

Burden of eye conditions at a specialised eye hospital in KwaZulu-Natal, South Africa



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Background: Comprehension of the burden of eye diseases in an area is essential for adequate budgeting and resource allocation.

Aim: The aim of the study was to describe the epidemiology of the presenting eye conditions at a provincial eye hospital.

Setting: A retrospective audit was conducted of first-time presenting patients at the McCord Provincial Eye Hospital over a 6-month period.

Methods: This was an observational, analytic cross-sectional study. Patients' basic demographic and diagnoses were captured. Categorical variables were summarised using frequencies and percentages. Age was summarised using the mean and standard deviation. Differences in the number of patients seen per month, week and day of the week were compared using analysis of variance.

Results: A total of 2250 new patients were seen over the 6-month period. There were more females ($n = 1253$, 55.7%) than males ($n = 997$, 44.3%). There were 186 (8.3%) patients (≤ 14 years). The three most common presenting conditions among adults were cataract ($n = 743$, 36.0%), posterior segment disorders ($n = 397$, 19.2%) and glaucoma ($n = 261$, 12.6%). Regarding posterior segment disorders, diabetic retinopathy was the commonest condition ($n = 284$, 71%), followed by retinal detachment ($n = 34$, 8.5%). Among the paediatric patients, the most common condition was squint ($n = 55$, 29.6%), followed by orbital conditions ($n = 29$, 15.6%) and cataract ($n = 25$, 13.4%).

Conclusion: Audits of the burden of eye conditions provide useful information for human resource management; appropriate allocation, as well as availability of ophthalmologic equipment and staff, can be guided by making use of such information. Further studies and surveillance of eye conditions are needed to plan for better eye health services for patient care.

Keywords: eye conditions; cataract; South Africa.

Introduction

Eye health is an important aspect of healthcare services. Many eye conditions require access to specialised care, and they can lead to blindness if left untreated. Limited information is available regarding the burden of eye conditions in South Africa, as data on the burden of eye conditions presenting to public or private health facilities are not routinely collected or reported. Data from the 1980s and 1990s show that the major causes of blindness and impaired vision in South Africa were cataract, glaucoma, refractive errors and corneal scarring.¹ In 2002, a study in Limpopo reported a prevalence of blindness of 0.7%, with the main causes being cataract, glaucoma, corneal opacities and trauma.² Refractive errors remain the leading cause of visual impairment worldwide.³

Human resources for eye health need to be planned according to the epidemiology of eye conditions, in terms of the requirements for diagnosis and treatment.⁴ A good understanding of the burden of eye diseases in an area is essential for adequate budgeting and resource allocation. The VISION 2020 Global Initiative by the World Health Organization and the International Agency for the Prevention of Blindness emphasise the importance of human resources, and the implementation and success of this programme to reduce avoidable causes of visual impairment.⁴ In sub-Saharan Africa, poor quality and lack of availability of data regarding human resources in eye health impede planning and implementation of programmes to prevent blindness. In a review of human resources for eye health among 21 countries in

sub-Saharan Africa in 2014, South Africa was excluded because of insufficient data regarding the number of various practitioners dealing with eye health.⁵

The demographic transition in sub-Saharan Africa and an increase in the number of diabetic patients are important factors while dealing with eye health. An increase in the prevalence of diabetic retinopathy, age-related macular degeneration and glaucoma in a population with increasing life expectancy has implications on the resources required to provide eye health services.^{6,7}

Visual impairment has been linked to poverty, decreased autonomy and social interaction, mental health disorders, such as depression, as well as a decline in physical mobility and self-care.^{8,9,10} All of these factors contribute to a decline in the quality of life and socio-economic interaction.

Many cases of blindness can be prevented by providing timely access to appropriate eye healthcare services. Blindness and visual impairment can result in a lack of education, unemployment and can be a burden on families and the healthcare systems.¹¹

Objectives

The aim of this study was to describe the epidemiology of eye conditions at a provincial hospital, and to determine if there are any differences in the number of patients seen per day of the week.

Methods

The study was conducted at the McCord Provincial Eye Hospital (MPEH), which is the only specialised eye hospital in the province of KwaZulu-Natal (KZN), South Africa. This hospital serves the majority of patients requiring healthcare from eThekweni, iLembe and Ugu health districts. The services offered at MPEH are structured in a systematic manner to help streamline the patient flow. First-time patients without appointments, as well as referred patients, are first triaged at the primary eye care unit (PECU), where they are screened by a trained ophthalmic nurse. Patients assessed as having a primary eye care condition are referred to either a medical officer, an ophthalmic nurse or an optometrist. Patients who are assessed as having signs and symptoms that warrant a second triage are sent to an ophthalmologist for further assessment. During this second triage, patients requiring prompt intervention are referred to the 'intake team' for further management. This includes patients presenting with ophthalmic emergencies, cataracts, vision-threatening conditions and all eye conditions requiring intervention and a higher level of care, as compared to that provided at the PECU. The intake team assesses these patients, and they are either admitted or treated as outpatients. The intake team comprises a consultant, registrar and medical officers.

This was an observational, analytic, cross-sectional study. A retrospective chart review was conducted for patients who presented to the intake team at MPEH over a 6-month period, from May to October 2016, as first presentations requiring treatment. The exclusion criteria were: (1) any follow-up patients seen by the intake team (patients previously known to MPEH) or (2) patients presenting to the intake team before 08:00 or after 16:00 on weekdays or patients seen over the weekend.

Patients' basic demographic data (gender and age) and diagnoses were recorded using Microsoft Excel spreadsheet. The diagnoses were categorised into 11 broad groups of eye conditions:

- cataract (age-related, congenital or secondary to other conditions)
- vascular disease (vein or artery occlusions)
- conjunctival pathology (pterygia, conjunctival masses)
- neurologic eye conditions (ptosis, cranial nerve palsies)
- orbit (thyroid eye disease, proptosis, idiopathic orbital inflammatory disease, orbital masses, infections)
- trauma (lid, orbital or globe)
- squints (esotropia or exotropia)
- uveitis (anterior, intermediate, posterior segment or panuveitis)
- glaucoma
- corneal pathology (ulcers, keratoconus or dystrophies)
- posterior segment disorders (retinal detachment, diabetic retinopathy requiring urgent intervention and other retinopathies).

The data were analysed using the Statistical Package for Social Sciences (SPSS) version 25. Categorical variables were summarised using frequencies and percentages. Age was summarised using the mean and standard deviation (SD). Patients were categorised as paediatric patients if they were below the age of 15 years.^{12,13} Differences in the number of patients seen per month, week and day of the week were compared using analysis of variance (ANOVA). Results were considered significant for $p < 0.05$.

Gatekeeper permission was obtained from the hospital management and the KwaZulu-Natal Department of Health. Institutional ethics approval was obtained from the Biomedical Research and Ethics Committee at the University of KwaZulu-Natal.

Ethical considerations

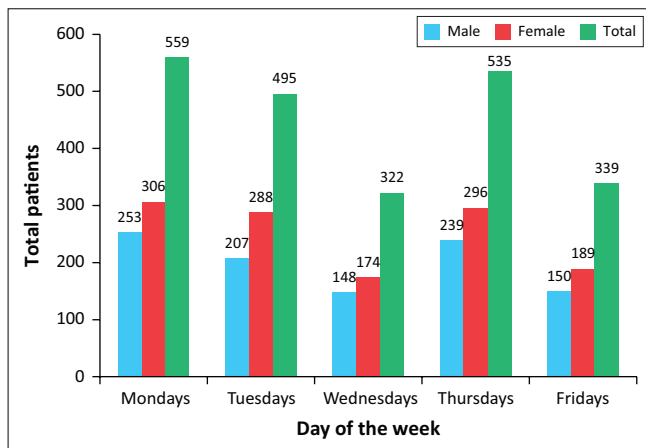
Ethical approval to conduct the study was obtained from the University of KwaZulu-Natal Biomedical Research Ethics Committee (clearance number: BE 453/16).

Results

A total of 2250 new patients were seen by the intake teams over the 6-month period. There were more females ($n = 1253$, 55.7%) than males ($n = 997$, 44.3%). The mean age of females (54.2 years, SD 22.3) was significantly higher than the mean

TABLE 1: Gender of patients presenting to the McCord Provincial Eye Hospital, May–October 2016.

Month	Male		Female		Month total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
May	153	42	212	58	365	100
June	190	42.4	258	57.6	448	100
July	179	45.7	213	54.3	392	100
August	199	45.1	242	54.9	441	100
September	124	47.7	136	52.3	260	100
October	152	44.2	192	55.8	344	100
Gender total	997	-	1253	-	2250	-

**FIGURE 1:** The number of patients seen per day of the week at the McCord Provincial Eye Hospital, May 2016 – October 2016.

age of males (46.6 years, SD 21.7) ($p = 0.005$). There were 186 (8.3%) paediatric patients (≤ 14 years).

The number of patients seen per month ranged from 260 in September to 485 in June (Table 1). There was no significant difference in the number of patients seen per week of the month. The mean number of patients seen per day of the week differed, with a significantly higher number of patients seen on Mondays, Tuesdays and Thursdays, compared to Wednesdays and Fridays ($p < 0.05$) (Figure 1). The highest number of patients were seen on Tuesdays ($p = 0.025$) and the least number of patients were seen on Fridays ($p = 0.046$).

The three most common presenting conditions for each month during the 6-month period were cataract ($n = 768$, 34.1%), posterior segment disorders ($n = 17.8\%$) and glaucoma ($n = 268$, 11.9%). The mean number of patients presenting with cataracts was significantly higher than the number of patients presenting with other conditions ($p < 0.05$). The majority of cataract cases were age related ($n = 661$, 86%). Among the patients with age-related cataracts, two-thirds ($n = 437$, 66.1%) were females. Twenty-three (3%) patients had congenital cataracts, and 84 (11%) patients had cataracts secondary to other causes. In the category of posterior segment disorders, diabetic retinopathy was the commonest condition ($n = 284$, 71%), followed by retinal detachment ($n = 34$, 8.5%). A total of 141 (6.3%) patients presented with trauma-related eye conditions, of which the majority were males ($n = 108$, 76.6%) (Table 2).

TABLE 2: Eye conditions seen at the McCord Provincial Eye Hospital, May–October 2016.

Conditions	Male	Female	Total
Cataract	-	-	768
Age-related	224	437	661
Congenital	15	8	23
Secondary to other conditions	47	37	84
Posterior segment disorders	-	-	400
Diabetic retinopathy	111	173	284
Retinal detachment	12	22	34
Other	38	44	82
Glaucoma	123	145	268
Orbit	-	-	146
Thyroid eye disease	2	3	5
Proptosis	10	3	13
Idiopathic orbital inflammatory disease	1	0	1
Orbital masses	9	19	28
Orbital infections	16	13	29
Other	32	38	70
Trauma	-	-	141
Lid	33	8	41
Orbital	15	7	22
Globe	46	13	59
Other	14	5	19
Conjunctival pathology	-	-	127
Pterygiums	7	21	28
Conjunctival masses	25	19	44
Other	19	36	55
Corneal pathology	-	-	126
Ulcers	45	30	75
Keratoconus	12	12	24
Dystrophies	1	1	2
Other	13	12	25
Uveitis	-	-	87
Anterior	26	20	46
Intermediate	1	1	2
Posterior	8	18	26
Panuveitis	10	3	13
Neurologic presentation	-	-	82
Ptosis	6	6	12
Cranial nerve palsies	5	8	13
Other	20	37	57
Squints	-	-	67
Esotropia	31	31	62
Exotropia	2	2	4
Other	0	1	1
Vascular disease	-	-	38
Vein occlusions	14	16	30
Artery occlusions	2	2	4
Other	1	3	4

Note: Bold data gives the total of the specific category of eye conditions that is listed.

Among the paediatric patients, the most common condition was squint ($n = 55$, 29.6%), followed by orbital conditions ($n = 29$, 15.6%) and cataract ($n = 25$, 13.4%).

Discussion

This is the first report of the epidemiology of eye conditions of patients presenting at a specialised eye hospital in South Africa. Females presented more commonly than males, in keeping with the general demography of users of healthcare services.^{14,15} However, studies from high- and low-income countries, such as the United States, Kenya and

Bangladesh, reported a higher proportion of males utilising eye care services.^{16,17,18,19,20,21}

We found that the females in this study were significantly older than the males. Worldwide, there is an increase in life expectancy, with women living longer.²² This is also reflected in South Africa where the life expectancy in females is 67.3 years, compared to 61.1 years in males.¹³ In our study, more females presented with age-related cataracts, and more males presented with trauma-related conditions. This can also explain the age difference between the presenting males and females.

The number of patients was significantly less on Wednesdays and Fridays, compared to the other weekdays. The Department of Ophthalmology has an academic meeting on Wednesday afternoons during which there are registrar teaching sessions, including tutorials, journal club, subspecialist clinics and academic case discussions. Academic ward rounds are held on Friday afternoons. Some referring hospitals are aware of the academic activities and therefore limit patient referrals on these days. Patients choosing not to present to hospitals prior to a weekend could possibly be an explanation for the lower number of patients seen on Fridays. Studies conducted in Portugal and Australia also reported higher non-attendance of patients for general outpatient and gynaecology appointments on Fridays.^{23,24}

However, a review of the patterns and influences of healthcare attendance behaviour found no clear and consistent association between day of the week and patient attendance at clinics.²⁵

Our finding of cataract being the commonest presenting condition is in keeping with this condition being the leading cause of blindness globally and in South Africa. Uncorrected refractive errors and cataracts remain the leading cause of preventable blindness in lower-middle-income countries.²⁶ This is also in keeping with previous studies conducted in South Africa.^{1,2,11,27} Patients in the eThekweni health district are largely dependent on cataract services provided at MPEH, with only Prince Mshiyeni Memorial Hospital (another public hospital) providing the facility of routine cataract surgery in this district. In addition, complicated cataract cases from other districts are referred to MPEH. The low proportion (3%) of congenital cataracts in this study is because the majority of patients with this condition are being referred directly to a specialised paediatric clinic at Inkosi Albert Luthuli Central Hospital.

Strikingly, a large proportion of patients who presented with posterior segment pathology had diabetic retinopathy. This finding is in contrast to global trends of blindness and visual impairment, for which cataract, age-related macular degeneration and glaucoma are the leading causes.^{28,29} Our finding of a high prevalence (12.6%) of patients with diabetic retinopathy that required specialised eye care services is almost 1.5 times that of the global estimate (8.5%).³⁰ While there are no national figures available for the prevalence of

diabetic retinopathy in South Africa, a study in Cape Town reported that diabetic retinopathy contributed to 8% of blindness and 11% of visual impairment, respectively.³¹ The prevalence of diabetes in KZN (12.5%) is higher than the national prevalence (9.2%),³² which may explain this high prevalence. Increased predisposition to diabetes in the Indian population (which accounts for 7.4% of the KZN population)^{13,20} has been described, along with an increase in the prevalence of diabetes among the black South African population.^{13,33} This study included only patients with diabetic retinopathy requiring an intervention (laser, intravitreal injection or surgery); therefore, the prevalence of diabetic retinopathy among this population may be overestimated.

The patients with diabetic retinopathy in our study presented to MPEH for the first time. This suggests that patients with diabetes mellitus are not being routinely screened for diabetic retinopathy. Screening for diabetic retinopathy should be conducted annually at primary healthcare clinics, and patients should be referred to specialist ophthalmic services timely. The importance of primary medical check-up, as well as eye care, for patients with diabetes mellitus must be stressed. Improvements in primary healthcare and screening for target organ damage will result in better prognosis for these patients. In the long-term, better glucose control and risk factor management will result in improved quality of life and preservation of vision.

The effect of glaucoma on vision, peripheral vision in particular, is profound in advanced glaucoma. More than 10% of the patients in this study had glaucoma that required intervention. South Africa does not have a formal screening protocol for glaucoma, which may result in many patients being diagnosed with the advanced disease.

Limitations

This study included only those patients seen on weekdays and during normal working hours. The exclusion of patients seen after-hours and on weekends can skew the epidemiology of the conditions seen. This is particularly true for trauma-related cases, which explains the low proportion of patients with ocular trauma. As this was a descriptive study, we were unable to assess risk factors for any of the conditions. We were also unable to categorise the severity of diagnosed diseases, such as diabetic retinopathy and glaucoma, based on the data used for this study. During the 6-month study period, there were strict screening criteria in place for the referral of patients to the intake team because of doctor shortages, which would have resulted in an underestimation of the prevalence of the various conditions requiring interventions.

Conclusion

Audits of the burden of eye conditions provide useful information for human resource management. Appropriate allocation, as well as availability of ophthalmologic equipment and staff, can be guided by using such information.

The high number of patients with cataracts highlights the need to increase resource allocation in order to meet the needs of this population. Screening for glaucoma and diabetic retinopathy should be implemented and improved at a primary healthcare level. The importance of screening cannot be underestimated, as timeous management and prevention of complications of these conditions can prevent blindness and decrease the long-term financial burden on the health system. Patients need to be educated on these conditions, so that they can present themselves for screening. Further studies and surveillance of eye conditions are needed at the district and provincial levels to plan for better eye health services for patient care.

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Competing interests

The authors have declared that no competing interest exist.

Authors' contributions

V.F.V. prepared the protocol, collected the data and wrote the manuscript. S.M. supervised the writing of the protocol, analysed the data and assisted with the preparation of the final manuscript.

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Data availability statement

Data sharing is not applicable to this article.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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