Teaching and Assessing Surgical Competence:

Applications for Ophthalmic Residents and Practicing Ophthalmologists
Teaching and Improving Cataract Surgery "Step by Step"

AAO Course 580

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Course Objectives

At the conclusion of the course you should be able to:

1) Describe the rationale for competency based residency education
2) Develop a plan for competency based cataract surgery education
3) Develop simple new resources as part of your plan

Introduction

Why are we doing this course?

At the University of Iowa we recently went through the resident review committee (RRC) 5 year review. During the preparation for this visit we realized how little guidance we had regarding competency based education and in particular competency for cataract surgery. During this course we will share our experience developing a plan for cataract surgery competency. We hope that our plan will be a starting point for others. During the course we hope to facilitate discussion to help us all improve

Who are the instructors?

a) Dr. Thomas A. Oetting is head of the Eye Service and Deputy Chief of Surgery for the VAMC in Iowa City. He has attended over 3,000 resident cataract cases. He won the resident teaching award in 2000, 2001, 2002, and 2005. He serves on the ABO/AAO Anterior Segment Knowledge Base task force and serves on the Cataract Committee for the 2005 AAO annual meeting. email: thomas-oetting@uiowa.edu
b) Dr. Andrew Lee is a prominent neuro-ophthalmologist who has also written extensively on the shift to competency based education (please see appendix). He is the curriculum director for the University of Iowa's resident education program and leads the University of Iowa education task force. The ACGME identified his Web site (go to eyerounds.org under competencies) as a site of excellence.
c) Dr. Hilary Beaver teaches third year resident cataract surgery at the University of Iowa. She is a member of the Iowa Education Task Force on the competencies. She is an instructor at the Harvard and Madison Resident Phaco Courses. She is the Director of Medical Student Education for the ophthalmology department.
d) Dr Tim Johnson does a high volume of cataract surgery at the University of Iowa. He has developed a technique to introduce second year residents to topical surgery and to deliberately practice their capsulorhexis technique while maintaining his efficient caseload. He helped develop the Madison Resident Phaco course.
e) Dr. Bonnie A. Henderson is an innovative educator who developed the largest cataract course for residents this year at Harvard (MEEI). She has developed innovative tools for education and has recently published w/her colleagues at Mass Eye and Ear Institute (MEEI) a summary of the OASIS project (please see appendix).

Primer on the Competencies

Why we must change. A group of forces including insurers, patient advocacy groups, and hospitals have convinced the ACGME that resident education must change. The current resident product was felt to have an unreliable skill set that was not ready for the demands of today's healthcare market. The measurement of resident surgical skill was based on numbers and not outcome. The emphasis was on medical knowledge and not performance. Please see Dr Lee's article in the appendix.
Dreyfus Model. The Dreyfus model proposes that professional skills are learned in distinct levels or stages. Progression along these stages is expected, can be measured, and can be influenced by education and practice. Professionals progress from novice, to beginner, to advanced beginner, to proficient, and eventually some advance to expert.
Deliberate Practice. Experts can be made and are not born. Deliberate purposeful practice is critical when developing and maintaining expert skills. An example is Dr. Johnson's capsulorhexis program described below.

Defining the stages of Cataract Competency

The first and most difficult step is to stop denying that you must change. The next step toward developing a plan to incorporate the competencies into cataract training is to incorporate the

Dreyfus model. One must come up with a working definition of each stage that is useful for residents in training. Certain skills or behaviors will be present at each stage. One would expect to acquire these skills at a certain point in training given the opportunities that have been presented to that resident up to that point. The timing of each stage will be very dependant on a particular program's curriculum. For the program at the University of Iowa we defined the stages in the following way with expectations for achieving certain stages by resident year.

1) **Novice**. The Novice would have desire and not much else. The novice would typically be a medical student, intern, or early first year resident.

2) **Beginner**. The beginner has started on their course toward competency and has started with wet lab training and doing parts of cataract surgery cases. The beginner would typically be a 1st year resident at Iowa (this would vary depending on your program's curriculum).

3) **Advanced Beginner**. The advanced beginner is doing whole cases on their own. Advanced beginners are expected to be able to do an entire case in 45 minutes. They are not expected to be facile yet with their non-dominant hand within the eye. The beginner would typically be a 2nd year resident at Iowa (this would vary depending on your program's curriculum).

4) **Proficient**. The proficient cataract surgeon does whole cases on their own using both hands. Proficient surgeons are expected to be able to do an entire case in 30 minutes. They are expected to be facile with both hands within the eye. The proficient surgeon would typically be a 3rd year resident at Iowa (this would vary depending on your program's curriculum).

5) **Expert**. Expert stage cataract surgeons would be rare among residents. Expert surgeons are expected to be able to do an entire case in less than 15 minutes. Expert surgeons would be able to handle almost any complex cataract case. The expert surgeon would typically be a resident graduate who had practiced his skills following graduation.

Setting Expectations for each Stage

For each stage of competency, or more practically each year of residency or each rotation the faculty must set expectations. When Dr. Oetting was in the Air Force these expectations were called samples of behavior. Dr. Lee sometimes refers to these as sentinel events. The expectations should be very similar in wording to the objectives for a CME course. They should be measurable and not gray. You could include minimal expected behaviors and also samples of exceptional behavior for each level.

Setting these expectations is hard. In most cases you will have no clear guidelines. Try to make them measurable. Try to make them meaningful. Try to make them realistic. You must be able to document progress. These expectations are established at the start of residency and should not be a moving target. When establishing these expectations recognize the possibility that a resident cannot meet them and must be failed or eliminated from the program.

Our cataract expectations at Iowa. Please know these are a starting point and are by no means perfect for every residency program.

Novice. No expectations except desire to proceed
Beginner. Typical met at end of 1st year of residency at Iowa

expected	know name/purpose of all instruments in VA cataract tray
	describe all steps of cataract surgery
	describe common complications of cataract surgery
	demonstrate ability to fold and insert IOL into capsular bag
	demonstrate ability to prep and drape eye
	demonstrate ability to drive operating microscope
	demonstrate ability to place a single suture

	demonstrate ability to remove viscoelastic device (OVD)
	demonstrate ability to perform Yag capsultomy
	manage routine cataract patients postoperatively
	describe findings of CME on OCT and FFA
	describe common complications of Yag capsulotomy
exceptional	demonstrate ability to remove cortical lens material
	demonstrate ability to use phacoemulsification handpiece

Advance Beginner. Typically met at end of 2nd year of residency at Iowa

expected	know name/purpose of all instruments on all VA eye trays
	consent patient for routine cataract surgery
	perform 5 uncomplicated phaco cases using 1 hand < 45min
	describe steps to convert to ECCE
	describe technique of anterior vitrectomy
	demonstrate ability to perform A scan for AEL
	demonstrate ability to place multiple sutures efficiently
	demonstrate ability to use capsular dye
exceptional	demonstrate ability to use both hands during surgery
	understand phacoemulsification settings
	demonstrate ability to do 2 handed cases < 30 minutes
	demonstrate ability to use iris hooks/iris stretch techniques

Proficient. Typically met at end of 3rd year of residency at Iowa

expected	understand IOL selection
	consent patient for complex cataract surgery (eg CTR, capsular dye)
	perform 5 uncomplicated phaco's w/ both hands < 30min
	demonstrate or deeply understand conversion to ECCE
	demonstrate or deeply understand anterior vitrectomy
	demonstrate or understand sulcus IOL placement
	understand phacoemulsification machine settings
	understand OVD selection
	demonstrate ability to use iris hooks
exceptional	demonstrate ability to use McCannell suture
	demonstrate ability to use CTR
	demonstrate ability to do 2 handed cases < 15 minutes
	demonstrate ability to use phaco chop techniques
	staff first years during portions of cataract surgery

Developing Resources for Stage Progression

Know your audience. *These times they are a changin*. Our residents have too much to learn in three years. The AAO basic Science series has almost doubled in size over the past 10 years. Our residents learn all the procedures and treatments we learned plus all the new cornea and retina procedures that have exploded over the past few years.

Our residents are part of a revolution in medical school training very different from ours. They are used to being treated as adult learners not as memory machines or unimportant apprentices. They don't know about the way it was nor do they really care -- just like we didn't care when we were residents. They value their time and it doesn't all belong to you. You must consider teaching important topics in during normal work hours (e.g. wet lab during the day).

Our residents get bored easily with lectures as they are used to multitasking with the internet, their cell phones, and e-texts. Their first reflex is Google not Duane's. They want multimedia resources. *Give the people what they want*.

Just in time education. Dell Computer Corporation helped to propagate the notion of just in time manufacturing to save inventory. Intellectual inventory is also expensive. We have to present resources to residents at a stage where the training is appropriate. Wet lab training 1 year before the first case is far less useful than the day before. Learning how to use the A scan too early will have little relevance if the resident is not doing surgery and may even be obsolete as new technology and procedures come so fast.

Try to develop resources that are available when the residents need them not when it is convenient for faculty or the curriculum. For example, key lectures can be placed on DVD or even better on a web site or local server. Develop a wet lab available 24/7 rather than relying on a single yearly wet lab course. Develop a steady source of pig eyes.

Baby Steps Forward. Confidence is critical in microscopic surgery. We have to slowly move forward so that the early experience of our residents is most likely to be positive. The most experienced surgeons should be with the most junior surgeons. Doing a small part of a case that goes perfectly is better than doing all of a bad case. Better certainly for the patient but also for the beginning surgeon who is developing confidence.

One strategy we use at Iowa to take baby steps forward for beginning surgeons is to "back" into cases. By that we mean that the beginning surgeon will do some of the last parts of perfectly started cases. At first they might simply act as the technician and hand instruments over and fold the IOL. The next week the beginning surgeon might fold the lens and place it through the perfect wound into the perfect capsular bag. The next week they might place the IOL and remove the OVD. One can also use the opposite strategy where the beginning surgeon does part of the start of the case and then a more senior surgeon finishes.

For advanced beginning surgeons the attending surgeon must be ready to provide the second instrument (may require a second paracentesis). It is common that advanced beginning surgeons will not be able to control both feet and both hands well enough to do all of the case. One could use single hand techniques at first. But, if the attending can provide the second hand for difficult parts of the case (e.g. last nuclear remnant) then the transition from one hand to two can be done in baby steps.

Deliberate Practice. Most residents and faculty consider the capsulorhexis the most difficult part of the case to master. In order to progress from advanced beginner to proficient the resident must deliberately practice the capsulorhexis. Animal, cadaver, and computer simulations poorly simulate this task.

One strategy we have used at Iowa is to have residents do only the capsulorhexis portion of the surgery with our highest volume cataract surgeon. First the attending does the paracentesis and wound. Next the resident performs the capsulorhexis using this perfect wound. If the resident starts to get into trouble they are quickly relieved. This system allows numerous and closely monitored deliberate practice on a critical part of the procedure. As the wound is perfect the beginning surgeon is set up to excel. Doing just the capsulorhexis minimizes the impact on the schedule of this efficient surgeon.

Inventing Resources. As you set certain expectations for each stage you may find as we did at Iowa that no resources exist to help residents meet that expectation. These gaps in resources were one of the most interesting findings for us as we developed our competency plan.

One of our expectations for beginning surgeons was to know the names and typical use for the instruments on the cataract tray at the VA in Iowa City. Of course we had a hard time even finding a list of the instruments on the tray. We also discovered that many of the 3rd year residents that we had assumed knew all the instruments did not. A quick solution to this problem was to make a low quality DVD where one of the attending surgeons simply went through the tray and named all of the instruments (please see course DVD).

One of our expectations for advanced beginner surgeons was to perform informed consent for cataract surgery. Everybody knows consent is good but what constitutes a good consent. We just sort of figured it out for ourselves years ago during training which is not good enough. At Iowa we made a DVD with some examples of consents on patients at the VA. We also developed a feedback form so that one of our senior nurses can critique the resident's consent (form in appendix) and document competency in this important area.

Listen to what your residents want. Dr. Michael Boland, who was a resident with us until July 2005 and is now on faculty at Wilmer, realized that we needed a video of early cases. Most videos show expert surgeons doing 10 minute cases, which are very different from first cases. We made narrated DVD's of first cases to give a more realistic picture of what will happen to future beginning surgeons on their first case.

As perfection can be the enemy of good surgery -- the enemy of good content, especially video content, is perfection. It is far better to have a poor quality DVD with relevant timely content than the slickest DVD that a beginning surgeon is not ready for. Strongly consider producing good, not perfect DVDs for your residents:

Typical prep and draping procedure in your facility
Typical first case in your facility
What is on the tray and how are the instruments set up
How is the phaco machine set up
Examples of good CCC
Examples of consent

Measuring and Documenting Progression

Formative Feedback. Historically in medical education we have used summative feedback. At the end of the rotation we would give a faculty evaluation that in greater or lesser degrees said "I'm OK you are lazy". This does little to help the resident gain competence as they are now off your rotation and on to other tasks.

Formative feedback is better. Formative feedback is distributed through the rotation and allows directed growth. Formative feedback starts with: "here's what I expected", then "here's what I saw that was good", then "here's what I saw that needs work" and most importantly "here are the resources for you to improve". We had often given formative feedback in an informal way but this work was never documented and as far as the RRC was concerned it never happened.

As part of the competency plan for our Iowa RRC review we developed a formative feedback form to document our formative feedback. These forms can be collected and saved in the resident's portfolio to document their growth. Two examples are in the appendix. The first is more closely tied to the Dreyfus stages and cataract surgery which may help to reduce grade inflation. The other is a more general form which could be used for any type of case. We have found that these forms are easy on the faculty as they are very quick to fill out.

Prove to the world you are teaching. You may want to consider starting a teaching portfolio to prove you are a competent teacher. One day you may need to show an RRC member all you have done. You may need to justify your existence to your residency director or chairman. At Iowa teaching portfolios are used for faculty promotion. Your teaching portfolio could include:

Your cataract teaching plan (and other subject areas)
Copies of formative feed back forms you have provided
Copies of minutes of cataract M&M conferences
Copies of teaching DVDs and Handouts you produce
Examples of resident improvement from your intervention

Objective Assessment of Skills in Intraocular Surgery (OASIS). Dr Bonnie An Henderson and her colleagues at Harvard have come close to producing the ultimate competency tool for cataract surgery. Their OASIS system documents the outcome of resident surgery. This system shows future employers, RRC reviewers, and residency directors that a particular resident is producing results. The OASIS system is a data base that collects preoperative, operative and post operative data for patients that had resident surgery. The system will collect complication data and refractive outcome data. This system could be done with paper or computer. The system could be modified to fit the needs of your program.

Putting it together into a plan

After you have your stages, expectations and resources you can put them together into a plan for your residents.

Dreyfus Stege	Level	Expected Samples of Behavior For this level	Typical rotation at this level	% grads at this level	Resources to Grow beyond this level
Novice	Starting	Desire to learn	n/a		Books video tapes observe
	assistant surgeon	demonstrate sterile technique know all instruments in tray know all steps of cataract surgery demonstrate prep and drape demonstrate IOL fold demonstrate RB injection	VA 1st yr		Books wet lab video tapes observe
Beginner	wet lab surgeon	demonstrate microscope use pig/cadaver eye with faculty	VA 1st yr		wet lab video tapes back into cases
	neophyte surgeon	demonstrate suture technique demonstrate IOL placement demonstrate use of I/A device	VA 1st yr		wet lab video tapes back into cases
Advanced Beginner	Basic cataract surgeon	demonstrate 5 cases < 45 min know steps to convert to ECCE know steps for vitreous loss demonstrate use of capsule dye demonstrate effective consent	VA 2nd yr	100%	wet lab video tapes develop non-dominant hand
	assistant topical surgeon	demonstrate capsulorhexis during topical case assist efficient cataract surgeon	UI 2nd yr	100%	video tapes
Proficient	two handed surgeon	demonstrate 5 cases < 30 min using both hands demonstrate topical cases	VA 3rd yr	95%	video tapes
Expert	advanced surgeon	demonstrate the use of small pupil techniques demonstrate the use of CTR demonstrate chopping techniques demonstrate IOL suturing techniques	VA 3rd yr DM 3rd yr UI 3rd yr	60%	video tapes
	efficient surgeon	demonstrate 5 cases < 15 min	VA 3rd yr DM 3rd yr UI 3rd yr	10%	video tapes

Key: DM: Des Moines VAMC; VA: Iowa City VAMC; UI: University of Iowa

Ophthalmology Resident Operative Feedback

Training Level: PGY1 PGY2 PGY3 PGY4 **Date**:_____

Facility: VA UIHC **Case #**:_____

Procedure: Phaco Other:_____

Respect for Tissue	1 rough	2	3	4	5 gentle	not observed
Time and Motion	1 slow	2	3	4	5 efficient	not observed
Instrument Handling	1 awkward	2	3	4	5 fluid	not observed
Knowledge of Instruments	1 poor	2	3	4	5 perfect	not observed
Use of Both Hands	1 awkward	2	3	4	5 fluid	not observed
Able to Handle Complication	1 confused	2	3	4	5 aware	not observed

Samples of Good Behavior: 1 hand <45” 2 hand <30” 2 hand <15”

_____

_____

Areas to work on: _____

_____

Corrective Action: Discussion Present case Wet Lab Video

_____ _____

Faculty Resident

Cataract Operative Feedback

Training Level: PGY1 PGY2 PGY3 PGY4 **Date**_____

Facility: VA UIHC # Similar cases done: _____

Procedure: Phaco Other: _____

	Novice	Beginner	Advanced Beginner	Proficient	Expert	
Respect for Tissue	rough	o	o	o	gentle	not observed
Time and Motion	slow	o	o	o	efficient	not observed
Instrument Handling	awkward	o	o	o	fluid	not observed
Instrument Knowledge	poor	o	o	o	perfect	not observed
Use of Both Hands	awkward	o	o	o	fluid	not observed
Handle Complication	confused	o	o	o	aware	no complication
Time Goal Met	>60 minutes	<60 minutes	<45 minutes	<30 minutes	<15 minutes	not applicable

Samples of Good Behavior: _____

_____

Areas to work on: _____

_____

Corrective Action: Discussion Present at M&M Wet Lab Video

_____ _____

Faculty Resident

Consent Feedback

Training Level: PGY1 PGY2 PGY3 PGY4 **Date**:_____

Facility: VA UIHC

Procedure: Phaco Other:_____

Identified Him/Herself	1 vague	2	3	4	5 specific	not observed
Identified Options	1 vague	2	3	4	5 exact	not observed
Description of Procedure	1 confused	2	3	4	5 clear	not observed
Identified Risks	1 vague	2	3	4	5 exact	not observed
Identified Benefit	1 vague	2	3	4	5 exact	not observed
Attention to Questions	1 poor	2	3	4	5 aware	not observed
Completion of Consent Form	1 blank	2	3	4	5 perfect	not observed

Samples of Good Behavior: _____

_____

Areas to work on: _____

_____

Corrective Action: Discussion Video

_____ _____

Faculty Resident

Objective Assessment of Skills in Intraocular Surgery (OASIS)

Sandra Lora Cremers, MD, Joseph Bowers Ciolino, MD, Zandra Karina Ferrufino-Ponce, MD, Bonnie An Henderson, MD

Objective: To establish an objective ophthalmic surgical evaluation protocol to assess residents' surgical competency and improve residents' surgical outcomes.

Participants: Eight experts in resident education from comprehensive ophthalmology, cornea, glaucoma, and retina services; 2 chief residents (postgraduate year 5 [PGY5]); and resident representatives from PGYs 2, 3, and 4 participated in the development of an objective assessment tool of skills in resident cataract surgery.

Methods: Analysis of all resident cataract surgeries performed at our service from July 2001 to July 2003 led to the development of a 1-page objective evaluation form to assess residents' skills in cataract surgery. A panel of surgeons at the Massachusetts Eye and Ear Infirmary reviewed the database and the evaluation form and provided constructive feedback.

Results: Development of a unique database of all resident cataract cases and constructive feedback by experts in resident teaching assisted in creating a 1-page evaluation form entitled Objective Assessment of Skills in Intraocular Surgery (OASIS).

Conclusions: OASIS has face and content validity and can be used to assess, objectively, surgical events and surgical skill. We believe the OASIS evaluation form and database will be a valuable tool for assessing ophthalmology residents' surgical skills at other residency programs as well. *Ophthalmology 2005;112: 1236–1241 © 2005 by the American Academy of Ophthalmology.*

In 1997, the Accreditation Council for Graduate Medical Education (ACGME) endorsed the use of educational outcomes measures as a tool in assessing residency programs' accreditation status.[1–4] They specifically identified 6 areas of competence for resident education in ophthalmology: (1) medical knowledge, (2) patient care, (3) practice-based learning, (4) interpersonal and communication skills, (5) professionalism, and (6) systems-based practice.[2,3] The seventh area of competence, surgery, was subsequently included by the American Board of Ophthalmology. The long-term goal of implementing the ACGME's guidelines is to improve resident medical and surgical education by using outcomes measures to improve feedback and teaching techniques. In ophthalmic surgery, the goal is also specifically to assess surgical skill, improve the surgical learning curve, and identify factors that affect resident surgical outcomes.

More recently, this effort to develop objective assessments of technical proficiency of ophthalmic procedures and to improve the learning curve for cataract extraction has led, for example, to further advances in computer simulations of ophthalmic surgery.[5,6] Though surgical competence entails more than just surgical skill (knowledge, decision making, confidence, and communication skills are noted key elements), the assessment of technical skills during training has long been considered to be a form of quality assurance in general surgical fields.[7–12] Typically, surgical learning is based on an apprenticeship model. In this model, the assessment of technical proficiency is the responsibility of the surgical preceptor. However, this type of assessment is often subjective.[9–11] Objective assessment of surgical competence is essential because deficiencies in training and performance are difficult to correct without factual data.[8,9,12]

Both the ACGME and the American College of Surgeons have also addressed outside factors involved in the need for objective assessments. The increasing interest of the public and media in the surgical performance of doctors and doctors-in-training is one example.[1–4] Additionally, the surgical community is aware of the vulnerability of graduate surgical education to financial pressures and the push to increase institutional productivity.[2,4,13,14] This external pressure has led to a decrease in available resident surgical cases in certain surgical specialties.[13] Surgical proficiency must therefore be acquired and verified in less time, with the

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SURGICAL RECORDS FOR PATIENTS UNDERGOING OCULAR SURGERY(OASIS)

Patient Stamp Here

Surgery Date: _____

Pt. Age: ___

Eye: OD OS

Resident: _____

Attending: _____

Lens Used:

Power:

Criteria for Cataract Surgery (Check or circle when appropriate.)
1. The cataract surgery is necessary because of the presence of an opacification in the crystalline lens that has resulted in the patient's decrease in visual acuity causing a limitation of the patient's ability to function in: daily activities ___, reading__, driving___, recreation___, employment__.
2. The cataract's presence precludes diagnosis or treatment of other eye disease___
3. Avoid actual or impending complications of lens-induced eye disease which requires lens extraction __.

Med Hx: □ Coumadin/ASA/Plavix □ DM □ HTN □ Other:_____

Ocular Hx: □ POAG/NTG/PXG □ ARMD □ NPDR/ PDR / CSME / s/p PRP/ FOCAL/ _____ □ Narrow angle (by VH) □ s/p LI □Small pupil □ Other:_____

Allergies:□ NKDA □ _____

Ocular Meds:_____ **Dominance:** OD / OS

Exam: Cataract: NO ___ NC____ PSC ___ Cort____ TOTAL _____ **PXF**/Traumatic/_____

Pupils: wnl/ abnl: Size after max dilation_____/____ mm
Motility: wnl/ abnl: _____
Cornea: clear/ abnl: MDF/ guttae /Fuchs' /_____
AC: clear/ abnl
Iris: clear/ abnl
Fundus: able to view / no view /abnormal/_____
Other: _____
Macula: wnl/ abnl/ limited view/ ARMD

Ethnicity: Caucasian Hispanic African American Asian Other:_____

MRx
OD_____Va 20/_____
OS_____Va 20/_____

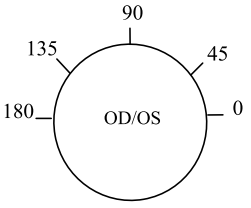
BAT (med)
20/_____
20/_____

A Scan (mm/AC depth)
OD_____/____
OS_____/____

IOP
OD_____
OS _____

Ks (AR/Man)
OD_____/_____ Steep Axis_____=_____
OS_____/_____ Steep Axis_____=_____

PACHY
OD_____mm
OS_____mm



Target Refraction: plano/ -0.25/-0.5/_____ **IOL Master: Formula:** □HofferQ □SRK □Holladay □Avg

Power Planned: _____D **IOL Planned**: □AR40e □LI61U □SA60AT □ACIOL □_____ Incision Size_____

Anesthesia: □Peribulbar □Retrobulbar □Topical □Intracameral □Supplement gtt □Injection □Subtenons

Procedure: □Clear Cornea □ Scleral Tunnel □ECCE □Conversion □_____ **LRI**: single /paired: 6mm, 8mm

Capsulotomy: □Pinch □Cysto/Utrata **Viscoelastic**: □Heal □Visc □Duovisc □Other_____

Phaco Tech: □Divide & Conq □Stop-Chop □Phaco-Chop □Bowl □Prechop □Bimanual

Instruments: □Drysdale □Chopper □Split IA □Cap Polish □PreChopper □Iris hook/ICG/CTR/_____

Attending Help: □NONE □Wound Constr. □Rhexis □Phaco □I & A □IOL □Wound closure □Ant Vit □Attending Case □Other: _____

IOL Position: □Capsular Bag □Sulcus □ACIOL (w/ PI) □Aphakic □Sutured: iris/sclera

Events: □NONE □CCC incomplete □PC tear □Vit loss □Ant Vit □Other:
When event occurred: □CCC □HD □Phaco ⌈Divide □Chop ⌊Last quadrant ⌈Epinuclear removal □IA □IOL Notes:

Phaco Time: ____min **Surgical Time**:_____min **BSS**_____cc

Post-op Date	D 1: / /	W 1: / /	M 1: / /	M 3: / /	M 6: / /	Y 1: / /
Va sc/ph	/	/	/	/	/	/
MRx						
Kmax/min	/	/	/	/	/	/
Axis						
IOP mmHg						
K edema	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+
Cells AC	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+
PCO	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+	0 /tr/ 1+/ 2+/3+/4+
PostOp Meds:						
Findings: (i.e., Seidel negative,etc.)						

The relative indications and potential risks, benefits and alternatives of cataract surgery with the insertion of an IOL have been discussed with the patient,including: risk of requiring further surgery, laser, new glasses, infection, loss of vision, and loss of eye.

Resident Signature: _____ Date: _____ Attending Signature: _____ Date: _____

NOTES:

Figure 1. Objective Assessment of Skills in Intraocular Surgery template. abnl = abnormal; AC = anterior chamber; ACIOL = anterior chamber intraocular lens; ant vit = anterior vitrectomy; AR/Man = automatic refraction/manual refraction; ARMD = age-related macular degeneration; ASA = aspirin; BAT = brightness acuity test; BSS = balanced salt solution; cap polish = capsular polisher; CCC = continuous curvilinear capsulorrhexis; CSME = clinically significant macular edema; CTR = capsular tension ring; D = diopters; DM = diabetes mellitus; ECCE = extracapsular cataract extraction; gtt = drops; Heal GV = viscoelastic with 14-mg/ml sodium hyaluronate; HD = hydrodissection; HofferQ = formula for IOL power calculation developed by Hoffer (Hoffer KJ. The Hoffer Q formula: a comparison of theoretic and regression formulas. J Cataract Refract Surg 1993;19:700–12); HTN = hypertension; Hx = history; IA/I & A = irrigation and aspiration; ICG = indocyanine green; IOL = intraocular lens; IOP = intraocular pressure; K = corneal; Kmax/min = steep corneal curvature/flat corneal curvature; LRI = limbal relaxing incision; MDF = map dot fingerprint; MRx = manifest refraction; NKDA = no known drug allergies; NPDR = nonproliferative diabetic retinopathy; NS = nuclear sclerosis; NTG = normal-tension glaucoma; OD = right eye; OS = left eye; PACHY = pachymetry; PCO = posterior capsular opacification; PDR = proliferative diabetic retinopathy; phaco = phacoemulsification; PI = peripheral iridotomy; POAG = primary open-angle glaucoma; PSC = posterior subcapsular cataract; PXF = pseudoexfoliation; PXG = pseudoexfoliative glaucoma; sc/ph = uncorrected vision/vision with pinhole; s/p LI = status after laser iridotomy; s/p PRP = status after panretinal photocoagulation; SRK = formula for IOL power calculation developed by Sanders et al; Va = visual acuity; VH = Van Herrick (Campbell DG. Primary angle-closure glaucoma. In: Albert DM, Jakobiec FA, eds. Principles and Practice of Ophthalmology. Philadelphia: WB Saunders; 1994:1365–88); Visc = Viscoat; wnl = within normal limits. Reprinted with permission.

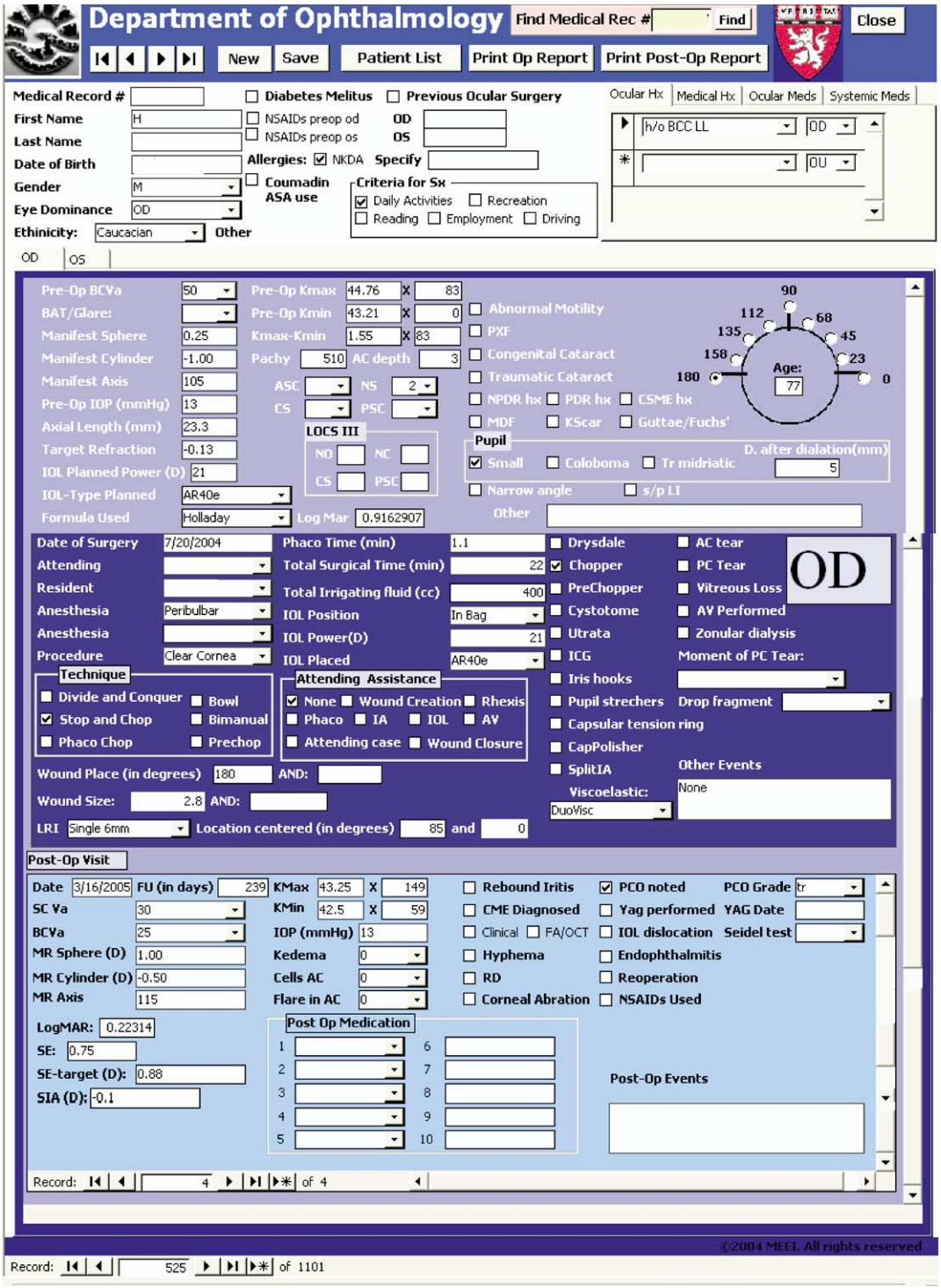


Figure 2. Example from Objective Assessment of Skills in Intraocular Surgery computer database showing calculation of surgically induced astigmatism and overcorrection from target refraction. AC = anterior chamber; ARMD = age-related macular degeneration; ASA = aspirin; ASC = anterior subcapsular cataract; AV = anterior vitrectomy; BAT = brightness acuity test; BCVa = best-corrected vision; capPolisher = capsular polisher; CME = cystoid macular edema; CS = cortical sclerosis; CSME = clinically significant macular edema; D = diopters; ERM = unilateral epiretinal membrane; FA = fluorescein angiography; FU = follow-up; hx = history; IA = irrigation and aspiration; ICG = indocyanine green; IOL = intraocular lens; IOP = intraocular pressure; Kedema = corneal edema; Kmax/min = steep corneal curvature/flat corneal curvature; Kscar = corneal scar; logMar = logarithm of the minimum angle of resolution; LRI = limbal relaxing incision; MDF = map dot fingerprint; MR = manifest refraction; MRX = manifest refraction; NKDA = no known drug allergies; NPDR = nonproliferative diabetic retinopathy; NS = nuclear sclerosis; NSAIDs = nonsteroidal antiinflammatory drugs; OCT = optical coherence tomography; OD = right eye; OS = left eye; OU = both eyes; PC = posterior chamber; PCO = posterior capsular opacification; PDR = proliferative diabetic retinopathy; phaco = phacoemulsification; PSC = posterior subcapsular cataract; PVD = posterior vitreous detachment; PXF = pseudoexfoliation; RD = retinal detachment; SC = uncorrected; SE = spherical equivalent; SIA = scleral–iris angle; s/p LI = status after laser iridotomy; tr = traumatic; Va = visual acuity; YAG = yttrium–aluminum–garnet. Reprinted with permission.

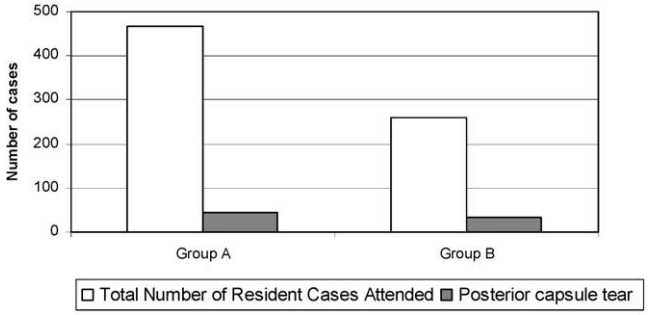


Figure 3. Graph comparing the residents' cases of posterior capsular tear between surgical preceptors, grouped by number of resident cases attended per year (RCPY) (group A > 90 RCPY, group B < 90 RCPY).

risk that some surgeons may not be sufficiently skilled at the completion of training.[9,15]

Existing methods for evaluating clinical skills in medical resident competency have been described for nonophthalmological specialties.[16–20] The limitations of these techniques in the evaluation of patient medical care are well known.[3] The American Board of Ophthalmology's Competency Task Force developed the Ophthalmic Clinical Evaluation Exercise through the Patient Care Subgroup in an effort to assist ophthalmology programs in the clinical realm of resident evaluations.[3]

The ACGME has in effect also stated that measuring surgical outcomes and analyzing results in a systematic manner will improve the surgical training system in the United States.[4] However, the ACGME did not specify how to assess residents' level of competence in the surgical realm specifically. To our knowledge, no articles have addressed the issue of surgical competency in ophthalmology resident training formally.

In an effort to evaluate ophthalmology residents' surgical skills, the Department of Ophthalmology, Comprehensive Ophthalmology Service (COS), Harvard Medical School developed a protocol entitled the Harvard Medical School Residents in Ophthalmology Cataract-Outcomes Study. Through this study, we have been able to analyze many factors involved with learning and teaching cataract surgery and residents' surgical outcomes. As part of this study, we created an extensive database of resident cataract surgery and an objective surgical evaluation form, Objective Assessment of Skills in Intraocular Surgery (OASIS).

The purpose of this report, therefore, is to report on the creation of an objective evaluation tool for resident cataract surgery.

Materials and Methods

A database for internal evaluation of residents' surgical outcomes was developed at the Harvard Medical School Department of Ophthalmology at the Massachusetts Eye and Ear Infirmary's COS as part of the Harvard Medical School Residents in Ophthalmology Cataract-Outcomes Study protocol. The computer database (Access 2002, Microsoft, Redmond, WA) consists of all cataract extraction surgeries performed at the COS by postgraduate year 4 (PGY4) residents from July 2001 to July 2003. The institutional review board approved the study. Surveying complications and resident surgery outcomes does not require special approval from institutional review boards if the results are used internally for feedback to the individual resident. However, if the results are used for published studies, our review board requires formal approval. The initial database template consisted of general pertinent preoperative medical and surgical histories, including preoperative refraction, keratometry, axial length, relevant ocular findings, general intraoperative events (i.e., intraocular lens used and vitreous loss), and postoperative information (i.e., vision at each postoperative visit, intraocular pressures, and other events or complications). After a review of our initial 500 cases, a trend of higher resident vitreous loss rates with certain surgical preceptors was evident. To understand this phenomenon, we collected more specific intraoperative information to determine what surgical techniques residents were utilizing and when surgical preceptors were assuming full control of the case. We thus saw the need to develop a more objective evaluation form for resident cataract surgery.

The MEDLINE, ERIC, and PubMed databases were searched (1957–2004) to identify existing methods for evaluating ophthalmology residents' surgical competence with regard to patients' surgical care. Terms such as *ophthalmology residents' surgical skills evaluations, ophthalmology residents' cataract surgery,* and *ophthalmology resident surgical evaluation* were searched. Relevant articles mainly reported resident vitreous loss rates, visual outcomes, and other intraoperative complications. No articles discussing the evaluation of ophthalmology residents' surgical competence have been published. Given the lack of guidance on evaluating surgical competency in ophthalmology, we developed a new evaluation tool to measure, objectively, residents' surgical performance in cataract surgery. In particular, we wanted to assess specific intraoperative events involved in the attending surgeon–resident teaching dynamic. Additionally, we wanted a surgery evaluation tool that was not burdensome for the residents and attending surgeons to complete and analyze at the end of each surgical case. Finally, we wanted to provide immediate and long-term feedback to each resident as an incentive to follow their patients' outcomes after leaving the cataract surgery rotation.

Through a stepwise evaluation and approval process, constructive feedback was obtained and incorporated into a 1-page evaluation form called OASIS. In the first phase, a panel of surgical experts in residency education from the COS developed an initial protocol for assessing resident outcomes. The initial protocol was reviewed by the chiefs of the cornea, glaucoma, uveitis, and retina departments, as well as by the director of the residency program.

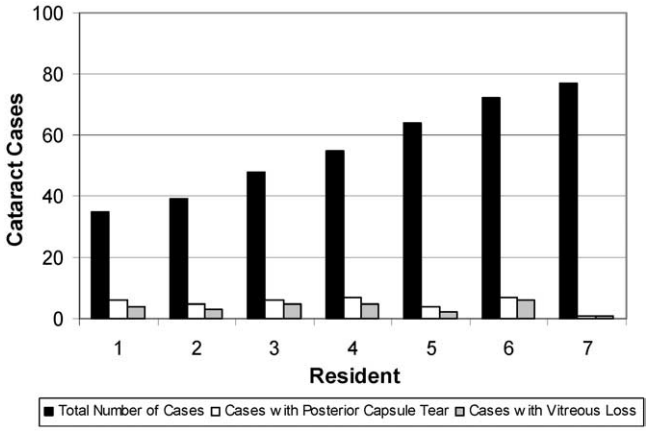


Figure 4. Number of cases of posterior capsular tear and vitreous loss among residents of an academic year class.

Subsequently, 2 chief residents (PGY5) from 2 consecutive years provided comments and feedback. The final protocol, which included the OASIS evaluation form and the OASIS computer database template, was presented to the Harvard Medical School's Department of Ophthalmology's Resident Steering Committee for formal approval. This committee consists of senior surgical attending surgeons directly involved in resident surgical education from all ophthalmology services, the residency program director, resident representatives from all 3 years of training (PGYs 2, 3, and 4), the chief resident (PGY5), and the chairperson of the department of ophthalmology. Finally, a survey to determine face and content validity of OASIS, as previously described, was conducted.[3] Comments and feedback were obtained, and modifications were made on the OASIS evaluation form and database template. A formal acceptance of the protocol for implementation into the residency program was officially obtained.

Results

The composite OASIS evaluation form consists of 3 parts: preoperative information, intraoperative information, and postoperative results. The majority of comments from the surgical experts pertained to the content of the intraoperative section. Specifically, a more precise evaluation of the learning curve for cataract surgery was desired. We therefore included the identification of the surgical preceptor's specific involvement in the surgery. This would help to identify patterns of mastering techniques over the course of the year for a particular resident or for resident groups as a whole. Additionally, in light of published reports identifying other factors associated with postoperative results, we also included the following: the phacoemulsification technique used, total phacoemulsification time, amount of irrigation fluid used, the resident's surgical time, total time in the operating room, location of the incision, use of limbal relaxing incisions, type of blade, and instruments used.[21–27] Further comments by service directors, chief residents, and residents focused on the need to create a concise and minimally burdensome evaluation form that would provide constructive feedback immediately after surgery as well as at the end of the surgical rotation.

The evaluation form's final version includes pertinent preoperative, intraoperative, and postoperative information. The OASIS template is presented in Figure 1, and the template of the OASIS computer database is presented in Figure 2.

Unique features of the OASIS evaluation form and computer database include the following. First, at each postoperative visit, the database allows for the calculation of surgically induced astigmatism using Azar's vector analysis techniques.[28] Second, the database can calculate automatically the amount of overcorrection or undercorrection in our final refractive outcome (Fig 2). Usually this begins at the 1-month postoperative visit at our service. Third, the database can easily provide graphic analysis of posterior capsular tear cases (Fig 3) or rates and of vitreous loss cases or rates according to a resident (Fig 4) or according to the surgical preceptor. Fourth, the program developed can provide graphic representation of vitreous loss rates over the course of the academic year for a particular resident or for the residents as a whole (Cremers SL, Ciolino J, Henderson B. Vitreous loss rates compared over the course of the academic year. Poster presented at: Association for Research in Vision and Ophthalmology meeting, May, 2004; Fort Lauderdale, Florida). Fifth, the database can easily compile cohorts of patients, such as all resident surgeries of cataract with pseudoexfoliation or all surgeries done with topical anesthesia, for further analysis of surgical outcomes (Fig 5).

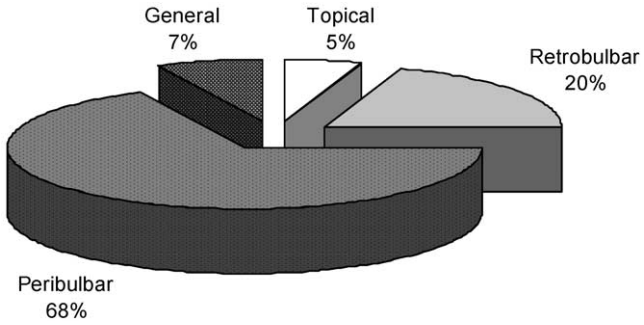


Figure 5. Graph showing percentage of resident cases by type of anesthesia.

Discussion

The ACGME has requested that all residency programs assess residents' surgical competency using valid and reliable methods. Currently, there is no objective evaluation tool to evaluate ophthalmology residents' surgical skills, to our knowledge. It is well known in the clinical realm that current qualitative forms used by faculty may be unreliable due to grade inflation and overt subjective assessments.[19] Direct observation is required in the training of residents during surgery, and is essential in the objective assessment of residents' surgical skill. Additionally, direct observation with objective analysis of surgical technique and proper immediate feedback after each resident surgical case are part of the professional responsibility of the teaching faculty.

The assessment developed by our service, OASIS, uses direct observation of residents' performance during cataract surgery. Because all information obtained is purely objective, with no subjective analysis involved in the surgical assessment form, there is no interrater variability. Supplementing OASIS with a subjective assessment of residents' surgical skills may provide a broader view of how the surgeon functions intraoperatively with regard to tissue manipulation and mastery of techniques.[11] We are currently developing a more subjective evaluation form as a complement to OASIS, called the Global Rating Assessment of Skills in Intraocular Surgery. This type of subjective assessment is currently undergoing evaluations for face and content
validity.

A concern raised with other clinical evaluations of residents has been the expense and time involved in assessments and outcomes analysis.[3] Once implemented, OASIS requires little time and financial resources for the attending surgeon or resident to complete and analyze. Internally, we have found that residents need approximately 5 minutes to fill out the OASIS form. Most residents stated that it decreases their work load, when comparing it with previous forms required by the hospital administration, which were more cumbersome. Additionally, residents appreciate having all the information on one easy-to-read sheet. This ultimately saves time and improves the effectiveness of the attending surgeon–resident postoperative discussion, as all operative information is present on a 1-page standardized form.

Of note, our evaluation of resident cataract skills repre-

sents only part of ophthalmology residents' surgical experience at Harvard Medical School. In addition to cataract surgery performed at the COS at the Massachusetts Eye and Ear Infirmary, residents also perform cataract surgery at other services and hospitals in the Harvard system. Residents perform extracapsular cataract surgery in the first and second years of residency off the COS service. The majority of their experience with phacoemulsification occurs in the third year on the COS service. We plan to implement the OASIS evaluation form and database for all resident cataract surgeries performed on other services at the Massachusetts Eye and Ear Infirmary in the future.

We expect OASIS to continue to benefit our residency training program because of its unique features. In the short term, the database can easily provide posterior capsular rupture and vitreous loss rates per individual residents. This provides direct feedback to each resident and allows surgical preceptors to monitor a resident's progress more closely. In the long term, the database will provide a general framework for further clinical research of the effects of cataract surgery on underlying ocular diseases such as diabetic retinopathy, macular degeneration, and glaucoma. Additionally, our outcomes assessments will help us to learn more about how certain educational interventions, such as simulation surgery or computer-based learning tools, affect overall surgical performance.

The general objective of creating a standard form to evaluate the progress of surgical programs is not proprietary, and this article describes one such approach. Though the software and database template used to create OASIS have been copyrighted by the Massachusetts Eye and Ear Infirmary, the authors believe more effective prospective multicenter studies can be performed if similar forms, if not the same database, are used by all training programs. We hope the development of this objective surgical evaluation tool will lead to a nationally standardized assessment tool to facilitate future prospective multicenter studies on resident education.

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Managing the New Mandate in Resident Education

A Blueprint for Translating a National Mandate into Local Compliance

Andrew G. Lee, MD,[1,2,3] *Keith D. Carter, MD*[1,4]

Objective: The Accreditation Council for Graduate Medical Education (ACGME) has mandated that all residency programs implement an assessment process of 6 core competencies. Assessment of surgical competence is also included in the mandate. We describe our local efforts to meet this new mandate.

Design: Systematic literature review.

Methods: A systematic MEDLINE search (1996–2003) of the literature on residency assessment tools was performed. All relevant titles were reviewed by a content expert, abstracts were selected, and all appropriate full articles were reviewed. The Department of Ophthalmology at the University of Iowa formalized the competency review process by forming an ad hoc departmental task force for "Meeting the Competencies" composed of clinicians, technical staff, education specialists, the program director, the director of residency curriculum, the medical student director, and residents.

Results: The task force reviewed the available literature, reviewed potential best practices, and reached consensus on an implementation plan. The following specific criteria for the assessment process were proposed: (1) there should be multiple assessments by multiple observers using multiple tools at multiple time points, (2) the tools should be reliable, reproducible, and valid; (3) the tools must be practical (i.e., feasible, convenient, low time commitment, easy to use, and inexpensive to implement and maintain); (4) the tools must produce qualitative and quantitative data, with direct linkage to improvement in educational outcomes in the future; (5) the assessment process must be linked to explicit and public learning objectives; and (6) the grading scale should be open and clearly defined, and the process should be judged as fair and accurate by both faculty and residents. The Meeting the Competencies task force reviewed all of the available tools from the literature and recommended a pilot implementation matrix matching specific tools to individual competencies. The 6 pilot tools include (1) written and oral examinations, (2) a 360° global evaluation form (using multiple observers from different perspectives, including nurses, technicians, fellow residents, and patients, to provide a wider assessment), (3) a resident portfolio, (4) direct observation of operative performance and clinical examination, (5) a phone encounter tool, and (6) a journal club tool.

Conclusion: We propose a potential blueprint for meeting the challenge of assessing the new ACGME competencies in ophthalmology and translating the national mandate into local compliance. *Ophthalmology 2004;111:1807–1812 © 2004 by the American Academy of Ophthalmology.*

The Accreditation Council for Graduate Medical Education (ACGME) is a national, private, not-for-profit organization charged with accrediting medical resident training in the United States.[1] The ACGME has mandated all residency programs to implement measures to teach and assess 6 core competencies: patient care, medical knowledge, professionalism, interpersonal and communication skills, practice-based learning, and systems-based learning. There is a 10-year timeline for full implementation. The American Board of Ophthalmology has added teaching and assessing surgi-

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cal competence to the charge. Each competency will require completion of specific learning objectives that have been outlined by the ACGME previously (http://www.ACGME.org), ongoing programmatic assessment, and proof of linkage to improved educational outcomes.[1] Unfortunately, this national mandate from the ACGME is unfunded, and the exact models by which the national charge to the residency programs can be translated into local compliance have not been defined. This article outlines one academic program's experience and efforts to implement the development phase (phase I) of the ACGME outcomes project.

Materials and Methods

A systematic review was performed of the medical education literature on existing tools for residency assessment, including website information (e.g., the ACGME Outcome Project[1]) and published literature on the competencies from 1996 to 2003.[1–64] A summary of this literature and the existing tools in the toolbox has been published.[2] The Department of Ophthalmology at the University of Iowa formalized the process of meeting the ACGME requirements for teaching and assessing the competencies in the department by forming an ad hoc departmental task force for "Meeting the Competencies" composed of clinicians, technical staff, education specialists, the program director, the director of residency curriculum, the medical student director, fellows, and residents. Task force members were selected for diversity in seniority, academic rank, and subspecialty area. All task force members had a demonstrated interest in resident education. The task force reviewed the current literature on the specific competencies and, based upon this review and clinical and educational experience in the field, recommended a blueprint for implementing a matrix of specific tools to meet the competencies mandate.

Results

The department task force met on several occasions and reviewed the available literature, reviewed best practices, and reached consensus on an implementation blueprint. The guiding principles of the task force are listed below and follow the recommendations from the ACGME website (http://www.acgme.org):

1. *Multiple assessments and comparative validity.* The assessment process requires multiple assessments and multiple tools. The traditional global end-of-rotation faculty evaluation form was deemed to be insufficient alone to measure the new competencies. Asking faculty members to grade all of the 7 competencies at once using a single evaluation form was deemed to be too onerous, time consuming, and unreliable to assess the desired outcomes. The recommendation of the task force was that each competency be assessed by at least 2 different tools. In this way, the 2 different tools could be directly compared with one another to determine if similar qualitative results were obtained (comparative validity).
2. *Face validity.* Each of the tools selected for each competency should have consensus external or face validity. For example, direct observation was believed to be the most reliable tool for measurement of surgical competence.
3. *Concurrent validity.* Each competency has to be measured by at least 2 tools and on at least 3 occasions during the same time period of training. In this way, an adequate sample size can be obtained to insure inter-rater and intrarater reliability and to insure reproducibility of results. The outcomes of each tool at each year of residency (e.g., postgraduate year [PGY] 2 compared with PGYs 3 and 4) should be assessed and compared for concurrent and discriminative validity—that is, separate tools assessing the same competency at the same time in training should produce comparable results (concurrent validity), and performance using the same tool but assessed at higher levels of training (e.g., PGY 4 should perform better than PGY 2 on the same assessment) should show improvement over time (discriminative validity).
4. *Practicality.* The tools should be applicable in the clinical or operating room setting (feasible) and easily used (convenient) during existing teaching opportunities (teach and assess in the same encounter).
5. *Time commitment.* All tools should be easy to use, require only a modest time commitment, and be inexpensive to administer and document. At the University of Iowa there are 5 residents per year (15 total) and 25 full-time faculty members. Assuming 12 assessments (2 assessments using 6 tools per year) per resident per year (12 assessments × 15 residents = 180 assessments) and that each assessment requires 1 hour or less on average per encounter, then the work load is spread out over the 25 faculty members (180/25 = 7.2 hours per year). The program director would obviously have additional time commitment for maintaining the documentation, reviewing the results, and providing feedback to the faculty and residents on performance.
6. *Budget.* The tools should be inexpensive to develop and to implement, and have a specific annual budget. The committee recognizes that the national ACGME mandate is completely unfunded.
7. *Outcomes data.* The tools should have the ability to produce quantitative data for possible linkage to educational outcome assessment in the future.
8. *Fairness.* The tools should be directly linked to explicit and openly published learning objectives, the grading scale should be open and clearly defined, and the process should be deemed fair by faculty and residents.
9. *Linkage to curriculum objectives.* The residency curriculum is reviewed, and the methodology is modeled on existing guidelines from the International Council of Ophthalmology Task Force on Resident Education.[3] The objectives of the curriculum by rotation should be aligned with and outcomes directly linked to the competency assessments.

The task force proposed the following phased plan for meeting the mandate and recommended a matrix matching specific tools to specific competencies (Table 1). Six pilot tools were selected for implementation, including (1) written and oral examinations, (2) a 360° global evaluation form (an evaluation that uses multiple observers from different perspectives, including nurses, technicians, fellow residents, and patients, to provide a wider assessment), (3) a resident portfolio, (4) direct observation of operative performance and clinical examination, (5) a phone encounter tool, and (6) a journal club tool.

Phase I: Short-term Response to ACGME Requirements (Current)

The department curriculum, based in part on the curriculum above, was revised with specific written objectives stratified by year and by subspecialty rotation. The learning objectives should include demonstration of improvement over time in the competencies. The teaching, learning, and assessment of the competencies should be

Table 1. Proposed Matrix for Meeting the Competencies

What to Assess	How to Assess
I. Medical knowledge	
Medical knowledge	Ophthalmology Knowledge Assessment Program scores. Pass rates on Written Qualifying Examination of the American Board of Ophthalmology.
Application of medical knowledge	Oral examination (e.g., 30-min case vignettes and visual props) at end of specific clinical rotations given by individual faculty rotation directors. Chart-stimulated recall (e.g., end-of-clinic discussion of selected patients seen that day and emphasis of specific teaching points). Case study of top 5 diagnoses within rotation, with resident documentation of diagnosis and disposition in his or her written portfolio.
II. Patient care	
Resident's overall patient care abilities in clinic	Global performance rating. A 360° assessment, to be completed by the resident, professional associates, and patients (unless patient care is not the primary activity of the specialty).
Clinical history and examination	Direct observation and evaluation of one complete patient encounter with checklist or ophthalmic clinical examination.
III. Interpersonal and communication skills	
Resident's overall interpersonal and communication skills during a rotation	Global performance rating. A 360° assessment, to be completed by the resident, professional associates, and patients.
Communication with outside physicians and patients by telephone	Focused observation and evaluation using phone tool checklist.*
IV. Professionalism	
Ethics knowledge	Web-based competency assessment, including ethics vignettes with multiple choice and open-ended responses (e.g., American Academy of Ophthalmology).†
Professional behaviors	A 360° assessment, to be completed by the resident, professional associates, and patients. Sentinel events portfolio.
The learning environment	Questionnaire completed by the residents. Exit interview with program director.
V. Practice-based learning and improvement	
Processes and behaviors	Portfolio with checklist assessment.
Reflection on practice and practice analysis	Discussion-based assessment (e.g., chart stimulated).
Utilization of current literature	Journal club tool (documentation of evidence-based learning, written review for portfolio).‡§
A plan for change/improvement	
Outcomes (i.e., performance improvements)	Record-based assessment with checklist/encounter card (preferred). Global performance rating.
Portfolio	Written learning plan. Evidence of self-directed learning. Time management diary. Sentinel and critical events documentation. Revised learning plan prompted by critical events.
VI. Systems-based care	
Systems-based care: interaction of ophthalmology and health care system, including other providers	Web-based vignette and portfolio documentation.
Patient-related systems-based problem solving	Focused observation and evaluation.
VII. Surgery	
Informed consent	Global performance rating. Direct observation checklist of performance.
Identification of instruments	Web-based tutorial (prerequisite curriculum).
Surgical skills: critical events	Video review and critique with faculty surgeon of intraoperative complications (sentinel events).
Surgical technique	Direct observation checklist using global rating scale of operative performance (e.g., respect for tissue, time and motion, instrument handling, knowledge of instruments, use of both hands, able to handle complication).

*ACGME Outcome Project. Teaching and assessing the resident phone encounter. Department of Ophthalmology, University of Iowa Hospitals and Clinics. Available at: http://www.acgme.org/outcome/implement/rsvpTemplate.asp?rsvpID=27. Accessed April 2, 2004.
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‡ACGME Outcome Project. Using journal club as an approach to teaching and assessing practice-based learning and improvement. University of Iowa Department of Ophthalmology. Available at: http://www.acgme.org/outcome/implement/rsvpTemplate.asp?rsvpID=28. Accessed April 2, 2004.
§Lee AG. Using the *American Journal of Ophthalmology*'s Website for assessing residency subcompetencies in practice-based learning [letter]. Am J Ophthalmol 2004;137:206–7.

integrated into the didactic and clinical educational experiences as needed to insure learning opportunities.

The department will develop an internal operational definition of "substantial compliance" in conjunction with the University of Iowa Graduate Medical Education Committee. The ad hoc intradepartmental Task Force on Meeting the Competencies will review

the relevant existing literature and formulate a compliance plan based upon the existing evidence and experience.

Phase II: Sharpening the Focus and Definition of the Competencies and Assessment Tools (July 2002–June 2006)

The program will be actively using tools to measure all 7 competency domains (including surgery). Accurate resident performance data will be collected to provide evidence of aggregate resident performance for the program's internal Graduate Medical Education Committee review.

Phase III: Full Integration of the Competencies and Their Assessment with Learning and Clinical Care (July 2006–June 2011)

The department will use resident performance data as the basis for improvement and will provide evidence of success for accreditation review. External measures of quality and outcomes will be used, including patient surveys, employer (postgraduation) surveys, and national pass rates on written and oral qualifying examinations to verify resident and program performance.

Phase IV: Expansion of the Competencies and Their Assessment to Develop Models of Excellence (July 2011–)

The Task Force envisions an ongoing work in progress during phase IV and beyond, with new tools being developed and tested and old tools being revised or discarded.

Limitations

We recognize and acknowledge the limitations of our report. First, the recommendations from our institution may not be applicable to programs of different sizes, with different departmental cultures, and with different available resources and personnel. Second, the use of the tools will have to respect the privacy limitations of the Health Insurance Portability and Accountability Act of 1996. For example, chart-stimulated recall and documentation of teaching encounters in a portfolio will have to have the patient's name and identifying information redacted from any documents outside of the medical chart. For the most part, however, teaching encounters and knowledge assessments are part of the general use of the medical chart, and our institution believes that these are not subject to any additional Health Insurance Portability and Accountability Act requirements.[65] Third, we do not have the phases II and III outcomes data on the efficacy, reliability, and validity of our proposed implementation matrix. Despite these limitations, we believe that our model might be of value to other programs in developing a local compliance program for the competencies.

Summary

The University of Iowa Department of Ophthalmology is committed to the ACGME long-term outcomes project. The ACGME proposes shifting the traditional paradigm of resident education from an accreditation model to a competency model. This model will require new tools for assessment, which will make up a toolbox for the competencies. Based on our experience, we recommend that programs (1) formalize the process, (2) review the existing tools in their toolbox, (3) apply an explicit criteria review of these tools, (4) tailor the approach to match the unique culture and learning environment of their individual institutions, and (5) start with the simple, safe, and successful tools first. The first phase will be the most difficult, and we recommend demonstrating success with 3 or 4 of the easiest assessment tools. Fortunately, these tools happen to be the least expensive (meeting the unfunded mandate), the most familiar, and the most externally valid (e.g., written and oral examinations, global evaluation, direct observation and chart-stimulated recall, a portfolio documenting completion of specific knowledge and skills milestones). The development phase brings greater challenges but also opportunities for reinvigorating and reinventing the resident training process in ophthalmology.

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