Evaluation of Refraction Skills and Competencies of Ophthalmic Technicians: Providers of Refractive Services in Mozambique

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Introduction
314 million people worldwide live with low vision and blindness. 145 million people's low vision is due to uncorrected refractive errors (URE). This does not include presbyopia.
Mozambique has an estimated 720,000 people with visual defects (excluding presbyopia). Visual impairment and blindness from URE is estimated at 156,000. In 2010 Mozambique had 17 ophthalmologists and 60 Optomatic Technicians’ (OT’s) for a population of about 21 million. These are the only personnel in the local health system trained in refraction. In order to meet recommendations from WHO (Vision 2020) for the ratio of optometry personnel who can reftact to head of population, the country would require about 420 refraction competent personnel by 2020.1

Aim
This research aims to evaluate knowledge, refraction skills and competencies of OT’s. The knowledge and level of refraction skills of the existing OT’s is unknown because the location and specifications of their training is varied. By identifying strengths and weaknesses of the OT’s refraction knowledge and skills, a programme of mentoring, upskilling and continuing education can be tailored accordingly to further develop their practice and career path.

Methods
16 OT’s were evaluated in 4 provinces at the Central Hospitals in Nampula (HCN), Beira (HCB), Chimoio (HCC) and Inhambane (HPI) using a variety of approaches:

i. Background questionnaire to determine OT’s levels of training, amount of experience and workload.

ii. Investigative tools for OT’s:
   a. Questionnaire on perceived confidence in refracting.
   b. Oral quiz about theoretical knowledge of refraction.
   c. Observations of OT’s in practise (with the equipment available) to grade refraction competencies.

Figure 1: OT’s carrying out VA testing and refraction.

Results
Background questionnaire
The OT’s have all trained at different institutions. 7 studied in Cuba on a 3-year training program, 2 in Malawi on a 1-year training program, and 7 in Mozambique. Of those trained in Mozambique, 2 took an 18 month course (graduated 2010), and 5 studied for 2 years. The refraction component varied in all from theory only (Malawi) and Mozambique 18 month course) to three years of theory and practice in Cuba. Most of the OT’s ranged in age from 37 to 49. Their clinical experience averaged at 13 years with a standard deviation (s.d) of 6.5. They refraated an average of 12 patients per day (with a s.d of 5) from an average daily total of 25 patients seen in an eye clinic (with a s.d of 8).

Confidence skills survey
This was designed to find out how the OT’s rated their own skills. Of the 16 OT’s:
   • None were always confident in performing retinoscopy on spherical or astigmatism eyes.
   • None were always confident in binocular balancing and +1.00 blur test
   • 8 were always confident with performing spherocylindrical refraction
   • 6 were always confident in determining the power of spectacle lenses through focimetry, and 9 were always confident in determining the power by hand neutralisation (spheres only).

Ocular test

Figure 2: Table showing results of oral quiz

<table>
<thead>
<tr>
<th>Subject Areas (n=16)</th>
<th>Pass (%)</th>
<th>Fail (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case History</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Refractive Errors</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Visual Acuity (VA) and Pupil Distance (PD) Measurements</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Retinoscopy
43.75 56.25

Subjective Refraction and Spectacle Prescription
75 25

Figure 3: Bar chart showing OT’s competencies in performing refractions.

Figure 4: Table of equipment available at various hospitals

<table>
<thead>
<tr>
<th>Location</th>
<th>VA chart</th>
<th>Trial case &amp; frame</th>
<th>Retinoscope</th>
<th>Auto-refractor</th>
<th>Cross-cylindere</th>
<th>Lens-meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCN</td>
<td>6</td>
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<tr>
<td>HCB</td>
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<td>1</td>
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</tbody>
</table>

Refraction skills competency

Figure 3: Bar chart showing OT’s competencies in performing refractions.

Analysis of results
For accurate refraation OT’s need to communicate with patients, have an understanding of refractive errors, and then carry out objective and subjective testing.
The confidence skills survey, oral quiz and observations showed that all OT’s were confident in and performed well with patient communication, understanding refractive errors and measuring distance and near VA and correcting presbyopia.

However, the assessments of objective and subjective refraction revealed varying results. This difference can be explained as follows:

a) Refraction training and practical experience
The OT’s had different levels of training as shown by the background questionnaire. The OT’s trained in Cuba had studied 3 years of refraction theory and practice. They performed best on the oral exam and the confidence levels survey. All 4 OT’s who were satisfactory at retinoscopy and the one who was satisfactory at cross-cylindrical refraction were Cuban trained.

The ones who studied in Mozambique on the 18-month course, and in Malawi had only studied theory and had the least experience. They were the 4 that failed the oral exam on subjective refraction and spectacle prescription.

b) Equipment availability and OT capacity to use it
The range of equipment available (see figure 4 below) and the way OT’s are taught to use it shows a direct relationship to how they performed at certain skills.

Figure 5a and b: Assessing the OT’s performing retinoscopy

Recommendations and Conclusions
Refraction is almost half of the OT’s daily workload but at present only prebyspheres are being corrected with any accuracy. There is huge potential for the OT’s to be proficient at refraction. The key recommendations are:

• Training: Upskilling: The different levels of training of the OT’s means that any upskilling will depend on where they qualified. The newly qualified OT’s (Mozambique 2010) and the OT’s qualified in Malawi need more intensive upskilling as they have no prior knowledge of objective and subjective refraction skills.

The ones who qualified from Cuba or have had extra training already have prior knowledge and practice so they will need less time to upskill.

Training should consist of courses in objective refraction in the use of a retinoscope, subjective refraction with cross cylinders for correcting astigmatism and binocular balancing.

Refraction training programs should be standardized in OT courses.

• Equipment provision and training in their use: All OT’s should be trained in the use, maintenance and calibration of already available retinoscopes, auto refractors and focimeters. Cross-cylinders need to be sourced for all refraction units.

• Monitoring and Evaluation (M & E) framework for continuing training and education would encourage reflective practice, raise awareness of their knowledge limitations and encourage peer-review thus raising standards of care for their patients.

For further information
Please contact kajshah@aol.com. More information on this and related projects can be obtained at www.mozeyecare.org.

Literature cited