Use of Our Existing Eye Care Human Resources

Assessment of the Productivity of Cataract Surgeons Trained in Eastern Africa

Paul Courtright, DrPH; Linus Ndegwa, MPH; Joseph Msosa, MMed(Ophth); Joseph Banzi, MSc

Objectives: To measure the productivity of cataract surgeons in Africa and assess the factors that predict high productivity.

Methods: A questionnaire on productivity and working environments was sent to all cataract surgeons trained in Malawi, Uganda, Tanzania, and Kenya. In addition, 2 meetings and in-depth discussions were held to elicit information on strategies to improve productivity among surgeons in general.

Results: More than 77,000 cataract surgeries were performed in the years 2000 through 2004, resulting in an annual productivity rate of 243 surgeries per surgeon. Higher productivity was associated with having 2 or more cataract surgical sets, a well-functioning operating microscope, 3 or more nursing support staff, and a community program that includes transporting patients to the hospital.

Conclusion: Strategies for training, supporting, and supervising cataract surgeons in Africa need to be revised to create conditions amenable to greater productivity.

Arch Ophthalmol. 2007;125:684-687

Human resource development is one of the 3 key components of VISION 2020: The Right to Sight—a joint initiative of the World Health Organization and the International Agency for the Prevention of Blindness—yet there is little evidence available to guide decision-making regarding aspects of human resource development. Most attention has been paid to the number of service providers, described as the number of ophthalmologists or other eye care providers per million population. While these indicators illustrate some of the deficiencies, they often fail to provide important information needed by planners, donors, and training centers to select, train, equip, supervise, and support eye health staff. In fact, it has been suggested that many of the ways in which human resources for health are trained, deployed, and managed have reduced their productivity.

Performance of health workers, defined as adherence to an accepted standard or guideline, has often been inadequate. As in other areas of health care, poor performance will likely contribute to low use of health facilities by those in need. Often, poor performance is assumed to be due to lack of knowledge and skills, and as a consequence, most interventions have concentrated on training or attending courses with mixed or disappointing results.

The lack of research on the true determinants of health worker performance has been noted. This lack means an absence of tested strategies and frustrates the creation of evidence-based guidelines or standards.

In eastern Africa, the training of non-physician cataract surgeons was initiated more than 20 years ago; this cadre of midlevel eye care personnel was viewed to be essential for filling in the gaps in settings where there were few ophthalmologists. Since then, 130 surgeons have been trained in programs in Malawi, Uganda, Kenya, and Tanzania. Some countries, such as Uganda, ceased training cataract surgeons after a few years while others, such as Ethiopia, have recently started a training program. In these settings, personnel recruited and trained as cataract surgeons have generally come from the midlevel cadre of health staff referred to as assistant medical officers, clinical officers, or ophthalmic medical assistants. Since the mid 1990s, all surgeons were trained in extracapsular cataract extraction with poste-
rior chamber intraocular lens implantation. Some surgeons trained previously in intracapsular surgery received upgrade training in extracapsular cataract extraction. No more than 5 surgeons practicing in eastern Africa are still performing intracapsular surgery.

We sought to assess the performance of cataract surgeons trained in eastern Africa, in particular to assess the determinants of their performance. This information could improve planning of future training activities as well as determine the best strategies for improving the performance of existing surgeons.

**METHODS**

Cataract surgeon training programs in Malawi, Tanzania, Kenya, and Uganda were requested to provide a list of all graduates of their training programs. A questionnaire was designed and pre-tested. All graduates (regardless of residence and current activities) were requested to complete and return the questionnaires (via post or email). Nonresponders were contacted on 3 separate occasions to request completion and submission of the questionnaire. The questionnaire covered clinical productivity (number of cataract surgeries) for the years 2000 through 2004 with numbers to be obtained from existing surgical books. The questionnaire included demographic characteristics, characteristics of training (location, timing, sponsorship), and current working environment (equipment, supplies, support staff, supervision, community-based programs). We used SPSS version 10 (SPSS Inc, Chicago, Ill) to analyze the findings. Productivity was measured by adding the number of surgeries over the 5 years and dividing by the number of years (minimum of 1, maximum of 5) in which surgery was done. Mean values were not normally distributed and nonparametric tests were used to assess the contribution of predictors to productivity.

Two in-depth interview and focus group discussion sessions were held, one in Dar es Salaam for the Tanzanian surgeons and one in Nairobi for surgeons from Kenya, Ethiopia, Uganda, Malawi, and Zambia. These sessions targeted issues arising from analyzing the productivity data. Participants for the sessions were selected randomly among “high-volume” surgeons (>300 surgeries per year) and “low-volume” surgeons. We sampled 14 surgeons from Tanzania, 6 each from Kenya and Uganda, 1 from Zambia, 2 from Ethiopia, and 1 from Malawi. Trainers from Malawi, Kenya, Uganda, Ethiopia, and Tanzania also participated in these sessions.

**RESULTS**

Among the 130 surgeons trained, 18 had died or retired. Among the remaining 112 surgeons, questionnaires were returned by 88 surgeons (78.6%); response was lowest among surgeons from Kenya (64.4%). Nine of the surgeons who returned completed questionnaires, although not retired, had not performed any cataract surgeries in 2000-2004; these individuals were not included in the analysis of productivity.

The total number of surgeries reported by surgeons during the 5-year period of 2000-2004 was 77 120 (Table 1). Each surgeon contributed a different number of years to the surgical totals, which required calculation of surgeon years. Overall, cataract surgeons have been doing an average of 243 surgeries per year (range, 114-347).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Surgeons, No.</th>
<th>Average Productivity per Year (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>61</td>
<td>295.2 (298.4)</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>141.2 (163.4)</td>
</tr>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;46</td>
<td>38</td>
<td>202.3 (223.9)</td>
</tr>
<tr>
<td>≥46</td>
<td>33</td>
<td>308.9 (300.3)</td>
</tr>
<tr>
<td>Sponsorship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ministry of Health</td>
<td>20</td>
<td>267.8 (338.1)</td>
</tr>
<tr>
<td>Christoffel Blindenmission</td>
<td>26</td>
<td>331.8 (286.7)</td>
</tr>
<tr>
<td>Sightsavers International</td>
<td>17</td>
<td>220.7 (203.2)</td>
</tr>
<tr>
<td>Other nongovernmental organization</td>
<td>8</td>
<td>221.1 (319.7)</td>
</tr>
<tr>
<td>Self-sponsored</td>
<td>4</td>
<td>121.2 (192.9)</td>
</tr>
<tr>
<td>Where trained</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kenya Medical Training Centre</td>
<td>27</td>
<td>246.2 (318.9)</td>
</tr>
<tr>
<td>Kilimanjaro Christian Medical Centre</td>
<td>21</td>
<td>303.3 (271.8)</td>
</tr>
<tr>
<td>Lilongwe School of Health Sciences</td>
<td>16</td>
<td>277.0 (235.4)</td>
</tr>
<tr>
<td>Uganda (various places)</td>
<td>7</td>
<td>101.7 (66.5)</td>
</tr>
<tr>
<td>Others</td>
<td>4</td>
<td>456.3 (449.9)</td>
</tr>
</tbody>
</table>

* Differences are statistically significant (Mann-Whitney U test P = .03).

Summarized in Table 2, the findings indicate that older surgeons were slightly more productive than younger surgeons; however, further analysis revealed that younger surgeons were in practice for a much shorter period, and years in practice was the primary predictor of productivity. On graduation and placement, surgeons generally started out with low numbers of surgeries during their first years, gradually building up to a peak at the fourth year in practice; productivity did not continue to increase after the fourth year.

There was some variation in productivity by training sponsorship; however, the type of hospital (Table 3) was the more important variable. For example, surgeons sponsored by Christoffel Blindenmission but based at Ministry of Health hospitals had lower levels of productivity than surgeons sponsored by Christoffel Blindenmission but based at mission or private hospitals. Mission hospitals and private hospitals were the most productive with rates 2 to 3 times higher than Ministry hospitals and private hospitals. Ministry hospitals and private hospitals.
of Health facilities. Variability in productivity was associated with the number of supportive eye staff; surgeons with 3 or more support staff were more than twice as productive as surgeons with 0 to 2 support staff. Supervision did not seem to predict productivity; however, the type and quality of supervision was not measured. Having 2 or more cataract surgical sets was associated with a 3-fold increase in productivity compared with having less than 2 cataract sets. Interestingly, surgeons who relied on a combination of purchases and donations for consumables, although few in number, generally had the highest productivity. Finally, surgeons working in settings with programs that brought patients to the hospital for surgery had productivity at twice the level of surgeons without such programs. There was no difference between having no community program and having a community program that did not involve transporting patients to the hospital for surgery.

The level of support to surgeons was related to the type of facility in which they were based. Mission and private hospitals were more likely to have adequate support for equipment, surgical instruments, systems to obtain consumables, nursing support, and programs to bring patients to the hospital compared with Ministry of Health facilities (Table 4).

Female surgeons generally were half as productive as male surgeons. Although the number of female surgeons was small, comparing male with females surgeons revealed that female surgeons were less likely to have adequate nursing support (odds ratio, 7.2; 95% confidence interval, 1.24-54.1) and to have 2 or more cataract surgical sets (odds ratio, 3.4; 95% confidence interval, 0.9-14.2).

COMMENT

Cataract surgeons have made a major contribution to the number of cataract surgeries carried out in eastern Africa in the past 5 years; however, the average productivity per surgeon per year was relatively low. Without data on the productivity of ophthalmologists, we cannot make a comparison between cataract surgeons and ophthalmologists.

During focus group discussions, the cataract surgeons recognized their limited productivity but showed limited understanding of potential productivity levels and
strategies to improve efficiency (eg, more surgical sets, more operating tables, better use of staff). Supervisory visits, when they occurred, tended to focus on clinical issues rather than management issues, and cataract surgeons generally had limited exposure to opportunities for continuing medical education. After the discussion, they proposed that they could do 500 to 800 surgeries per year if there were better support and supervisory systems in place.

The higher productivity of male surgeons compared with female surgeons was unexpected and appeared to be related to levels of support. Further investigation is needed to determine why female surgeons were less supported than their male counterparts.

Placement (Ministry of Health hospital compared with mission/private hospital) seems to have been the primary determinant of posttraining support, whether in terms of supportive personnel, equipment and supplies, or community programs. The tendency of training (including sponsorship) to be disconnected from posttraining program support is problematic. Key strategies for improving efficiency and productivity once trainees are graduated require planning and support, both of which have been missing in many programs. Adoption of a list of essential equipment by all training sponsors may be an effective way to ensure that there is a minimum package for all surgeons on completion of training. Furthermore, prior to admission to training programs, policies regarding selection and support and supervision of cataract surgeons on completion of training. Negotiation with the hospital regarding the assignment of nursing support (and their training) for the cataract surgeon might ensure better use of human resources.

Strategies to bridge communities with hospitals transporting cataract surgical patients to the hospital, described previously,9 are more effective than community-porting cataract surgical patients to the hospital, de- 

Submitted for Publication: April 19, 2006; final revision received July 31, 2006; accepted August 1, 2006. 

Correspondence: Paul Courtright, DrPH, Kilimanjaro Centre for Community Ophthalmology, Tumaini University/ KCMC, PO Box 2254, Moshi, Tanzania (pcourtright@kcco.net).

Financial Disclosure: None reported.

Acknowledgment: This project was supported by Sight-savers International (Nairobi), to whom we are grateful. Many people assisted in the project, we are particularly grateful to Irma Makupa, Grace Saguti, Peppy Machange, Susan Lewallen, and Pius Mabuba (Tanzania); Nancy Thuo and Gladys Okal Koyengo (Kenya); Ben Male and Daniel Balina-Nsoko (Uganda); Joseph Munsanje (Zambia); Moses Chiramo and Abigail Suka (Malawi); and Amir Bedri and Elias Hallu (Ethiopia). We also are very grateful to the cataract surgeons in eastern Africa, without whom the project could not have been carried out.

REFERENCES