A Cataract Surgery Training Program: 2-Year Outcome After Launching ☆

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BACKGROUND: To investigate whether a short-term training program can produce competent cataract surgeons.

METHODS: This observational pilot study enrolled 12 trainees who could not perform phacoemulsification independently. The training consisted of 2 phases. During the first 3-month phase, trainees were taught phacoemulsification through wet laboratory exposure and deliberate practice in patients at the training center in the Eye Hospital of Wenzhou Medical University in China. The second phase consisted of performing 50 cases at the trainees' home institution with supports from instructors of the first phase. Trainees' surgical results were followed-up. The surgical skill as measured by the Ophthalmology Surgical Competency Assessment Rubric (OSCAR) and surgical outcomes were analyzed.

RESULTS: During the first phase trainees performed 193.3 ± 95.4 wet laboratory cases and 557 eyes in patients. The complication rate was 0.54%. The OSCAR scores improved significantly ($p < 0.01$) in the first phase. At the second phase, all the trainees could carry out phacoemulsification at their home hospital and the complication rate was 1.87%. During the long-term follow-up, 4936 cases of phacoemulsification were performed and the complication rate was 0.87%.

CONCLUSIONS: Trainees succeeded in performing phacoemulsification safely and skillfully through a limited short period of training by wet laboratory exposure, deliberate practice in patients, and frequent formative feedback provided by the OSCAR tool. (J Surg Ed 73:761-767. © 2016 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: cataract surgery, phacoemulsification, training, teaching

COMPETENCIES: Medical Knowledge, Practice-Based Learning and Improvement, Systems-Based Practice

INTRODUCTION

Cataract is a major cause of blindness worldwide, affecting almost 18 million people.[1] Fortunately, the visual impairment caused by cataract is reversible in majority of the patients after cataract surgery.[2–4] Phacoemulsification is a common method of cataract surgery. However, phacoemulsification remains one of the most challenging procedures to master in ophthalmology training. There is no standardized method for the teaching or learning of phacoemulsification. In addition, phacoemulsification training should be provided without compromising patient safety. In China, the majority of ophthalmologists do not perform phacoemulsification in residency and thus there needs to be a way to train these individuals to meet the needs of the population. To try and meet these challenges a pilot study of a phacoemulsification training program was launched at the Eye Hospital of Wenzhou Medical University (EHWMU), China in July 2012. This included wet laboratory exposure, deliberate practice in patients, management of workflow and resources, patient safety principles, use of the International Council of Ophthalmology's Ophthalmology Surgical Competency Assessment Rubric (ICO-OSCAR),[5] and long-term follow-up of procedures performed, outcomes, and surgical skill. We report the experience of the first 2 years after launching of this pilot study.

SUBJECTS AND METHODS

Inclusion criteria for trainees were as follows. (1) Graduation from ophthalmology residency training program. (2) Experience in extracapsular cataract extraction (ECCE) or

☆This research was conducted at the Eye Hospital of Wenzhou Medical University, Wenzhou, Zhejiang, China.

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some steps of phacoemulsification, but unable to perform phacoemulsification independently. (3) Passed a competency assessment that included eye anatomy, biometric measurements, patient selection, perioperative management, and a video evaluation of their ECCE or steps of phacoemulsification surgeries. (4) Their home hospital would provide resources to perform phacoemulsification. They were unable to do phacoemulsification because of the lack of standard training of phacoemulsification in residency and the increasing demand on patient safety. After the candidates applied for the program, a preliminary evaluation of the candidates was conducted and their surgery video of ECCE or steps of phacoemulsification was recorded. The video was assessed by the director and the trainers of the training program to judge their competence when they started the program. All trainees were supervised by experienced cataract surgeons who had received formal training in teaching cataract surgery in a previous ICO educational meeting.

The training program was divided into 2 phases (Table 1).

Phase 1

The first phase was conducted at EHWMU where the trainees achieved competence of standardized steps of phacoemulsification and patient management through wet laboratory exposure, deliberate practice in patients, use of the ICO-OSCAR and management of workflow, resources, and patient safety principles. The duration of phase 1 is 3 months for each trainee. They were trained in consecutive waves between July, 2012 and July, 2014.

During phase 1, low-risk cases were selected, i.e., age-related cataract patients with wide lid aperture, clear cornea, dilated pupillary diameter greater than 7 mm, nuclear hardness grade III, and good cooperation. The phacoemulsification procedure was performed under topical anesthesia. A standardized method of phacoemulsification was to be taught to allow constant repetition of a single technique by the trainees.

The surgery was deconstructed into discrete steps and ranked according to difficulty level referred to the published literature[6] and the faculty consensus. The steps, in order from least to most difficult, were intraocular lens (IOL) insertion, aspiration of cortex, incision construction, hydrodissection, capsulorhexis, sculpting and cracking of the lens, and quadrant removal of the lens.

The surgical steps were learnt in order of difficulty and each of these steps was deliberately practiced on subsequent cases. Trainees were expected to perform only one of the steps during each surgery, allowing for deliberate practice of that particular skill, until they reached a predetermined level of skill and demonstrated the confidence needed to progress to the next surgical step. The trainers then performed the remainder of the case. All cases were to be videotaped, and all complications were reported to and reviewed with the director of the training program.

The trainers would instruct the trainees when they began to go wrong in specific steps and take over if they felt patient safety could be compromised. The trainees reviewed their surgery videos afterwards, and discussed the specific points with the trainers at the end of the operation day. All trainees received verbal and diagram-assisted feedback for each case they performed.

Both trainees and trainers assessed surgical performance by using the ICO-OSCAR: phacoemulsification tool.[5] This tool divides the procedure into 20 steps and each step is rated at the following4 levels: novice, beginner, advanced beginner, and competent. Each step is also assigned a numerical score from 2 to 5, which allows surgical skill improvement to be measured numerically. The threshold set in the specific step of wet laboratory or procedures to be done by each trainee was ICO-OSCAR score 4. Once this score was achieved, the trainee was moved on to the next surgical step. Importantly, each rating at every step includes a description of required performance thus allowing the student to know exactly what is expected.

Phase 2

During phase 2, the trainees returned to their home hospitals where they performed 50 cases of phacoemulsification with continued supports from the instructors. The trainees were supported in the following way:

TABLE 1. The 2 Phases of the Training Program

Phase 1			Phase 2
First month	Second month	Third month	
Learn theory	Wet laboratory	Complete cases	Return to home hospital & perform 50 phacoemulsifications under observation
Wet laboratory	Deliberate practice in patients (hydrodissection, capsulorhexis, sculpting, quadrant removal)	Complicated case discussion	
Deliberate practice in patients (incision, cortex removal, IOL implantation)	Patient counseling	Managing complications	
Biometric measurements	IOL selection		