Outreach cataract surgery services: How good are their outcomes?

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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. 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.

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

Abstract

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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 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, including: 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).

**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>
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</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 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. showed less 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, does 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 und conducive 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 outreaches. Outreach cataract surgery services in South Africa often rely on medical officers and ophthalmology registrars, with varying levels of surgical experience, to perform outreaches. 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 outreaches. Our study does not tell us why the day 1 outcomes on outreaches 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