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From the Editor

We have reached our third issue for 2020 – time seems to have passed by so quickly despite us still being caught in the Covid-19 pandemic and it is likely to remain with us well into 2021. We, true to the human spirit, have adapted in various ways to our ‘new’ reality. Our ophthalmology practices have evolved and continued, albeit in reduced capacities, despite the restrictions that have been placed on us.

In June 2020, we had our first virtual WOC Congress which was an unusual experience in that we were unable to attend in person or meet our colleagues in the flesh. Virtual meetings, lectures, webinars and the like, seem to have become the order of the day. Our consulting rooms, as well as examination instruments and machines, have been adapted to limit the spread of Covid. Our lives have changed drastically, at least for the foreseeable future. We are now in the phase of re-escalating our services within the restrictions that Covid has placed on us. Once again, we are facing challenges, but the safety of patients and staff remains our priority.

Telemedicine and artificial intelligence have come to the fore during these times, since the ‘new normal’ requires physical distancing, minimal contact, quick examination and a flexible layout. Fees for telemedicine consulting are being revised and restructured. The FDA has recently approved the use of the EyeArt Autonomous Artificial Intelligence System for diabetic retinopathy screening. This system has a 96% sensitivity and 88% specificity for detecting more than moderate retinopathy, as well as a 92% sensitivity and 96% specificity for detecting vision-threatening retinopathy. It is currently only approved for use with Canon fundus cameras. We are living in times when, as the saying goes, ‘the only constant in life is change’.

In this issue we have our usual review article, three original studies and a case report. Our review article focuses on fungal keratitis and gives a brief but comprehensive overview of the topic. The original studies include an article on the outcomes of outreach cataract surgery services in our country and recommendations for their improvement; an interesting study on describing the use of tear meniscus height measured by optical coherence tomography – a recent approach that has been developed in the assessment of dry eyes; and a questionnaire-based study on the perception of stigma among patients with strabismus at an eye clinic in Southwestern Nigeria. It is good to see that submissions to the South African Ophthalmology Journal have started to expand beyond our borders on an increased basis. The case report in this issue describes a novel finding in a rare disease and makes for interesting reading.

On another note, we are pleased to report that Google Scholar listing was achieved with our last South African Ophthalmology Journal issue and the full issue can be found at this link: https://bit.ly/31RG6wY

Our publishing manager is still working on getting individual articles to appear when authors’ names are searched on Google Scholar. He has done the journal a great service with the progress made with indexing thus far. We will also retrospectively list all our peer-reviewed South African Ophthalmology Journal issues – back to September 2018. Of course, indexing with SciELO, Pubmed/Medline and Scopus remain part of our long-term plans. Please continue to support us with your valuable submissions.

The South African Ophthalmology Journal team encourages all our readers to continue to stay safe during the waning Covid crisis.

Prof Nagib du Toit
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Guidelines for authors

The SA Ophthalmology Journal is a peer-reviewed scientific journal and the official mouthpiece of the Ophthalmological Society of South Africa. It appears on a quarterly basis.

1. A cover sheet is to be submitted with each manuscript. It should contain the title of the manuscript, the names of all authors in the correct sequence, their academic status and affiliations. The main author should include his/her name, address, phone and email address.

2. The South African Ophthalmology Journal invites review articles, original studies and case reports for submission. Articles should be the original, unpublished work of the stated author. All materials submitted for publication must be submitted exclusively for publication in this journal. Written permission from the author or copyright holder must be submitted with previously published figures, tables or articles.

3. The Editor reserves the right to shorten and style any material accepted for publication.

4. Authors are solely responsible for the factual accuracy of their work.

5. Articles should be between 2000 and 3000 words in length. A 200-word abstract should state the main conclusions and clinical relevance of the article.

6. All articles are to be in English and are to follow the Vancouver style.

7. Abbreviations and acronyms should be defined on first use and kept to a minimum.

8. Tables should carry Roman numerals, I, II etc., and illustrations Arabic numbers 1, 2 etc.

9. References should be numbered consecutively in the order that they are first mentioned in the text and listed at the end in numerical order of appearance. Identify references in the text by Arabic numerals in superscript after punctuation, e.g. ...trial.19

10. The following format should be used for references:

   **Articles:**

   **Chapter in a book:**

11. Articles are to be submitted by email to the Editor-in-Chief, Prof Nagib du Toit at the following email address: journaleditor@ossa.co.za
   The text should be in MS Word. Pages should be numbered consecutively in the following order wherever possible: Title page, abstract, introduction, materials and methods, results, discussion, acknowledgements, tables and illustrations, references.

12. All figures, tables and photographs should also be submitted electronically. Each figure must have a separate self-explanatory legend. The illustrations, tables and graphs should not be embedded in the text file, but should be provided as separate individual graphic files, and clearly identified. The figures should be saved as a 300 dpi jpeg file. Tables should be saved in a PowerPoint document or also as a 300 dpi jpeg.

13. Authors should declare any interests, financial or otherwise, regarding the publication of their article.

The CPD questions now have to be completed online.

To complete the questionnaire, go to https://www.medicalacademic.co.za/courses/sa-ophthalmology-journal-cpbs-winter-2020
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SAFE WORKING DISTANCE
An overview of fungal keratitis

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Abstract

Purpose of review: Fungal keratitis is associated with significant morbidity and is of major concern in the developing world where filamentous fungi such as Fusarium species predominate. Standardised diagnostic modalities and treatment strategies are not well established, and thus management is constantly evolving. This review is aimed at providing clinicians with an updated overview of fungal keratitis.

Recent findings: Molecular identification methods such as polymerase chain reaction offer superior diagnostic and prognostic utility and, unlike conventional sensitivity testing, may predict in vivo antifungal sensitivity. Water moulds such as Pythium insidiosum result in a keratitis morphologically similar to typical filamentous fungi, but exhibit marked treatment resistance. There is currently insufficient evidence to suggest that corneal crosslinking is a useful therapeutic modality. Solid lipid nanoparticle formulations of natamycin are being developed to improve ocular penetration. Fungal keratitis may recur after keratoplasty in up to 15%, with three-quarters of these cases requiring further surgery. The site of recurrence heavily influences prognosis.

Summary: Fungal keratitis is a globally significant and relatively understudied entity. It poses formidable challenges to the clinician, both diagnostically and therapeutically. Advances in molecular identification have enabled improved understanding of this disease, and management protocols are starting to emerge from various high incidence centres.

Keywords: Fusarium, Candida, fungal keratitis, corneal ulcer, keratoplasty, management

Funding: All research was funded by the principal/corresponding author.

Conflict of interest: The authors declare that they have no financial or personal relationship(s) that may have inappropriately influenced them in writing this article.

Introduction

Fungi are eukaryotic saprophytic microorganisms with chitinous cell walls. These are broadly classified as yeasts or filamentous fungi (moulds). Yeasts are oval single-celled microbes that multiply via budding. A well-known example is Candida species. Moulds are multicellular microbes that develop filaments termed hyphae. Examples include Aspergillus, Penicillium as well as Fusarium species.

Fungal keratitis (FK) is of major concern in the developing world, and in the tropics where it is responsible for as much as half of infective keratitis cases. The prevailing infection tends to be filamentous, of which Fusarium species is most prevalent, followed by Aspergillus and Curvularia. FK is not common in temperate climes or developed areas, but when it occurs, yeasts are more prevalent than moulds (most commonly Candida species). FK carries a poorer prognosis than bacterial keratitis, and evidence-based protocols are in short supply.

Methods

A PubMed database search was conducted to find recently published, original English articles concerned with the topic of FK. Articles relevant to an up-to-date review were included. Furthermore, important publications referenced by the authors of the aforementioned articles were also reviewed and included where appropriate. All research included is in accordance with the Declaration of Helsinki.

Mycology

Filamentous fungi organise into a mycelium, which is composed of interconnecting hyphae. When these fungi exhibit individual nucleated cells with dividing cell walls, they are sub-classified as septate. Well-known septate fungi include Aspergillus and Fusarium species. When moulds lack cell wall divisions between their many nuclei, they are termed non-septate. Well-known non-septate fungi include Rhizopus and Mucor species. Water moulds are morphologically similar to typical filamentous fungi, but closely related to brown algae. Pythium insidiosum is such a fungus and is newly identified as the cause of treatment-resistant keratitis in Southeast Asia. Yeasts are single-celled organisms that do not form hyphae. Candida is described as a dimorphic fungus in that it may occur in two distinct configurations. These are the typical single-celled yeast form, and a multicellular form characterised by pseudohyphae. These pseudohyphae enable corneal invasion by producing proteases and phospholipases.

Epidemiology

FK occurs over a wide geographic range. This is due to differences in climate,
employment type, income, and access to medication. Over 70 species have been identified globally as causes by the Indo-Hungarian Fungal Keratitis Working Group.\(^5\)

Five to 10% of keratitis is caused by fungi in the USA, but in 2006 there was a major US outbreak of FK due to Fusarium contaminating the contact lens cleaning product ‘Renu with MoistureLoc’. The Pacific Rim was also involved.\(^3\)

**Pathogenesis**

Fungi require a violated corneal epithelium to cause keratitis. Once in situ, hyphae or pseudohyphae form which are recognised by dendritic cells and macrophages. These cells release chemokines, interleukin-1β, and tumour necrosis factor alpha which in turn attract neutrophils to the area. Significant inflammation accompanies the infection which worsens the clinical picture.\(^3\) Filamentous fungi may progress rapidly to a thinned or perforated necrotic cornea. Even without frank perforation, the Descemet membrane may be breached by the infection to cause endophthalmitis.\(^7\)

The severity of the infection depends on the virulence of a specific fungal pathogen. Factors associated with increased virulence include filamentation, biofilm formation, protease production, and phospholipase production.\(^3\)

The most prominent risk factor for FK is corneal injury,\(^5\) especially involving vegetable matter or agrarian implements. Additional risk factors include: an unhealthy ocular surface, chronic topical steroid administration, contact lens wear, immunosuppressive conditions (HIV, diabetes, chemotherapy, etc.),\(^1\) persistent epithelial erosions, surgery such as keratoplasty or refractive surgery.\(^3\)

**Clinical presentation**

Most cases are not diagnosed immediately, but rather have been previously treated as bacterial keratitis. It is difficult to distinguish these entities from one another clinically, but suspicion may be raised earlier if typical fungal features are present, or if anti-bacterial agents are ineffective.\(^1\)

The patient may have shown a partial response to empirical antibacterial therapy. While this may be due to mixed bacterial and fungal infection, it may also represent a direct antifungal effect of fluoroquinolones (such as moxifloxacin and gatifloxacin), aminoglycosides (such as gentamicin and tobramycin), or the preservative benzalkonium chloride. In vitro studies have demonstrated the antifungal effects of these agents, and several case series have reported successful resolution of FK with topical moxifloxacin 0.3% monotherapy while awaiting laboratory results. This is further supported by fluoroquinolone monotherapy cure rates of 16 to 36% during the MoistureLoc-related Fusarium outbreak of 2006. This phenomenon appears to be limited to a small subset of FK cases however, and most cases will not respond significantly to antibacterial monotherapy.\(^6\)

Because chronic topical steroid use is an important risk factor for FK, a high index of suspicion is appropriate where there is a history of keratoplasty, inflammatory disorders (such as ocular cicatricial pemphigoid), or allergic conjunctivitis.\(^3\)

Symptoms of FK are typically subacute. Patients report discomfort, photophobia, redness and decreased vision. A discharge may be noted, ranging from mucopurulent to watery. Signs include epithelial defect, although this may be small or absent with an underlying yellow/white/grey infiltrate.\(^7\) An elevated corneal epithelium is often seen.\(^7\) Yeasts tend towards dense stromal abscesses and are usually more superficial,\(^7\) although may rarely cause deep invasion.\(^7\) Moulds may display fluffy/feathery borders, ringed infiltrate and satellite lesions (Figure 1).\(^1\) The finding of satellite lesions is less common than classically believed. Moulds tend to deep invasion, and the epithelium is often intact. Hypopyon and an exudate on the endothelial surface are common. Moulds may invade the anterior chamber, the sclera, the iris and the vitreous. This is heralded by worsening inflammation, and the prognosis worsens drastically at this point. Secondary angle closure glaucoma may result due to pupil block.\(^3\)

**Investigations**

Investigations include corneal scraping which is best obtained prior to starting antifungal medications. Avoid calcium-based swabs as they may limit polymerase chain reaction activity. Any contact lenses and their containers should be sent for culture.\(^1\) Laboratories usually rely primarily on mycelium and spore morphology to recognise the organism. It is not uncommon for microscopy to show fungi followed by a negative culture. For this reason, the exact organisms may not be identified, which has negative implications for treatment success. As a result, molecular identification is now the preferred diagnostic modality, and multi locus DNA sequencing has been done for 65 different Fusarium keratitis samples by the Indo-Hungarian Fungal Keratitis Working Group.\(^4\)

The available diagnostic modalities are listed below:

1. **Stains:** Gram/Giemsas (50% sensitivity), only Candida will stain with Gram stain\(^5\), potassium hydroxide wet mount (very sensitive), calcofluor-white, methenamine silver\(^7\).
2. **Culture:** Mediums include Sabouraud dextrose agar, blood agar,\(^7\) brain-heart infusion agar,\(^1\) chocolate agar,\(^7\) and fungal broth.\(^7\)
3. **Sensitivity testing:** Antifungal sensitivity in vitro does not guarantee efficacy in vivo.\(^7\) As a result, in vitro sensitivity

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*Figure 1. A case of septate filamentous fungal keratitis*
testing of antifungal agents is not routinely employed. This outlook is starting to change, however, as more standardised data is becoming available for specific organisms such as Candida and Aspergillus. A 4. Polyomavirus chain reaction: Sensitivity approaches 90%, and it is likely the single most useful investigation. 1 Exact molecular identification may predict antifungal sensitivity in vivo. 4

5. Corneal biopsy: This is indicated where fungal infection is strongly suspected but no improvement is seen after four days without a positive culture. A 2 to 3 mm square of deep corneal stromal tissue is excised, and the sample is divided for histology and culture. 7

6. Anterior chamber aspiration: This may be positive if endothelial deposits are present.

7. Confocal microscopy: This may be employed as an adjunct where available, especially to detect the hyphae of septate moulds.

General therapeutic measures

Admission is indicated, as is debridement of the ulcer base or epithelium overlying the stromal abscess. 1 This debridement increases penetration of topical agents, and is especially useful for superficial infection. 6 Intraocular pressure must be observed and managed where necessary. 8 Perforation develops in as many as 50% of patients, and must be monitored for. Prajna et al. (2017) found that hypopyon at presentation, a deep infiltrate involving the inner 33% of the stroma, and larger infiltrate size significantly increased perforation risk. 8 Doxycycline 100 mg PO is useful where there is corneal thinning as it inhibits collagenases. 1

Topical therapy

Relatively few antifungal medications are available, in contrast with the wide range of fungal pathogens. In resource-limited settings, chlorhexidine gluconate has shown efficacy, albeit less so than natamycin. Silver sulphadiazine 0.5%/1% has also been shown to be efficacious when resources are limited. 9

Antifungals are administered topically every hour for at least the first two days, then tapered according to response. 1 Twenty-one to 50 days of treatment may be required. 1 In vitro studies have shown a synergistic effect when dual topical antifungal therapy is used. While there are case reports to support this notion, further study is needed to elucidate the role of dual therapy. 9 A topical antibiotic is prudent for prophylaxis and treatment of superinoculated bacterial infection. 9 Moxifloxacin or gentamycin may be preferred for this purpose as they may enhance the effect of antifungal medication. 9 Cycloplegic agents improve comfort and prevent posterior synechiae. 1 Moulds are managed with natamycin 5% (first line) or econazole 1%. 3 Other options are voriconazole 1%/2%, amphotericin B 0.15% (shown to be especially efficacious for Aspergillus species), 3 or miconazole 1%. 1 Despite being fungicidal, 10 natamycin 5% does not penetrate the entirety of the stroma, and so it was postulated that voriconazole 1%/2% may be a more efficacious drug. Indeed, it was shown to have excellent penetration and a wide spectrum in vitro. 3 The Mycotic Ulcer Treatment Trial (MUTT) disproved its superiority in vivo for filamentous fungi however, and natamycin emerged as superior in both safety and efficacy for the treatment of moulds. The results were so marked that the trial had to be stopped ahead of schedule, and all patients switched to natamycin. Natamycin monotherapy resulted in better visual outcomes at three months, and was less likely to result in perforation or therapeutic keratoplasty than was voriconazole monotherapy. This effect was much more marked for Fusarium keratitis; non-Fusarium cases fared similarly. The regimen employed was hourly until the cornea epithelialised, then four times daily for no less than three weeks. 3 Natamycin remains the only FDA-approved medication for FK. Its hydrophobic nature is thought to limit ocular penetration, and so solid lipid nanoparticle formulations are being developed, which have shown promising preliminary safety and efficacy enhancement. 10 Yeasts such as Candida are managed with amphotericin B 0.15–0.30% which is the most efficacious agent, 3 but needs to be compounded. 3 Other options include econazole 1%, natamycin 5%, clotrimazole 1%, voriconazole 1%/2% or fluconazole 2%. 1

Toxic ocular surface effects may result with topical therapy such as hyperaemia, chemosis, punctate epithelial erosions and corneal epithelial erosions. 9

Regional therapy

Regional antifungal therapy options available include subconjunctival injection, intrastromal injection and intracameral injection. The aim is to improve ocular penetration of the antifungal agent. Subconjunctival injections, such as fluconazole for severe keratitis, are described but cause significant pain and may result in necrotic conjunctival ulcers. 3 Intrastromal voriconazole has been used in patients not responding to topical natamycin and voriconazole with contradictory results. No definitive benefit has been proven over topical voriconazole at this stage. Intrastromal natamycin has been shown to be no better than topical treatment. Intracameral injections have been described in the literature, but no clear efficacy has been shown as outcomes differ. 3 Amphotericin B may be administered intracameral, usually after anterior chamber washout. 3 Intracameral injection may be helpful in cases where stromal infiltrate is unchanged but endothelial deposits are increasing. 3 At present intrastromal and intracameral injection are considered an unproven adjunct to conventional treatment, and require further study. 2

Systemic therapy

Systemic antifungal agents are indicated for severe infections and extension into the anterior chamber. 3 These are especially helpful when the infection is close to the limbus. 1 Options include voriconazole (400 mg twice daily for one day, then 200 mg twice daily), 3 posaconazole (800 mg daily), 3 itraconazole (200 mg per day, then tapered to 100 mg per day), as well as fluconazole 200 mg twice daily. 1 Older agents such as ketoconazole, fluconazole and itraconazole are being replaced by the newer agents such as voriconazole and posaconazole as these have superior ocular penetration and spectrum of cover. 3

MUTT II randomised patients with severe filamentous FK to oral voriconazole or placebo. A 400 mg bd loading dose for one day, then 20 days of maintenance dose (200 mg bd) was used if patients weighed more than 49 kg. The loading and maintenance doses for patients weighing 40–49 kg were 300 mg and 150 mg respectively. Patients weighing less than 40 kg received a 200 mg loading dose and a 100 mg maintenance dose. All patients received topical dual therapy with natamycin and voriconazole. The oral voriconazole group achieved no statistically significant benefit over the placebo group. The rate of perforation, therapeutic penetrating keratoplasty (PKP), and corneal re-epithelialisation were not different. Moreover, spectacle visual acuity and scar size were not different at three...
months. Oral voriconazole is expensive (approximately $4 180 per patient), and significantly increases side-effect incidence such as transaminase elevation, visual disturbance and gastrointestinal upset. The study concluded against the use of oral voriconazole for severe mould-related FK. A subgroup analysis of the data from MUTT II was performed looking specifically at cases of Fusarium keratitis. This analysis showed lower risk of perforation and therapeutic PKP, as well as smaller corneal scars. Re-epithelisation rates and spectacle visual acuity were not different. Based on this, there may be a role for oral voriconazole in severe Fusarium-related FK.

Photoactivated chromophore for keratitis crosslinking (PACK-CXL)

In vitro studies of PACK-CXL monotherapy have not demonstrated fungal inactivation. In vivo studies have evaluated PACK-CXL as a possible adjunct to medical therapy for resistant cases of FK. These studies tend to be case series and their results do not cohere. As such there is currently insufficient evidence to suggest that PACK-CXL is a useful modality for the treatment of FK, especially in severe cases where deep corneal stroma is involved.

Rose bengal photodynamic antimicrobial therapy (PDAT)

Rose bengal PDAT is a novel treatment for infectious keratitis that has shown some preliminary success in the treatment of FK. Rose bengal is a well-known ophthalmic dye used to detect corneal and conjunctival pathology. During PDAT, green light is used to activate this dye. This results in the generation of reactive oxygen species that exert effects on nearby organic structures. These effects include antimicrobial activity, and a degree of corneal crosslinking. In vitro studies have shown fungicidal activity against Fusarium, Aspergillus and Candida species. In vivo treatment has been shown to be safe for keratocytes and deeper ocular tissues. A recent case series (2019) by Naranjo et al. reports the successful use of rose bengal PDT as a last resort to avoid therapeutic PKP in cases of Fusarium and Curvularia keratitis. Randomised control trials are needed to further evaluate the role of this modality.

Surgical management

Medical treatment of FK is often not sufficient. Superficial keratectomy (SK) may be employed where it is possible remove the majority of the infection. This is possible due to the relatively minimal inflammation in the adjacent stromal bed which allows good visualisation of the mycelium. SK may also be employed for diagnostic purposes where culture has yielded nothing despite a high index of suspicion for FK. SK is employed in cases of moderate keratitis, where infiltration depth is more than one-third but less than two-thirds of the stroma, and infiltrate is 3–6 mm in diameter. Phototherapeutic keratectomy may also be used in these cases. Early keratectomy may shorten disease duration. Further studies are needed to define the effects of SK on perforation rates. Up to 50% of severe FK cases eventually perforate. Therapeutic keratoplasty is indicated when medical therapy fails or perforation occurs, and options include either penetrating or lamellar keratoplasty. These grafts have a higher failure rate than conventional keratoplasty, but may facilitate control of the infection. Lamellar keratoplasty may be performed if Descemet membrane has not been breached, otherwise PKP is performed (Figure 2). Post-operative
topical antifungals, antibiotics and nonsteroidal anti-inflammatory drugs are employed. Topical steroid is added at two weeks if no recurrence is present. Oral antifungals are used pre- and post-operatively. FK may recur after keratoplasty in as many as 10–15% of cases, and treatment of such cases is not currently protocol driven. Where lamellar keratoplasty is performed, the recurrence is in the stroma of the host, while in PKP cases 15% of recurrence may be intraocular. The overall incidence of recurrence is not different between PKP and lamellar keratoplasty, however. Prognosis depends heavily upon the site of recurrence. In descending order of prognosis, the recurrence sites are: anterior chamber; host corneal stroma; vitreous; atypical. Medical management of recurrence includes dual topical therapy such as natamycin with voriconazole, as well as subconjunctival fluconazole or voriconazole, and may successfully treat a quarter of cases. Three-quarters of recurrences may need surgical treatment, and this is site dependent. Anterior chamber recurrence responds excellently to early washout and intracameral voriconazole. Stromal recurrence may require injections, focal excision, PKP or corneoscleral patch graft. Posterior segment-based recurrence necessitates intravitreal antifungals, lens extraction and pars planar vitrectomy. Evisceration or enucleation may become necessary if all else fails. Conclusion

FK is a globally significant and relatively understudied entity. It poses formidable challenges to the clinician, both diagnostically and therapeutically. Recent advances in molecular identification have enabled improved understanding of this disease, and treatment protocols are starting to emerge from various high incidence centres. The management of FK is still very much evolving and as such there remains much to be learned from future studies.

Acknowledgements

Special thanks to Prof T Carmichael, Dr S Goolam, and Dr F Indiveri at the University of the Witwatersrand Division of Ophthalmology.

References

BCVA = best-corrected visual acuity; ETDRS = Early Treatment Diabetic Retinopathy Study; nAMD = neovascular age-related macular degeneration.

Since LUCENTIS® launch, no other approved anti-VEGF has shown superiority to LUCENTIS® in head-to-head studies.1,4

The primary endpoint of RIVAL was mean change in area of geographic atrophy from baseline to Month 24. Mean BCVA change was a key secondary endpoint.1 Patients received 3 initial monthly injections in both treatment groups.1 Data shows the proportion of patients who achieve each of the injection intervals at least once during the study.1 The injection rate ratio (95% CI) for LUCENTIS®: aflibercept was 1.01 (0.95 - 1.08, p=0.75).1

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RIVAL 2-year results: Distribution of treatment intervals achieved over 24 months*1,2

After 2 years of treatment, similar proportions of patients receiving LUCENTIS® or aflibercept reached each treatment extension interval.1

LUCENTIS®: EFFICACY AND DURABILITY IN nAMD CONFIRMED WITH RIVAL

The RIVAL 2-year results demonstrated that nAMD patients receiving LUCENTIS® reached a mean BCVA of 71.9 vs. 69.7 in those receiving aflibercept.1

Adapted from Gillies M, et al.1

Adapted from Gillies M, et al.1

Adapted from Gillies M, et al.1


LUCENTIS®: 0.5 mg Treat & Extend (n = 117)

Aflibercept 2.0 mg Treat & Extend (n = 108)

Mean BCVA scores at the end of treatment period (ETDRS letters)

Step into the light.
Abstract

**Background:** Cataracts are the main cause of blindness worldwide. Cataract blindness is reversible with surgery, a procedure which is well recognised for its clinical and cost effectiveness. Several approaches are used to reduce the cataract burden. They include a ‘reach out’ approach, a ‘reach in’ approach and a combination of the two. In South Africa, there are several non-governmental cataract surgery services utilising the ‘reach out’ approach.

**Objectives:** The purpose of this study is to investigate the visual outcomes of a non-governmental organisation providing outreach cataract surgery services (referred to as the ‘outreach service’ from now on) to underserviced areas in South Africa.

**Methods:** A retrospective comparison was made of the day 1 post-operative visual acuities of patients who underwent cataract surgery during outreaches conducted by the outreach service and the day 1 post-operative visual acuity of patients who were operated on at Groote Schuur Hospital (GSH).

**Results:** A total of 1 067 cases from the outreach service and 584 cases from GSH were included in the study. The patients who underwent surgery at GSH had significantly better day 1 visual acuities (Pearson chi square test, p<0.0001). The day 1 visual acuity in cases performed during outreaches also did not fulfil the minimum day 1 visual acuity as set out by the World Health Organization (WHO).

**Conclusion:** Our study raises concerns about the quality of cataract surgery performed on these outreaches. Our recommendation is that non-governmental outreach cataract surgery services should audit their long-term post-operative visual outcomes and initiate the appropriate interventions in case they do not meet the minimum WHO requirements. Ultimately, South Africa should strive towards establishing more permanent eye care centres.

**Keywords:** cataract surgery outcome, cataract surgery post-operative visual acuity, cataract surgery outreach

**Funding:** Nil

**Conflict of interest:** Nil

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**Introduction**

Cataracts are responsible for 51% of blindness worldwide. Cataract blindness is reversible with surgery, a procedure which is well recognised for its clinical and cost effectiveness.

Cataract blindness treatment programmes are often overwhelmed in middle- to low-income countries, especially in rural communities. One of the most effective strategies to address this problem is through community outreach initiatives. These are widely employed in countries such as India and Nepal where they are known as surgical eye camps, community camps or peripheral eye camps (referred to as ‘camps’ from now on).

These camps may either have a ‘reach out’ or a ‘reach in’ approach. The ‘reach out’ or peripheral eye camp approach was the main trend in India during the 1970s and 80s. Camps were conducted in the target community and cataract surgeries were performed on site, usually in rural hospitals, primary health care centres, schools or community halls.

Intracapsular cataract extraction (ICCE) was the procedure of choice and after a post-operative stay of four to seven days, patients were discharged with +10 dioptre aphakic spectacles.

Over the past two decades there has been a transition from the ‘reach out’ to the ‘reach in’ or base hospital approach. Screening camps take place in the community itself, after which suitable candidates are transported to the base hospital. Here they undergo the necessary pre-operative investigations followed by
their surgery, which is conducted under microscopes in well-equipped theatres. The emphasis in this type of setting is on the quality (rather than the quantity) of surgery. There is also a shift away from ICCE with aphakic spectacles towards extracapsular cataract extraction (ECCE) with intraocular lens (IOL) implantation. If there are no complications on day 1 post-operatively, the patients are transported back to their respective communities. Today, the base hospital approach is the preferred method in India, with peripheral eye camps reserved for remote, inaccessible communities.

In South Africa there are several non-governmental organisations (NGOs) involved in outreach cataract surgery. They usually offer their services to under-resourced communities. These areas often lack permanent eye care services, which means that there is no post-operative care or long-term post-operative data available for these patients. We looked at the visual outcomes of one of these NGOs, which will be referred to as the ‘outreach service’ from now on.

The outreach service utilises the ‘reach out’ approach and staffs several mobile units. These units are responsible for conducting outreach cataract surgery initiatives (referred to as ‘cataract tours’ from now on) throughout the country, mostly in rural, impoverished communities. These cataract tours typically last four days. Day 1 is set aside for screening, refraction and biometry. They aim to perform 40 cataract surgeries on days 2 and 3, and post-operative evaluations are done on day 4. Each unit is staffed by three ophthalmic-trained nurses and a volunteer surgeon. They are further equipped with a microscope and all the other necessary items to perform high-volume cataract surgery, while theatre facilities are provided by local hospitals.

Each cataract tour’s statistics are recorded by the ophthalmic nurses. They record the age, sex, pre-operative visual acuity as well as the day 1 post-operative visual acuity for each patient. There are furthermore columns for documenting the type of procedure, complications and the name of the surgeon. Most patients are discharged on day 1 without any future follow-up dates and no data are available on long-term visual outcomes. Complicated post-operative cases are referred to the closest hospital with the necessary ophthalmology services to deal with these complications.

Venkatesh et al. showed that good quality cataract surgery is possible in a high-volume setting. In order to achieve the latter, they advised standardised techniques, standardised protocols and good training of surgeons and paramedical staff. Their study was conducted in a permanent eye care facility using staff members that are familiar with its functioning and layout.

The nature of these cataract tours may be suboptimal, due to different surgeons with varying levels of experience employing diverse techniques in unfamiliar environments. The cataracts seen during tours are often of an advanced nature. This, in addition to a large number of surgeries performed in a limited time frame, might contribute to an increase in intra- and post-operative complications. When complications arise, they are often difficult to manage appropriately under these conditions.

Aliyu et al. demonstrated a strong association between the day 1 and the four to eight-week post-operative visual acuity. Corneal oedema (mostly secondary to intra-operative complications) leading to poor vision on day 1 was an exception to this correlation and the visual acuity in these patients often improved to a WHO category 1 or 2 with time. Unfortunately, the reasons for poor visual acuities after four to eight weeks were not investigated and might have included comorbidities such as refractive errors, diabetic retinopathy and glaucoma.

Congdon et al. showed a similar correlation between early and late post-operative visual acuity. They attempted to justify omitting a late post-operative follow-up visit in rural communities where there are often several obstacles to further follow-up reviews.

In this study, we compared the day 1 visual acuity of cataract surgeries performed by the outreach service to those performed at a permanent ophthalmology centre involved in cataract surgery.

**Methods**

All patients who received cataract surgery between July 2014 and December 2014 during the outreach service’s cataract tours and at Groote Schuur Hospital (GSH) were included in our study. The outreach service and the Division of Ophthalmology at GSH provided us with their data bases of all patients who underwent cataract surgery during this six-month period.

An identifiable variable and the day 1 post-operative visual acuity were collected. Visual acuity was documented as Snellen visual acuity and was categorised according to the WHO categories 1 (good, 6/6 to 6/18), 2 (ok, 6/24 to 6/60) and 3 and 4 (poor, <counting fingers).

The data were analysed using STATA 12 (StataCorp, Texas, USA). Ethical approval for the study was given by the Human Research Ethics Committee of the University of Cape Town (HREC reference 558/2018).

**Results**

A total of 1 067 cases from the outreach service and 584 cases from GSH were included in the study. They were allocated into one of the day 1 post-operative WHO visual acuity categories.

**Tables I and II** show the number of cases in the WHO categories 1, 2 and 3+4, with the WHO recommendations for the proportions in each category on day 1 for the outreach service and GSH respectively. The difference in the visual acuities between the two groups was statistically significant. (Pearson chi square test, p<0.0001).

**Table I: Outreach service day 1 post-operative visual acuities**

<table>
<thead>
<tr>
<th>WHO category</th>
<th>Number</th>
<th>%</th>
<th>WHO recommendation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (6/6 to 6/18)</td>
<td>234</td>
<td>21.9</td>
<td>40</td>
</tr>
<tr>
<td>2 (6/24 to 6/60)</td>
<td>492</td>
<td>46.1</td>
<td>50</td>
</tr>
<tr>
<td>3+4 (&lt;6/60)</td>
<td>341</td>
<td>32</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1 067</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

**Table II: GSH day 1 post-operative visual acuities**

<table>
<thead>
<tr>
<th>WHO category</th>
<th>Number</th>
<th>%</th>
<th>WHO recommendation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (6/6 to 6/18)</td>
<td>342</td>
<td>58.6</td>
<td>40</td>
</tr>
<tr>
<td>2 (6/24 to 6/60)</td>
<td>151</td>
<td>25.7</td>
<td>50</td>
</tr>
<tr>
<td>3+4 (&lt;6/60)</td>
<td>91</td>
<td>15.6</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>584</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Discussion

India is the country in the world with the most cataract-related blind and visually impaired people. Over the past five decades, they have made significant strides towards alleviating their high cataract burden. Their cataract surgical rate has increased from 700 per million in 1981, to 6 000 per million in 2012. Surgical eye camps, employing a ‘reach out’ approach, played a pivotal part in achieving this. Over the past two decades however, there has been a paradigm shift away from these camps towards a base hospital – or a ‘reach in’ approach.

Questionable post-operative outcomes, poor follow-up and a lack of modern equipment and surgical techniques have been raised as reasons for this, despite the absence of supporting evidence in the literature.

During a reach in approach, a well-organised team, consisting of ophthalmologists, optometrists and a coordinator from within the community, performs screening camps in rural areas. Volunteers from the community can help the coordinator to recruit patients and to also help overcome some of the barriers to surgery that might exist in the community. Appropriate cases are then transported to the closest base hospital where they are admitted. There, the appropriate pre-operative workup is performed after which they undergo their surgery. Patients are kept in hospital for early post-operative evaluation, and any problems that might occur can be dealt with at the base hospital. To maintain a sense of community orientation, follow-up visits and post-operative refraction are often conducted in the periphery during ‘reach out’ tours. The Aravind Eye Care System in India, performing over 250 000 cataract surgeries annually, is a well-known example of this.

Maheshgauri et al. did show better visual outcomes at base hospital than on camps. Unfortunately, uniform procedures were not used, making it difficult to highlight the actual camp setting as the reason for the poorer outcomes. Despite the poorer results from camp surgery, they still had a good six to eight week BCVA in 80% of their cases, which is close to the WHO recommendations.

In their older comparative study, Gogate et al. also showed more favourable results at base hospitals compared to camps. The study is not without significant confounding factors. Of note was the fact that ECCEs with IOLs were used at base hospital compared to largely ICCEs with aphakic spectacles at camps. The literature shows that ICCEs have inferior results to ECCEs with IOLs. This study highlights the superiority of ECCEs with IOLs over ICCEs with aphakic spectacles, rather than the actual setting in which surgery took place.

More recent studies from Nepal, where camps are still widely employed due to mountainous terrain, do show comparable results between the two. In their prospective, comparative observational study, Bhatta et al. obtained similarly excellent results in both base hospital as well as camps. Through standardised techniques (manual small-incision cataract surgery – MSICS) and same-surgeon surgery in both settings, they showed that it is possible to provide a high-quality outreach cataract surgery service to inaccessible communities. In a very similar prospective study, Manandhar et al., also showed the same good results in both camps and at base hospital.

Our study shows that the day 1 visual acuities of surgeries performed by the outreach service are worse than those performed at GSH. They also do not meet the WHO recommended day 1 visual acuities. Even though we cannot assume that all these cases will end up with poor vision, evidence shows that there is an association between poor day 1 visual acuities (in the absence of corneal oedema) and poor long-term visual acuities. Unfortunately, due to a lack of post-operative care, follow-up and refraction, it is not possible to obtain data on the final visual acuities of patients who underwent surgery during the outreach service’s cataract tours.

We were unable to comment on the reasons for the outreach service’s poor day 1 visual outcomes. Further investigation will be necessary to determine if it is related to outreach-specific circumstances as opposed to reasons that may be encountered in any cataract surgery set-up. Even though the outreach service is well equipped with most of the necessities to perform modern cataract surgery, several other variables might play a role.

Challenging operating environment

Microsurgery in an unfamiliar theatre set-up can be daunting. For the visiting surgeon, variables such as new equipment, surgical instruments and nursing staff might make such an environment unconducive for high-volume cataract surgery. Repetitive, same-surgeon outreachs in the same community, might negate this.

Staff fatiguability

Outreach cataract surgery is characterised by high volumes of surgeries performed over a short period of time. The staff often consists of a single surgeon supported by one or two nursing staff members who travelled long distances to reach the target community. This, combined with long operating hours, can have a negative impact on the quality of surgery.

Lack of senior cover or access to referral centres

Due to limited funds and long travelling times to reach rural communities, it is often difficult to recruit qualified ophthalmologists to conduct outreachs. Outreach cataract surgery services in South Africa often rely on medical officers and ophthalmology registrars, with varying levels of surgical experience, to perform outreachs. Without the necessary senior cover or access to referral centres should complications arise, junior surgeons should not expose themselves or their patients to these circumstances.

Limitations of this study include the following: It is a retrospective review with the associated weaknesses. It is a crude comparison between the visual outcomes in these two settings and by no means an absolute indication of the final visual outcomes. There are several confounding factors that may play a role. Even though the procedures were not documented in a substantial proportion of the outreach service’s cases, the majority of the ones that were documented were ECCEs. We are unsure how many of these were MSICS. On the contrary, most cases at GSH were performed using phacoemulsification (phaco). Even though it has been shown that MSICS can have comparable results to phaco in the right hands, phaco is widely recognised as the gold standard.

We have no information on the surgical experience of surgeons utilised by the outreach service, whereas all of the cases at GSH were either performed by consultants or registrars. Pre-existing ocular disorders, that may lead to poor visual outcomes after surgery, were not documented and this may skew the results.

Conclusion

Outreach cataract surgery services still
play an important role in our South African society today. Due to an uneven distribution of medical resources, a legacy of our past, these outreach initiatives are often the only hope for many South Africans to be cured from blindness.

Despite its limitations, our study does however raise concerns about the quality of cataract surgery performed on these outreachs. Our study does not tell us why the day 1 outcomes on outreachs were poor and it is therefore difficult for us to make definite recommendations. We suggest that all patients operated on during outreaches should have four- to six-week post-operative follow-up visits. The visual outcomes on these visits should be audited. Should they still not meet the WHO’s recommendations, steps should be taken to firstly find the reasons for this and secondly to rectifying these. Rather than focussing only on one aspect of care, all the components of the care pathway should be explored. Outreach-specific factors, such as staff fatigue, portability of equipment and pressure to perform large volumes of surgery in a set time period, should be looked at in particular.

South Africa should ultimately strive towards a base hospital approach, where every community has access to a dedicated cataract surgery centre. But until then, every effort should be made to provide the highest quality cataract surgery possible under outreach conditions to the most vulnerable communities in South Africa.

References
When inflammation hits, strike back with Loteprednol

An advancement in corticosteroid therapy for ocular inflammation

- High anti-inflammatory efficacy
- Improved safety profile

References:

Scheduling status: S4

Proprietary name and dosage form: Lotemax Ophthalmic Suspension, Eye Drops.

Composition: Each 1 ml contains: Loteprednol etabonate 5.0 mg (0.5 % m/v) and Benzalkonium chloride (preservative) 0.01 % m/v.

Pharmacological classification: A 15.2 Ophthalmic preparations with corticosteroids.

Registration number: 37/15.2/0588.

Proprietary name and dosage form: Alrex Ophthalmic Suspension.

Composition: Each 1 ml contains: Loteprednol etabonate 2.00 mg (0.2 % m/v) and Benzalkonium chloride (preservative) 0.01 % m/v.

Pharmacological classification: A 15.2 Ophthalmic preparations with corticosteroids.

Registration number: 38/15.2/0203.

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Correlation between Ocular Surface Disease Index and tear meniscus height in dry eye disease

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Abstract

Background: Dry eye disease is a common and potentially vision-threatening problem. The Ocular Surface Disease Index (OSDI) is a well-established method of subjectively assessing dry eye disease. Objective means of diagnosing dry eye disease suffer from poor reproducibility, low sensitivity and specificity, are invasive, time consuming and often require specialised equipment. It is hypothesised that optical coherence tomography (OCT) of the tear meniscus may address these problems.

Methods: This was a prospective, cross-sectional study of adults at a tertiary level eye clinic. Participants were included if they were older than 18 years, and excluded if they were contact lens wearers, had an established diagnosis of dry eye disease, or were known to have (or be taking any treatment for) any ophthalmological or medical condition that has the potential to influence dry eye disease. A control and investigative group was determined using the dry eye OSDI. The inferior TMH of both groups was imaged using OCT.

Results: A total of 36 right eyes of 36 patients were included in this study. Patient ages ranged from 20–64 years, with a median age of 43 years. Overall, there were more females (n=27) than males (n=9). There was a moderate negative correlation between the normal/dry eye group and TMH (r=−0.452, p=0.032). Optimising sensitivity and specificity yielded a diagnostic cut-off TMH of 296 um.

Conclusion: Tear meniscus height tends to decrease between OSDI classifications of ‘normal’ and ‘dry eye disease’. However, TMH performed poorly as an objective measure of dry eye disease in our study population, limiting recommendations to adopt it as a diagnostic test.

Keywords: dry eye disease, Ocular Surface Disease Index, optical coherence tomography, tear meniscus height

Funding: This study received no financial contributions from private individuals, government, commercial or non-profit organisations.

Conflict of interests: The authors hereby declare that they have no financial, professional or personal relationships that may have unduly influenced them in writing this article.

Introduction

Dry eye disease is an insufficiency in the volume and/or quality of the tear film which in turn causes tear instability and subsequent ocular surface disease. The aetiology of dry eye disease is multifactorial and can be classified into aqueous deficient or evaporative states with significant contribution from environmental factors. Dry eye disease is a common problem with an estimated one in four patients presenting to eye clinics with characteristic symptoms, and a global prevalence of 7–34%. There is a paucity of epidemiological data for South Africa and indeed the African continent with an estimated prevalence of 41–92% in...
three small population-based studies.\(^3\)\(^-\)\(^7\) Furthermore, dry eye disease results in a significant economic burden, with an average expenditure of USD $11 302 per patient and a total of USD $55.4 billion yearly in the United States of America alone.\(^8\)

There are a number of well-validated questionnaires that have been developed to subjectively assess dry eye disease – the Ocular Surface Disease Index\(^6\) (OSDI) is one of the most frequently used and performs well with a sensitivity and specificity of 60% and 83% respectively.\(^9\),\(^10\) The OSDI consists of 12 questions based on the recall of symptoms in the preceding week. Severity, environmental factors and the degree to which activities of daily living are affected are all scored.

In contrast there is no gold standard objective measurement to quantify or monitor dry eye disease. Schirmer’s test, ocular surface staining, fluorophotometry, biomarker sampling and osmolarity are invasive, suffer from inaccuracy or poor reproducibility, are time consuming or require specialised equipment that may not be readily available in the clinic setting.\(^11\),\(^12\)

Non-invasive methods are attractive as they do not induce reflex tearing which may increase the normal rate of tear secretion by 100–500%.\(^3\)\(^-\)\(^7\) This, combined with recent advances in anterior segment optical coherence tomography (AS-OCT), has renewed interest in meniscometry as means of measuring tear volume as a proxy for dry eye disease.\(^13\),\(^14\) Experimental studies have shown that the inferior tear meniscus, which is formed in the angle between the cornea and the lower lid (Figure 1), compromises 75–90% of total tear volume. Within this, the tear meniscus height (TMH) varies little in absolute value terms from tear meniscus area and performs the best diagnostically in both specificity and sensitivity in predicting disease.\(^12\),\(^13\),\(^15\),\(^16\)

The primary aim of our study was to describe the correlation of TMH against the OSDI. Additionally, we aim to determine a diagnostic cut-off of TMH for diagnosing dry eye disease.

Methods

This was a prospective, cross-sectional, case-controlled study conducted at St John Eye Hospital, Soweto, Johannesburg, South Africa. Ethical clearance was approved by the Human Research Ethics Committee, University of the Witwatersrand (M190650). The study was conducted in accordance with the declaration of Helsinki.

A sample size of 20 (17±10%) for each group was determined using anticipated mean differences; a p-value of <0.05 was taken to be significant. Considering the strict exclusion criteria and the anticipated difficulty in recruiting participants, especially to the control group, we decided not to power the study to perform a sub-group analysis of severity of disease, age or sex.

Patients, their family members or escorts, and staff members older than 18 years were randomly recruited to be invited to participate in the study. Participants were excluded if they were current contact lens wearers, had used topical eye drops in the preceding 14 days or had undergone any previous intraocular or extraocular surgery including laser and refractive procedures. Patients were also excluded if they were pregnant or lactating; or if they had a systemic disease or were using treatments for: diabetes mellitus, thyroid disease, Sjögrens syndrome, hepatitis C, vitamin A deficiency, human immunodeficiency virus (HIV) infection or any hormonal dysfunction.\(^3\),\(^7\) Patients were also excluded if they were unable to speak English, Afrikaans, Zulu or Sotho.

A brief direct ophthalmoscope examination was performed to exclude localised ocular pathology such as blepharitis, pterygium and pinguecula.

Demographic data including the participants’ age, sex and race was collected. In addition, the total duration of dry eye symptoms was captured (if applicable). Each participant was divided into a control (‘normal’) or investigative (‘dry eye disease’) group based on the recall of symptoms of dry eye in the preceding week using the dry eye OSDI iOS application (Allergan Inc., Dublin, Ireland). The investigative group was further divided into ‘mild’, ‘moderate’ and ‘severe’.

Each group’s TMH was measured using a SPECTRALIS® (Heidelberg Engineering, Heidelberg, Germany) OCT with anterior segment capabilities. A light source 1 310 nm wavelength, 60 nm bandwidth, scan width 15 mm at eight frames per seconds, scan depth 2 mm in air and optical resolution less than 10 um was set. Measurements were taken in a dimly

![Figure 1: (A) Lower lid tear meniscus shown together with infrared photo of the lower cornea and lid (frame); (B) Tear meniscus height (TMH) and tear meniscus depth (TMD); (C) Tear meniscus angle and angle alpha (\(\omega\)).](image-url)
lit room from 10.00 to 16.00 during the months of November 2019 to March 2020.

Each participant was asked to blink and then maintain central and steady gaze while three scans were taken approximately two seconds later. The anatomical landmark was taken to be the midpoint of the lower lid in primary gaze. Each scan was manually inspected and a quality index of greater than 20 was taken as sufficient. The TMH was measured in each scan using the caliper function at a standard magnification of 3× and averaged to mitigate random error.

Statistical analysis was conducted using Statistical Package for Social Sciences (SPSS) software (IBM Corp. Released 2016. IBM SPSS Statistics for Mac, Version 24.0 Armonk, NY: IBM Corp.)

Results
Patient characteristics
A total of 36 right eyes from 36 patients were included for analysis. Shen et al. showed that dry eye disease is bilateral and equally affects each eye; thus, the right eye was chosen by convention.13 Participant age ranged from 20–64 years, with a mean of 43 years (95% confidence interval, 39.3–46.7). The age group 41–50 years accounted for 39% of all participants. Overall, there were more females (n=27) than males (n=9). All the participants were black Africans. The mean duration of dry eye symptoms was 428 days, the median was 56 days with a range of 0–3 640 days, standard deviation 880 days. Within the ‘dry eye disease’ group, 55% were classified as mild, 13.6% as moderate and 36.4% as severe.

Table I: Demographic data of normal (control) and dry eye disease (investigative) groups

<table>
<thead>
<tr>
<th></th>
<th>Control (n=14)</th>
<th>Dry eye disease (n=22)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20–30</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>31–40</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>41–50</td>
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<td>10</td>
</tr>
<tr>
<td>51–60</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>&gt;61</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Correlation analysis
A Pearson correlation coefficient revealed a weakly negative relationship between raw OSDI scores and TMH (r=−0.211, p=0.216) as shown in Figure 2. However, a bi-serial analysis performed by examining only ‘normal’ and ‘dry eye disease’ as a function of TMH showed a more strongly negative, significant relationship (r_b=−0.452, p=0.032). A variance analysis showed that TMH contributed only 4.45% to the overall variance observed in OSDI scores.

There was no correlation between the duration of symptoms and TMH (r=−0.066, p=0.702).

An independent t test of TMH in isolation revealed that it was indeed higher in the control group (M=659 um, SD=676 um) compared to the investigative group (M=325 um, SD=173 um); however, this was not found to be statistically significant (p=0.092).

Diagnostic cut-off for TMH
A diagnostic cut-off for determining ‘normal’ from ‘dry eye disease’ participants was determined by linear regression analysis of receiver operating curves (ROC) as shown in Figure 3. Choosing a TMH which optimises sensitivity and specificity (50% and 36% respectively) yields a TMH of 296 um. Maximising sensitivity at the cost of specificity (77% and 7% respectively) yields a diagnostic cut-off of 224 um. The area under the curve (AUC) is 0.289, indicating an overall poor diagnostic performance.

Power and effect size
Our study had a Cohen effect size of 0.4 indicating a small-to-medium effect size. Retrospective calculation of a larger effect using our available data (>0.8) would have required 36 participants in each group for a total of 72.

Discussion
Dry eye disease is a common problem and invasive methods of assessment are currently unsatisfactory. AS-OCT TMH has shown promise as a non-invasive diagnostic test that addresses these problems.

To the best of our knowledge this is the first study of its kind in South Africa attempting to compare TMH against a validated method such as the OSDI. Our study found that TMH tends to decrease in those whose symptoms are sufficiently severe to have been classified as dry eye disease by the OSDI. This is consistent with the findings of other studies and may be explained by the fact that in the absence of reflex tearing, the volume of tears is lower than in control subjects.21,23,28 It is important to note that dry eye disease incidence
in our population. 13,15,16 This may reflect a limitation in our study or an undescribed bias. It was not possible to control for all factors which may influence the tear meniscus such as palpebral aperture height, corneal curvature and ambient conditions.

Future well-designed studies should attempt to recruit a larger participant pool and sufficiently power their statistical analysis to include sub-groups such as age, sex and OSDI severity. It may be necessary to develop automated software techniques that are able to determine tear meniscus variables with a high degree of accuracy.

**Conclusion**

Dry eye disease is commonly encountered and potentially vision-threatening, but despite this, there is little evidence about the prevalence locally or more widely on the African continent.

While recall questionnaires such as the OSDI are well-validated, objective non-invasive methods of diagnosis are lacking.

AS-OCT meniscometry is a potential alternative to this problem that has shown promise in international studies. We have shown that TMH tends to decrease in dry eye sufferers compared to those without symptoms as validated by the OSDI, but this relationship has neither the same robustness nor diagnostic value as described in similar studies. This could reflect inherent limitations in our study or a broader difference in our local populace that needs to be further elucidated.

As such TMH meniscometry should not be used as a diagnostic tool, or used with caution, in our local population.

**What was known:**

- Subjective methods of diagnosing dry eye disease such as the OSDI are useful and well validated.
- TMH as measured by AS-OCT shows promise as an objective tool in diagnosing dry eye disease in international studies.

**What this article adds:**

- It confirms that TMH tends to decrease with increasing symptoms of dry eye disease.
- TMH performs poorly as a diagnostic test in an isolated South African population.

**Acknowledgment**

Ms Robyn Williams for assistance with data analysis and critical review of the manuscript.

**References**


Perception of stigma and health-seeking behaviour among patients with strabismus visiting a tertiary eye clinic in Southwestern Nigeria

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Abstract

**Background:** Stigma is one of the psychosocial problems borne by people living with strabismus. Self-evaluation of stigma by patients is not often reported in studies due to the failure by clinicians to probe for information in this regard. The aim of this study was to determine the self-perception of stigma among patients living with strabismus.

**Methods:** A descriptive cross-sectional study was carried out among 22 persons living with strabismus attending the Eye Clinic at Olabisi Onabanjo University Teaching Hospital, Sagamu, Nigeria, between September 2018 and August 2019. A stigma scale questionnaire was administered to the patients and data was analysed using SPSS version 20.

**Results:** The age range of respondents was 10–74 years. There were 12 (54.5%) males and ten (45.5%) females. The majority (84.6%) had exotropia with angle of strabismus ranging from 30 to 90 prism dioptres. About 63.6% did not know that strabismus could be corrected. About half of the respondents claimed they had been insulted and that life was unfair. Also 50% felt that people avoided them as a result of their condition. A third reported experiencing discrimination due to their strabismus; a sizable number (40.7%) experienced being talked down to. None of the respondents met the criteria for calculation of self-stigmatisation. Of the 22 patients, only five (22.7%) had been offered treatment prior to this study and all had declined. Some of the reasons adduced were that the condition is not a disease, nor a treatable condition.

**Conclusion:** There is a poor awareness that strabismus can be treated among people living with strabismus in Sagamu. None of the respondents reported perceived stigmatisation about their condition. There is need to improve education in the general populace about strabismus and the fact that it is amenable to correction.

**Keywords:** exotropia, stigma, strabismus, self-evaluation, Nigeria

**Funding:** No funding was received for this research.

**Conflict of interest:** The authors declare that there is no conflict of interest with regard to this study.
that individuals with strabismus are adversely affected in many aspects of their lives, including finding a spouse, job prospects and interaction with peers. Other psychosocial problems include stigmatisation, and psychiatric disorders such as low self-esteem and depression. In a study on the awareness, perception and knowledge of strabismus among various patients visiting a tertiary eye clinic in southwest Nigeria, stigmatisation/social misfit, burden (economic/time), and poor cosmetic look were reported as perceived social effects of strabismus.

In Nigeria, the uptake of treatment for strabismus is low, as many people do not think it is a disease or that it can be treated. The reported psychosocial effect of strabismus seems to be absent, particularly in adults, and to the best of our knowledge there is no published study on the psychosocial aspect of strabismus in Nigeria. The aim of this study is to determine the perception of people with strabismus about stigmatisation.

Materials and methods

The study is a cross-sectional study conducted between September 2018 and August 2019. A structured, pretested, self-administered questionnaire was adapted and administered to all consecutive patients with strabismus aged 10 years and above who presented to the Eye Clinic of Olabisi Onabanjo University Teaching Hospital over a one-year period.

The questionnaire was adapted from the standardised validated stigma scale of Dino et al. which had previously been tested in a large population. There were 15 questions in all, and the patients responded whether they strongly agree, agree, don’t agree/disagree, disagree or strongly disagree. The stigma score was then calculated. Each of the 15 questions was scored 0–4 in the direction of greater stigma. Questions marked with A were scored 0–4 in the direction of agreement, while those marked D were scored in the direction of disagreement. The total score was calculated for each respondent. A score of 50 and above was taken as signifying stigma.

The respondents’ visual acuities were checked with Snellen’s chart and tumbling E-chart for those who were not literate. A complete ocular examination was conducted by the ophthalmologists. The angle of strabismus was measured using Hirschberg, cover-uncover and prism cover tests. The recommended treatment was noted and recorded as taken or not taken by the patient.

Written informed consent for the research was sought from the patients or their parents/guardians after a thorough explanation of the procedure to them. Assent was taken from children above 8 years. Ethical approval was obtained from the Ethics Committee of Olabisi Onabanjo University Teaching Hospital. Data were stored in a personal computer. Confidentiality was maintained as the results were only accessible to the researchers and analysed with SPSS version 20. Simple frequencies were calculated. The stigma score was calculated.

Results

There were 22 respondents comprising 12 (54.5%) males and ten (45.5%) females. Their ages ranged from 10 years to 74 years with a mean of 30.2 ±18.7 years. Table I shows the demographic characteristics of respondents. Six (27.3%) of the children were age ≤16 years. Exotropia was the most common type of strabismus, found in 19 (86.4%) while esotropia was found in three patients.

### Table I: Demographic characteristics

<table>
<thead>
<tr>
<th>Sex</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>12</td>
<td>54.5</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
<td>45.5</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10–20</td>
<td>8</td>
<td>36.4</td>
</tr>
<tr>
<td>21–40</td>
<td>8</td>
<td>36.4</td>
</tr>
<tr>
<td>41–60</td>
<td>5</td>
<td>22.7</td>
</tr>
<tr>
<td>&gt;60</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christianity</td>
<td>15</td>
<td>68.1</td>
</tr>
<tr>
<td>Islam</td>
<td>7</td>
<td>31.8</td>
</tr>
<tr>
<td>Educational status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Primary</td>
<td>3</td>
<td>13.6</td>
</tr>
<tr>
<td>Secondary</td>
<td>7</td>
<td>27.3</td>
</tr>
<tr>
<td>Tertiary</td>
<td>11</td>
<td>50</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>1</td>
<td>4.5</td>
</tr>
</tbody>
</table>

(13.6%). The angle of strabismus ranged from 30 to 90 prism dioptres.

Seventeen (77.3%) respondents had never been offered treatment before. Fourteen (63.6%) did not know that strabismus could be corrected, while only five (22.7%) had been offered treatment previously but declined. Their reasons for refusal were physical [1] psychological [1] and financial [3].

### Table II: Respondents’ self-evaluation

<table>
<thead>
<tr>
<th>Questions</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agreed to having been discriminated against because they have a squint</td>
<td>8</td>
<td>36.4</td>
</tr>
<tr>
<td>Agreed to sometimes feeling they are talked down to because they have a squint</td>
<td>9</td>
<td>40.9</td>
</tr>
<tr>
<td>Agreed to not sometimes feeling bad about having a squint</td>
<td>8</td>
<td>36.4</td>
</tr>
<tr>
<td>Agreed to worrying about having to explain to people about their eye condition</td>
<td>9</td>
<td>40.9</td>
</tr>
<tr>
<td>Strongly agreed to have been discriminated against by their friends/people because of their squint</td>
<td>7</td>
<td>31.8</td>
</tr>
<tr>
<td>Disagreed that they sometimes feel lonely because of their squint</td>
<td>12</td>
<td>54.5</td>
</tr>
<tr>
<td>Disagreed that they would have been a better person if not for their squint</td>
<td>7</td>
<td>31.8</td>
</tr>
<tr>
<td>Disagreed to keeping to their problems to themselves because of peoples’ reaction to their squint</td>
<td>9</td>
<td>40.9</td>
</tr>
<tr>
<td>Disagreed to being angry with the way people have reacted to their squint</td>
<td>11</td>
<td>50.0</td>
</tr>
<tr>
<td>Disagreed that health workers have discriminated against them because of their squint</td>
<td>18</td>
<td>81.8</td>
</tr>
<tr>
<td>Disagreed that people have avoided them because of their squint</td>
<td>10</td>
<td>45.5</td>
</tr>
<tr>
<td>Agreed that they have been insulted because of their squint</td>
<td>11</td>
<td>50.0</td>
</tr>
<tr>
<td>Agreed that they do not feel embarrassed because of their squint</td>
<td>8</td>
<td>36.4</td>
</tr>
<tr>
<td>Disagreed to feeling life is unfair because of their squint</td>
<td>11</td>
<td>50</td>
</tr>
</tbody>
</table>
for declining included the following: strabismus is not a disease; they travelled out of the city where treatment was offered; strabismus was not treatable; the patient does not want surgery and is not aware there is a problem with the eyes. Table I shows the respondents’ self-evaluation response to the stigma questions.

The stigma score ranged from 10–49, with none of the respondents having a score of 50. An independent sample t-test was done to compare the mean score between the paediatric age group of ≥16 years and adults. There was no significant difference in the mean score (paediatric age 25.9±9.2; adults 28.7±12.4, t=0.54, df=20, p=0.60). It was also not significant for sex (males 28.3±12.1; females 27.2±11.0, t=2.30; df=20; p=0.82).

Discussion

Strabismus is not a very common disease. The prevalence in Nigeria ranged from 0.14% among school children in Ilorin to 2.4% in Benin. 11 We found that the most common form of strabismus in our study was exotropia; it was not an unusual finding as it has been reported by a minority of studies on strabismus.13 14 This may actually be due to the age of respondents as esotropia has been found to be more common in children less than 5 years of age.15 The study showed that about two-thirds of respondents did not know that strabismus could be treated, which is similar to the findings of others. 16 This could emphasise that knowledge of strabismus is poor even among people with strabismus in this environment. The poor knowledge has resulted in poor uptake of treatment. There is a need to educate the general populace on the disease condition and that it could be amenable to treatment, including surgery. The psychosocial and emotional consequences of strabismus have been well documented.1 3 4 In their study, Kothari et al. found that 65% of parents of children with strabismus were distressed due to the squint and people’s remarks; and that 55% of children with strabismus were extremely distressed by people’s comments. 5 This is probably due to the social stigma from this condition and may be linked to the high uptake of strabismus surgery in developed countries and India. Although the primary goal of strabismus surgery is to align the visual axes and achieve binocular single vision, other advantages include the restoration of normal appearance which also helps correct some of the psychosocial and emotional consequences among strabismic children and adults. 6 Hence, it is expected that social stigma will result in increased demand for treatment in our environment also; however, this was not so as our finding showed that there is no perceived stigma among these patients. The stigma score in this study ranged from 10–49. There was no significant statistical difference between the adult mean scores and those of the children, although it was noted that adults had higher mean scores than children. This may be due to adults having more social and self-awareness. Further studies with a larger sample would be required to corroborate this. The lack of stigma perception could be responsible for the low uptake of surgical correction among respondents. The study found that only a few respondents had sought treatment for the condition and even among these people, they all declined intervention for one reason or another. Despite the stigma level being low, about half of the respondents said that they had been insulted and felt life was unfair. Also, another 50% felt that people avoided them as a result of their condition. These issues need to be addressed.

A limitation of this study is the small sample size. Since the world is becoming a global village and due to increasing civilisation, there is need to educate and increase awareness that strabismus can be amenable to treatment to prevent inhibition and poor job opportunities in adults, particularly when they move to developed countries.

Conclusion

We conclude that there is a poor level of awareness among people living with strabismus; that it can be amenable to surgery; and that there is no perceived stigmatisation, which may be related to the poor uptake of treatment. All the patients offered surgical treatment in the past had declined due to a variety of reasons.

References

PREVENTION and treatment of pain and inflammation associated with cataract surgery and reduction in the risk of macular oedema associated with cataract surgery

INDICATED FOR:

- Prodrug structure delivers relief to key tissues
- 63% of patients had complete inflammation clearing at Day 14
- 83% of patients were pain-free at Day 14
- Established safety and tolerability with minimal discomfort in clinical trials

References:
Macular oedema in Charcot-Marie-Tooth disease

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Abstract
Charcot-Marie-Tooth disease is a rare, inherited neuromuscular disorder which is seldom associated with ocular features. We present the first reported case in the English literature of unilateral macular oedema in a child with Charcot-Marie-Tooth disease and no underlying metabolic or vascular disorders.

Keywords: Charcot-Marie-Tooth, macular oedema, ocular features

Funding: Nil

Conflict of interests: None

Introduction
Charcot-Marie-Tooth (CMT) is an inherited neuromuscular disorder, not typically associated with metabolic derangements. Professor Jean Martin Charcot and Pierre Marie, both of France, published the first description of CMT in 1886, in a patient presenting with muscle weakness and wasting in the legs. He called the disease peroneal muscular atrophy. Howard Henry Tooth described the same disease in his Cambridge dissertation, also in 1886, but called the disease peroneal progressive muscular atrophy. Tooth explained the symptoms to be as a result of a neuropathy, rather than myopathy. CMT presents in two forms: CMT1 and CMT2. CMT1 is a disorder of peripheral demyelination, which leads to uniform slowing of conduction velocity in motor and sensory nerves. CMT1 is predominantly inherited in an autosomal dominant fashion. CMT2 is primarily an axonal disorder and not demyelinating in nature.

CMT1 is known to be associated with the following ocular features: impaired accommodation, anisocoria, tonic, Argyll Robertson and Horner’s pupils. It can also present with glaucoma and cataracts. Other studies have reported external ophthalmoplegia, bilateral vitritis, optic neuropathy, primary optic atrophy, macular degeneration and retinitis-pigmentosa-like electroretinography tracings. After a search of the English literature, to date, this appears to be the first report of macula oedema in a child with CMT.

Case study
An 11-year-old girl was referred to the Red Cross War Memorial Children’s Hospital in Cape Town, South Africa, with a one-month history of occasional headaches and reduced vision in the left eye. At age 2 years she had been diagnosed as having Charcot-Marie-Tooth disease by the neurology department, where she was being followed up. She had an uncomplicated term delivery and was up-to-date with her immunisations. She had a positive maternal history of CMT. Genetic testing confirmed the diagnosis of CMT1A.

She did not have any other contributory chronic metabolic illnesses. She had had a previous ophthalmology consultation at age 7 years for a suspected ocular problem. At that stage, she had visual acuities of 6/6 in each eye, normal pupil reactions, full ocular motility and normal fundi.

Examination findings
The right eye was completely normal, with a visual acuity of 6/6 (Figure 1). She was orthotropv with full extraocular motility. Visual acuity in the left eye was measured at 6/9, with no improvement on pinhole. Her anterior segments were normal, as were her intraocular pressures (14 mmHg right, 13 mmHg left). Pupil responses were normal, with no relative afferent pupillary defect. On dilated fundoscopy,
Management

After consultation with a medical retinal specialist, oral acetazolamide 250 mg daily was commenced. At one-month follow-up, there was no improvement in her visual acuity, and the fundoscopic findings were unchanged. The macular cysts and retinal thickness were also unchanged on repeat OCT (Figures 5 and 6). Fundus fluorescein angiography (FFA) showed increasing macular hyperfluorescence in the early phases, consistent with macular oedema (Figure 7). The child reported no deterioration in symptoms and because there was no noticeable improvement in clinical findings, acetazolamide was then stopped. Routine monitoring was scheduled and the family counselled regarding the current stability of her vision, albeit in the context of an uncertain prognosis.

Discussion

This case of confirmed CMT1A is the first reported to present with macular oedema, which was unilateral and did not resolve after a one-month trial of oral acetazolamide. Electrophysiological features of CMT are known to mirror those of Refsum disease and retinitis pigmentosa.10 Both of these retinal degenerative diseases can be associated with macular oedema. We did not perform an electroretinogram (ERG) in this case, as only crude, mass response electrophysiological testing is available at our institution, which is unable to differentiate cone and rod photoreceptor dysfunction. Bakthavatchalam et al., in their systematic review of the English literature, showed that oral carbonic anhydrase inhibitors were effective first-line treatments in retinitis-pigmentosa-associated macular oedema.11 Improvement can occur within two weeks of starting treatment.12 However, the mechanism of macular oedema in CMT1A is yet unknown. The rationale for treatment in this case was that the electrophysiological features of CMT are similar to that of retinitis pigmentosa. As no subjective or objective improvement was observed after one month of treatment, the decision was made to stop acetazolamide because of its potential systemic side-effects. Topical ketorolac was not considered as a treatment option in this case, on the basis that the macular oedema was unlikely to be inflammatory in origin. Due to the absence of good evidence on the possible effectiveness and safety of anti-vascular endothelial...
growth factor (anti-VEGF) injections in paediatric macular oedema, it was decided not to pursue this therapeutic option.

Conclusion
This case describes the novel finding of macular oedema in a child with Charcot-Marie-Tooth disease. The underlying mechanisms for the macular oedema in this setting, and the fact that it did not respond to a one-month course of oral acetazolamide, remain unclear.

References
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Author: Sean Carroll
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References:
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2. Lumigan® Professional Information, 25 November 2011
3. Travatan® Professional Information, 6 June 2014
4. Xalatan® Professional Information, 25 November 2011

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Fake news, false news, pseudo-news, hoax news, misinformation, yellow journalism – call it what you like – the world is full of it. The Covid pandemic seems to have added fuel to the fire as people stay at home and scroll through social media. Wikipedia defines fake news as a form of news consisting of deliberate disinformation or hoaxes spread via traditional news media (print and broadcast) or online social media.

Fake news has been around for as long as we can remember. During the first century BC, Octavian ran a campaign of misinformation against his rival Mark Antony, portraying him as a drunkard, a womaniser and a mere puppet of the Egyptian queen Cleopatra VII. During the 18th century Benjamin Franklin wrote fake news about murderous Indians working with King George III in an effort to sway public opinion in favour of the American Revolution. Fake news in the form of propaganda was rife before and during the First and Second World Wars in the 1900s.

In the 21st century, the impact of fake news as well as the usage of the term became widespread. The opening of the Internet meant easy access to information for all. The Internet has grown immensely, allowing it to be a host for plenty of unwanted, untruthful and misleading information, fabricated by anyone and making it difficult for people to know what is true and what not. In 2017, the inventor of the World Wide Web, Tim Berners-Lee, claimed that fake news was one of the most significant new disturbing Internet trends that must first be resolved if the Internet is to be capable of truly serving humanity.

Fake news has the tendency to become viral. On Twitter, false tweets are more likely to be retweeted than truthful tweets. The tendency for humans to spread false information has to do with human behaviour. According to research, humans are attracted to events and information that are surprising and new, and, as a result, cause ‘brain arousal’. They don’t stop to verify the information. Massive online communities thus form around a piece of false news without any prior fact checking or verification of the veracity of the information – a deliberate lie is picked up by dozens of blogs, retransmitted by hundreds of websites, cross-posted over thousands of social media accounts and read by hundreds of thousands of people.

The term, fake news, has also been used to refer to satirical news, whose purpose is not to mislead but rather to inform viewers and share humorous commentary about real news and the mainstream media. This is achieved by using exaggeration and introducing non-factual elements that are intended to amuse or make a point rather than deceive. Fake news on the other hand, is written and published usually with the intent to mislead in order to damage an agency, entity or person, and or gain financially or politically, often using sensationalist, dishonest or outright fabricated headlines to increase readership. The relevance of fake news has increased in post-truth politics. American president Donald Trump popularised the term but used it erroneously to describe any negative press coverage of himself regardless of its truthfulness.

According to Claire Wardle of First Draft News, a project to fight mis- and disinformation online, seven types of fake news can be identified:

1. Satire or parody (no intention to cause harm but has potential to fool)
2. False connection (headlines, visuals or captions don’t support the content)
3. Misleading content (misleading use of information to frame an issue or an individual)
4. False context (genuine content is shared with false contextual information)
5. Impostor content (genuine sources are impersonated with false, made-up sources)
6. Manipulated content (genuine information or imagery is manipulated to deceive, as with a ‘doctored’ photo)
7. Fabricated content (new content is 100% false, designed to deceive and do harm)

In order to spot fake news, and not perpetuate its spread, go through the following eight steps:

1. Consider the source (to understand its mission and purpose)
2. Read beyond the headline (to understand the whole story)
3. Check the authors (to see if they are real and credible)
4. Assess the supporting sources (to ensure they support the claims)
5. Check the date of publication (to see if the story is relevant and up to date)
6. Ask if it is a joke (to determine if it is meant to be satire)
7. Review your own biases (to see if they are affecting your judgment)
8. Ask experts (to get confirmation from independent people with knowledge)

Only share if you’re sure! 😊

Dr Linda Visser
MBChB, MMed(Ophth), FCOphth(SA)
President: Ophthalmological Society of South Africa
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Pot-pourri

1. Lockdown
Everyone knows how the Covid-19 lockdown has affected medical practices, especially ophthalmology. April 2020 was the first month in 25 years that I did not break even. But what upsets me most is the increase that I have had in patients unable to afford surgery or expensive investigations. Owing to the devastating economic consequences of the lockdown, many patients have had to resign from medical aids. And those that were never on medical aids are struggling to afford just the consultation fees. To make matters worse, the state hospitals seem to be even less able to accommodate referrals of these indigent patients. Today a patient told me that he went to a state hospital but was told by someone in the admin office that they have stopped doing cataract surgery due to ‘the pandemic’ and he should return next year. And many patients going for surgery at private hospitals cannot afford the compulsory pre-admission Covid-19 test. The practice of medicine, as for every other industry, depends on a functioning economy. Is that stating the obvious?

2. Association between vitamin D and dry eye
A systematic review and meta-analysis study was done and published in March 2020 (email me if you want further details). It found a significant correlation between serum vitamin D levels and dry eye disease. Now we know how important vitamin D is for bones, the immune system, and many other functions. We also know that it’s not easy to get enough vitamin D from diet alone. That’s why a moderate amount of sun exposure has many other health benefits besides increasing the vitamin D levels. To satisfy our dermatology colleagues, the golden rule is to expose to the sun without getting burned.

3. Wearing masks
Of course, wearing a mask is going to lower droplet transmission of coronavirus. But for any intervention we must look at the costs and the unintended consequences. Weighing up the risks versus the benefits is what we in medicine are always doing. So, what are some of the possible unintended consequences of wearing masks? Just ask any deaf or hard-of-hearing person this question. They are suffering as they are unable to lip-read. Have you perhaps noticed fewer deaf or partially deaf patients coming to see you? I have and I’m sure that the reason is that they cannot communicate properly anymore. Also ask anyone with claustrophobia or breathing difficulties. And what about the people who work in a shop or factory where the wearing of masks is compulsory all day? It should be obvious that the oxygen level breathed in through a mask will be less than normal and the carbon dioxide level will be increased. It should be equally obvious that this may have long-term adverse effects. Many studies have been done to demonstrate this scientifically. A study done in Singapore in 2016 showed that more than 60% of respired air re-entered the body while wearing a mask across the nose and mouth. A similar discussion can be had about hand sanitisers and the possible adverse effects of these chemicals. If there’s one thing I like about wearing a mask; I can eat as much garlic as I like.

4. Dagga and glaucoma
There are two main components to the cannabis plant chemistry: THC (tetrahydrocannabinol) and CBD (cannabidiol). We have known since the 1960s that cannabis lowers intraocular pressure (IOP). Now it has been shown that it is the THC chemical that does the IOP lowering. The THC chemical is also responsible for the psychoactive effects of dagga. So, taking CBD oil or drops will probably have no effect on the IOP. Moreover, according to one study, it may even increase the IOP. Dr Alex Straiker and his team at the university of Indiana studied all this in mice and they found that THC lowers IOP while CBD raised it. They also found a sex difference. The male mice responded more to the THC than the female mice. So ‘medical marijuana’ (which removes the THC part) will probably be of no use for our glaucoma patients and may even be harmful.

5. Kindles for ARMD
One of the most useful tools for our age-related macular degeneration (ARM) patients, or any patient with central vision loss, has been the use of the Kindle or iPad for reading. These versatile devices allow for changing the background colour, font colour, font type, contrast, brightness, and most importantly, the size of the font (magnification). Patients, perhaps with the help from a tech-savvy family member,
Clive’s Corner

6. Red light for improved retinal function
Talking of ARMD, a small study has been done showing the possible benefit of red light for dry ARMD. I am always interested in anything that can help with dry ARMD because it is so much more common than wet ARMD and because most of the new research is aimed at wet ARMD. Researchers at the University College of London asked 24 people to stare at a red light (wavelength 640 nm) for 3 minutes per day for two weeks. They found that this improved colour vision and scotopic vision in those over age 45 years. The study was published in the Journal of Gerontology.

Apparently, the red light is absorbed by the mitochondria in the retinal cells giving them some sort of energy boost. It may well be worth a try because red light is harmless to the retina at this intensity and duration. The device used to produce this red light is also very cheap. Maybe if there is an AREDS III study, they should include this?

7. Viagra can damage the retina
Talking of seeing red, a patient who took high doses of sildenafil developed multicoloured photopsia and erythropsia (red-tinted vision) according to a case report published in Retinal cases and brief reports. The symptoms occurred shortly after taking the drug (which has also been used to treat pulmonary hypertension).

Further investigation using optical coherence tomography (OCT), scanning laser ophthalmoscopy and electroretinography (ERG) showed that the vision problems were associated with both structural and functional retinal damage which were probably permanent. Colour vision disturbances are a well-known side effect of this medication but until now, the actual structural effects of the drug on the retina have never been visualised.

For any questions, further discussions or references, please email me at clivenovis@mweb.co.za

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clivenovis@mweb.co.za

**Prolong corneal contact time with DexaGel**

○ For greater anti-inflammatory effect vs dexamethasone solution
○ Equivalent efficacy and safety compared to prednisolone

The Big Picture.
On the origin of life, meaning, and the universe itself

Author: Sean Carroll
Year of publication: 2016
Number of pages: 467
Reviewer: Clive Novis (clivenovis@mweb.co.za)

Sean Carroll is a theoretical physicist at the California Institute of Technology. He was born in 1966 and is a master at simplifying and explaining difficult physics concepts so that the intelligent layman can get some sort of understanding of these things.

What is ‘naturalism’? Naturalism is the belief in natural laws (of physics), rejecting any supernatural beliefs and superstitions. ‘Poetic naturalism’ is what this book is all about and is Dr Carroll’s main world view. Poetic naturalism is a philosophical approach to naturalism which encourages a variety of ways to talk about the world, using language dependent on what’s being discussed.

This book is divided into six parts:

**Part one** discusses the fundamental nature of reality (philosophers call this the study of ontology), time, and the evolution of the cosmos as a whole. Also discussed are the second law of thermodynamics, the laws of conservation of momentum and determinism in general. These give rise to very deep questions and Carroll says that we have every right to ask them, but we have no right to demand answers that will satisfy us!

**Part two** is all about understanding and how we learn about the world. Principles of statistics are explained, and Bayes theorem is discussed in detail. Statistics and the laws of probability are vital for trying to get as close to the truth as possible. This is especially important in the biomedical fields where so much uncertainty exists. Cognitive biases need to be avoided. Doctors need to have a good grasp of these concepts in order to make judgements about issues that affect the health and well-being of our patients and of society as a whole.

**Part three** is entitled ‘Essence’ and here Dr Carroll tries to explain the ‘Core Theory’ of reality. The core theory consists of two parts; ‘the standard model’ which is the model of quantum mechanics, quantum fields, particles and forces. The other part of the core theory is general relativity and the explanation of gravity.

**Part four** is entitled ‘Complexity’, with entropy being the focus of attention (back to the second law of thermodynamics). The only reason complex structures (like living things) form, explains Carroll, is that the universe is undergoing a gradual evolution from very low to very high entropy. The difficult concept of ‘energy’ is discussed, including how living things store energy in the form of ATP molecules inside mitochondria. Did you know that the ‘purpose’ of life is to hydrogenate carbon dioxide so as to release the free energy contained within that molecule?

**Part five**: Thinking, neuroscience, and theories of consciousness. The controversial topic of free will has been discussed by philosophers and scientists for a long time. Poetic naturalism has a very satisfying solution: there is no such thing as free will if you are talking about atoms, sub-atomic particles and quantum wave functions, which is the underlying stuff of which our brains are made. But there sure is free will if you’re talking about the brain as an organ of a human being alive in the natural world today.

**Part six**: Caring. Now Dr Carroll softens the rigorous scientific thinking to discuss morality and the meaning of human life. In the penultimate chapter of the book (chapter 49), Dr Carroll uses the Ten Commandments as a basis for an updated ‘Ten Considerations’ for us modern humans. He says that the important distinction is not between ‘naturalists’ (like himself) and ‘theists’ but it’s between people who care enough about the universe to make an effort to understand it and those who simply take it for granted.

If another lockdown comes and I am granted only one book to read or re-read, this book would definitely be on my short list.
When **GLAUCOMA** works on the nerves causing tunnel vision, **it's time to reduce IOP**

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**References**


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**BAK:** benzalkonium chloride; **PGA:** prostaglandin analogue; **CAI:** carbonic anhydrase inhibitor; **POLYQUAD®:** polyquaternium-1

*Brinzolamide has a physiological pH, comparable to that of human tears*
Masked Heroes, a national campaign to protect and support community care workers (CCWs) during the Covid-19 pandemic, was officially launched at the end of July 2020, and has started delivering personal protective equipment (PPE) to community-based organisations across the country.

Coordinated by the DG Murray Trust (DGMT) in partnership with REDISA and the Centre for Learning on Evaluation and Results at the University of the Witwatersrand, the campaign will be providing PPE, psychosocial support, information and communication to tens of thousands of CCWs across the country in the coming months. This effort is in response to thousands of CCWs across the country in the information and communication to tens of thousands of CCWs across the country in the coming months. This effort is in response to a bottom-up demand, and complements the Government’s distribution of PPE to health facilities.

CCWs include community health workers, emergency services personnel, social workers and social auxiliary workers, child and youth care workers, as well as food and other relief workers. As the Covid-19 epidemic continues to unfold, protection of frontline CCWs is crucial in preventing them from becoming both victims and vectors of infection. Keeping CCWs healthy will also help ensure that support, relief and counselling systems are in place as communities experience extreme duress and rising mortality.

Lorrie Allen from the Charlize Theron Africa Outreach project said, ‘The age of Covid has drawn into sharp clarity how crucial it is for all communities to be within reach and have access to healthcare – whether it be through the distribution of much-needed PPE, or the support of women and children experiencing gender-based violence at home during lockdown.’

The efforts of CCWs often go unseen. Says Dr Jonathan Broomberg, Health Response Lead for the Solidarity Fund, ‘We salute community care workers for the critical role they play in the country’s efforts to keep our communities functioning. We pay tribute to them for their courage and dedication.’

Executive Director of ELMA Philanthropies, Bernadette Moffat shared this sentiment, adding that, ‘we cannot let these heroes provide such service unprotected.’

Wherever possible, the procurement team have worked with local providers of PPE, including the Stellenbosch Nanofiber Company (SNC). ‘When we saw the pandemic was leading to a global shortage of PPE, we decided to refocus our efforts on helping to solve this problem locally,’ said Dr Eugene Smit, Business Development Manager and CEO. ‘SNC set out to develop a nanofiber-based surgical mask that would meet medical device requirements.’

Distribution of the much-needed PPE, as well as Covid-19 educational content is coordinated through a bespoke logistics system developed and managed by REDISA. Coca-Cola in South Africa, which comprises of its bottling partners Coca-Cola Beverages South Africa and Coca-Cola Peninsula Beverages, has to date provided distribution support of PPE to community-based organisation (CBOs) supporting CCWs across Gauteng and the Western Cape.

In turn these CBOs will manage and distribute stock to registered CCWs in their communities. Additionally, many of them will undergo training through the Masked Heroes campaign’s team of psychologists to provide much needed psychological first aid support to CCWs.

Masked Heroes project manager, Sinazo Nkwoelo, shared that ‘the successful delivery of PPE and other forms of support to CCWs is also testament to the power of great collaboration, how the private and NGO sectors can together, efficiently and effectively, meet social needs. This project could not be possible without the uniquely important contributions of everyone involved. Thank you to our funders who responded very quickly and with great compassion toward this urgent need and thank you also to all our partners, without whom we would not be able to reach and serve community care workers.’

To the tens of thousands of community care workers across the country, our unsung heroes, we appreciate the contributions and sacrifices you make daily – thank you!’

The Masked Heroes campaign is supported by The Solidarity Fund, The ELMA South Africa Foundation, Coca-Cola in South Africa, which comprises its bottling partners Coca-Cola Beverages South Africa and Coca-Cola Peninsula Beverages, The Johnson & Johnson Foundation, The Entertainment Industry Foundation, The Charlize Theron Africa Outreach Project (CTAOP) and The Horace W Goldsmith Foundation.

For more information, visit maskedheroes.org.za, find them at @MaskedHeroesSA, or email info@maskedheroes.org.za.
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Taking care of all types of Dry Eyes
The webside manner – how telehealth is changing healthcare

It is no secret that ‘things have changed’ since the onset of Covid-19 and subsequent living and working restrictions. The realm of digital has taken off and an industry ripe for this change is healthcare.

Technology can help address the supply and demand, for example, by assisting practitioners with their admin, thus streamlining the running of their practice to free them up to consult with treat and their patients. Already in existence prior to lockdown, telehealth has been given a huge boost by the need for patients to still see their practitioners.

Telehealth

Neil Kinsley, CEO of Medici, a telehealth app, points out: “Telehealth has been practised for a number of years. Each time practitioner and patient send a message to one another or have a consultation over a telephone, this is telehealth.” Nowadays, telehealth includes the ability for this communication to occur through different channels and mediums: voice, text and or video over mobile phone, laptop, desktop, tablet as well as email, etc.

This means that healthcare can be provided at anytime and anywhere. Telehealth also takes into account the need to adhere to social distancing. Being digital, telehealth can also reach more people and those located in remote places that were previously inaccessible.

Practice management

One of the greatest drawbacks to fully embracing telehealth, for both the practitioner and the patient, has been the billing and claiming for consultations that are done remotely. “To date, few checks and balances have been in place when it comes to virtual consulting, with practitioners relying on memory and rudimentary means to tally up consulting times spent on a particular patient, then coding them before submitting to the medical aid scheme for payment”, says Deon Bührs, Global Group Executive: Operations at ProfNet Medical (who created EZMed). To assist with this problem, a practice management software programme like EZMed, combined with Medici’s telehealth application, has given practitioners the ability to precisely track their patient interactions, which are then pulled through into the practice management billing system. The EZMed platform’s ‘intelligence’ makes provision for certain coding checkpoints along the way to ensure that the practitioner captures the correct information, which is then automatically submitted to the medical aid scheme for payment. (EZMed is integrated into all 83+ medical aids.)

Data security

‘Data security is the minimum requirement for a good telehealth platform. It needs to be PoPi compliant too. A critical question that practitioners and patients should be asking themselves when engaging in telehealth, is whether the platform was specifically made for healthcare use or not. If it was not, it is likely not secure,’ says Kinsley.

Steps for a better webside manner

1 Consent: Make sure the relevant permissions have been given with a view to conducting a virtual consulting session.
2 Practitioner professionalism: Look smart – banish the comfy lounge tops till the weekend; act smart – maintain the same professional demeanour as you would in face-to-face interaction and be engaged and focused; sit smart (or stand straight if using a standing desk) – this also includes screen placement so you can still look at each other eye to eye.
3 Minimise external disturbances: Turn off your mobile phone (switch to airplane mode) so that you are not disturbed, and banish the background screen saver as they are distracting.
4 Network connection: Internet connectivity can go offline or signal can be weak so have a plan upfront to deal with this and agree who will call who back. To minimise interruptions though, minimise the number of devices connected to your internet at any one time – this applies equally to practitioners and the patients.
5 Be prepared: Practitioners and patients should be ready in advance of the consultation with all notes. If you are sharing a screen, make sure all other documents are closed so you are not inadvertently sharing someone else’s information.
6 Finish up: Make sure you close out and finish you online session when done. Remain silent until you are 100% sure the connection has closed.
7 Take a break: When working from home or remotely, there is a greater likelihood of being inactive (lots of sitting). To keep alert and able to focus on patients’ needs, it is important to physically move between consultations. Being focused will mean everyone will benefit from the healthcare interaction.

More information can be found at: https://www.ezmed.solutions

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References:
1. COSOPT® Professional Information, 15 January 2010

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