

INTRODUCTION

Penetrating corneal injuries are a cause of visual morbidity. In Zimbabwe, the incidence or prevalence of morbidity or blindness due to penetrating corneal injuries is unknown. However anecdotal evidence suggests that there is at least one case of penetrating corneal injury for repair each theatre list at Sekuru Kaguvi, of which there are five scheduled theatre lists per week.

I am also not aware of the existence of a national data base on eye injury related morbidity or blindness. In the United States, such data is captured on the United States Eye Injury Registry (USEIR).¹ A hospital based study by G.M. Chirunga over a six month period from August 1994 to January 1995 revealed that penetrating eye injuries accounted for 11,5% of admissions at Sekuru Kaguvi Eye Unit.² In Scotland, the incidence of eye injury needing admission is 8.4 per 100 000 population annually.³ According to both the USEIR and Scotland records, any age group is at risk of penetrating eye injury, but with a higher incidence in males particularly the ages 25 to 30^{1,3}. The study by G.M. Chirunga also showed that among adults, males below the age of 40 years were more at risk for penetrating eye injuries as well as children below 15 years of age.²

International epidemiology of penetrating eye injury has similar demographics of who is likely to sustain penetrating corneal injury.¹ The demographics of penetrating eye injury in Zimbabwe are unknown.

Penetrating eye injury is an ophthalmic emergency. When patients present, a detailed history is taken to establish the circumstances surrounding the injury, nature of object of injury, time and place, intervention strategies taken before reaching the hospital. Severe pain is a constant feature and the amount of vision in the affected eye depends on the severity of the injury. A quick careful assessment of the injury is undertaken, including where possible, the visual acuity of the injured eye. During the assessment, extreme care should be taken not to apply undue pressure to the globe by the examiner as this could result in the unintended extrusion of the globe contents since the globe would be open.¹ The injured eye is then protected by covering it with a hard eye shield which rests on the margin of the bony orbit.¹ The patient is given anti tetanus injection, systemic prophylactic broad spectrum antibiotics and analgesics.^{1,4} At SKH oral ciprofloxacin is given as prophylactic antibiotic. Other regimens can be used though, that have a coverage for the bacillus species, gram positive cocci, pseudomonas and other gram negative organisms, like intravenous vancomycin and ceftazidime.⁴ Topical medications into the injured eye as well as sub conjunctival injections are best avoided before repair of the injury since they may deliver concentrated drug into the eye as well as irritate the patient causing him/her to squeeze the eye with extrusion of globe contents.

The causes of penetrating corneal injuries are many . Various authors have written on the various causes and the activities associated with the injuries. Activities associated with such injuries include accidents while playing in children, domestic chores like wood chopping, farm accidents, road traffic accidents, work related injuries and violence.^{2, 5, 6,7, 8,9} The objects of injury are also varied and include such items like vegetative matter, wires, nails, broken glass etc. Vegetative

matter, particularly carries a high risk of causing endophthalmitis^{9,10}, as well as retained intraocular foreign bodies.

Surgical repair should be aimed for within 24 hours of injury. The patient or guardian is counseled about the intended surgical plan and informed consent is obtained and signed for. The patient is prepared for theatre to be operated on under general anesthesia.

Post operatively the patient is put on topical steroid/antibiotic combination drops frequently enough to prevent healing with excessive scarring and possible endophthalmitis.

Topical atropine drops twice daily for usually up to two weeks will sufficiently control the pain caused by spasms of the ciliary body muscles. If surgery was uncomplicated, follow up is usually day 1 post op, at two weeks post op, then a month later to make a total of six weeks at which point corneal sutures can be removed.⁴ Children below eight years, will need to have amblyopia treatment by patching the better uninjured eye periodically to encourage the injured eye to develop some useful vision.

JUSTIFICATION OF STUDY

Trauma is such an important cause of mortality and morbidity in the practice of medicine.

Although mortality from eye injuries is rare, visual morbidity is significant. The resulting visual morbidity can negatively impact on the future career choices of some affected individuals and some already on jobs because some careers are exacting in their visual requirements. Timely management of penetrating corneal injuries and subsequent visual rehabilitation can save useful vision in the injured eyes. This study is therefore designed to assess what level of success in terms of saving useful vision we are achieving at Sekuru Kaguvi Eye Unit. The findings can then be used as basis for guidelines on the management of penetrating corneal injuries building on the strengths of the current management protocol and strengthening on areas that may be contributing to not so favourable outcomes.

Sekuru Kaguvi is a specialist referral hospital which receives patients with penetrating corneal injuries from most parts of the country. It is therefore imperative for the unit to be able to audit itself as far as management of ophthalmic emergency cases so that it can better inform its satellite referral centres of successes and limitations to providing quality eye care in such cases.

LITERATURE REVIEW

Structure and Function of the Cornea

The cornea and the sclera form the outermost fibrous tunic/coat of the human eyeball.¹¹ Both are soft connective tissues designed to provide structural integrity of the globe and to protect the inner components of the eye from physical injury.¹¹ The cornea covers the anterior one sixth of the total surface of the globe and the opaque sclera covers the remainder five sixths.¹¹ The cornea is the transparent front part of the eye ball. The cornea is thus essentially the window of the eye.¹¹

The cornea is the major refractive medium of the eye accounting for three quarters of the eye's total refractive power.¹² The anterior corneal surface provides the major refractive power where refraction occurs at the air/ pre corneal tear film interface owing to the large difference in the refractive indices of the air and the cornea stroma or tear film.¹² The posterior corneal surface contributes little to the cornea's total refractive power because of the little difference between the refractive indices of the cornea stroma and the aqueous in the anterior chamber.¹²

For the cornea to perform its optical functions, it must remain transparent and be able to transmit light with minimal scattering.¹² Transparency of the cornea is achieved through its anatomic structure and physiological functions. Traditionally anatomy of cornea consists of 5 layers, from out to within; epithelium, Bowman's membrane, stroma, Descemet's membrane

and endothelium.^{12, 13} . The recent discovery of a pre Descemet's layer, the Dua's layer, makes the layers of the cornea six¹⁴. The regular arrangement of the epithelial cells provides a smooth refractive surface, producing negligible scattering of incident light. Absence of blood vessels, presence of unmyelinated nerve fibres and the regular arrangement of uniformly sized collagen fibrils in the stroma into lamellae, as shown in figure 1 below, account for minimal scatter and distortion of light rays thus maintaining corneal transparency.^{12, 13}

Physiologically, the pumping action of the epithelium and especially the endothelium, maintains stromal hydration at 78%, the optimal hydration to maintain corneal clarity.^{11, 12} This accounts for minimal light scatter hence transparency of the cornea.^{12, 13}

The epithelium and the endothelium also provide a mechanical barrier through tight junctions between cells that prevent water from getting into stroma from the pre corneal tear film and aqueous respectively.^{11, 12, 13}

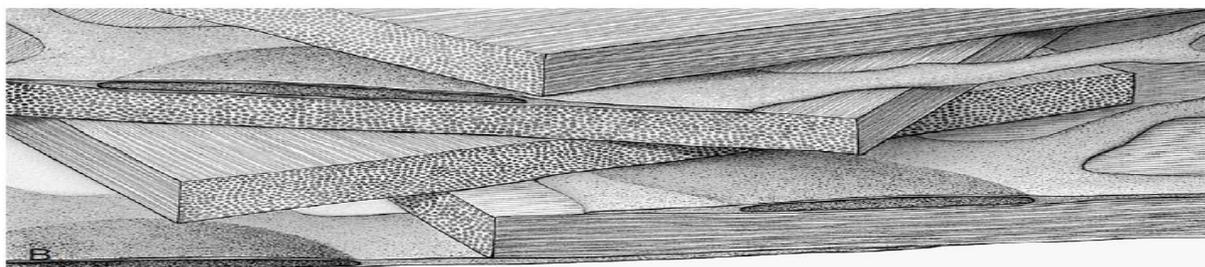


Figure , showing uniform sized collagen fibrils arranged regularly into lamellae in the cornea stroma with flattened keratocytes between lamellae. Adapted from Clinical Anatomy and Physiology of visual system. Pdf, page17.

Corneal Injury and Healing

With epithelial injuries, basal epithelial cells at the edge of the wound develop membrane extensions that enable the cell to migrate and cover the wound.¹² Once the defect is covered by a single layer of cells, cell-to-cell junctions develop between adjacent cells.¹² Cell division starts until the stratified nature of the epithelium is established.¹² The Bowman's layer, if injured will not regenerate.¹²

When the injury extends into stroma, keratocytes increase in number and are stimulated to become myofibroblasts. Myofibroblasts cause contraction of the wound bed enabling rapid wound coverage by the epithelium.¹² New connective tissue is laid. The regenerated collagen is larger than original fibrils, and the alignment and organization of the new fibrils is not regular.¹² Thus scar tissue forms, light scatter increases and hence loss of corneal transparency. This causes visual obscuration the severity of which depends on the size and location of the scar. The Descemet's membrane will be reformed by the endothelium. The endothelium does not regenerate.¹² Neighbouring endothelial cells enlarge and flatten to cover the area of loss, resulting in decrease in endothelial cell density.¹²

Management of penetrating corneal lacerations and factors affecting final visual outcome

Following penetrating cornea injury, the injury ideally needs primary repair within 24 hours for optimal results, all other things being equal. Repair is done with the patient under general anesthetic. Achieving a water tight wound is the goal of surgery.^{15,16} Monofilament 10.0 nylon on a fine spatula-design microsurgical needle is the suture of choice because this suture causes very little tissue reaction, thus minimizing vascularization and scarring of the wound site.^{15,16} Restoration of normal anatomic relationships is vital as well as the normal corneal topographic contour and in centers where resources are available, computed corneal topography analysis aides in restoration of normal corneal contour. In resource limited settings, such facilities may not be available. During repair, viscoelastic substance administered through a limbal paracentesis will help to form and maintain the anterior chamber, protect the corneal endothelium and iris as well as tamponade intra ocular contents.¹⁶ Suture placement should be done in way so as to avoid wound edges from overriding and they should be placed about 90% deep and equal distance either side of wound.¹⁶ If wound edges are sutured properly, the cornea will reshape to its normal topography upon removal of sutures because it has a high topographic memory.¹⁷ Associated injuries are managed accordingly. At SKH , in cases of traumatic cataract with ruptured anterior lens capsule, the policy is to repair the corneal laceration and do anterior chamber washout. Intraocular lens implantation is done secondarily, while other authors advocate for primary lens insertion.¹⁸ Post operatively, the patient is put on steroid/antibiotic combination as frequently as necessary.

The steroid is to suppress an intense inflammatory response to achieve as minimal scarring as is possible and the antibiotic as prophylaxis against development of endophthalmitis.

Scarring and induced astigmatism will cause significant visual loss. The final visual outcome following penetrating cornea injury and repair is influenced by a number of factors, singly or in combination. R Agrawal et al, evaluated factors that influence final visual outcomes after surgical repair of penetrating globe injuries, and writing in the Indian Journal of ophthalmology 2011 concluded that age of patient, preoperative visual acuity, mode of injury and time lag between injury and repair were associated with final visual outcome at univariate level.¹⁹ On multivariate analysis, only age, mode of injury and time lag between injury and surgical repair achieved statistically significant results.¹⁹ All the patients under evaluation had been operated on by experienced ophthalmologists to minimize as much as possible surgeon factors as an influence on the final visual outcomes. C.C. Barr also evaluated prognostic factors in corneoscleral lacerations. C.C. Barr evaluated 122 patients with corneoscleral lacerations and found out that good visual outcomes were associated with good initial visual acuity, absence of hyphaema, absence of posterior uveal prolapse or vitreous haemorrhage. Delaying initial repair up to 36 hours had no effect on outcome.²⁰

Visual Rehabilitation following corneal laceration repair

Optimal visual rehabilitation following cornea laceration repair can be achieved by either spectacles or rigid gas permeable (RGP) contact lenses.²¹ Jeewen S Titiyal evaluated both methods and found RGP contact lenses provided superior visual outcomes providing two Snellen lines better visual acuity than spectacles.²² Because of the scarring, RGP contact lenses provide a smooth regular refracting surface eliminating astigmatism.^{22, 23} In severe degrees of scarring

involving the visual axis, penetrating keratoplasty (PKP) can be offered depending on the vision in the fellow eye and whether or not that particular eye and patient meet the criteria for the procedure and the patient's visual needs.

Complications of penetrating corneal injuries

Penetrating corneal injuries can result in some of the following complications, depending on the mechanism, the severity of injury and nature of object of injury. Iris damage can occur and hyphaema can result from bleeding from injured iris blood vessels.^{7,8} There is a real risk of introducing infection into the eye resulting in the serious complication of endophthalmitis. Around 6% of patients with penetrating eye injury develop endophthalmitis²⁴ and the risk of developing endophthalmitis is particularly high with injury from organic matter.²⁴ When there is lens damage, risk of endophthalmitis increases.^{18,24}

Uveitis, vitreous haemorrhage, retinal tears leading to retinal detachment are potential complications which have a profound effect on the final visual outcome.^{7,8} Traumatic cataract is commonly seen in penetrating corneal injuries with or without rupture of the anterior capsule. Post traumatic glaucoma can also complicate penetrating injury.^{7,8} Healing with fibrotic scar of the cornea will result in significant visual impairment from light scatter and induced astigmatism.

OBJECTIVES

Main Objective

To analyze the visual outcomes of patients in the study who underwent surgical repair for penetrating corneal injuries at Sekuru Kaguvi Eye unit during the study period.

Specific Objectives

1. To describe the demographics of the study population.
2. To elicit the causes of the injuries.
3. To evaluate the monocular uncorrected and best corrected visual acuities of eyes of the patients under study.

METHODOLOGY

Hypothesis

At least 68% of patients who had penetrating corneal laceration and repair at Sekuru Kaguvi Eye Unit achieved best corrected visual acuity (BCVA) of 6/60 or better.²⁵

Study Type

Prospective hospital based study.

Study Setting

Sekuru Kaguvi Hospital is located at Parirenyatwa Group of Hospitals, one of five referral hospitals in Zimbabwe. Sekuru Kaguvi Eye Unit is one of two eye referral hospitals in

Zimbabwe, with the other being Richard Morris, located at United Bulawayo Hospitals in Bulawayo. Sekuru Kaguvi receives patients from all corners of Zimbabwe.

Study Population

Patients who suffered penetrating corneal lacerations and were repaired at Sekuru Kaguvi and they were being followed up in the Outpatient Department.

Sampling

Recruit all eligible patients.

Sample size

Sample size was 70 based on literature review where the proportion of patients who achieved good visual outcome, i.e. BCVA of 6/60 or better was 68%.²⁵ The sample size was calculated using life stata formula at 80% power.

Data Management and Analysis

Data was captured onto Data sheet by the researcher. It was then entered into Epi info version 3,5,3 by the research assistant. Data cleaning and analysis was done using STATA version 12,1. Fisher's exact test was used to test associations between two variables with p values of less than 0.05 being significant.

Inclusion Criteria

Patients who were willing to enroll into the study.

Patient having had penetrating cornea injury repaired at Sekuru Kaguvi.

Exclusion Criteria

Patients who were unwilling to enroll into the study.

Patients who were likely to be uncooperative in assessing visual acuity like the mentally retarded, non school going children.

Patients whose injury circumstances suggested ruptured globe instead of sharp penetrating injury.

Risks to the patient

Study involved no added risks to the patient. Patients were managed routinely.

Procedure

.Patients were referred to SKH after injury and were seen during clinics, of which there are 5 clinics during the week, Monday to Friday.

.During weekends and holidays patients with penetrating eye injuries were seen at the Casualty, then admitted to the ward.

.Patients with penetrating corneal injuries seen in clinics or casualty were admitted to SKH after history had been taken of when and how the injuries occurred, what the causes of the injuries were.

.An assessment of the patient's injury was made noting the degree of injury, other associated injuries and where possible checking the visual acuity of the injured eye preoperatively.

.Assessment of the patient was done on slit lamp biomicroscope if in the clinic or using pen torch if the patient was seen in the casualty department as initial assessment.

.A review of the patient's pre hospital treatment was made to see if patient had already been given anti tetanus injection, was getting adequate analgesia and was on systemic prophylactic antibiotic from the referral centre.

.If patient had not received above treatment at referral center, the patient was then given anti tetanus injection as appropriate, adequate analgesia and systemic prophylactic ciprofloxacin by oral route and a protective eye shield.

.Patient was counseled about need for surgical repair under general anaesthetic and an informed consent was obtained from the patient or parent/guardian if patient was under the age of 18years in order to undergo surgical repair.

.Bloods for FBC and U&Es were drawn and sent to the laboratory.

.If patient was seen in the clinic, the patient was put on the operation list for the following day and operated on by the registrar covering that list.

.If patient was seen during weekends or holidays, he/she was put on the emergency list and operated on by the registrar on call.

.Post operatively patients were put on topical medication, steroid/antibiotic combination drops at least 6 hourly; atropine drops twice daily and steroid or antibiotic ointment at night. Systemic prophylactic antibiotic (ciprofloxacin) was continued until full course of five to seven days.

.Day 1 post op, patients were seen by the researcher and were interviewed and examined for suitability to enroll into the study.

.Informed consent to enroll into study was obtained from the patient or parent/guardian for those under 18 years of age, for those who met recruitment criteria.

.The researcher then captured onto the data sheet details of the patient's age, sex, occupation, place of residence, when and how the patient got injured and what the cause of the injury was and noted the initial findings on ocular examination at the slit lamp.

.Patients were seen on Day 1 post op. If they had no complications, patient were discharged and then seen at 2 weeks and 6 weeks post op.

.At 2 weeks patients were examined for wound healing, checking for treatment compliance and resupply of medications where necessary.

.At six weeks,⁴ corneal sutures were removed at the slit lamp under local anaesthetic with suture removal forceps after cutting them with sharp green needle, and patients asked to come back a week later.

.A week after suture removal, the uncorrected visual acuity was assessed using Snellen chart.

The patient was then refracted objectively with a retinoscope followed by subjective refraction to obtain the best possible monocular distance visual acuity using the Snellen chart.

.The anatomical structure of the eye was then assessed on the slit lamp and recorded on the data sheet. Anterior segment structures were examined and the following noted and recorded on the data sheet:

- Globe, normal or phthisical.

- Cornea scar, size, involving visual axis or not, drawing of scar.
- Cornea clarity, clear, hazy or opaque.
- Anterior chamber, normal depth, shallow, anterior synechiae present/absent.
- Pupil, shape round/irregular, central/eccentric, size dilated/ posterior synechiae.
- Lens phakic and clear, phakic and cataractous, aphakic, pseudophakic.
- Anterior chamber angle, open/recession/closed.
- Posterior segment was examined on the slit lamp using 90D lens or with an indirect ophthalmoscope using a 20D lens after pupil dilation with a mydriatic and the following noted:
 - Fundoscopy, media clear/ opaque.
 - Fundoscopy, retina normal/ abnormal (findings), optic disc findings (cupping).
- Then intraocular pressure (IOP) was measured using Goldmann Applanation tonometer on the slit lamp.

Materials.

- . data capture sheet.
- . slit lamp biomicroscope with Goldman Applanation tonometer.
- . Snellen chart/ illiterate E chart.
- . retinoscope/ trial lens set and frame.
- . 90D and 20D lenses.
- . Goldman three mirror lens.
- . indirect ophthalmoscope.
- . pen torch.
- . fluorescein strips.
- . local anaesthetic drops.
- . mydriatic drops.
- . suture removal forceps.
- . dry and spirited swabs.
- . 18 gauge sterile needles.

RESULTS

A) DEMOGRAPHICS

A total of 70 patients were recruited into study following penetrating corneal injury and surgical repair. The patients had surgery between August 2012 and April 2013. Follow up period was 7 weeks from date of surgical repair.

The median age of the patients was 39 years, range 6 to 72 years. The mean age was 21,5 years for the study population.

There was no significant difference in age distribution between males (median age 24 years) and females (median age 19 years), $p= 0,377$.

Of the total, 19 were females and 51 were males. The male: female ratio was 2.7:1. Males less than 18 years ($n=23$) and males between 18 and 40 years ($n = 19$) had the greatest risk of injury by a ratio of 3,3:1 and 3,2:1 over the females of the same age groups respectively. Males below 40 years of age made up 60% ($n = 42$) of the study population. Between ages 41 to 65 years males and females were affected in a ratio of 1:1. Above 65 years only two males were affected with no females in the age group.

The figure below shows the age and sex distribution of the study population (< 18years n=30 (f=7, m=23); 18-40 years n=25(f=6, m=19); 41-65 years n=13(f=6, m=7); >65 years n=2(f=0, m=2)).

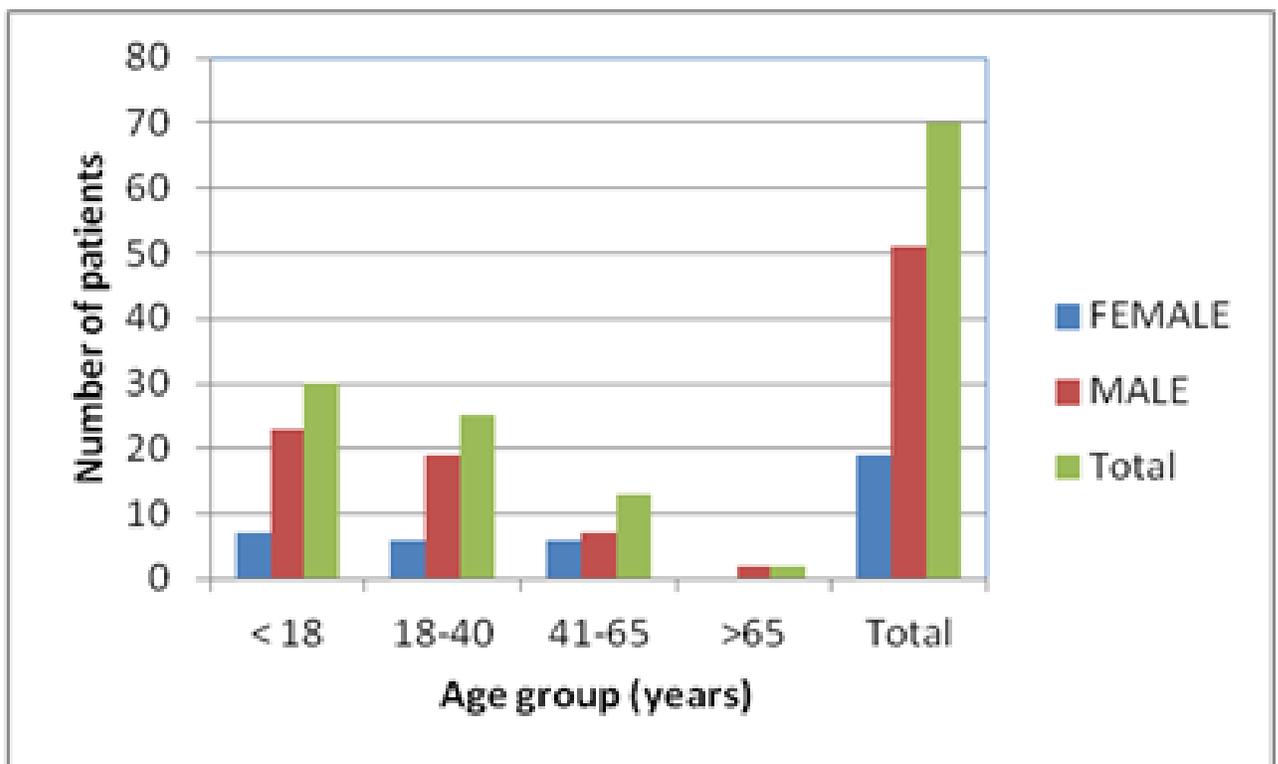


Figure : Distribution of patients by age group and gender

B) OBJECT OF INJURY

The object of injury was classified into metallic, glass, vegetative material and other. Majority (92,86%) of the objects of injury fell into the first three categories; metallic object 40% (n = 28), vegetative material 42.86% (n = 30), glass 10% (n = 7). The objects classified as other included such things as ball point tips at school and one such case as human finger nails and flying chip of stone. Table below shows object of injury and distribution by gender.

OBJECT	FEMALES	MALES	TOTAL
GLASS	1 (15%)	6 (12%)	7 (10%)
METALLIC	4 (21%)	24 (47%)	28 (40%)
VEGETATIVE MATERIAL	10 (53%)	20 (39%)	30 (43%)
OTHER	4 (21%)	1 (2%)	5 (7%)
TOTAL	19 (100%)	51 (100%)	70 (100%)

Table 1: Shows the object of injury and distribution by gender.

There was an association between the object of injury and gender (p value of 0,016).

Of those injured by metallic object, one had retained intra ocular foreign body which lodged onto the iris surface. One patient had retained corneal foreign body after penetration by vegetative matter. Overallly vegetative matter accounted for the majority of the penetrating injuries (n=30).

C), VISUAL OUTCOMES

Good visual outcomes were Snellen best corrected monocular visual acuities (BCVA) of 6/60 or better and those less than 6/60 were bad visual outcomes.

Of the total, 59% of patients (n=41) achieved BCVA of 6/60 or better. The remainder, 41% (n=29) had BCVA less than 6/60.

Table 2, below shows the visual acuities and number of patients in each classification.

VISUAL ACUITY	NUMBER OF PATIENTS	% OF TOTAL
6/6 – 6/12	11	16
< 6/12 – 6/18	9	13
< 6/18 – 6/60	21	30
< 6/60 – 3/60	12	17
< 3/60	17	24
TOTAL	70	100

The causes of visual outcomes less than 6/60 were irregular corneal astigmatism, significant cornea scar involving visual axis, vitreous hemorrhage / opacities, dense cataract and retinal detachment.

ASSOCIATIONS

(1) .There was a statistically significant association between the final BCVA and corneal scar location ($p = 0.001$) with those patients with corneal scar off the visual axis less likely to have a BCVA less than 6/60 compared to those with scar involving visual axis. See table below:

Corneal Scar Location	BCVA 6/60 or better	BCVA < 6/60	Total
Involving Visual Axis	5	23	28
Off Visual Axis	36	6	42
Total	41	29	70

Table 3: Association between BCVA and Corneal scar location.

(2). There was no statistically significant association between Time lapse between injury and repair AND final BCVA ($p = 0.155$) as shown in the table below:

Time Lapse Between Injury And Surgical Repair	BCVA 6/60 Or Better	BCVA less than 6/60	Total
Within 24 hours	6	8	14
After 24 hours, within 72 hours.	20	9	29
After 72 hours, within 1 week	12	12	24
After 1 week	3	0	3
Total	41	29	70

Table 4: Association between BCVA and Time lapse between injury and surgical repair.

3). There was no statistically significant association between final BCVA and the place of residence of the patient ($p = 0.342$).

Place Of Residence	BCVA 6/60 or Better	BCVA less than 6/60	Total
Urban	17	14	31
Rural	22	12	34
Other	2	3	5
Total	41	29	70

Table 5: Association between BCVA and Place of Residence.

(4). There was no statistically significant association between place of residence and time lapse between injury and repair ($p = 0.232$) as indicated in table below:

Place of Residence	Within 24 hrs	After 24hrs, Within 72 hrs	After 72 hrs, Within 1 week	After 1 week	Total
Urban	9	10	12	0	31
Rural	4	15	12	3	34
Other	1	4	0	0	5
Total	14	29	24	3	70

Table 6: Association between Place of residence and Time lapse between injury and repair.

(5) There was no statistically significant association between Age and final BCVA ($p = 0,973$) as shown below:

Age Group	BCVA 6/60 or better	BCVA less than 6/60	Total
< 18 years	21	9	30
18 -40 years	13	12	25
41-65 years	6	7	13
>65 years	1	1	2
Total	41	29	70

Table 7: Association between Age and BCVA.

(6) The table below shows the association between the status of lens at the final assessment of best corrected visual acuities.

	VISUAL	OUTCOME	
LENS STATUS	BCVA 6/60 or Better	BCVA < 6/60	TOTAL
PHAKIC AND CLEAR LENS	24	1	25
PHAKIC AND CATARACTOUS	0	2	2
PSEUDOPHAKIC	2	0	2
APHAKIC	15	26	41
TOTAL	41	29	70

Table 8: shows association between Lens Status and Visual outcomes (p= 0.001)

Total of 43 patients had ACWO.

Of the patients who had ACWO, only 5% (n = 2) had IOL implanted.

DISCUSSION

A) Demographics of Study Population

This study has showed that males were more at risk of suffering penetrating corneal injuries than females by a ratio of 2.7: 1. This mirrors literature which says males are three times more at risk than females.¹ Other literature sources quote a male to female ratio of 4:1. Males, particularly under the age of 40 years, with some literature narrowing the age range to 25 to 30 age group,¹ and young boys are the ones at greatest risk. Data sources that quote a male: female ratio of 3:1 or higher included all eye injuries that required admission to hospital whereas in my study only those with penetrating corneal injuries were included, hence the slightly lower ratio. This is explained by the fact that men and young boys are generally at risk of injuries in general, apart from penetrating eye injuries. The reasons that have been proffered in many articles are to do with the nature of work men less than 40 years engage in and their social habits.^{2,6} They are engaged in occupations that put them at great risk of general body injuries and this also translates to penetrating corneal/ocular injuries. Their occupations often involve work with tools/machinery that have sharp edges, both at their formal places of work and informal places including the home environment. This age group's propensity to violent tendencies in social gatherings like beer halls also puts them at great risk of penetrating ocular injuries from such objects like broken glasses and sharp knives.

The younger boys' appetite for play, and often with dangerous objects also puts them at greater risk than their female counterparts.² A lot of the injuries are accidental and quite a good number are caused by experimentation with dangerous objects with the children quite unaware of the potential dangers.

B) Object of injury

The object of injury may suggest gender roles in society. Most females were injured by vegetative matter which included flying chips of firewood, wooden sticks and tree branches, all of which suggest their role as gatherers of firewood. Firewood is the commonest source of fuel in Zimbabwean communities, especially in the rural areas, where it is used for cooking and heating. Anecdotal evidence also points to urban women increasingly resorting to firewood for cooking as a result of power outages. A normal everyday household chore, firewood chopping, proves to have potential for causing serious visual morbidity or blindness. Penetrating injuries from vegetative matter have potential for serious intraocular infection, endophthalmitis,^{2,10} which may progress to panophthalmitis leading to loss of the affected eye.² Incidence of endophthalmitis following penetrating eye injury from vegetative matter is reported to be high⁹, with incidences as high as 6.3%.¹⁰ The causative pathogens are commonly organisms like fungi and bacteria especially bacillus species which are found everywhere in the environment. Fortunately in this study there were no cases complicated by endophthalmitis. All patients received pre and post operative prophylactic broad spectrum systemic antibiotics and this could have contributed to having no cases of endophthalmitis in the study group.

On the other hand, more males were injured by metallic objects. The objects included such items as pieces of wire, wire nails, flying chips of metal fragments while doing such activities as erecting fences at farms, welding etc. Such activities are generally regarded as male domain, although an increasing number of women are taking up such

occupations. One such patient who was welding had an intra ocular foreign body which lodged onto anterior iris surface after penetrating through the cornea. Risk of introducing infection into the eye from a flying hot chip of metal is low. It seems from the history, awareness of the potential risk for injuries while doing such activities is high, but some report that they have to work without protective eye wear because it is usually not available in their workplaces.

C. Visual Outcomes

Good visual outcomes were BCVA of 6/6 – 6/60 or better and bad visual outcomes were BCVA < 6/60 outcomes), in order to address the study question. From literature review, outcomes were also classified into the two categories.²⁵ International Classification of Diseases denotes that there are four levels of visual acuity function namely: normal vision (BCVA 6/6 – 6/18); moderate visual impairment (BCVA < 6/18 – 6/60); severe visual impairment (BCVA < 6/60 – 3/60) and blindness (BCVA < 3/60).²⁶ However there have been submissions from other authors to revise the WHO classification to reflect the high visual needs that come with human development.^{27,28} and also to address some definitions so as to capture all cases of visual impairment.

The final visual outcomes were assessed using the Snellen chart with the best possible monocular spectacle correction and this did not take into account the refractive state of the other eye. Of the total, 59% (n = 41) of the patients achieved monocular BCVAs of 6/60 or better. Of those who had BCVA of 6/60 or better, 37% (n = 15) were aphakic. The standard procedure at SKH, Parirenyatwa, is to do primary corneal laceration repair and anterior chamber washout, then secondary implantation of intraocular lens later in

those patients who have suffered traumatic cataract and anterior lens capsular rupture. In order to fully rehabilitate these patients visually, they will have to undergo a second operation for secondary intraocular lens implantation. This is the best option to manage unocular aphakia since this reduces aniseikonia to 2%, restoring binocular single vision.²⁹ Aphakic spectacles are not appropriate in unocular aphakia because of the large amount of anisometropia and the problem of diplopia that would result. One option of visually rehabilitating unocular aphakes is use of contact lenses, an option that is not available at SKH, Parirenyatwa. Although they are not without their own problems, which include cost, care, fitting difficulties and related complications like giant papillary conjunctivitis, contact lens lenses reduce many of the problems associated with aphakic spectacles.²¹

Aphakic patients were 59% (n = 41), more than half of the total number of patients assessed for their final visual outcome. Of these patients only 37% (n = 15) achieved BCVAs of 6/60 or better. Reasons for the bad visual outcomes among these patients were the extensive nature of the injuries with complications like vitreous hemorrhage (n=23), retinal detachment (n=1) and central location of the corneal scars and irregular astigmatism.

Only 3% of the patients (n = 2) were pseudophakic. The reason for this maybe was the study period which was short because the aphakic patients would in future need secondary intraocular lens implantation. The other reason for such a low proportion could be the fact that secondary intraocular lens implantation is an elective procedure and as such patients are required by the hospital authorities to pay a deposit fee before the operation and many patients fail to raise the required fee. This is unlike in the first

operation where patients are operated on as an emergency without the requirement for cash upfront.

Of the factors that were assessed, location of corneal scar achieved statistical significance, with those who had corneal scars off visual axis having favorable chance for BCVA of 6/60 or better ($p=0.001$). Lens status also achieved statistical significance ($p=0.001$) with more aphakic patients having BCVAs $< 6/60$ and more of those with clear lens achieving good BCVAs of 6/60 or better.

Time lapse between injury and surgical repair did not achieve statistical significance in this study. This was also shown in the study by C C Barr.²⁰ However other studies have shown an association with those patients operated on early having good visual outcomes.¹⁹ Delay in repair is usually associated with bad visual outcomes since risk of complications like endophthalmitis increases. Repair of wound edges is complicated by tissue loss as some tissue become devitalized making it difficult to restore the normal cornea contour, hence high degrees of irregular astigmatism. Most literature report that the optimal time for repair is within twenty-four hours of injury, which is very difficult to achieve in our setting at SKH. In this study, 4% of the patients ($n = 3$) had repair more than a week after injury but still had good visual outcomes. These patients had small corneal lacerations which were off the visual axis, almost self sealed and were not complicated by other anterior segment or intra ocular structure damage. More than three quarters (80%) $n=56$, of the patients in the study group were repaired more than 24 hours after injury and $n=35$ of them achieved BCVAs of 6/60 or better.

Place of residence did not have statistical significance in the final visual outcome. It also did not have statistical significance in the time lapse between injury and repair.

Ordinarily it would be expected that those residing in urban areas have better access to health facilities by virtue of their close proximity to the health facilities and better transport and road networks than their counterparts in the rural areas. SKH is a referral hospital hence patients come from different parts of the country.

Some rural areas are closer to Harare, hence closer to SKH than some urban centres which refer patients to SKH. This could explain why place of residence and time lapse between injury and time of repair did not have statistical significance.

Some patients had hazy media due to vitreous hemorrhage and one had a B ultra sound scan report which showed he also had retinal detachment. Lack of equipment for posterior vitrectomy at SKH also means such patients cannot be optimally managed after injury resulting in poor visual outcomes.

Most of the patients with penetrating corneal injuries at SKH are repaired by junior registrars. The experience of the surgeon is also critical in influencing the final visual outcomes. In this study the proportion of patients operated on by senior surgeon was not known and the surgeon factors were not taken into account. In other studies, only patients operated on by experienced surgeons were enrolled into the study. The more experienced surgeon is better equipped to manage any scenario and has a better outcome.

Limitations of the study

1. The issue of sample size could have resulted in inadequate numbers to demonstrate associations between different variables and the final visual outcome.
2. Study time and follow up period was short . A lot of the patients still need to have a second operation for secondary IOL implantation. Those who had good visual outcomes but were aphakic may end up with poor outcomes after second operation due to risks generally associated with any intra ocular operation. Some patients with poor visual outcomes could also end up with good outcomes especially if resources for vitrectomy become available as well as donor corneas for penetrating keratoplasty.
3. Lack of funding prevented patients from religiously sticking to their scheduled reviews. A little in support for bus fares could assist patients to turn up on their scheduled visits so that they could be adequately followed up for treatment compliance.
4. All refractions were done by the researcher. Maybe an independent observer would have removed any bias likely to creep in.
5. The pre injury visual acuities of the injured eyes were unknown. Therefore there is no way to tell whether these patients had good visual acuities before injury since eyes with no or poor visual acuities are more prone to injury. This is particularly true for those eyes that achieved bad visual outcomes, whose visual acuities may already have been poor anyway before injury.

Recommendations

1. A significant proportion of patients had bad visual outcomes due to corneal scar in the visual axis. There is therefore need to court other institutions in the developed world to create partnerships so that donor corneas can be accessed by public health sector patients at an affordable cost. In the long run, there is need to lobby law makers for enactment of laws that would enable the creation of cornea banks.
2. There is need to establish optometry services at SKH so that patients can have a wide range of visual rehabilitation services post injury.
3. A lot of patients remain aphakic after primary corneal laceration repair and anterior chamber washout. This is most likely due to them not being able to afford the cost of operation for secondary IOL implantation. There is therefore need for SKH to have a data base of such patients so that they could benefit from free services during eye camps.
4. Carry out research into practices that predispose at risk populations to eye injury with a view to finding simple, effective and affordable protective eye wear to prevent or reduce incidence of penetrating corneal injuries.
5. Develop and maintain an eye injury register at SKH and other tertiary institutions to form the basis of a national eye injury register like the USEIR.

Conclusions from the study

1. The prevalence of good visual outcomes following surgical repair of penetrating corneal injuries at SKH is high and those factors associated with poor visual outcomes include significant corneal scar involving the visual axis, vitreous hemorrhage and irregular corneal astigmatism.
2. Age and gender are risk factors for penetrating corneal injuries among patients seen at SKH with a male: female ratio of 2.7: 1. Males under the age of 40 years are more at risk of injury.
3. Gender is a risk factor for penetrating corneal injury from particular type of object among patients seen at SKH with more females sustaining injuries from vegetative material and more males from metallic objects. This could suggest gender roles in society.

REFERENCES

1. Andrew A Aronson, MD, FACEP; Chief Editor, Barry E Brenner, MD, PhD, FACEP
Corneal laceration, treatment and management, Apr 2011.
Also available from: <http://www.emedicine.medscape.com/article/798005-overview>.
2. G M Chirunga; Causes and prognosis of perforating eye injuries resulting in
hospitalization at Sekuru Kaguvi, 1995.
3. Caroline J Macewen; Ocular injuries, Journal of Royal college of Surgeons Edinburgh,
vol44, October 1999, 317-23.

Also available from: <http://www.rcsed.ac.uk/RSCEDBackIssues/journal/vol44-5/4450034>.
4. Yicheh Shiuey MD; General Ophthalmology quiz, Digital Journal of Ophthalmolgy
June 1998.
5. Parul Desai, Caroline J Macewen etal; Epidemiology and implications of ocular trauma
admitted to hospital in Scotland; Journal of epidemiology and community health
vol.50.no4, aug 1996 pp 432-441.
6. Fasina oluyeni; Epidemiology of penetrating eye injury in Ibadan: A 10 year hospital
based review; Middle East African Journal of Ophthamology.2011Apr-Jun;18(2):159-
163.
7. Mary DR, Kuhn FP etal; The epidemiology of serious eye injuries from the United
States Eye Injury Register; Graefes Arch Clin Exp ophthalmol2000Feb;238(2):153-7
ABSTRCT PUB MED, PMID 16510343.

8. Sinclair SA, Smith GA, Xiang H; Eyeglasses related injury treated in US emergency department; Ophthalmic epidemiology.2006Feb;13(1);23-30PUB MED, PMID1987951.
9. Michael Yulish, Joseph Pikkell; Olive-harvesting eye injuries, Middle East African journal ophthalmology.2012Jul-Sep;19(3):320-322.
10. Ingrid U Scott, Harry W Flynn Jr and Dennis P Han; Endophthalmitis: categories, management and prevention,Vol 6, Chapter 64.
11. Daniel G Dawson, John L Ubels, Henry F Edelhauser; Adler's physiology of the eye, edited by Leonard A Levin; Cornea and sclera, chapter4.
12. Lee Ann Remington, OD, MS, FAAO; Clinical anatomy and physiology of the visual system 3rd edition; cornea and sclera, chapter 2.
13. Richard S Snell, Michael A Lemp; Clinical anatomy of the eye, 2nd edition; The eyeball, chapter 6, page143.pdf
14. Harminder S Dua etal; Human corneal anatomy redefined: A novel Pre-Descemet's layer (Dua's layer) ABSTRACT, ophthalmology, volume 120,issue 9, pages1178-1185, sept 2013.
15. E Maul, T Muga; Anterior segment surgery early after corneal wound repair, British journal of ophthalmology 1977;61;782-784. Also available from:
www.bjo.bmj.com/content/61/12/782.
16. Peter s Hersh, Bruce M Zigelbaum, Kenneth R Kenyon and Bradford J Shingleton; Surgical management of lacerating anterior segment trauma, volume 6, chapter 39.

Also available from; <http://www.oculist.net/downaton502/prof/ebook>

17. Navon SE; Topography after repair of full thickness corneal laeration, journal of cataract and refractive surgery, May 1997;23(4):495-501(ABSTRACT).

18. Jack J Kanski; clinical ophthalmology: A systematic approach, 6th edition, trauma; chapter 23 pp858.

19. Rupesh Agrawal etal; Prognostic factors influencing vision outcome after surgical repair of open globe injuries; Indian journal of ophthalmology 2011 Nov-Dec 59(6):465-470.

20. C C Barr; Prognostic factors in corneoscleral lacerations; archives of ophthalmology 1983 Jun; 101 (6):919-24 (PUB MED)

Also available from: <http://www.ncbi.nlm.nih.gov/pubmed/6860205>

21. VN Highman; Stereopsis and aniseikonia in unocular aphakia, British journal of ophthalmology 1977jan;6(1):30-33 (ABSTRACT).

22. Jeewen S Titiyal etal; Contact lens rehabilitation following repaired corneal perforations; BMC ophthalmology 2006,6:11

23. Singh K, Jain D, Teli K; Rehabilitation of vision disabling corneal opacities. Is there hope? ABSTRACT (PUB MED).

24. Fini ME, Strammer BB; How the cornea heals: cornea-specific repair mechanisms affecting surgical outcomes; cornea.2005Nov;2(8suppl):S2-S11 ABSTRACT PUBMED.

25. CH Javed Iqbal etal; Visual outcome after surgical management in penetrating ocular trauma; Pakistan journal of medical and health services, vol 5.issue3 Apr-Jun 2011.

26. WHO; International classification of disease-10(Update and revision 2006), Visual impairment and blindness, WHO fact sheet No 282, June 2012.

27. Parveen K Monya et al; Are current guidelines for categorization of visual impairment in India appropriate? Indian Journal of ophthalmology. 2009 Nov-Dec; 57(6):423-426.

28. Lalit Dandona and Rakhi Dandona; Revision of visual impairment definitions in the international statistical classification of diseases; BMC med 2006; 4:17

Also available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/pmc14>

29. Neil J Friedman, Timothy T Khater and Douglas D Koch; Secondary intraocular lens implantation, volume 6, chapter 8.

Also available from: <http://www.oculist.net/downaton502/prof/ebook>

APPENDICES

DATA SHEET

1. Name/Initials:
2. Age:
3. Sex: M (), F ()
4. Place of residence: Urban (), Rural (), Other ()..... (specify).
5. Occupation: Employed (), Unemployed (), Student (), (specify job).....
6. Preexisting chronic medical condition: Yes (), No (), If yes state, duration.....
7. Preexisting ocular condition: Yes (), No (), If yes state, duration
8. Date of injury: Date of operation
9. Laterality: Right (), Left (), Both () .
10. Place of injury: Home (), Workplace (), Other () (specify).
11. Object of injury:
12. Preoperative visual acuity: R (), L () .
13. Time lapse between injury and surgery: Within 24hrs (), After 24 hrs but within 72 hrs (), After 72 hrs but within 1 week (), More than 1 week () .
14. Preoperative prophylactic systemic broad spectrum antibiotics: Yes (), No () .
15. Preoperative anti tetanus: Yes (), No () .
16. Other preoperative treatment:
17. Postoperative steroid/antibiotic: Yes (), No () .

18. Other postoperative medications:
19. Snellen visual acuity affected eye: Uncorrected (), BCVA ().
20. Corneal scar: Involving visual axis (), Off visual axis ().
21. Drawing: position and size of scar
22. Corneal clarity: Clear (), Hazy (), Opaque ().
23. Anterior chamber: Normal depth (), Shallow AC (), Anterior synechiae: Present (), Absent ().
24. Pupil: Round (), Irregular (), Central (), Eccentric ().
25. Lens: Phakic and clear (), Phakic and Cataractous (), Aphakic (), Pseudophakic ().
26. Fundoscope: Media clear (), Media opaque ().
27. Fundoscope: Retina normal (), Abnormal () state abnormal.....
28. Fundoscope: Optic disc normal (), Abnormal () state abnormal.....
29. IOP.....

Informed Consent in English

Proposal Title: An analysis of the visual outcomes following surgical repair for penetrating corneal injuries at Sekuru Kaguvi Hospital, Eye Unit at Parirenyatwa Group of Hospitals.

Name of Researcher: Dr. Mashaka Wicliff Phone: 0774125637.

Project Description: Evaluating the final visual outcomes of eyes that were injured and then surgically repaired at SKH to see how much vision was regained after the injured eye has healed and also see what other injuries were inflicted on the eye apart from the transparent front (cornea) part of the eye.

Your Rights

Before volunteering to be part of the study, you must understand the purpose of the study, how it may benefit you and what risks, if any, the study may bring to you. Understanding the above and agreeing to take part in the study is called informed consent.

Purpose of study:

- .To describe the demographics of the study population.
- .To elicit the causes of injuries and describe other associated ocular injuries.
- .To evaluate the uncorrected (before spectacle testing) and best corrected (after spectacle testing) visual acuities of patients under study.

Procedures Involved

- . Surgical repair of corneal injuries under general anaesthesia (routine).
- .After injured eye has healed, test the patient's best vision.
- .Examine patient for other related injuries to the eye that could have a bearing on the final best corrected vision.

Discomforts

- .Reduced vision for near work like reading after examination of the back of the eye.

Potential Benefits

- . Close follow up care after surgical repair of corneal injury.
- .Free spectacle prescription, although spectacles will not be provided free if required.
- .Knowledge gained could be used to improve care for corneal injuries in future.

Study Withdrawal: You may choose to enter study or withdraw from study at any time without loss of benefits.

Confidentiality

. All records will be kept by the researcher.

.No information will be disclosed to a third part without the patient's consent.

Problems/ Queries

Please feel free to ask any questions about this consent or study now or at any point in future that you may have.

Authorization

I have read about the study or it was to me. I understand the possible risks and benefits of the study. I have chosen to be in the study and I know I can withdraw from the study whenever I so decide without losing any benefits that I am entitled to.

Patient/ Guardian signature:

Patient / Guardian's Name:

Researcher's Signature:

Witness signature:

Informed consent in Shona

Zita Retsvakiridzo

Kuongorora maonero anenge achizoita ziso mushure mekukuvadzwa nekusonwa **pamboni** yeziso pachipatara chemaziso cheSekuru Kaguvi iri pachipatara chikuru cheParirenyatwa.

Zita Remuongorori: Dr Mashaka Wicliff, Nhamba yerunhare 0774125637.

Tsanangudzo Yetsvakiridzo

Kuongorora kuti ziso rakakuvadzwa **pamboni** rikasonwa richazenge richiona zvakadii mushure mekunge rasonwa rikapora.

Kodzera Yemurwere

Musati mapinda mutsvakiridzo iyi, munofanira kuziva chinangwa, betsero nezvakakosha kubva mutsvakiridzo. Iyi ndiyo inonzi mvumo yenyu mutsvakiridzo ino

Zvinangwa Zvetsvakiridzo

.Kutsvaka kuti ndivanani varikukuvadzwa maziso, uye vachiitei.

.Kutsvaka kuti chii chirikukuvadza maziso evanhu varimutsvakiridzo nekuti pane dzimwe here nhengo dzeziso dzinokuvara pamwechetepo **nemboni** yeziso.

. Kuongorora kuti mushure mekurapwa , ziso racho rinosara richiona zvakadii risina magirazi uye kuti magirazi anozoita kuti rione zvirinani zvakadii.

Zvichaitwa mutsvakiridzo

.Kusona ziso rakuvadzwa makakotsiriswa kutheatre.

.Kana ziso rapora richaongororwa kuti rinoona zvakadii.

.Ziso richaongororwa kuti pane dzimwe nhengo dzaro dzakakuvadzwawo here pamwepo **nemboni** idzo dzinogonawo kukanganisa maonero eziso racho.

Zvingakanganisike Mutsvakiridzo iyi

. Mushure mokuongororwa maziso, munombotadza kuona zvepedyo zvakaita sekuverenga bhuku kana bepanhau kwechinguva chidoko.

Zvingabatsire mutsvakiridzo

.Kuongororwa zvakadzama mushure mokusonwa ziso rakuvadzwa.

.Ruzivo rwuchabuda musarudzo runogona kuzobatsira marapirwo achazoitwa vamwe vanenge vakuvadzwa maziso kuti maonero emaziso iwayo abude zvakana.

Kubuda Mutsvakiridzo

Ikodzero yenyu kubuda mutsvakiridzo iyi pamunenge maona kuti hamuchada, asi muchikwanisa kuramba muchiwana rubatsiro sevamwe vari mutsvakiridzo.

Kuchengetedzwa kwezvinyorwa mutsvakiridzo

.Zvose zvinyorwa zvemutsvakiridzo zvichachengetwa nemuongorori pakavandika pasina kufumuka.

.Hapana anobvumidzwa kuziva zvemutsvakiridzo pasina mvumo yemurwere.

Mibvunzo

Munobvumidzwa kubvunza zvose zvamungade kuziva pamusoro petsvakiridzo iyi chero nguva yamunenge mava nemubvunzo.

Mvumo yemurere/ muchengeti wake

Ndaverenga / ndaverengerwa bepa iri ndikanzwisisa zvinodiwa pamwe nebetsero yetsvakiridzo iyi. Ndanzwisisa kuti kuva mutsvakiridzo iyi kuzvisarudzira saka ini ndasarudza kuva mutsvakiridzo. Ndinogona kusava mutsvakiridzo iyi asi ndichiwana betsero sevamwe varimutsvakiridzo.

Runyoro rwemurwere:

Zita remurwere:

Runyoro rwemuongorori:

Runyoro rwemufakazi:

Informed Consent in Ndebele

Ukuhlolisisa ukuphumelela kokubona ngemva kokuhlinza intanga ekade ilimelele esibhedhela samelilo esikhlu samehlo eHarare e Sekuru Kaguvi esise Parirenyatwa.

Ibizo lomhlolisi: Dr Mashaka Wicliff, Ucingo 0774125637

Isichasiso Sokuhlolisisa

Ukuhlolisisa ukuthi ilihlo elalalinzwayo lizabe libena kanani ngemva kokuhlinzwa eSKH.

Ilungelo Lakho

Qalo ngokuzwisisa uhlelo lolu ungakazinikeli ngoba kudingeka ukuthi ubekwazi ukuba yindaba, kungakunceda ngani njalo yiphi ingozi engayenzakala nxa ikhana. Lokhu kukwenza uvume uloliwazi.

Injongo Yalokhu

.Ukachasisa ukuthi ngobani abalimala eamehlo.

.Ukudingisisa imbangela zokulimalo njalo ilihlo lilimele.

.Ukulilolisisa ukuthi ilihlo elatshiweyo libana kajani nxa lingela / lila magilazi amehlo.

Amanyathelo azathathwa ngumhloli nxa ezahlola

.Uzalaliswa etheatre.

.Ilihlo lizathungwa ulalisiwe etheatre.

. Ngemva kokuphola uzalolwa njalo ukuthi selibona njani.

.Njalo uzahlolwa ukuba kungabe kukhona okunye okungabe kulimelele phakathi kwelihlo okungayenza ungaboni kuhle.

Ukungakwenza ungalaliseki

Ngemva kokulilolwa kungenzakala ukuba ungabani okuseduze.

Okunganceda l uncedo

.Vakatshela udokotelangemva kokunhlizwa amehlo.

.Ulwaziduzizikyo lungakunceda kusasa ekuvikeleni kwamehlo.

Nxa ungasafuni ukubangamunye wabahlolwayo

Uvunyele ukutshiya / ukwala loba ngasiphi isikhathi lilungelo lakho.

Imfilo ezakwenzakala

Ingwalo zakho zonke zizagcinwa ngumhloli njalo akula muntu ozavunyele ukubona lezangwalo ngaphandle kwemvumo yakho.

Imibuzo /Uhlupho olungavela

Ukhululekile ukbuza ngohlelo lolu loba yisiphi isikhathi.

Isivumelwane

Sengibalil / ngibalile ngohlelo lolu njalo ngizwisile ngohlupo / umvuzo wohlelo lolu. Ngizikhetlele ukuba ngomunye wohlelo lolu njalo ngingakwanisa ukutshiya nxa sengingasatuni.

Isigulane:

Ibizo lesigulane:

Umhloli:

Umsekeli: