for cases that had major trichomatous trichiasis (> 5 eyelashes touching the eyeball) pre-operatively.

4.11 The group further recommended that in order to improve the outcomes of trichomatous trichiasis surgery, *Trichiasis surgery for trachoma (1)* be revised to include:

(i) a section on day one assessment, by the operating surgeon, for under- and over-correction, with instructions on how these conditions should be managed; and

(ii) guidance on undertaking audits of trichiasis surgery outcomes at 6 months; the International Coalition for Trachoma Control is requested to promote this audit practice.

5. Measuring the prevalence of trichomatous trichiasis

5.1 As a condition becomes rarer, obtaining precise estimates of its prevalence becomes progressively more difficult.

5.2 The elimination prevalence threshold for trichomatous trichiasis is a prevalence of trichomatous trichiasis unknown to the health system in ≥ 15 -year-olds of < 0.2%³ in each formerly-endemic district.

5.3 For programmatic surveys specifically designed to measure the evaluation unit-level prevalence of trichomatous trichiasis unknown to the health system, current WHO recommendations are that sufficient households be visited to allow 2818 individuals aged ≥ 15 years to be examined (50). This should provide sufficient power to estimate a prevalence of trichomatous trichiasis of 0.2% with absolute precision of $\pm 0.2\%$ (50).

5.4 The group agreed that to assess whether the elimination prevalence target for trichomatous trichiasis has been reached, national programmes may use:

(i) population-based prevalence surveys powered at evaluation-unit level (i.e. populations of 100 000–250 000 people); or

(ii) house-to-house case searches (which could be integrated with other public health activities); or

(iii) a combination of data from multiple adjacent evaluation units. Professional statistical advice should be sought as to the best way to combine data from multiple evaluation units, with guidance subsequently given to national programmes and their partners.

5.5 Guidance should be given to national programmes and their partners on how to interpret and use trichomatous trichiasis prevalence data to inform public-health-level trichiasis surgery interventions. This guidance should include reinforcement of the need for a system “to identify and manage incident cases of trichiasis, using defined strategies, with evidence of appropriate support for those strategies”, which is the third technical indicator for elimination of trachoma as a public health problem (16).

³ This was derived by calculating an 80% relative reduction from a baseline prevalence of 1% in ≥ 15 -year-olds, which was considered to represent a universal public health problem for trichomatous trichiasis (8).

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Annex 2. Declarations of interest

All the invited experts completed declarations of interests for WHO experts, which were submitted to and assessed by the WHO Secretariat before the meeting. Significant interests were defined by WHO as:

- interests valued at \geq US\$ 5000 for the expert, a family member, or other associated party;
- a professional or intellectual bias; or
- circumstances that might lead to an unfair competitive advantage,

current as of the time of the meeting, or within the previous four years.

The following interests were declared:

Dr Ana Cama reported receiving research and consultancy income from an academic institution (London School of Hygiene & Tropical Medicine) and a nongovernmental organization (Research Triangle Institute) to train trachoma graders, plus employment based on funds from two nongovernmental organizations (The Queen Elizabeth Diamond Jubilee Trust via The Fred Hollows Foundation; and the International Agency for the Prevention of Blindness) that have professional and financial interests in the outcomes of the meeting.

Dr Paul Emerson declared personal salary, programme support and travel support for this meeting provided by Pfizer Inc. (the manufacturers of azithromycin) to his employer, the Task Force for Global Health.

Ms PJ Hooper declared personal salary, research support and travel support for this meeting provided by Pfizer Inc. to her employer, the Task Force for Global Health.

John Kaldor declared previous research support from the Task Force for Global Health (funded by Pfizer Inc.).

Ms Grace Mwangi declared a current scholarship to study at the University of Cape Town from a nongovernmental organization (The Queen Elizabeth Diamond Jubilee Trust) with a professional and financial interest in the outcome of the meeting.

Professor Serge Resnikoff declared consulting income from the Théa Foundation (funded by Théa, which manufactures azithromycin eye drops).

Annex 3. Agenda

Tuesday, 27 November

<i>Time</i>	<i>Item</i>	<i>Speaker</i>
08:30–09:00	Arrival and registration	
09:00–09:10	Opening	Director NTD
09:10–09:30	Nomination of officers Introductions and apologies Purpose, outcome and outputs of meeting Adoption of agenda Administrative matters List of standard terms	Anthony Solomon Chair Chair Chair Anthony Solomon Anthony Solomon
09:30–09:40	Introduction to Q2	Anthony Solomon
09:40–09:55	Incidence of trichiasis in non-trachoma-endemic populations (1)	John Kaldor
09:55–10:10	Incidence of trichiasis in non-trachoma-endemic populations (2)	Mathieu Bangert
10:10–10:30	Phenotype, causes and correlates of trichiasis in Delhi	Noopur Gupta
10:30–11:00	<i>Coffee</i>	
11:00–11:30	Trichiasis with and without tarsal conjunctival scarring	Esmael Habtamu
11:30–12:30	Discussion (Q2): For the purposes of defining prevalence targets for “elimination of trachoma as a public health problem”, how should “trachomatous trichiasis” be defined?	

12:30–14:00 Group photograph, then lunch

14:00–15:30	Discussion (Q2): For the purposes of defining prevalence targets for “elimination of trachoma as a public health problem”, how should “trachomatous trichiasis” be defined? (continued)	
15:30–16:00	<i>Coffee</i>	
16:00–16:05	Introduction to Q3	Anthony Solomon
16:05–16:20	Assessment of trichiasis surgery outcomes (1)	Grace Mwangi
16:20–16:30	Assessment of trichiasis surgery outcomes (2)	Amir Kello
16:30–16:40	Assessment of trichiasis surgery outcomes (3)	Shannath Merbs
16:40–17:00	Discussion (Q3): How and when should trichiasis surgery outcomes be assessed, and what should the targets be?	

Wednesday, 28 November

09:00–10:30	Discussion (Q3): How and when should trichiasis surgery outcomes be assessed, and what should the targets be? (continued)	
10:30–11:00	<i>Coffee</i>	
11:00–11:05	Introduction to Q1	Anthony Solomon
11:05–12:00	Trachoma in Melanesia	Robert Butcher
12:00–12:10	Report from the Expert Consultation on the Elimination of Trachoma in the Pacific, Melbourne, January 2018	Aya Yajima
12:10–12:20	Ancillary surveys in Vanuatu and Solomon Islands	Robert Butcher
12:20–12:30	Report from Technical Consultation on the Use of Serology for Trachoma Surveillance, Decatur, October 2018	Anthony Solomon

12:30–14:00 Lunch

Agenda (cont'd)

14:00–15:30	Discussion (Q1): Are the prevalence targets for “elimination of trachoma as a public health problem” appropriate for the Western Pacific Region, or should they be changed?	
15:30–16:00	<i>Coffee</i>	
16:00–17:00	Discussion (Q1): Are the prevalence targets for “elimination of trachoma as a public health problem” appropriate for the Western Pacific Region, or should they be changed? (continued)	

19:30–22:30 Group dinner (optional)

Thursday 29 November

<i>Time</i>	<i>Item</i>	<i>Speaker</i>
09:00–09:05	Introduction to Q4	Anthony Solomon
09:05–09:20	Prevalence of trachomatous trichiasis unknown to the health system at EU level (1)	Lucienne Bella
09:20–09:35	Prevalence of trachomatous trichiasis unknown to the health system at EU level (2)	Abdou Amza
09:35–10:00	Alternative methodologies for estimating the prevalence of trachomatous trichiasis unknown to the health system	Anthony Solomon
10:30–11:00	<i>Coffee</i>	
11:00–12:30	Discussion (Q4): How should the prevalence of trachomatous trichiasis unknown to the health system be measured for the purposes of establishing that trachoma has been eliminated as a public health problem?	

12:30–14:00 Lunch

14:00–15:30	Conclusions and recommendations	Chair
15:30–16:00	<i>Coffee</i>	
16:00–16:30	Conclusions and recommendations (continued)	Chair
16:30–17:00	Meeting feedback and close	Chair

Annex 4. Standard terms for scientific communications about trachoma

Correct term	Examples of incorrect alternatives	Notes
elimination of trachoma as a public health problem	elimination of trachoma; elimination of blinding trachoma; eradication of trachoma; interruption of transmission	
elimination prevalence threshold	ultimate intervention goal (UIG)	
environmental improvement (the E component of the SAFE strategy)	environment improvement; environmental change; environmental improvements; environment, education and empowerment	Original publication (6) uses both “environmental improvement” and “environmental improvements” in different places, but uses the former more.
facial cleanliness (the F component of the SAFE strategy)	face cleaning; face washing; facial cleaning; facial hygiene	Original publication uses “clean faces”, “increased face washing” and other variations in different places. Some authorities have noted that the desired outcome is facial cleanliness, not a particular frequency or the act of face washing.
GET2020	GET 2020	No space – it is an acronym. This is important for branding purposes.
impact survey(s)	impact assessment(s); impact assessment survey(s)	Use of “survey” rather than “assessment” is important to stress that the same level of epidemiological rigour (51) is required as for baseline surveys and pre-validation surveillance surveys.
infection	active infection	This mixes up the concepts of “infection” and “active trachoma”.
post-operative trichiasis	recurrent trichiasis; post-surgical trichiasis	It is possible that surgery did not fully correct the trichiasis or was not done at all. The preferred term avoids blaming the surgeon or absolving them of guilt (38).
trachoma	blinding trachoma	The phrase “elimination of blinding trachoma” was initially coined to capture the sense of “elimination of trachoma as a public health problem” for the purposes of setting a public health goal. Other neglected tropical diseases adopted “elimination as a public health problem” when they were setting targets for 2020. “Elimination as a public health problem” is the more modern usage and should be used for the sake of consistency.
trachomatous inflammation—follicular	trachoma follicles; trachoma follicular; trachomatous follicular; trachomatous folliculitis	Note correct punctuation: an em-dash without flanking spaces, as in the original publication (37).
trachomatous inflammation—intense	trachoma intense; trachomatous inflammation; trachomatous intense	Note correct punctuation: an em-dash without flanking spaces, as in the original publication (37).
trachomatous trichiasis	trachoma trichiasis	
validation of elimination of trachoma as a public health problem	certification or verification of elimination of trachoma as a public health problem	The process for diseases targeted for elimination as a public health problem was defined as “validation” by WHO NTD-STAG in 2015 (52).

Annex 5. Post-operative trichomatous trichiasis

Post-operative trichomatous trichiasis (PTT) is defined as the presence in the operated eye, at any time after surgery, of one or more eyelashes from the upper eyelid touching the eyeball, or evidence of epilation of in-turned eyelashes from the upper eyelid.

Recent meetings of trachoma experts have recommended that approaches for managing PTT should be further developed. Data suggest that in most cases of PTT, patients have less severe trichiasis than they had pre-operatively, with a significant proportion of PTT-affected eyes having only one or two eyelashes touching the eyeball, with the remaining eyelashes being adequately positioned. In such cases, further surgery is not indicated: externally rotating the marginal eyelid would result in over-correction of the majority of the eyelid.

The group discussed management strategies for patients with PTT. It concluded that features that should be evaluated post-operatively (after initial or repeat surgery) are:

- PTT;
- granuloma; and
- eyelid contour abnormality with or without over-correction.

PTT encountered on the first post-operative day invariably results from under-correction and requires removal and reapplication of sutures under local anaesthesia to achieve the desired slight over-correction (1).

If a patient is found to have PTT after the first post-operative day, the clinician responsible for the patient should refer the patient to the most experienced trichiasis surgeon or eye specialist available for assessment and a management plan. Between diagnosis and review by that professional, epilation should be encouraged.

If correction of PTT by removal and reapplication of sutures under local anaesthesia is no longer possible, options for management include epilation, electrolysis and surgery. The group agreed that:

1. If a patient has only a few peripheral eyelashes touching the eyeball, with no eyelashes touching the cornea and no entropion, then epilation or electrolysis should be the first management approach.
2. Surgery should be considered in patients with PTT in whom:
 - trichiatic eyelashes present a threat to vision; or
 - there is evidence of entropion.

In such cases, the potential risks and benefits of surgical and non-surgical approaches to PTT should be discussed with the patient. If surgery is recommended but the patient refuses it, epilation or electrolysis should be recommended.

3. Patients with moderate to severe eyelid contour abnormalities should receive corrective surgery when available.

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