

# APPROACH AND MANAGEMENT OF ACUTE RED EYES IN FAMILY PRACTICE IN SINGAPORE

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## INTRODUCTION

Patients presenting with red eye(s) constitute one of the commonest encounters for eye-related conditions in general practice in Singapore. The Singapore Health survey in 2001 showed that conjunctivitis was ranked 10th amongst the most frequent conditions seen by primary practitioners<sup>1</sup>. It was reported that these cases account for 1 to 4 percent of all family practice consultations in the United States<sup>2</sup>. In a large scale survey of 8742 general practitioners (GPs) in the United Kingdom, 68% of them admitted that they had 'some uncertainties about eyes' and 10 percent affirmed the statement 'eyes scare me stiff'<sup>3</sup>. The survey showed that less than 30% of GPs everted the eyelids of their patients with eye complaints, performed visual field/acuity testing or used fluorescein stain<sup>3</sup>. Little is known about the practice of primary care physicians (PCPs include both GPs and doctors working in public primary care centers) in managing common acute eye diseases in the local community.

Apart from conjunctivitis, there are other differential diagnoses to consider if patients present with red eyes to the PCP, some of which carry a potentially high risk of complications and morbidity. History and clinical examination remain as key steps in the diagnosis of "red eye". Local primary care clinics are equipped with hand-held ophthalmoscope required for basic eye examination but the use of slit lamp or fluorescein strip is very limited. In view of the constraints, the challenges facing the PCP will be to derive at the most probable diagnosis promptly, so as to ensure that timely and appropriate therapy is instituted for rapid recovery and minimal complication. An evidence-based systematic approach will facilitate the PCP in managing common eye conditions.

This review paper attempts to answer the following practice questions:

1. What the medical terms used to describe the "red eye"?
2. How can the PCP differentiate the various causes of "red eye"?
3. What are the microbial causes of conjunctivitis?
4. What is the rationale for using topical eyedrops in treating conjunctivitis?
5. Are topical antibiotics necessary?

Three cases are used to illustrate the presentation of "red eye" to PCP in a local public primary care clinic.

### CASE 1

Madam PAH (picture 1) is a 42-year-old Chinese lady, who does not wear contact lens. She developed bilateral eye redness, itchiness and tearing over a single day. There was no blurring of vision, fever, headache or nausea and vomiting. Examination revealed conjunctivitis but both pupils were normal and reactive

to light. Chemosis, corneal lesions or infiltrates and preauricular lymphadenopathy were absent. She was treated as for viral conjunctivitis and was prescribed topical chloramphenicol. Her symptoms resolved after 4 days of treatment.



Picture 1. Madam PAH's left and right eyes

### CASE 2

Mr AS is a 17-year-old Indian male with no medical history. He presented with bilateral eye redness, discomfort and sticky milky discharge over a period of two days (picture 2). He noted that his eyelids were 'stuck together' when he woke up in the morning. He is a contact lens user, who practices good lens washing hygiene. He does not wear his contact lens overnight, swimming or during baths. He wears contact lens daily, with an average of 10 hours each day. Examination showed that apart from conjunctivitis, pupils were normal, reactive to light without any chemosis, corneal lesions or infiltrates nor preauricular lymphadenopathy. He was treated as for bacterial conjunctivitis. He was prescribed topical chloramphenicol and ointment chlortetracycline and advised to refrain from wearing contact lens. His symptoms resolved after 7 days.



Picture 2. Mr AS, a contact lens wearer, had bilateral eye redness

### CASE 3

JT is a 6-year-old boy with allergic rhinitis. He presented with 1 day history of watery discharge, mild redness, itch and swelling of his right eye (picture 3). He had mild irritation of his left eye as well. There was no history of trauma nor blurring of vision. Examination showed reactive pupils and his right conjunctiva was pinkish in colour. He had periorbital swelling, the right more than left. Cornea was clear. He was treated as for allergic conjunctivitis. He was prescribed topical chloramphenicol and advised to return if unwell. His symptoms resolved the following day.



Picture 3. JT, a 6-year-old boy, had right more than left eye irritation of 1 day duration.

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# HISTORY AND EXAMINATION

Table 1 shows the history and clinical features in conditions presenting as acute red eye(s) in the primary care setting.

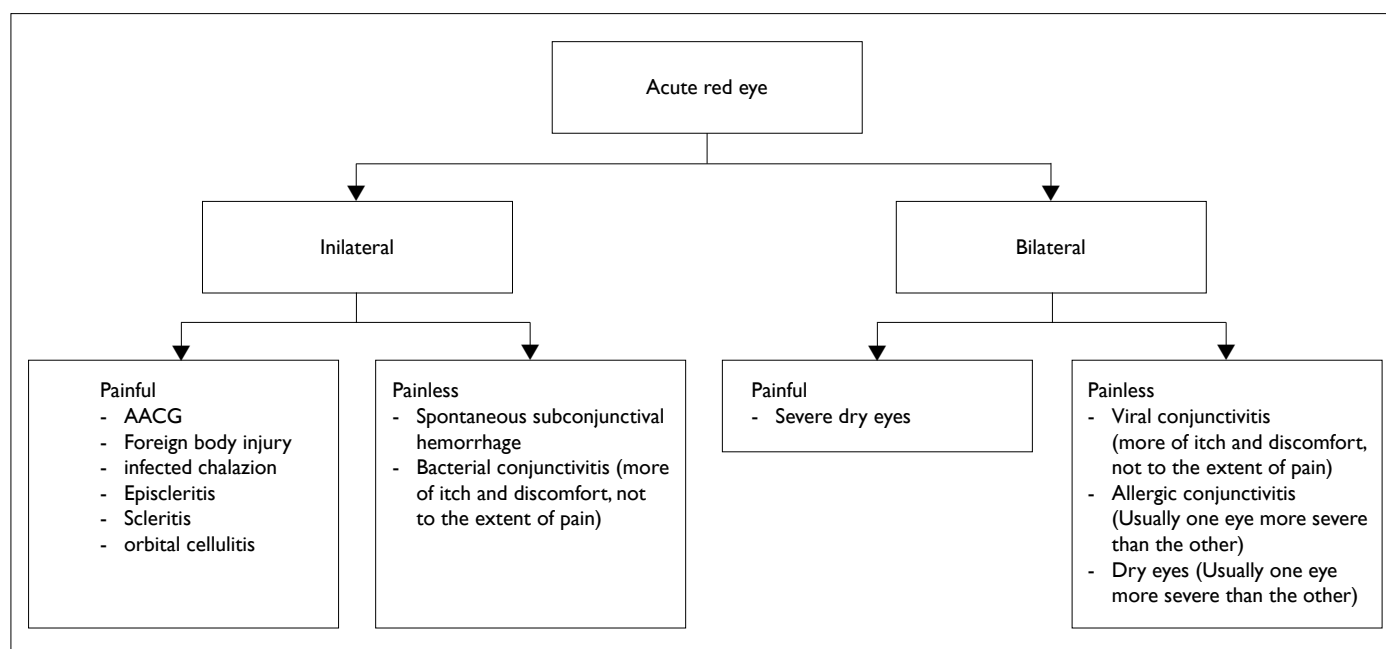
**Table 1. History and Clinical examination of the Acute Red Eyes in the Primary Care Setting**

## (A) History

	Onset	Unilateral /bilateral	Pain	Itch	Discharge	Contact lens use	History of trauma	Others
Viral conjunctivitis	Acute	Unilateral then bilateral	min	Yes	watery	No	No	Photophobia
Bacterial conjunctivitis	Acute	Bilateral	min	Yes	mucopurulent	Yes	No	Eyelids stuck together
Allergic conjunctivitis	Acute	Bilateral	min	Yes	watery	No	No	History of atopy
Chalazion	Acute	Usually unilateral	yes	no	no	no	no	
Episcleritis/Scleritis	Insidious	Unilateral	min	no	no	no	no	History of autoimmune disorder
Blepharitis	Insidious	Can be either	yes	yes	no	no	No	
Acute angle closure glaucoma	Acute	Unilateral	yes	no	watery	no	no	Occurs in rainy weather
Keratitis	Acute	Unilateral	yes	no	no	yes	no	Blurring of vision if involves visual axis
Uveitis/Iritis	Acute	Unilateral	min	no	no	no	sometimes	Blurring of vision, photophobia
Chemical injury	Acute	Can be either	yes	no	no	no	sometimes	
Endophthalmitis	Acute	Usually unilateral	yes	no	mucopurulent	no	no	Blurring of vision
Foreign body	Acute	Usually unilateral	yes	no	no	no	yes	
Spontaneous subconjunctival hemorrhage	Acute	Unilateral	no	no	no	no	no	Use of antiplatelet/ anticoagulant, history of constipation, valsalva manoeuvre
Dry eyes	Acute	Can be either	yes	yes	watery	no	no	Occasional photophobia, blurring of vision

## (B) Clinical Examination

	Visual acuity	Eyelid	Conjunctival	Corneal	Pupil	Systemic signs/others
Viral conjunctivitis	Can be decreased	Normal	Reddish	Usually clear	Reactive	Recent URTI
Bacterial conjunctivitis	Can be decreased	Normal	Reddish	Usually clear	Reactive	-
Allergic conjunctivitis	Can be decreased	Edema	Pinkish	Usually clear	Reactive	Can have atopy
Chalazion	Normal	Swelling	Usually normal	Clear	Reactive	-
Episcleritis/Scleritis	Normal	Normal	Tortuous vessels	Clear	Reactive	Can be associated with autoimmune disorder
Blepharitis	Normal	Poor lid condition	Usually normal	Clear	Reactive	-
Acute angle closure glaucoma	Decreased	Normal	Reddish	Hazy	Mid dilated	Unilateral headache, nausea and vomiting
Keratitis	Decreased if involved visual axis	Normal	Reddish	White infiltrates seen	Reactive	-
Uveitis/Iritis	Decreased	Normal	Reddish	Clear	Slow in reacting	Can be associated with autoimmune disorder
Chemical injury	Decreased	Normal	Reddish	Hazy	Reactive	-
Endophthalmitis	Decreased	Can have edema	Reddish	Hazy	Reactive	Fever Can be associated with sepsis
Foreign body	Decreased if involved visual axis	Normal	Reddish	FB seen on cornea	Reactive	-
Spontaneous subconjunctival hemorrhage	Normal	Normal	Fresh red bleeding if acute	Clear	Reactive	-
Dry eyes	Can be decreased		Usually normal	Clear	Reactive	-

**Figure 1. Algorithm to Approach Acute Red Eyes**

## DEFINITIONS AND DESCRIPTORS

Chemosis: swelling of the conjunctiva

Fornix: The fornix of the conjunctivae refers to loose arching folds connecting the conjunctival membrane lining the inside of the eyelid with the conjunctival membrane covering the eyeball.

## PRESENTING SIGNS AND SYMPTOMS

Presenting signs and symptoms are often related to the etiologies and the component(s) of the eye(s) affected. See Table 2.

## CONJUNCTIVITIS

The most frequent cause of red eyes in primary care is conjunctivitis<sup>3</sup>. A randomized, double-blind, placebo-controlled trial conducted in United Kingdom reported that 1 in 8 school children had an episode of acute infective conjunctivitis annually<sup>4</sup>.

### What are the microbial causes of conjunctivitis?

Based on microbial origin, acute conjunctivitis can be broadly classified into 4 main types—adenoviral, bacterial, fungal and chlamydial. See Table 3. Most of these conjunctivitis have overlapping presenting signs and thus it is not easy to confirm the diagnosis. Though conjunctival swab is suggested to be accurate in diagnosing and guiding treatment<sup>5</sup>, such a practice is uncommon in local primary care clinics due to the lack of immediate laboratory support and lag time in the culture results. Even in local tertiary hospitals, conjunctival swabs are not routinely done. However, each of these conditions does have its more prominent feature which can be teased out during history taking and examination of the eye.

In general, patients with adenoviral conjunctivitis often present as red eyes with watery discharge, gritty sensation and occasional preauricular lymphadenopathy. Viral respiratory infection often precedes the onset of eye symptoms. There are 51 subtypes of adenoviruses with serotype 8, 19 and 37 being isolated as the common pathogens. Hemorrhagic viral conjunctivitis may occur in severe infection during local outbreaks<sup>6,7</sup>.

Yellowish discharge was frequently noted in bacterial conjunctivitis. There is a correlation of bacterial conjunctivitis with sticky eyelid/eyelashes and purulent discharge as noted in recent well designed cohort studies<sup>8,9</sup>. Regression analysis revealed that this combination had a post- culture test probability of 96 percent. The common isolated pathogens are *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Staphylococcus aureus* and *Moraxella catarrhalis*<sup>10</sup> and were mostly sensitive to topical chloramphenicol eyedrops.

Chlamydial conjunctivitis is caused by serotype D-K of *Chlamydia trachomatis*. Signs include mucopurulent discharge, large follicles most prominent in the inferior fornix and peripheral corneal infiltrates. A detailed sexual history is important as well as treatment of other possible sexually transmitted diseases is needed. If clinical suspicion of chlamydial conjunctivitis is high, it is prudent to refer for review by ophthalmologist.

### Allergic conjunctivitis

Allergic conjunctivitis is usually seasonal and affects both eyes almost simultaneously. The patient has transient attacks of redness, lacrimation and severe itching with possible chemosis. Usually there is associated sneezing, nasal discharge or even history of atopy.

## MANAGEMENT

Table 4 summarises the management of common acute red eye syndromes seen at primary care level.

### What is the rationale for using topical eyedrops in treating conjunctivitis?

Topical antibiotics are frequently used even amid contrasting views by ophthalmologist and PCP. It is believed that viral conjunctivitis is usually self-limiting and does not require topical antibiotics. Even in acute bacterial conjunctivitis, the disease is self resolving for most cases. The general accepted belief was that they accelerate recovery, reduce the rate of getting complications and risk of secondary infection<sup>11</sup>. Previously, randomized double-blind studies have supported the efficacy and use of topical antibiotics reporting that by day 3 to 5 of its use, the bacterial pathogen was eradicated in as high as 71 percent of patients as compared to 19 percent in the placebo group<sup>12,13</sup>. In fact, many countries have recommended the use of topical chloramphenicol or aminoglycosides in the treatment of acute bacterial conjunctivitis<sup>14,15</sup>.

A meta-analysis by Sheikh et al<sup>16</sup> showed that, even though acute bacterial conjunctivitis is self-limiting, clinical remission was evident in 83% in the intervention group treated with topical antibiotic compared to 64% in the placebo group. In his subsequent Cochrane meta-analysis of antibiotics versus

placebo<sup>17</sup>, based on case note review of 1034 patients in 5 randomized trials, the results showed that the topical antibiotic use was most beneficial if the latter is started during day 2 to 5 after onset of symptoms. It led to faster clinical recovery (RR1.24, 95% CI 1.05 to 1.45). The numbers needed to treat was 5.

### Are topical antibiotics necessary?

In 2005, a landmark randomized double-blind placebo-controlled trial<sup>4</sup> demonstrated that most patients with acute infective conjunctivitis seen in primary care will get better on their own without the need for topical antibiotics. By day 7, 86% and 83% of patients in both study and placebo group respectively had recovered. The results showed that topical antibiotics were not necessary in acute infective conjunctivitis.

With regards to the selection of topical antibiotic, chloramphenicol had been demonstrated to be associated with bone marrow aplasia resulting in death in a case report<sup>18</sup>. However, such risks were not high and given the relative high effectiveness and low cost of this medication, it was still being prescribed routinely. Nonetheless, topical chloramphenicol should be avoided in a patient with known history of marrow suppression.

Ultimately, the prescribing and dispensing of topical antibiotics for the treatment of acute infective conjunctivitis are influenced by multiple factors pertaining to the patient's, the caregivers' and the physician's belief, understanding of the disease and their concerns.

**Table 2. Aetiologies of the Acute Red Eye**

Diagnosis	Presenting signs and symptoms
Acute angle closure glaucoma	Unilateral headache (same side as the affected eye), unilateral eye pain, nausea/vomiting, blurred vision, mid-dilated pupils, hazy cornea, raised intraocular pressure
Keratitis	Eye pain, blurred vision, corneal opacities, fluorescein staining on cornea
Scleritis	Eye pain, visual acuity normal, sometimes localized bluish-tinge on sclera
Uveitis/Iritis	Eye pain, blurred vision, photophobia
Orbital cellulitis/endophthalmitis	Eye pain, blurred vision, fever, eye adnexa swelling, conjunctival chemosis, restricted eye movement, proptosis
Chemical injuries	Eye pain, conjunctival chemosis, fluorescein staining on cornea, hazy cornea (in severe cases)
Foreign body	Eye pain, blurred vision (if involving visual axis)
Episcleritis	Eye irritation, diffused prominent episcleral vessels
Blepharitis	Eye irritation, red eyelid margin, crusted eyelids, possible abnormal eyelash growth/alignment
Conjunctivitis	Eye irritation, no or minimal blurred vision, purulent discharge (bacterial), lacrimation, preauricular lymphadenopathy
Chalazion	Eye pain, localized eyelid lump (sometimes more obvious on everted eyelids)
Spontaneous subconjunctival hemorrhage	No pain, visual acuity normal, injected conjunctiva
Dry eyes	Eye irritation (often described as foreign body sensation), lacrimation

#### Legend

Red shade: refer for ophthalmologist review immediately

Yellow shade: Manage initially at primary care, can be given non-urgent ophthalmology referral

Green shade: Manage at primary care level, refer only if no improvement on subsequent follow-up

**Table 3. Etiological Types of Conjunctivitis**

Types of conjunctivitis	Signs and symptoms	History taking
Adenoviral conjunctivitis	Red eye, watery discharge, gritty sensation, preauricular lymphadenopathy	Recent viral respiratory infection
Bacterial conjunctivitis	Red eye, initial watery discharge subsequently become purulent discharge, eyelids stuck together	Contact lens history
Fungal conjunctivitis		
Chlamydial conjunctivitis	mucopurulent discharge, large follicles most prominent in the inferior fornix and peripheral corneal infiltrates	Possible high risk sexual behaviour

**Table 4. Management of Common Acute Red Eye Syndromes**

Eye condition	Management
Episcleritis	Topical non-steroidal anti-inflammatory drugs (NSAIDs) or steroids Topical lubricants
Blepharitis	Antibiotic ointments Lid hygiene/wash, warm compress
Conjunctivitis	(viral) topical antibiotics, lubricants (bacterial) topical antibiotics, lubricants (allergic) topical anti-inflammatory, lubricants (Chlamydia) if suspicion is high, refer to ophthalmologist immediately
Chalazion	Antibiotic ointments Lid hygiene/wash, warm compress
Spontaneous subconjunctival hemorrhage	Reassurance Lubricants and observe
Dry eyes	Lubricant eyedrop and ointment

A questionnaire survey<sup>19</sup> showed that parents and teachers believed that antibiotics are mandatory to stop transmission of the disease and that immediate treatment can prevent vision-damaging complications. This coupled with the desire to return the child back to school earlier in the event of 'missing out' on studies made them push for immediate antibiotic treatment. This can be easily seen in our local setting as well where the need to keep up with studies and the fear of disease transmission often resulted in the patients being prescribed a course of topical antibiotics for 2 weeks.

Another study concluded that the lack of knowledge regarding the self-limiting nature of acute infective conjunctivitis was the reason why patients presented to the PCP<sup>20</sup>. Perhaps with adequate education about the disease, patient will wait a few days to see if the disease improves or resolves before making a decision to visit the practitioner.

A newer approach of management entails delayed administration of topical antibiotics after the consultation. Patient could fill a prescription 3 days after the diagnosis of infective conjunctivitis was made. If the patient felt worsening of the symptom, the prescription would be filled and therapy would be initiated. The data collected for the interventional group was compared with 2 different control groups of (i) immediately commencing topical antibiotic treatment and (ii) no antibiotic use at all. The results showed that delayed topical antibiotic prescription is probably the most appropriate strategy for managing acute conjunctivitis in primary care<sup>21</sup>. It resulted in reduced antibiotic use by 50% and symptom control was similar to the group that started topical antibiotic treatment immediately. In addition this trial also showed that treatment with topical antibiotic reduced the duration of clinical disease by half to one-and-a-half days.

A review study<sup>22</sup> suggested that conjunctival swab culture has very high positive predictive value and could be used to guide treatment. However, such a method would not be feasible as most local primary care facilities are unable to process the cultures.

## CONCLUSIONS

- This review provided a summarized table to help general practitioners in diagnosing aetiology of acute red eye syndrome and which cases to refer to the ophthalmologist. It also illustrated the breadth of issues encountered in managing patients with acute infective conjunctivitis, the most common cause of acute red eye in primary care.
- Unilateral, painful, red eye associated with a decrease in visual acuity, a history of recent ocular injury or surgery require an urgent ophthalmologist consultation as these are red flags of more serious eye conditions.
- Viral conjunctivitis often present with watery discharge, gritty sensation and occasional preauricular lymphadenopathy. Bacterial conjunctivitis, on the other hand often presents with mucoid or purulent discharge, gluing together of eyelids.
- In the absence of red flags, a reasonable option would be to ask the patient to return in 2 or 3 days' time to review for remission. If not better by then, the eyes are examined to look for signs in support of a bacterial cause.

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