

REVIEW

Primary eye care in sub-Saharan African: do we have the evidence needed to scale up training and service delivery?

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The models for addressing the delivery of an eye-care service in sub-Saharan Africa have seen considerable revision in the last 30 years, and the on-going challenges, as well as the future needs, will probably require many more changes and new systems. There is a need to assess the different models that are currently employed, in order to ensure that all potential contributions to the elimination of avoidable blindness are used; the evolving concept of primary eye care (PEC) requires such assessment. For the current review, the published literature on eye care provided by general front-line healthworkers was screened for articles that provided evidence of the impact of such PEC on the general delivery of eye care in sub-Saharan Africa. Of the 103 relevant articles detected, only three provided evidence of the effectiveness of PEC and the authors of all three of these articles suggested that such eye care was not meeting the needs or expectations of the target populations, the trainers, or programmes of eye care. Among the main problems identified were a lack of a clear definition of the scope of practice for PEC, the need for clarifying the specific skills that a front-line healthworker could perform correctly, and the changing needs and expectations for the delivery of an eye-care service in Africa. If PEC is to become adequately grounded in Africa, the generation of further evidence of the effectiveness and limitations of such care would be a prudent move.

The concept of primary eye care (PEC) was born as a consequence of the Alma Ata meeting in 1978, which highlighted the tenets of primary health care (PHC). In particular, it was suggested that PEC could have an impact on reducing two important causes of blindness in developing countries: (1) vitamin-A deficiency, which could be addressed through the integration of measles immunization with vitamin-A supplementation; and (2) trachoma, which could be addressed through community-based efforts at improved general hygiene (face washing) and environmental improvements, such as the construction of latrines and the development of safe water sources.

In the past few decades, there has been considerable success in controlling both of these problems: vitamin-A-related blindness is becoming rare and the global burden of trachoma has dropped (Burton and Mabey, 2009; Gogate *et al.*, 2009).

Early on, the concept of PEC started to expand, in terms of scope of work, when it was noted that a minimally trained healthworker could probably diagnose a white cataract and recognise a red eye with minimal or no equipment (Sheffield, 1983). If such a worker were taught to measure visual acuity, by asking the subject to count fingers or say what they could see on an inexpensive visual-acuity chart, he or she could also identify people with blindness or other visual impairment. In addition, by including tetracycline eye ointment in the

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standard list of medicines for primary health facilities, some infectious eye conditions might be prevented or treated.

For the current article, the published peer-reviewed literature on PEC in sub-Saharan Africa was reviewed, to determine the current evidence for the effectiveness of PEC and identify the issues that require consideration before the scaling up of PEC in the region. Although PEC can be defined in various ways, the definition most commonly used in sub-Saharan Africa — eye care provided by general healthworkers at the lowest level where full-time healthworkers are routinely deployed (i.e. health centres or dispensaries) — was the one used for the present review. Reports on specially trained community healthworkers or village health volunteers dealing with eye health, and reports that only appear as ‘grey’ literature, were not considered.

MATERIALS AND METHODS

For the literature search, combinations of a few key words and phrases (‘primary eye care’ with ‘Africa’ and, separately, ‘eye disease’ with ‘primary health care’ and ‘Africa’) were fed into the PubMed search engine (covering all years and all languages). Abstracts of all the 103 articles found were reviewed before the full version of each article that provided information on the provision of eye-care services, at primary-care level, by full-time, front-line, general healthworkers was retrieved for further analysis. The full articles of interest were grouped in several ways, to allow their contents and main findings to be summarized.

RESULTS

Overall, 103 articles that mentioned some form of primary eye care in Africa were identified via the literature review. Most of these simply referred to the potential for PEC to contribute to the delivery of an

eye-care service. Six articles described the content of training for, and the expectations of, general healthworkers in PEC (Arbuckle, 1983; Godwin, 1983; Sheffield, 1983; Sutter, 1983; Taylor, 1984; Steinkuller, 1987), while another three articles reported the results of studies designed to analyse the actual provision of PEC services (De Wet and Ackermann, 2000; Courtright *et al.*, 2010; Müller *et al.*, 2010). Two other reports, although not on research designed to test the provision of PEC *per se*, nonetheless included information relevant to the topic (Bronsard *et al.*, 2008; Al-Attas *et al.*, 2010).

The conclusions of the five articles that provided information on the performance of primary healthworkers in providing PEC services (De Wet and Ackermann, 2000; Bronsard *et al.*, 2008; Al-Attas *et al.*, 2010; Courtright *et al.*, 2010; Müller *et al.*, 2010) were generally not encouraging. Problems documented in these articles included a lack of appropriate skills, low productivity, an onerous referral system, poor decision making, and a lack of trust in the services by the target population (as indicated by a high level of by-passing).

After categorizing the articles according to the diseases that were discussed, cataract — the leading cause of blindness in Africa — was found to be the focus of six articles, only one of which (Courtright *et al.*, 2010) referred to the role of PHC workers in identifying and referring cataract patients for surgery. Glaucoma, the second leading cause of blindness in Africa, was featured in eight articles, none of which demonstrated the role of PHC workers in either diagnosis or referral. Diabetic retinopathy, a growing epidemic in Africa, was featured in 10 articles, almost all of them from South Africa, where screening using a mobile retinal camera and technician has been tested. Trauma was featured in four articles, one of which (Al-Attas *et al.*, 2010) referred to the failure of workers at PEC level to refer patients in a timely manner. Most of the 16 articles discussing trachoma were reporting

the results of surveys of active trachoma or trichiasis, with no special reference to PEC services. Childhood blindness featured in five papers, only one of which addressed the actual (rather than the potential) role of PEC in the recognition and referral of children in need of surgical services; Bronsard *et al.* (2008) reported a clear failure, at the PHC level, to provide timely and appropriate referral. Of the four articles on the giving of vitamin-A supplements to children — a proven strategy to reduce both mortality and blindness in children — one (Hendricks *et al.*, 2007) noted the distribution opportunities missed in PHC settings in South Africa.

There were six articles related to the use of traditional eye medicines or treatment by traditional healers; in the two papers referring to interventions to train traditional healers (Chana *et al.*, 1994; Courtright *et al.*, 1995), the strategy entailed having the healers refer patients to the secondary-level services rather than to the primary-level.

One recent paper demonstrated the low coverage of presbyopic spectacles in an area where a PEC programme is in place, and proposed that primary health units might be able to provide these spectacles effectively (Laviers *et al.*, 2010).

The remaining articles did not refer to any specific cause of visual disability or ocular conditions; each simply made a reference to PEC as a potential approach to improving access and achieving the main goal of VISION 2020 (i.e. the elimination of avoidable blindness by the year 2020).

The only review article on PEC in Africa that was identified was published in 1987 (Steinkuller, 1987), and alluded to disappointing findings following the training of general healthworkers in PEC in Kenya and Malawi:

'What has been accomplished by these programs? Eye clinic monthly records have not reflected any overall change in eye disease patterns in the areas covered.

*Furthermore, although I was in a position to examine thousands of patients who had filtered up the pyramid from the villages from both projects, I personally saw no patients who had his vision tested or a foreign body removed by one of the conference students. Red eyes were uniformly still diagnosed as conjunctivitis and treated with the single topical ocular antibiotic available; no differentiation was made regarding trachoma or even the hyper-purulent conjunctivitis of gonorrhea, even though these two items had been specifically addressed in the early series of seminars. It would appear that visual acuity testing and **any** kind of differential diagnosis of a red eye are too difficult, obtuse, and/or poorly taught to be practically employable by non-ophthalmic professional health workers **in this setting**, i.e., a setting in which the health worker already has far too many other tasks to handle adequately and in which he or she is only too aware that a bothersome eye patient can be easily and happily assuaged by distributing a tube of tetracycline ointment or by referring to the nearby eye clinic, where an ophthalmic medical assistant or ophthalmic nurse is posted.'*

DISCUSSION

In spite of numerous mentions of PEC within the literature, there is a paucity of literature on the effectiveness of such care in the provision of basic eye-care services. In fact, there is not even a clear agreement on the definition of PEC, even within the context of sub-Saharan Africa. For this review, PEC was defined as eye-care delivery at the 'front line' by full-time, integrated, healthworkers. It is worth noting that there are reports of various specific programmes, using village-level volunteers for specific eye-health-related tasks, such as the provision of vitamin A or reading spectacles, or the use of key informants to identify visually disabled children, which were not considered

in this review. The articles that were considered reflect several interconnected themes that deserve consideration. These include (1) a lack of agreement on the scope of PEC, with a resulting failure to tailor any training, support and supervision to this; (2) a lack of documentation on the technical eye-related skills that front-line healthworkers can actually be expected to perform correctly, in view of their many other responsibilities in the delivery of PHC; and (3) the changing needs and expectations for the delivery of a high-quality eye-care service in Africa.

Lack of a Clear Definition of the Scope of PEC

There is considerable variation in the scope of the PEC practised throughout Africa, for a variety of reasons. There is variation in the cadre of those who are expected to be front-line healthworkers (who may be general physicians, clinical officers, nurses or health assistants), variation in the overall medical and health responsibilities of such healthworkers (which may include mother and child preventive health services, HIV/AIDS, diabetic care etc), and variation in the size of the population covered by a front-line health facility (which can range from 2000 up to 50,000). Health facilities with very small catchment populations (such as dispensaries in Tanzania) are unlikely to see enough eye-disease cases each year to enable their healthworkers to maintain adequate diagnostic skills. On the other hand, health centres serving larger areas and manned by general physicians (such as many of those in Madagascar) may have the capacity to provide a broad scope of practice related to PEC. Scope-of-practice guidelines may presume the availability of diagnostic tools (e.g. visual-acuity charts, torches, and examination loupes) that rarely appear on the standard instrument lists for health centres at the primary level.

It is unrealistic to expect that front-line healthworkers will be comparable across Africa. Each country would probably benefit

from developing clear scope-of-practice guidelines for PEC and then using these guidelines to develop or refine the relevant curricula and training programmes.

What Eye-care Skills Can and Should a Front-line Healthworker be Expected to Perform Correctly?

Front-line healthworkers in Africa have a large, and growing, list of conditions to be managed. There are many reports of poor supervisory systems (Manongi *et al.*, 2006; Bosch-Capblanch and Garner, 2008) and the overloading of healthworkers (Chen *et al.*, 2004), with consequent high levels of attrition (Chankova *et al.*, 2009) and absenteeism (Chaudhury *et al.*, 2006) and services of low quality (Kiwauka *et al.*, 2008). A poor-quality service results in patients who completely by-pass front-line health facilities (Kruk *et al.*, 2009) and this is a common feature of eye-care services in Africa. In some situations, such as those described by Bronsard *et al.* (2008) and Al-Attas *et al.* (2010), inappropriate treatment and a failure to refer serious conditions may lead to detrimental outcomes, further undermining trust in the service. Common sense and increasing evidence indicate the need for supportive supervision to improve the quality of all the services provided by front-line healthworkers (Bosch-Capblanch and Garner, 2008). External supervision requires infusion of resources (time, transportation, funds etc), however, and is not always of good quality (Tavrow *et al.*, 2002). It is probably less effective when the supervisors do not have the technical skills that the healthworkers are expected to have. In Rwanda, however, supervision by people with the relevant technical skills (i.e. dedicated eye workers) led to a general shift in referral, from the community directly to the 'specialist' supervisors, that undermined the whole purpose of training the primary healthworkers in PEC in the first place (Courtright *et al.*, 2010).

The most common conditions that impair vision — cataract (at a stage before it

becomes white), glaucoma, retinal diseases and refractive error — are beyond the capacity of the generalist clinical officer and nurse, who see them only occasionally, to diagnose. In addition, to differentiate these conditions, even an eye specialist requires equipment that is not present at PHC level. These problems will always limit diagnostic eye-care services at the front line.

The Changing Needs and Expectations for the Delivery of an Eye-care Service in Africa

The technical changes seen in the provision of eye care since the Alma Ata declaration on PHC, made more than 30 years ago, have been huge. These changes, along with the changing expectations of the target populations, challenge the providers, planners and trainers who have to determine how best to provide eye-care services of high quality. Many patients do not now want to wait until white cataracts render them blind before they have cataract surgery. The widespread availability of intra-ocular lenses and new surgical techniques have introduced the possibility of excellent outcomes after cataract surgery, and continually lower the threshold of visual impairment at which it is reasonable to remove cataracts. Urban dwellers want good vision to drive and watch television, and even the rural elderly may now want to be able to see a cell-phone display clearly. The increasing availability of sub-specialist services, such as retina and paediatric ophthalmology, in Africa mean that conditions that were once ignored, when the focus was on white cataract, trachoma and vitamin-A deficiency, are now becoming part of national eye-care plans.

The growing epidemic of diabetes poses a new challenge. Researchers in South Africa have started to explore ways to link PHC and eye-care services for those people who need to be screened regularly for diabetic retinopathy. One group found that a technician who visited PHC facilities with a

mobile retinal camera was not only able to detect diabetic retinopathy but was also able to identify and refer previously unrecognised cases of cataract (Mash *et al.*, 2007).

CONCLUSIONS

The paucity of evidence of successful models of delivery for PEC services currently limits the ability of eye-care professionals and planners to agree upon effective models for the delivery of eye-care services at the primary level. In particular, there is a need to test and document the actual (rather than the potential) contribution of PEC to the delivery of eye care, particularly that for the most common causes of vision loss. With emerging conditions such as diabetic retinopathy, there will be a need to look at new models of PEC. It is sometimes argued that an eye-care service that is integrated into the PHC service is sustainable whereas any more ‘vertical’ strategies for eye-care delivery are not. In existing PHC systems, however, external support — to obtain basic equipment and provide training in PEC — is often necessary. A properly supervised PEC service may prove to be just as expensive and ‘unsustainable’ as a ‘vertical’ eye-care service that is based on outreach and specialist eye workers. PEC can only be as strong as the primary-health structure into which it is built. There is evidence that so-called ‘hybrid’ or ‘diagonal’ outreach programmes — where specialist eye workers with appropriate equipment make regular visits to PHC centres to provide eye clinics — can go a long way to improving cataract surgical rates (Lewallen *et al.*, 2005; Eliah *et al.*, 2008). The South African model, based on mobile retinal cameras, is an example of such a programme (Mash *et al.*, 2007). Such programmes can also provide essential transportation for patients, back to base hospitals for good-quality surgery, and reduce the burden of the multiple trips that a patient might otherwise need to achieve diagnosis and treatment.

The role of PEC in this model is to provide public education and promote attendance at the clinics, rather than to provide diagnostic and curative services. The definition and role of PEC in meeting the needs of people and eliminating blindness and visual impairment in rural areas deserves further study **before** there is wide-spread advocacy for the full integration of eye-care services into PHC.

Finally it is imperative to recognise that nearly all of the scant literature that is available on PEC in Africa only reflects experiences in the east and the south of the continent. As the situations in central and western Africa are often vastly different, the temptation to assume that the available data apply across a region as vast as sub-Saharan Africa should be avoided.

Clearly, if the main goal of the VISION 2020 initiative (the elimination of avoidable blindness) is to be achieved within the next decade, the realities of PHC systems in sub-Saharan Africa, the continuing technical advances that expand the scope of professional eye-care services, and the changing expectations of the target populations must all be carefully considered.

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