The ophthalmology surgical competency assessment rubric for strabismus surgery

Karl C. Golnik, MD,[a] W. Walker Motley, MS, MD,[b] Huban Atilla, MD,[c] Rachel Pilling, MB, ChB, MA,[d] Aravind Reddy, FRCSEd,[e] Pradeep Sharma, MD, FAMS,[f] Maria B. Yadarola, MD,[g] and Kanxing Zhao, MD[h]

PURPOSE To produce an internationally valid tool to assess skill in performing strabismus surgery.

METHODS A panel of 7 content experts adapted a previously published tool for assessing phacoemulsification by using a modified Dreyfus scale of skill acquisition and providing behavioral descriptors for each level of skill in each category. The tools were then reviewed by 12 international content experts for their constructive comments. The main outcome measure was a consensus of the experts on the final rubric.

RESULTS Experts' comments were incorporated, establishing face and content validity.

CONCLUSIONS The tool (Ophthalmology Surgical Competency Assessment Rubric for Strabismus Surgery (ICO-OSCAR: strabismus) has face and content validity. It can be used globally to assess strabismus surgical skill. Reliability and predictive validity are yet to be determined. (J AAPOS 2012;16:318-321)

In the United States, the Accreditation Council for Graduate Medical Education (ACGME) has mandated that all residency training programs (including ophthalmology) teach and assess six general competencies (ie, medical knowledge, communication and interpersonal skills, patient care, professionalism, practice-based learning, and systems-based practice).[1,2] Currently, surgery is included in the *patient care* competency, but the American Board of Ophthalmology (ABO) and other organizations have recommended that surgery be split from this competency to become a seventh competency. To fulfill the ACGME mandate, ophthalmic residency programs need valid assessment tools to demonstrate attainment of surgical competence. We believe such assessment tools should also help guide the acquisition of skills as well to assess the ophthalmologist's progression. These tools should be used for both summative (final grade) and formative (designed to improve performance) feedback. Our objective was to develop a standardized, internationally valid tool to both guide the development of and assess the progression of an ophthalmologist's competence in performing strabismus surgery.

Pilling and colleagues[3] previously described the "Strabismus Surgical Skills Assessment Tool." This tool divides strabismus surgery skills into 17 steps, which are scored on a 5-point Likert scale, where 1 = "poorly or inadequately performed," 3 = "performed with minor errors or some hesitation," and 5 = "performed well with no prompting or hesitation" (there are no scale anchors for scores of 2 or 4). Although clearly a good start, the scale could be improved by the addition of behavioral or skill-based anchors for evaluators to use when assessing residents' competence. The present study describes our methods of designing and validating (for face and content validity) an assessment tool for rectus recession surgery, including a skill-based rubric.

Methods

A group of content experts (the authors), representing Argentina, China, England, India, Turkey, the United Kingdom, and the United States worked together online via a Google communication site. Taking the 17 steps of the Strabismus Surgical Skills Assessment Tool as a starting point, we created a rubric with descriptions of behavior expected at each step. We define a rubric as an explicit set of criteria used for assessing a particular type of work or procedure. The specific behavioral narrative anchors in the rubric provide raters with objective benchmarks for comparative purposes and provides the learners with specific targets for behavioral change.

Author affiliations: [a]Departments of Ophthalmology, Neurology, and Neurosurgery, University of Cincinnati and the Cincinnati Eye Institute, Cincinnati, Ohio; [b]Abrahamson Pediatric Eye Institute, Cincinnati Children's Hospital Medical Center and University of Cincinnati, Cincinnati; [c]Department of Ophthalmology, Ankara University, Faculty of Medicine, Ankara, Turkey; [d]Department of Ophthalmology, Bradford Royal Infirmary, Bradford, UK; [e]Department of Ophthalmology, Royal Aberdeen Children's Hospital and University of Aberdeen, Aberdeen, Scotland; [f]RP Center for Ophthalmic Sciences, All India Institute of Medical Sciences, New Delhi, India; [g]Department of Pediatric Ophthalmology and Adult Strabismus, Centro de Ojos Romagosa, Córdoba, Argentina; [h]Department of Ophthalmology, Tianjin Eye Hospital, Tianjin, China

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Correspondence: Karl C. Golnik, MD, 808 Elm Ave, Terrace Park, OH 45174-1205 (email: kgolnik@fuse.net).

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Face validity was demonstrated by developing a rubric draft based on a modified Dreyfus model of skill acquisition (novice, beginner, advanced beginner, competent, expert). The "expert" category was omitted because residents are not expected to become experts during training. Rating categories also were assigned a numerical value so that total score for the tool could be calculated and monitored for improvement over time. Similar tools use a 2- to 5-point scale and for uniformity we adopted the same scale.[4] Behavioral anchors were written by the authors and modified repeatedly through the online Google communication site until all authors were satisfied. Anchors were written for each of the scoring categories for all 17 steps.

We solicited input from a second group of 12 content experts from around the world who reviewed the draft and made suggestions. The international content experts were selected for their expertise and to try and assure global representation. These experts teach strabismus surgery in Argentina, China, Canada, England, India, Italy, Peru, Saudi Arabia, and the United States. Their suggestions were catalogued and reviewed by the authors; the final draft was called the Ophthalmology Surgical Competency Assessment Rubric for strabismus surgery (OSCAR:strabismus). The International Council of Ophthalmology (ICO) approved this assessment tool, which has been renamed the ICO-OSCAR: strabismus. The specific behavioral narrative anchors in the rubric provide raters with objective benchmarks for comparative purposes and provide learner with specific targets for behavioral change.[5,6]

Results

The international panel's comments on the initial tool draft included both general and specific suggestions. Several reviewers suggested adding new categories to the 17 published in the Strabismus Surgery Assessment Tool described by Pilling and colleagues,[3] and 2 reviewers thought the tool might be too extensive and burdensome to complete. Most of the comments regarded adding items such as preoperative evaluation or operative and postoperative complications. The content experts considered these comments but thought that the tool could become too cumbersome and the goal was to produce a surgical skill assessment tool. Thus, the consensus of the experts was to not add categories (Table 1). The tool is intentionally rather detailed to achieve our goal of guiding acquisition of skills and assessing in the same tool. There were numerous specific suggestions regarding many of the rubric's behavioral descriptors. All expert comments were considered, and the authors incorporated appropriate suggestions, thus establishing a level of face and content validity. Table 2 shows steps 4 to 6 of the OSCAR:strabismus tool (the full tool is provided as e-Supplement 1, at jaapos.org).

Table 1. Steps of the OSCAR:strabismus assessment tool

1	Draping
2	Forced duction test
3	Globe stabilization
4	Conjunctival incision
5	Hooking muscle
6	Exposure of muscle
7	Suture placement in muscle
8	Disinsertion of muscle
9	Use of caliper/ruler
10	Intrascleral needle pass
11	Conjunctival closure
12	Hemostasis
13	Tissue handling
14	Knowledge of instruments
15	Loading needle
16	Knot tying
17	Communication

Discussion

Rectus muscle recession strabismus surgery is one of the most common surgical procedures performed by ophthalmology residents; however, to the best of our knowledge, no universally accepted standard competency assessment tool for strabismus surgery exists either in the United States or elsewhere. In the United States and the United Kingdom, ophthalmology residency programs are required to show that in aggregate, residents in a program have performed a specified "minimum" number of strabismus surgeries (quantity) and have an "equivalent experience," but there are no standard requirements or measures to assess how well the resident did conducting the surgery (ie, quality). Globally, greater variability exists. Indeed, many countries do not even require a minimum number of surgeries, let alone standards for competence. One of the authors (KCG) participates in the International Council of Ophthalmology's Program Director Courses designed to teach program directors how to become more effective educators. Having interacted with more than 1,000 program directors from around the world, we were prompted to undertake the current study because there was clear feedback about a desire and need for a more standardized system for surgical education and evaluation.

A variety of surgical skill competency assessment tools have been developed by groups of individual ophthalmic medical educators; however, most have focused on cataract surgery.[7-11] Cremers and colleagues[7] developed the "Objective Assessment of Skills in Intraocular Surgery" (OASIS), a one-page objective evaluation form to assess residents' skills in cataract surgery. The form is completed by an evaluator who directly observes the surgical procedure and includes objective data such as wound placement and size, phacoemulsification time, and total surgical time. The authors showed that the OASIS had both face and content validity.

To complement this objective assessment, the same group developed a subjective rating of surgical skills named "Global Rating Assessment of Skills in Intraocular Surgery" (GRASIS).[8] This one-page form allows the evaluator to assign scores from 1 to 5 on the basis of a behaviorally anchored rubric to domains such as preoperative knowledge, microscope use, instrument handling, and tissue treatment in addition to seven other areas. Feldman and

Table 2. ICO-ophthalmology surgical competency assessment rubric-strabismus (ICO-OSCAR:strabismus)

	Novice (score = 2)	Beginner (score = 3)	Advanced beginner (score = 4)	Competent (score = 5)
4 Conjunctival incision and Tenon's dissection	Is unable to describe limbal or fornix conjunctival incision for rectus muscle surgery.	Is able to describe but not able to perform limbal or fornix conjunctival incision for rectus muscle surgery.	Is able to perform limbal or fornix conjunctival incisions but is inefficient and requires guidance.	Is able to efficiently perform either limbal or fornix conjunctival incision.
5 Hooking rectus muscle	Is unable to describe proper technique of hooking the muscle and is unable to perform technique.	Is able to describe proper technique but unable to hook muscle on first attempt.	Usually hooks the muscle on first attempt but is inefficient.	Is able to efficiently and precisely hook the muscle on first attempt.
6 Exposure of rectus muscle	Is unable to describe proper dissection technique to expose rectus muscle.	Is able to describe dissection technique for muscle exposure but requires constant guidance to perform the basic steps.	Is able to perform basic exposure but is inefficient and/or occasionally disrupts multiple tissue planes or branches of the anterior ciliary arteries.	Is able to efficiently expose muscle using a combination of sharp and blunt dissection as appropriate and avoids branches of anterior ciliary arteries.

Geist[9] described the Subjective Phacoemulsification Skills Assessment as an evaluative instrument designed specifically for intraoperative assessment of resident phacoemulsification cataract extraction surgery. This form delineates phacoemulsification cataract extraction into overall performance and specific steps of the procedure.

The performance was graded with a rubric defining a good outcome at each step and asking the evaluator to rate on a 1-5 scale from strongly agree to strongly disagree. They were able to show some degree of interrater reliability. Other authors have investigated surgical skills outside of actual human surgery. Fisher and colleagues[10] developed the Eye Surgical Skills Assessment Test (ESSAT), a 3-station (skin suturing, muscle recession, phacoemulsification/wound construction and suturing technique) wet laboratory surgical skills obstacle course for ophthalmology residents. In contrast to other surgical assessments, the ESSAT is designed to evaluate residents' basic skills before they enter the operating room.

Gauba and colleagues[11] developed the Human Reliability Analysis of Cataract Surgery tool to identify the frequency and pattern of technical errors observed during phacoemulsification cataract extraction by surgeons with varying levels of experience. They analyzed the number of errors performed per task, nature of performed errors, and surgical experience of operating surgeon. They demonstrated face, content, and construct validity and suggested that the tool could be used to enhance and structure resident surgical training.[11] Lee and colleagues[12] developed an ophthalmology wet laboratory curriculum for teaching and assessing cataract surgical competency. The curriculum includes pre- and posttests of cognitive skills in addition to a structured wet laboratory curriculum with observed ratings of surgical skill. The same group from Iowa has shown that changes in their surgical curriculum have decreased resident complications during cataract surgery.[13] Thus, in at least one institution, the ACGME mandate has led to measurable improved outcomes.

McClatchey and colleagues[14] developed strabismus surgery and retinopathy of prematurity competency checklists designed to assess the quality of a resident's training and experience. The checklists use a 5-point Likert scale with explicit behavioral anchors at only the middle and extreme points of the scale. The checklists were validated by ophthalmologists in the United States and are a good start in improving structured resident feedback and assessment in these areas.

It is hoped that our approach will offer a platform for global standardization for teaching, training, and evaluation in this domain. Face and content validity have been established by incorporating comments from a group of content experts representing Africa, Asia, Europe, and North and South America. Similar tools have been developed for phacoemulsification (ICO-OSCAR:phaco) and extracapsular cataract (ICO-OSCAR:ECCE) surgical skill.[4]

This assessment tool serves two purposes: first, it will decrease subjectivity of the assessment by clearly defining for the assessor what behavior must be observed for each level of proficiency; second, the rubric clearly communicates to the learner what is expected to attain competence and thus can be used for both assessment and teaching. Ultimately, it is likely governing bodies will want to assess surgical skills as part of recertification. The ICO-OSCAR:strabismus tool could be used for this purpose. In addition, this tool will allow practicing ophthalmologists the ability to self-assess in a standardized manner.

The ICO-OSCAR:strabismus has face and content validity and can be used internationally to teach and assess resident strabismus surgical skill. Although we have demonstrated the tool has face validity, further work is necessary to show that different raters will rate the same procedure similarly (inter-rater reliability) and to show

that results from the tool do predict strabismus surgical skill measured by other methods (construct validity).

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