# Contact Lens - Related Corneal Ulcer: A Two-Year Review

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**SUMMARY**

**To create a national registry of contact-lens related corneal ulcers (CLRCU) patients in Malaysia with the aim of detecting outbreaks, identifying pattern of causative organisms, determining patient demography, risk factors, wearing patterns and monitoring outcome of treatment. The CLRCU registry is an ongoing patient registry established in 2007 as a surveillance tool used by Malaysian Ministry of Health ophthalmology departments. Notification of patients clinically suspected of CLRCU was performed online through the National Eye Database (NED). Data collected included patient demography, contact lens type, causative organism and treatment outcome. During 2007-2008, a total of 202 patients were notified to the CLRCU registry with a mean age of 26.7 years (71.8% female). All registered patients wore soft contact lens and monthly disposable lenses were the most popular (83.5%). The majority of patients had bacterial CLRCU and the most common causative organism was Pseudomonas (79.7% of bacterial cases). No epidemics were identified during the period of data examination. Use of contact lenses, which is increasing during modern times, may lead to CLRCU as a severe complication. The CLRCU registry is an effective tool which uses a web-based notification system that allows quick and up to date reports of CLRCU cases. This provides the ability to monitor outbreaks of disease and identify important causative and associated factors of the disease which may be used to reduce future incidence.**

**KEY WORDS:**
*Contact lens related corneal ulcer, Infectious corneal ulcer*

## INTRODUCTION

Widespread use of soft contact lens is associated with increasing number of ocular complication in young adults, the most severe being corneal ulceration. Without early intervention, it may lead to permanent visual loss[1]. Common risk factors include overnight wear, non-compliance with advised lens care and contaminated cleaning solution/case. The 2006 *Fusarium* outbreak reported in Singapore, Hong Kong and the United States of America (USA) lead to the beginning of web surveillance of local cases for the purpose of overcoming delayed reporting and efficient disease trend monitoring. The contact lens- related corneal ulcer (CLRCU) registry was established in 2007 and ophthalmologists from 35 MOH tertiary hospitals participated. This article presents data from the first two years.

## MATERIALS AND METHODS

This is an active surveillance of patients with CLRCU. All doctors at MOH Ophthalmology departments would notify any patient with clinically suspected CLRCU. A total of 36 hospitals took part in this surveillance. Data was entered online through a web application at www.acrm.org.my/ned according to patient demography, contact lens type, wearing pattern, cleansing solution used, cultured organisms and vision one month post- treatment. Real time reports are available online.

## RESULTS

Review of 202 cases of clinically diagnosed CLRCU over two years (103 cases in 2007 and 99 cases in 2008; Figure 1, Table I) showed bilateral involvement in 7.9% (six cases in 2007 and ten cases in 2008; Table I). A third of the patients were females (71.3%) and the mean age was 26 years (Table I). All patients wore soft contact lens, the most popular was the monthly disposable type (79.6%) (Table II). In terms of wearing pattern, most of the patients removed their contact lens daily (67%) (Table III).

A significant number of patients could not recall the brand name of cleansing solution used (22.9% in 2007 and 24.7% in 2008). Table IV shows the type of contact lens cleaning solution used by patients. The commonest was Bausch & Lomb, followed by Allergan (AMO) and normal saline. Six patients used tap water to clean their contact lens. In most cases, corneal scraping cultures grew Pseudomonas (84.6%). Snellen acuity was performed on a total of 218 eyes of which six eyes met the criteria for legal blindness (≤ 3/60) at the time of presentation. Only eight of the total 202 patients gave a history of ocular trauma (3.7%). Epidemiological curve constructed from the available data on the registry did not suggest an outbreak.

More than 80% of cases were treated empirically for a bacterial corneal ulcer while 7.0% were presumed to have acanthamoeba and 5.9% were suspected to have fungal corneal ulcer (Table V). Corneal scrapings of 175 eyes (83.5%) were sent for microbiology investigations, of which 83 (49.5%) had no yield. Of the 69 culture-proven cases, 65 were bacterial, three fungal and one Acanthamoeba. The commonest causative organism was pseudomonas (55/69=79.7 %) (Table VI).

Snellen acuity was scored on presentation. Seventy-six eyes (34.9%) were able to read lines down to 6/12, 56 eyes (25.7%) read between 6/18 to 4/60 and 36 eyes (16.5%) did not even score 3/60. Vision in 50 eyes (22.9%) could not be obtained. A month later, 36 eyes (16.5%) scored better than 6/12, 18 eyes (8.3%) read from lines 6/18 to 4/60 and six eyes (2.8%) had visual acuity worse than 3/60. Visual outcome in 158 eyes (72.4%) could not be obtained.

**Table I: Demographic Characteristics**

| | Year 2007 | | Year 2008 | | Total | |
|---|---|---|---|---|---|---|
| Total number of patients | 103 | | 99 | | 202 | |
| Mean Age (SD) (years) | 26.1(8.1) | | 26.5(8.8) | | 26.3(8.4) | |
| Min (years) | 10 | | 15 | | 10 | |
| Max (years) | 51 | | 68 | | 68 | |
| **Distribution of age group, years** | **No.** | **%** | **No.** | **%** | **No.** | **%** |
| 0-<10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10-<20 | 22 | 21.4 | 18 | 18.2 | 40 | 19.8 |
| 20-<30 | 51 | 49.5 | 53 | 53.5 | 104 | 51.5 |
| 30-<40 | 24 | 23.3 | 21 | 21.2 | 45 | 22.3 |
| 40-<50 | 5 | 4.9 | 5 | 5.1 | 10 | 5 |
| 50-<60 | 1 | 1 | 0 | 0 | 1 | 0.5 |
| 70-<80 | 0 | 0 | 2 | 2 | 2 | 1 |
| Gender | | | | | | |
| Male | 29 | 28.2 | 29 | 29.3 | 58 | 28.7 |
| Female | 74 | 71.8 | 70 | 70.7 | 144 | 71.3 |

**Table II: Types of contact lens worn at diagnosis**

| Types of contact lens | Year 2007 | | Year 2008 | | Total | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Daily disposable | 6 | 5.5 | 4 | 3.7 | 10 | 4.5 |
| Weekly disposable | 1 | 0.9 | 1 | 0.9 | 2 | 0.9 |
| 2 weekly disposable | 3 | 2.8 | 2 | 1.8 | 5 | 2.3 |
| Monthly disposable | 92 | 84.4 | 84 | 77.1 | 176 | 79.6 |
| Extended wear | 3 | 2.8 | 5 | 4.6 | 8 | 3.6 |
| Rigid gas permeable | 0 | 0 | 0 | 0 | 0 | 0 |
| Others | 5 | 4.6 | 6 | 5.5 | 11 | 5 |
| Missing | 1 | 0.9 | 8 | 7.3 | 9 | 4.1 |

*multiple checks were allowed for types of contact lens.

**Table III: Contact lens wearing pattern at diagnosis**

| Wearing pattern | Year 2007 | | Year 2008 | | Total | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Remove daily | 70 | 64.2 | 76 | 69.7 | 146 | 67.0 |
| Extended wear | 32 | 29.4 | 26 | 23.9 | 58 | 26.6 |
| Missing | 7 | 6.4 | 7 | 6.4 | 14 | 6.4 |

**Table IV: Types of cleaning solution used at diagnosis**

| Types of cleaning solution | Year 2007 | | Year 2008 | | Total | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Alcon | 4 | 3.7 | 4 | 3.7 | 8 | 3.5 |
| Bausch and Lomb | 24 | 22 | 17 | 15.6 | 41 | 18.1 |
| Allergan (AMO) | 12 | 11 | 4 | 3.7 | 16 | 7 |
| Ciba Vision | 0 | 0 | 4 | 3.7 | 4 | 1.8 |
| Opto-medic | 0 | 0 | 1 | 0.9 | 1 | 0.4 |
| Freskon | 3 | 2.8 | 2 | 1.8 | 5 | 2.2 |
| Sauflon | 2 | 1.8 | 7 | 6.4 | 9 | 4 |
| Multisoft | 1 | 0.9 | 2 | 1.8 | 3 | 1.3 |
| I-Gel | 4 | 3.7 | 3 | 2.8 | 7 | 3.1 |
| Medivue | 0 | 0 | 1 | 0.9 | 1 | 0.4 |
| Normal Saline | 4 | 3.7 | 8 | 7.3 | 12 | 5.3 |
| Simvue | 0 | 0 | 0 | 0 | 0 | 0 |
| Multimate | 1 | 0.9 | 1 | 0.9 | 2 | 0.9 |
| Pharmasafe Multipurpose solution | 3 | 2.8 | 1 | 0.9 | 4 | 1.8 |
| Tap water | 3 | 2.8 | 0 | 0 | 3 | 1.3 |
| Do not use because of daily wear | 1 | 0.9 | 1 | 0.9 | 2 | 0.9 |
| Not known | 25 | 22.9 | 31 | 28.4 | 56 | 24.7 |
| Others | 24 | 22 | 15 | 13.8 | 39 | 17.2 |
| Missing | 4 | 3.7 | 10 | 9.2 | 14 | 6.2 |

*multiple checks with allowed for cleaning solution.

**Table V: Presumptive causative organism**

| Presumptive causative organism | Year 2007 | | Year 2008 | | Total | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Bacteria | 86 | 78.9 | 75 | 68.8 | 161 | 87 |
| Fungus | 2 | 1.8 | 9 | 8.3 | 11 | 5.9 |
| Acanthamoeba | 5 | 4.6 | 8 | 7.3 | 13 | 7.0 |
| Others | 4 | 3.7 | 2 | 1.8 | 6 | 3.2 |
| Missing | 14 | 12.8 | 19 | 17.4 | 33 | 17.8 |

*multiple checks to the presumptive causative organism were allowed.

**Table VI: Bacteria specify for each types of lab investigation**

| Bacteria | Year 2007 | | Year 2008 | | Total | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Corneal scraping (n) | 34 | | 31 | | 65 | |
| Pseudomonas | 27 | 79.4 | 28 | 90.3 | 55 | 84.6 |
| Enterobacter | 3 | 8.8 | 0 | 0 | 3 | 1.3 |
| Staph. epidermidis | 1 | 2.9 | 0 | 0 | 1 | 1.5 |
| Acinetobacter | 1 | 2.9 | 0 | 0 | 1 | 1.5 |
| Serratia Marcescens | 1 | 2.9 | 0 | 0 | 1 | 1.5 |
| Missing | 1 | 2.9 | 3 | 9.7 | 4 | 6.2 |
| Contact lens (n) | 26 | | 16 | | 42 | |
| Pseudomonas | 20 | 76.9 | 16 | 100 | 36 | 85.7 |
| Enterobacter | 3 | 11.5 | 0 | 0 | 3 | 7.1 |
| Klebsiella | 1 | 3.8 | 0 | 0 | 1 | 2.4 |
| Burkholdenia cepacia | 1 | 3.8 | 0 | 0 | 1 | 2.4 |
| Serratia Marcescens | 1 | 3.8 | 0 | 0 | 1 | 2.4 |
| Contact lens solution (n) | 16 | | 12 | | 28 | |
| Pseudomonas | 13 | 81.3 | 12 | 100 | 25 | 89.3 |
| Enterobacter | 1 | 6.3 | 0 | 0 | 1 | 3.6 |
| Klebsiella | 1 | 6.3 | 0 | 0 | 1 | 3.6 |
| Coagulase negative Staphylococcal | 1 | 6.3 | 0 | 0 | 1 | 3.6 |
| Serratia Marcescens | 0 | 0 | 0 | 0 | 0 | 0 |

*Multiple checks were allowed for corneal scraping, contact lens and contact lens solution.

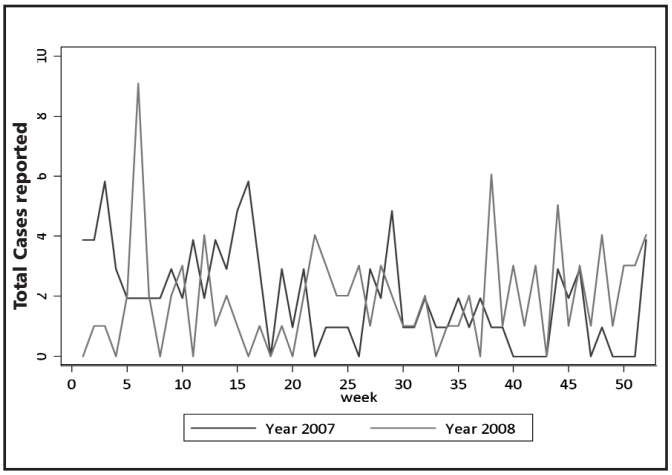


**Fig. 1:** Epidemiologic curve – notification of CLRCU by week in 2007-2008

## DISCUSSION

Corneal ulcers are undoubtedly the most devastating complication of soft contact lens use. Evidence suggests that history of corneal ulcers is a predisposing factor for further corneal inflammation in contact lens wearers. Improper lens wear and care as well as lack of awareness of the importance of aftercare visits have been identified as risk factors for corneal ulcer among contact lens wearer [3]. Our findings where females are predominant and pseudomonas is the most frequently isolated organism were similar to those from larger population surveys done in Australia & New Zealand [3] and the United Kingdom (UK) [4].

Antibiotic resistance is an important issue associated with pseudomonas infection[5]. Pseudomonas is less sensitive to chloramphenicol, a common antibiotic prescribed by general practitioners. This finding suggests the importance of referral of all contact lens wearers with suspected corneal infection to ophthalmologists for further treatment and culture of the corneal scraping and contact lens solution should be done to guide antibiotic therapy.

Overwear and improper lens care and replacement schedules[6] are important modifiable risk factors of CLRCU. Thus, eye care providers should educate prospective contact lens users on proper lens care and wear duration. Importance of lens fitting and regular after – care visits should be stressed. The use of daily-disposable lenses should be encouraged as it has been suggested to reduce the risk of developing ulcer if introduced at the disinfectant stage [7]. Regular re-inforcement on proper lens care, compliance monitoring and regular aftercare visits with eye health providers is crucial.

Web based notification and prompt dissemination of reports make the CLRCU registry a useful monitoring tool. However,

there is a significantly large number of patients who seek private medical care only once the registry receives more participants from the private sector can the surveillance data reflect the actual incidence in our population and help the registry achieve its objectives.


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