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Rapid assessment methods in eye care and their use in assessing refractive errors

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Rapid assessment methods

Rapid assessment methods are a means to undertake a comprehensive assessment of a public health issue using minimum resources within a limited amount of time. Such methods help plan, develop and implement interventions and monitor service delivery. These methods are typically useful in situations where data are needed quickly, and time and cost factors prohibit the use of classical research studies. Rapid Assessments can be considered as striking a "balance between methodologically appropriate and logistically feasible" methods.

Rapid assessments have been used in a broad range of health and development areas for decades. They have been applied successfully in public health including: sanitation, suicide, malaria, epilepsy, diarrhoea, HIV and AIDS and substance abuse. In the field of eye care, rapid assessment methodologies are in existence for cataract, trachoma and onchocerciasis (Table 1). Recently a rapid assessment tool for avoidable blindness (RAAB) was successfully field-tested.

Rapid assessments in eye care

Cataract is a disease of ageing and more commonly affects those above the age of 50. It is disease of public health importance, universal in occurrence, and easy to detect, and surgery is highly cost effective. The Rapid Assessment of Cataract Surgical Services (RACSS) is a sound epidemiological method that uses systematic random cluster sampling to collect data on cataract surgical services in the age group of 50 years and above (Table 1). The modified Snellen chart used in RACSS and RAAB uses only 6/60 and 6/18 optotypes. The protocol is simple and can be performed by trained paramedics in a door-to-door survey in the selected area. Subjects with visual acuity < 6/18 in either eye are referred for further investigations and treatment. Software for data entry and data analysis is available from WHO. To date RACSS has been conducted in more than 10 countries including Bangladesh where the results were compared to a previous large population-based study (reference).

The Rapid Assessment of Avoidable Blindness (RAAB) is a modified version of the RACSS (table 1). RAAB use a simple sampling process and examination protocol. It can be done at low cost within a few weeks. RAAB software enables easy data entry and analysis.

Trachoma is a blinding disease caused by *Chlamydia trachomatis*, which spreads through contact with eye discharge from the infected person (on towels, handkerchiefs, fingers, etc.) and through transmission by eye-seeking flies. Repeated infection leads to entropion, trichiasis and corneal scarring, ultimately resulting in blindness. Trachoma continues to be hyperendemic in many of the remote poor rural areas of Africa, Asia, Central and South America, Australia and the Middle East. The detection of trachoma is done using a magnifying loupe. The number of adults with trichiasis, children with active infection and hygiene & environmental risk factors can provide the magnitude of trachoma in an area. The intervention for trachoma includes the "SAFE" strategy. This consists of lid surgery (S), antibiotics to treat the infection (A), facial cleanliness (F); and environmental changes (E).

Trachoma Rapid Assessment (TRA) is conducted in an area identified as endemic based on key information sources such as community health centres or hospital records. The worst section of the village is selected and 50 children aged 1-9 years are examined from 15- 20 households (Table 1). The data are used for planning the service delivery.

Onchocerciasis is an eye and skin disease caused by *onchocerca volvulus*. It is transmitted to humans by the black fly (*Simulium* species). These flies breed in fast-flowing streams and rivers, increasing the risk of blindness to individuals living nearby, hence the commonly known name of "river blindness". The parasite can be seen as nodules under the surface of the skin which cause severe itching and disfigurement. The organism also invades the ocular tissues and causes irreversible blindness. Onchocerciasis is a disease of the community rather than individual so rapid assessments can be used at community level instead of at individual level.

The area affected by onchocerciasis can be mapped using a technique termed as 'Rapid Epidemiological Mapping of Onchocerciasis' (REMO). Maps are used to mark out the areas with disease-related

Table 1: Overview of Rapid Assessment methods in eye care

Rapid Assessment Method	Main Objective (To determine)	Age group	Examination Protocol/ Indicators
Rapid Assessment of Cataract Surgical Services - RACSS	Prevalence of blindness due to cataract Cataract surgical coverage Visual outcome after cataract surgery Barriers for uptake of services	50 years and above	Visual acuity assessment Torchlight examination for lens status
Rapid Assessment of Avoidable Blindness - RAAB	Prevalence of avoidable blindness (Cataract, refractive errors, cornea and retinal cause of vision loss)	50 years and above	Visual acuity assessment Torchlight examination for lens status Fundus examination, if required
Trachoma Rapid Assessment - TRA	Prevalence of trachoma in endemic areas proportion of children aged 1 – 9 years with dirty faces Households > 30 minutes from water source presence of functional latrine	50 children aged 1-9 years from 15 – 20 households in an endemic area.	Examination of upper lids using magnifying loupe
Rapid Epidemiological Assessment - REA	Prevalence of onchocerciasis	30 male individuals from the selected community	If 6 or more individuals have skin nodules, then Onchocerciasis is considered as present in the community and entire community is treated.
Rapid Assessment of Refractive Errors - RARE	Prevalence of uncorrected refractive errors & presbyopia Spectacle coverage	16 – 50 years	Visual acuity assessment (with and without pinhole) Auto refraction and subjective acceptance for glasses, if presenting visual acuity is < 6/12

environmental risk factors like free flowing rivers. Once the areas are identified Rapid Epidemiological Assessment (REA) is conducted (Table 1). If 6 or more individuals have nodules, then Onchocerciasis is considered to exist at a significant level and the entire community is treated with the drug Mectizan.

Principles of rapid assessments

The basic issues involved in rapid assessments include the following:

- The problem should be of public health importance with high prevalence in the affected groups
- A reliable and valid methodology for examination should be available, which can be applied to cover a large number of individuals in a limited time, using personnel with minimum training
- The data analysis should be simple and straightforward

Rapid Assessment of Refractive Errors (RARE)

Introduction

Refractive error is a phenomenon wherein the parallel rays after refraction through the optical components of the eye do not focus on the retina when accommodation is at rest. Until recently, refractive errors did not receive much attention due to use of best-corrected vision to define visual impairment (low vision and blindness). With new data available on the magnitude of avoidable blindness due to uncorrected refractive errors, these along with low vision are considered a priority in the global initiative VISION 2020:The Right to Sight.

Visual impairment due to uncorrected refractive errors is a major cause of unavoidable vision loss. New data released from the WHO on the World Sight Day 2006 for the first time revealed that there are 153 million people with uncorrected refractive errors. At least 13 million of them are children (aged 5 to 15) and 45 million working-age adults (aged 16 to 49) are affected globally. Nearly 90 percent of all people with uncorrected refractive errors live in low and middle-income countries.

Uncorrected refractive errors can be corrected using glasses. Despite the simple remedy, uncorrected refractive errors cause 16% of the blindness and 46% of the visual impairment across all age groups in the Indian state of Andhra Pradesh.

Rationale

Data on magnitude of uncorrected refractive errors and spectacle coverage are essential to plan service delivery. Data can be obtained by various means like school screening programmes, community outreach services, needs assessment surveys, secondary data from hospitals and other service providers. But this information is not truly representative of the general population and depends on various factors like enrollment in schools, documentation, etc.

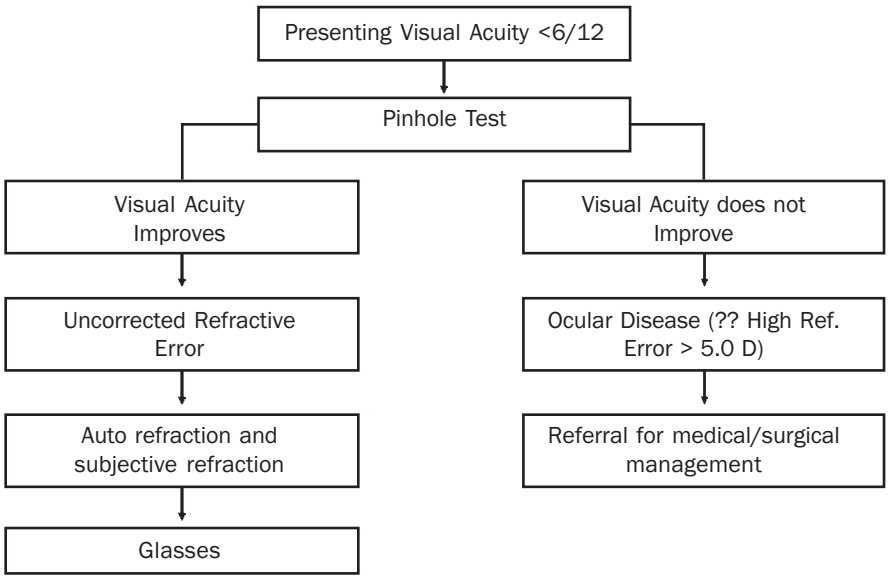
Classical population-based epidemiological surveys can provide the vital information on the prevalence of refractive errors in the population, which can be truly representative of the population, if the sample size is adequate. But surveys are expensive, need intensive specialized training of personnel, standardisation of techniques and expertise to collect and analyze the data. Most developing countries are inadequately equipped in terms of personnel and resources and consequently, cannot undertake large-scale surveys.

Refractive errors are common across all age groups. However, assessing the refractive status in children can be difficult in field settings. RAAB is already available for avoidable blindness in the population of 50 years and older. Hence there is a need to develop a rapid assessment for refractive errors (and presbyopia) in the age group of 15 –50 years. Uncorrected refracted errors and presbyopia are of public health importance in this age group such as demonstrated in the study of the prevalence of refractive errors in South Indian state of Andhra Pradesh (Table 2). However a simple examination protocol that can be administrated by personnel with minimal training, using simple equipment has been developed to detect vision loss from refractive errors. The combination of pinhole and a visual acuity test are the instruments needed for RARE. These instruments can be used by persons with minimal training in eye care. Sampling methods similar to RACSS can be used. The pinhole is used as a screening device and a hand-held autorefractor is used to

Table 2: Age & sex adjusted prevalence of refractive errors in south India state of Andhra Pradesh (APEDS)

Age Group	Myopia (>-0.50 D) % Prevalence (95 % CI)	Hyperopia (>+0.50 D) % Prevalence (95 % CI)
>/= 15 years	3.19 (2.24 - 4.13)	62.62 (57.10 - 68.13)
16 - 39 years	8.92(7.24 - 10.61)	1.90 (1.48 - 2.33)
>/= 40 years	36.54 (33.90 - 39.18)	18.92 (16.22 - 21.64)

Figure. Flow chart illustrating the procedures for testing vision for detection of uncorrected refractive errors



determine the magnitude of the refractive error. Fieldwork is currently underway to test the reliability and validity of these instruments as tools for RARE.

What can be expected from RARE?

- Estimation of the prevalence of uncorrected refractive errors and presbyopia.
- An understanding of the barriers to uptake of services in a given area
- Information on spectacle coverage and utilisation patterns
- Evidence and scientifically sound epidemiological data to plan the refraction services
- When repeated at regular intervals it can provide an understanding of the changing trends in prevalence of uncorrected refractive error over time.

What RARE is not?

- RARE is not a detailed epidemiological survey; it gives the extent of the problem in a given area, which can be used to plan service delivery.
- RARE is not intended to replace classical epidemiological surveys.

Conclusion

The methodology for RARE and the associated procedures are being piloted in the South Indian State of Andhra Pradesh. A manual will be produced after the validation of the procedures for replication in various areas.

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Near Vision Assessment

Distance Visual Acuity assessment

Distance Visual Acuity assessment using multiple pinhole occluder

Village Blindness Control Societies –

A concept for implementing VISION 2020: The Right To Sight

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The Global Initiative for the Elimination of Avoidable Blindness, VISION 2020: the Right to Sight, was launched in February 1999 at the global level and subsequently regions and countries followed suit. While being a signatory to this initiative is expressing solidarity with the vision and mission of prevention of blindness and visual impairment that is avoidable 2020, if the initiative needs to successful, the focus should be on implementation at the unit level or as in our case, the village level.

The author has embarked setting up what are called "Village Blindness Control Societies (VBCS)" in a rural district in the state of Andhra Pradesh in India, over the last couple of years. This article outlines the plan, model and possible structure that could further deliver decentralized eye care to those in need.

The Village Blindness Control Societies are envisaged as a platform for all blindness control activities at the village level and to address eye problems in the village. The idea is to fully utilise all the government schemes that are available at the village level through all national programmes for blindness control and involve the local population. It is planned as a 2–tier structure with the existing health human resources from the public sector supported by the local youth through volunteerism. It is presumed that by doing so a sense of societal responsibility is engendered among the future citizens of the village as well as the evolution of a more equitable social order.

The broad objectives for the VBCS are outlined as:

- To detect and eliminate avoidable blindness at individual village level.
- To identify and provide services to those with severe visual impairment and low vision in the village.
- To carry out eye care awareness programs and provide primary eye care.

Organizational Structure for a VBCS

The VBCS would have the following members and they will carry out the functions outlined below:

- The Head of the village or the "Sarpanch" as the Chairperson of the Society
- The Ophthalmic Assistant as the member secretary
- The Health Assistant or Health Supervisor as the Co-ordinator
- The Village Secretary as member

The Village Eye Health Volunteers (male and female) also as members.

Village health volunteers with respect to the eye care programme are trained in primary eye care, recording vision and maintaining records, counseling in the case of promotion of eye donation, running a community revolving fund for health collection and management as well as maintaining active and passive surveillance for eye ailments and follow up activities. The other national health programmes have also outlined activities for the volunteers to perform. These volunteers, one for every 25 households, with a good gender distribution are supported by the health funds of the local self-government and a donation-based model.

Personnel	Planned Responsibilities
Chairperson	• Chair the monthly meetings and review the activities • Facilitate organisation of monthly eye screening camps • Facilitate health education and publicity activities • Recruit and pay the Village Eye Health Volunteers • Supervision of fund raising and disbursement • Make available resources at disposal for eye care activities • Arrange for consumables like spectacles for the needy • Monitoring the Volunteers and other activities
Ophthalmic Assistant	• National Program for Control of Blindness Implementation • Updating Village Blind Registry • Training of other health and volunteer functionaries • Organising and conducting eye screening programmes and camps • Surveillance and follow up activities • Eye donation awareness and referral services
Health Assistant	• Liaise with Ophthalmic Assistant for eye care activities • Make health resources at disposal available • Eye Health Education as main activity • Volunteers training programme • Co-ordinate between all eye care programme activities • Attend monthly and regular meetings
Village Secretary	• Assist the Village Health Volunteers in their activities • Build and Co-ordinate Fund raising by Village Health Volunteers
Village Health Volunteers	• Assist in implementing National health programmes • Assist Ophthalmic Assistant in prevention of blindness programmes • First point of contact for all ailments at the village level • Responsible for 25 households in the village • Assist in updating the Village Blind Registry • Carry out primary eye care activities • Counseli for eye donation • Facilitate a revolving fund collection for health activities • Assist in vital statistics collection

Last year, the author established VBCS in 6 blocks in his district. He was able to:

- Increase out-patient attendance at camps and fixed facilities like a primary health centre
- Contributed to about 600 cases of cataracts that were operated in the district last year
- Provided 188 free spectacles to needy students for refractive errors
- Set up a key informant system to identify children with eye ailments
- Provide eye donation education resulting in one pair of eyes being donated last year

All this was possible because of the systematic efforts of all the functionaries who worked as a cohesive team at the village level in the VBCS. Local fund raising for health activities throughout the village was more effective where such a society was established.. Community participation and intersectoral co-ordination has also been very successful through establishing such societies for eye care as well as other health activities.

It is such localised efforts that will help make "VISION 2020: the Right to Sight" a reality.

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