

Systematic literature review on task shifting for trichiasis surgery in patients with trachoma

Prepared by: Ilona Hale, MD

Susan Lewallen, MD

Paul Courtright, DrPH

Kilimanjaro Centre for Community Ophthalmology

Background

The problem of blindness and visual impairment

Blindness is estimated to affect around 39 million people in the world and an additional 246 are visually impaired. (Pascolini & Mariotti BJO 2010 epub ahead of print) To give this some perspective, “blindness means visual acuity of less than 3/60, which translates roughly to an inability to count fingers accurately at 3 meters. “Visual impairment” encompasses a wide range of visual acuity from blindness up to 6/18, still less vision than is required in developing countries to obtain a driving license. In addition blindness is defined by a very constricted visual field, but this definition is rarely used in developing countries. In terms of prevalence of blindness and visual impairment, among the World Health Organization (WHO) Regions, Africa is one of the highest (0.73%), second only to the eastern Mediterranean (0.85%). Critically, at least 80% of visual disability in Africa could be avoided by application of recognized preventive and curative measures. Recognizing this, in 1999 a coalition of non governmental organizations (NGOs) and the WHO launched an initiative named

“VISION 2020: The Right to Sight,” which aimed to eliminate avoidable blindness by the year 2020. This was considered realistic because of the fact that the technical solutions to eliminate much visual disability already exist and are neither unduly expensive nor complex. However the shortage and poor distribution of human resources for health care were recognized from the beginning as posing a significant challenge.

Task shifting: a solution?

The shortages and maldistribution of health workers in developing countries are well known. One solution put forth has been to shift tasks from highly specialized-- more scarce and expensive--health workers to less specialized-- more readily available and cheaper-- workers. “Task shifting” is one term for the phenomenon, but it is also known as substitution. It is not new. “Clinical officers” in Africa have been trained and provided the backbone of medical care in many countries for years. These workers generally have a basic secondary education followed by 2 or 3 years of practical medical training, after which they take on tasks that would be performed by doctors in the industrialized countries. They are usually given more responsibilities and prestige than nurses, often working as heads of district hospitals and filling the roles of fully trained medical doctors. They may serve as general practitioners but specialized training has also been designed for them in a number of areas including anesthesia, obstetrics, general surgery, orthopedics, and others.

Trachoma and trichiasis

Although cataract surgeons are the best known example of task shifting in eye care, a second example has also been practiced in the area of trachoma treatment. Trachoma is an infectious disease caused by a specific bacteria common in very poor settings with inadequate hygiene. After years of repeated infections in childhood, some adults develop scarring of the inner eyelid, which results in painful in-turned lashes that rub the cornea and lead to blindness. This condition is known as trachomatous trichiasis or TT. A relatively simple operation can evert the eyelid. In industrialized countries surgery such as this would be done by an ophthalmologist, but in Africa, ophthalmic

personnel devoted only to eye work such as ophthalmic clinical officers, ophthalmic nurses, and ophthalmic health assistants have done most of the TT surgery. In the past decade, in certain countries targeted by NGOs and the WHO for elimination of blinding trachoma, training has expanded tremendously and included general primary health care workers. This was done because there were not believed to be enough dedicated eye care workers to do all the surgery needed. IN contrast to the use of cataract surgeons, there has never been controversy over whether it is acceptable for non physician ophthalmic workers to perform TT surgery and this is probably explained by two facts. First, TT surgery is considerably simpler and carries less risk (of worsening the vision) than cataract surgery. Second, trachoma, unlike cataract, affects poor often disenfranchised populations; the surgery must be offered in remote and difficult places and there is no money to be made. The shift of TT surgery from non physician ophthalmic workers to general eye care workers has raised some questions but not been particularly controversial.

Methods

We conducted a review of the literature with the above question in mind (With respect to shifting the responsibility for trichomatous trichiasis surgery from specialized ophthalmic personnel to general health workers: “How widespread is this particular shifting of tasks across Africa, how well does it work to ensure acceptable quality eye health for Africans at all levels and what are the factors that might influence its effectiveness, both in theory and in practice.”)

One of the researchers (IH) conducted a search of Medline using Pubmed and combinations of the following keywords: trichiasis surgery (355, 70 abstracts), task-shifting (141, 10 abstracts), ophthalmic nurse (43, abstracts 6), ophthalmic paramedical (6, abstracts 3). A review of the grey literature using Google was carried out using similar search terms.

Library technicians at the College of Physicians and Surgeons of BC library completed a parallel search using the Medline, Google scholar and CINAHL (a nursing and allied health professional database) and produced a bibliography of appropriate articles.

Bibliographies of selected key articles were reviewed to identify other relevant research papers.

Abstracts of approximately 100 articles of interest were reviewed and from these, 40 articles were obtained in full text. Less than half of these were primary research papers, the remainder being reviews, background material or opinion pieces. Information, primarily from the primary research articles, was synthesized to produce this review.

Task shifting for surgery for trachomatous trichiasis

As described above, surgery for trachomatous trichiasis (TT) in trachoma-endemic countries is largely performed by non-ophthalmologists. WHO endorses this community-based approach as an integral part of the ``SAFE`` strategy. Traditionally these surgeries have been performed by dedicated eye care personnel such as community ophthalmic nurses or ophthalmic medical assistants. In the past ten years, some countries have attempted to address the huge backlog of trichiasis surgeries by training generalist health workers such as clinical officers, nurses and medical assistants to perform TT surgery as part of their regular duties. The rationale for this decision was based upon the following assumptions:

- Having a routine surgical service based as a health centre would improve access to surgery by the population (thus, increasing the number of surgeries carried out)
- General health workers, with training, could integrate trichiasis surgery into their routine service delivery without significant external financial or administrative inputs.

- General health workers could provide a good quality trichiasis surgery (that led to minimal surgical failure) that people living in the area would be satisfied with.

The following review summarizes the available research on TT surgery performed by dedicated ophthalmic personnel, particularly ophthalmic nurses, compared to general medical workers. There are two specific measures related to task shifting:

1. Surgical outcomes (quality of the surgery)
2. Productivity (quantity of surgeries)

Surgical Outcomes of Specialist vs Generalist TT Surgeons

One of the most important questions to answer when examining task-shifting is whether or not the new cadre of workers is technically competent to perform the task. A successful outcome is defined as no single lash touching the eye. There are a number of reasons for an unsuccessful outcome. Besides the quality of the surgery (evidence of surgical competence) there are patient-related factors that, over time can contribute to recurrence. Generally, any “recurrence” within the first 6-9 months after surgery is likely to be due to the quality of surgery while recurrence years after surgery is likely to be due to patient related factors. Several studies were identified that address this question either directly or indirectly.

Specialists:

One of the original and much referenced studies looked specifically at the effectiveness of an expatriate ophthalmic nurse in Tanzania reported that she performed 156 surgeries with success rates of 82.6% after a minimum of 9 months follow-up. (2)

Other studies, although focused on different aspects of trichiasis surgery (type of surgery, recurrence rates, use of antibiotics, location of surgery), provide further insight into the effectiveness of trachoma surgeons.

In a study comparing the location of surgery (village vs health centre) Bowman et al found the ophthalmic nurses involved to have a 91- 94% success rate at 3 months.(4)

A study from Morocco compared recurrence rates of trichiasis in 750 patients and found the lowest rates were found in patients who had been operated on by ophthalmic nurses when compared to those treated by general physicians and ophthalmologists.(6) This was explained by the likelihood that more complicated cases had been referred to the physicians and, possibly, that general physicians, having a broader scope of practice, had less experience with trachoma surgeries than the nurses.

A small study from Brazil found that a non-ophthalmologist physician with a one week training was able to achieve a success rate of 76% at six months with 42/46 patients reporting significant symptom relief.(3)

In general, these and other studies examining recurrence rates with dedicated community ophthalmic nurses, mostly in The Gambia, have found rates of recurrence varying from 6% to as high as 83% for some individual surgeons.(2,4,6,7,,10,11)

Although the recurrence rates of trichiasis following surgery have been found in some cases to be disappointingly high, there are other positive outcomes to surgery. Patient perceptions assessed by Bowman in the Gambia after a mean time of 7 years after surgery (by ophthalmic nurses) found: “satisfaction with surgery (88%), less discomfort than before surgery (93%), improved vision (83%), work easier (38%), worth the expenditure (94%), would recommend it to others (93%), had recommended it to others (38%)”. These findings were present despite a 55-65% recurrence rate of trichiasis.
(15)

Generalists

The only randomized prospective trial specifically designed to compare ophthalmologists to generalist Integrated Eye Care Workers (IECW) was conducted by Alemayehu et al in Ethiopia (2004) (1). Researchers assessed recurrences of trichiasis after surgery on 962 patients at 3 and 6 months. They found no statistically significant

difference in recurrence rates between the two ophthalmologists (12.1% recurrence) and two (very experienced and highly productive) integrated eye care workers (9.9%) involved in the study and concluded that IECWs could be safely trained to perform these surgeries. This study has been widely referenced in other literature in support of task-shifting for trichiasis surgery.

In the Surgery for Trachoma: Antibiotics to Prevent Recurrence (STAR) trial from Ethiopia where all surgeries were performed by IECWs, the overall recurrence rate of trichiasis was 8/100 person years. (5)

A subset analysis of 439 of the participants in the STAR trial (generalist IECWs) were found to have statistically significant improvement in visual acuity and symptoms (93.8% described significant pain and 90.4% significant photophobia at baseline compared with only 1.4% and 0.9%, respectively, following surgery. (6 months).(14) The STAR trial was carried out in a highly-structured research setting.

There is limited information in routine surgical service delivery settings. A study by West et al among a mix of general health workers and ophthalmic nurses in Tanzania found that, after a minimum of 18 months follow-up, 50% of individuals had trichiasis in at least one eye (either surgically treated or not) and 28% had trichiasis in both eyes.

Although limited by the relatively small number of studies, many variables making comparisons between studies difficult and, in some cases a small number of operators examined in the studies, there does not appear to be a consistent difference in surgical outcomes comparing the two groups of surgeons.

Factors Influencing Reported Surgical Outcomes

Several studies have concluded that outcomes, particularly early recurrences, are related to surgical factors such as different techniques, degree of eversion, incision length, suture material and experience of the surgeon (7,16 ,17,18)

Length of time since surgery also affects recurrence rates however, since recurrences due to surgical factors tend to occur early, even relatively short duration studies are likely to reflect the outcome of interest for the purposes of this review.

Considerable inter-surgeon variability even amongst groups of similarly trained ophthalmic nurse or generalist trachoma surgeons has been reported in several studies. An analysis of long term outcomes of trachoma surgery in the Gambia (ophthalmic nurses) found that 75% of recurrences had developed by 6 months and there was significant inter-surgeon variation in success rates.(7) Another study by West in Tanzania, where TT surgery is performed by generalist TT surgeons, also revealed high inter-surgeon variation in recurrence rates (16% - 38%), particularly in one region where many different surgeons had been trained (compared to other districts where all surgeries were performed by only one or two surgeons).(8) Burton found rates of recurrence among the 17 community ophthalmic nurses varying from 0-83%. (11)

These findings suggest that individual factors such as training, experience, or volume may be important in determining outcomes of surgery. Interpretation of the findings is limited by the different follow up periods reported. Furthermore, the cadre “generalist” includes people with variable training, skills, and responsibilities. This might limit the ability to generalize findings from studies involving only small numbers of surgeons but also suggests that a small number of more carefully selected and supervised specialists might be more effective than a large number of generalists.

Productivity of TT Surgeons

Aside from the outcomes of surgery itself, there are other important considerations for those interested in expanding trachoma surgery programs. Studies from countries where large numbers of generalist trachoma surgeons have been trained have shown disappointing results in the effect of these trainees on addressing the large backlog of surgeries. Assessment of the 2010 trichiasis surgery figures from 13 countries in Africa

(accounting for 3 million of the total trichiasis burden) revealed an annual productivity of 66 surgeries/surgeon per year (ranging from 4.2 to 240). If the existing 1,582 surgeons maintain current productivity levels it will take 28 years to manage the existing backlog of trichiasis patients. Of note, the 3 countries that are on track to cover their backlog by 2020 (Mali, Niger, and Mauritania) do not use general health workers for carrying out trichiasis surgeries.

There are two studies of productivity of trichiasis surgeons in the literature. The first study was carried out among 95 TT surgeons trained in Tanzania; findings revealed that half of the surgeons performed less than 7 surgeries per year and 9% had performed none at all since training.(19) There was considerable variability among surgeons however, with one surgeon averaging 15 surgeries per month, meeting the national target of 15-20 surgeries per month. More productive surgeons had conducted more outreach activities and knew who their supervisor was, suggesting a higher level of involvement and support from their supervisor. Both the quantitative data and the focus group discussions supported the finding that lack of support (supplies, supervision and support for outreach) was an important barrier to productivity.

In Ethiopia, researchers interviewed 224 individuals who had been trained as IECWs.(16) Fifty nine percent of these were no longer in positions where they were able to perform trachoma surgery. Of the 94 still in IECW positions, the average number of surgeries performed per year was 41 (falling short of the target of 200/yr) and only 14% of these were performed in the workers' static sites; most were carried out during vertical surgery outreach campaigns. During a spot check, only 3% had the minimum surgical equipment and consumables available at their sites to do surgeries despite considerable ongoing investment in consumables and all sites having been initially provided with complete surgical sets. Other barriers cited were lack of time, lack of patients and lack of support and supervision. Despite these findings, Ethiopia is still the most productive in the world, accounting for approximately one third of all TT surgeries reported in 2007-2009.

A report from Senegal described an effort to address their backlog of surgeries by training community nurses and mobilizing community health associations. The report

notes that although the program seemed to show some improvement initially, it was not sustained. Problems included workload, motivation and quality of surgery not being “as good as it should be”. During ten months of the program, TT surgeries were performed on 1256 of 1961 (71%) of patients referred to the surgeons and it was felt that this relatively low uptake represented an underutilisation of the services available, perhaps due to inadequate training or persuasive power of the health workers. (21)

A participatory assessment of trachoma control programmes in 8 countries (which did not specify whether TT surgeons were dedicated eye personnel or generalists) also identified low output of surgeons as the most significant problem.(20) This was attributed to both provider and patient factors. Assessment of quality of surgery and supervision was found to be inadequate. Morocco was cited as an exception. After an analysis of surgical outcomes revealed unacceptably high recurrence rates, the country moved to using experienced teams of “elite” surgeons with subsequent improvement in outcomes. It is not clear what is meant by “elite” but presumably these surgeons would be relatively specialized.

These findings suggest that the existing practice of training legions of generalists as trichiasis surgeons will not lead to addressing the trichiasis surgical needs.

Weaknesses within the general health system which lead to high levels of attrition, inadequate supervision, and poor provision of supplies and instruments will plague the scale up of surgery through generalists. Some countries have made the decision to have surgical service delivery part of dedicated eye care staff responsibilities with structured outreach visits to manage the burden.

Conclusion

In summary, this review identifies several examples of both ophthalmic and generalist personnel in TT surgery programs with no obvious difference in outcomes in reducing trichiasis, its symptoms and long term complications. Many important concerns remain about the relatively high recurrence rates of trichiasis post-surgery, inter-surgeon variability for both types of surgeons, patient factors such as low uptake and supply chain issues. Concerns were also reported in the generalist group about lack of time,

supplies and support leading to low productivity. Presumably these issues would also be easier to address if there were a smaller number of dedicated surgeons to support and they didn't have other non-ophthalmic responsibilities. These factors need to be further examined. TT surgeons, whether specialists or generalists, need good training, support and supervision in order to allow them to fulfill their potential and contribute to reducing the ongoing burden of blinding trachoma.

Acknowledgement

This work was carried out with support from the Global Health Research Initiative (GHRI), a collaborative research funding partnership of the Canadian Institutes of Health Research, the Canadian International Development Agency, Health Canada, the International Development Research Centre, and the Public Health Agency of Canada. The work was carried out with the aid of a grant from the International Development Research Centre, Ottawa, Canada and with the financial support of the Government of Canada, provided through the Canadian International Development Agency (CIDA).

Bibliography

1. Alemayehu W, Melese M, Bejiga A, et al. Surgery for trichiasis by ophthalmologists versus integrated eye care workers: a randomized trial. *Ophthalmology* 2004;111:578e84.
2. Bog H, Yorston D, Foster A. Results of community-based eyelid surgery for trichiasis due to trachoma. *Br J Ophthalmol.* 1993;77:81–83.
3. Soares OE, Cruz AA. Braz Community-based transconjunctival marginal rotation for cicatricial trachoma in Indians from the Upper Rio Negro basin. *J Med Biol Res.* 2004 May;37(5):669-74.
4. Bowman RJ, Soma OS, Alexander N, Milligan P, Rowley J, Faal H, Foster A, Bailey RL, Johnson GJ. Should trichiasis surgery be offered in the village? A community

randomised trial of village vs. health centre-based surgery Trop Med Int Health. 2000 Aug;5(8):528-33. _

5. West S, Alemayehu W, Munoz B, Gower EW. Azithromycin prevents recurrence of severe trichiasis following trichiasis surgery: STAR trial. Ophthalmic Epidemiol. 2007 Sep-Oct;14(5):273-7.
6. Negrel AD, Chami-Khazraji Y, Arrache M, Ottmani S, Mahjour J. The quality of trichiasis surgery in the kingdom of Morocco (in French). *Sante*. 2000;10:81–92.
7. Rajak SN, Makalo P, Sillah A, Holland MJ, Mabey DC, Bailey RL, Burton MJ. Trichiasis surgery in The Gambia: a 4-year prospective study. Invest Ophthalmol Vis Sci. 2010 Oct;51(10):4996-5001.
8. West ES, Mkocho H, Munoz B, et al. Risk factors for postsurgical trichiasis recurrence in a trachoma-endemic area *Invest Ophthalmol Vis Sci*. 2005;46:447–453.
9. Reacher MH, Huber MJ, Canagaratnam R, et al. A trial of surgery for trichiasis of the upper lid from trachoma. *Br J Ophthalmol* 1990;74:109e13.
10. Burton MJ, Bowman RJ, Faal H, Aryee EA, Ikumapayi UN, Alexander ND, Adegbola RA, West SK, Mabey DC, Foster A, Johnson GJ, Bailey RL Long term outcome of trichiasis surgery in the Gambia. *Br J Ophthalmol*. 2005 May;89(5):575-9.
11. Burton MJ, Kinteh F, Jallow O et al. A randomised controlled trial of azithromycin following surgery for trichomatous trichiasis in the Gambia. *Br J Ophthalmol*. 2005;89:1282–1288.
12. Khandekar R. Recurrence of trichiasis: A long-term follow up study in the Sultanate of Oman. *Ophthalmic Epidemiol*. 2001;8:155–161.
13. Bowman RJ, Jatta B, Faal H, et al. Long-term follow-up of lid surgery for trichiasis in The Gambia: surgical success and patient perceptions. *Eye* 2000;14:864e8.

14. Woreta TA, Munoz BE, Gower EW, Alemayehu W, West SK. Effect of trichiasis surgery on visual acuity outcomes in Ethiopia.Arch Ophthalmol. 2009 Nov;127(11):1505-10.
15. Bowman R, Jatta B, Faal H, Bailey R, Foster A, Johnson GJ. Longterm follow-up of lid surgery for trichiasis in the Gambia: Surgical success and patient perceptions. *Eye*. 2000;14:864–868.
16. Habtamu E, Rajak SN, Gebre T, Zerihun M, Genet A, Emerson PM, Burton MJ. Clearing the backlog: trichiasis surgeon retention and productivity in northern Ethiopia.PLoS Negl Trop Dis. 2011 Apr 5;5(4):e1014.
17. Alemayehu W, Kello AB. Trichiasis surgery: a patient-based approach.Community Eye Health. 2010 Dec;23(74):58-9.
18. Buchan JC, Limburg H, Burton MJ. Quality assurance in trichiasis surgery: a methodology. Br J Ophthalmol. 2011 Mar;95(3):331-4. Epub 2010 Sep 29.
19. Lewallen S, Mahande M, Tharaney M, Katala S, Courtright P. Surgery for trachomatous trichiasis: findings from a survey of trichiasis surgeons in Tanzania. Br J Ophthalmol. 2007 Feb;91(2):143-5.
20. Kuper, H., Solomon, AW, Buchan, JC, Zondervan, M., Mabey, D., Foster, A. Participatory evaluations of trachoma control programmes in eight countries. *Tropical Medicine and International Health* volume 10 no 8 pp 764–772 august 2005
21. Sarr, B. Senegal Country Report to the 15th Meeting of the WHO Alliance for the Elimination of Blinding Trachoma by 2020, Geneva, April 18-20, 2011 p23