

WOLFE | **World Ophthalmology Leaders Forum In Education** *A Forum at the American Academy of Ophthalmology's Annual Meeting*

Teaching Surgical Skills to Trainees Today and Tomorrow 2009 REPORT | San Francisco, California

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WOLFE: An Introduction

Organized by the American Academy of Ophthalmology (AAO), the World Ophthalmology Leaders Forum in Education (WOLFE) is a collaborative effort among ophthalmic leaders to improve and advance ophthalmic education. WOLFE participants are leaders from ophthalmological societies and academic centers worldwide.

WOLFE participants gather annually during the AAO's Annual Meeting to discuss the challenges and issues in ophthalmic education. The Forum provides the opportunity for open communication and the exchange of knowledge, information and expertise.

The findings from WOLFE are collected and published as a white paper each year. You are encouraged to share this document with training programs and ophthalmic societies in your country or region. Summaries and presentations from 2009 and years past are available on the AAO's Web site at www.aao.org/international/wolf.cfm. Previous WOLFE topics include *Principles and Practices of Resident Education Around the World* (2008), *Guidelines for Developing Guidelines: Consensus versus Clinical Trials: Where Is the Future?* (2007) and *Continuing Professional Development (CPD) Needs of Ophthalmologists* (2006).

Executive Summary

Ophthalmic educators worldwide face common challenges based on the convergence of two factors: diminishing resources and increased patient expectations. From these two elements a variety of obstacles emerge, including how to measure the efficiency of simulation, conduct performance evaluation and design a comprehensive curriculum.

Increasingly, a surgeon's time is used to its fullest in the operating room, as institutions desire maximum surgical productivity. Not only does this limit the amount of time surgeons spend with residents, but it impacts the quality of education. Institutions must make a concerted effort to establish ophthalmic resident education as a worthwhile investment in order to provide students the best opportunity to succeed and to provide future patients with the best possible care.

Successful resident education is not based entirely upon resources however. Educators must continue to review their methods and incorporate adult learning principles. By designing comprehensive curricula with clearly identified steps, goals and objectives, educators can incorporate a broader spectrum of experience and provide context for surgical training.

Another aspect of resident education that can be reviewed and adapted is who is teaching which students. Educators should consider personalities when assigning mentors to students, but also when assigning cases and selecting patients. There is a substantial emotional element to surgical learning. As an educator, it is important to recognize that element and then construct an environment that instills confidence as well as capabilities.

Where it is financially feasible, educators often use simulation to train residents - from wet labs to advanced virtual reality. While simulation may not replace real-life experience and should not be relied upon instead of a surgical curriculum, it is one tool that can encourage confidence and teach surgical technique. Educators also hope to use surgical simulation to help students practice uncommon, disaster situations.

As simulation technology advances and becomes more accessible, it may be used as a method of performance evaluation for residents. Two issues that must be addressed before this is possible are the formal establishment of "reasonable complication rates" and benchmarking expert surgeons against simulation technology.

To discuss and debate these challenges, ophthalmic educators representing 25 countries gathered at the Marriott Hotel in San Francisco on Monday, 26 October 2009, for the World Ophthalmology Leaders Forum in Education (WOLFE). Now in its fifth year, WOLFE is organized by the American Academy of Ophthalmology (AAO) and brings together leaders from around the world to discuss trends in ophthalmic education and resident training.

WOLFE provides educators with the opportunity to hold an open dialogue and exchange knowledge, information and expertise in a stimulating and supportive environment. Its broad goal is to improve ophthalmic education worldwide through the collective wisdom of practicing educators. The 2009 WOLFE theme was focused on residents, *Teaching Surgical Skills to Trainees Today and Tomorrow*. David W. Parke II, MD, executive vice president and CEO of the AAO, welcomed WOLFE participants.

"Thank you for attending. As a result of your dedication, resident training has progressed significantly in recent years - to more sophisticated evaluation, better technology and more dedicated mentoring," said Dr. Parke. "In recent years, the AAO has made a commitment to resident education - to be more than the provider of the Basic and Clinical Science Course. Through substantive collaboration with program directors and the Resident Education Center we hope to function as a repository for clinical content and a facilitator of educational collaboration. Our overarching goal is to offer a resource that has real value for trainees and ophthalmologists regardless of whether they are in Baltimore, Scandinavia, Sub-Saharan Africa, India or Japan."

Ronald E. Smith, MD, program chairperson and AAO Secretary for Global Alliances, opened the session and described the format and topics. The 2009 format involved presentations followed by roundtable discussions. The presentations included curriculum design and sequencing of skills transfer, use of wet labs, an update on surgical simulation, and an overview of the AAO's Resident Education Center. The roundtable discussions focused on global challenges and solutions for mentoring trainees, performance evaluation and barriers to skills transfer.

To conclude the session, Michael W. Brennan, MD, president of the AAO, thanked participants for their attendance. "More than 6500 international guests came to San Francisco to participate in lifelong learning," said Dr. Brennan. "I would like to recognize all of you for being a part of that effort. Your attendance demonstrates how truly global ophthalmology has become. And, the discussion today has proven how our commitment to the advancement of education as well as shared challenges can unite us, resulting in constructive debate and practical solutions."

The obstacles ophthalmic educators face today cannot be solved by historical teaching methods. Educators must collaborate, invent and adapt to the new educational landscape. By doing so, resident education has the opportunity and capability to raise the standard for patient care worldwide.

You are encouraged to share this document with training programs in your country or region. This summary is on the AAO's Web site at www.aao.org/international/wolf.cfm.

Curriculum Design and Sequencing of Skills Transfer

Nicholas J. Volpe, MD

Scheie Eye Institute, University of Pennsylvania, United States

The challenge of curriculum design and sequencing of skills transfer is directly connected to the transformation from apprenticeship-based education to surgical teaching based on solid adult learning principles, according to Nicholas J. Volpe, MD, Scheie Eye Institute, University of Pennsylvania.

"It is necessary to teach surgery systematically, and yet, what separates good surgeons from those who are merely average is not their level of technical skill, but their ability to judge a difficult situation and react appropriately. How effectively we design our curricula and incorporate surgical skills will directly affect our residents' decision-making capabilities and confidence."

Unique Challenges and Solutions

Educators around the world face the same challenges in creating a sustainable and systematic surgical curriculum. Those challenges include rapidly evolving technology, reliability of surgical simulation, the divide between teaching and surgical proficiency, and the need for flawless outcomes. In addition, in many residency programs, surgical ability is not assessed until very late in the students' educational process.

According to Dr. Volpe, the aforementioned problems need to be addressed in the complete learning context, in how an educational experience is planned. First and foremost, educators must teach proactively and define expectations for residents. Beyond a list, they should include what educators expect at specific times during the residency. Identify when the resident should be learning what - from specific surgical skills, to professionalism, preparation and surgical judgment.

While it may seem trivial to some, Dr. Volpe purports that by defining an overall goal for residents and identifying specific objectives with an expected timeline, it is easier for the resident to frame his or her educational experience. Remember, goals should be broad and objectives should be specific, measurable steps. Used in conjunction, goals and objectives set for students help educators evaluate progress and recognize potential problems.

Read more about Goals and Objectives on page 15.

5 Helpful Sequencing Tips

from Dr. Volpe

1. Provide residents with clear goals and objectives early in their training
2. Organize a surgical lecture series
3. Teach residents in a practice lab
4. Use surgical simulation
5. Perform assessments before residents enter the operating room

Building the Curriculum with Surgical Experience

Clear goals and objectives are the structural base for an effective curriculum. To build upon it, there are a number of tools available, including wet lab experience, surgical simulation and videos. For example, Dr. Volpe highlighted the opportunity to use video monitoring outside of the classroom and in the microsurgical lab in order to review residents skills in detail.

Surgical simulation is a constantly developing technology that will play a critical role in the future, but it is unlikely to replace physical learning entirely. As a result, it is important to focus on providing quality surgical experiences for residents in safe, reflective environments. This includes moving surgical experiences into the earlier stages of residency, encouraging the addition of stages to surgical learning and incorporating a surgical skill checklist that is previewed, reviewed and assessed.

The Best Surgeons and the Best Teachers

The most effective educators may not be those who present at meetings around the world. They may not be the best surgeon at the hospital. The best educators are those who are the most committed to the resident educational experience, who can manage difficult personalities and who can teach residents to think about the procedures they perform, in addition to instructing them on the surgical process.

One of the most important functions of ophthalmic educators is to identify problems and recognize the responsibility to intervene.

"Most importantly, all of us who have an interest in improving resident education require support from our departments and peers. Those who have difficulty will be those without the appropriate support and resources," Dr. Volpe concluded.

Use of Wet Labs/Technology

Jan Geert Bollemeijer, MD
Leiden University Medical Center, the Netherlands

Wet labs are an increasingly influential tool in ophthalmic resident education worldwide. It is important to recognize the opportunities and disadvantages of learning in this setting and how educators can capitalize from the benefits to provide an effective, comprehensive educational experience.

Transparency and Restrictions

For many teachers, ophthalmic surgical education was based on real-life experience; learning from mistakes and management of complications.

“In 2009, we are facing a crisis,” according to Dr. Jan Geert Bollemeijer. “We can no longer educate in the manner in which we learned, while facing increasing demands and shrinking financial resources.” Education must be transparent and patient expectations are exceedingly high. Educators must supply background information, as well as perform demonstrations and in some countries, hospitals are required to disclose when residents are performing surgery.

In addition, limited resources, financial requirements, reduction of working hours with residents and rapidly changing technology add complexity to the resident education landscape. The complete picture creates a dire need for a stabilized method of assessing residents’ surgical skills.

Advantages and Disadvantages of the Wet lab

While wet labs alone cannot provide a complete solution to the challenges facing ophthalmic educators, they add a unique opportunity for residents and teachers alike. Two advantages of wet labs are that the residents learn to use the microscope and instrumentation, as well as suturing and wound construction. Even if the intraocular pressure is not perfectly accurate, the resident is able to understand the concept of eye surgery as pressure surgery and respond to that challenge.

In addition, residents are able to work in teams with little stress; it can even be fun. This benefit is slightly less tangible, but it is possible that learning in this environment decreases the pressure on the residents and affords them the opportunity to manage complications and make mistakes, thereby increasing their confidence when they are successful.

The major disadvantage of wet lab experiences is that it is inconsistent and essentially unrealistic. While it can be helpful in adding comfort and familiarizing residents with the appropriate tools, it cannot replace real-life surgical experience entirely. Specifically, the cornea is not clear, and the tissue is dead, as well as a different thickness.

Tips for a successful wet lab from Dr. Bollemeijer

1. Use proper equipment (co-axial microscope, proper surgical instruments, proper hand support)
2. Use fresh eyes and arrange for safe disposal
3. Create a focused atmosphere
4. Perform wet labs regularly
5. Make a manual with easy and advanced procedures
6. Keep records and evaluate sessions with residents

Training Surgical Skills at Leiden University Medical Center

The basis of surgical skill development at Leiden University Medical Center (LUMC) is thorough preparation followed by wet lab training and review. Their preparation begins with a complete knowledge of surgical anatomy before even entering the wet lab. Residents also must understand the theory, instrumentation and stages of the coming procedure and be clear on the assignment, what should happen and why. Finally, educators and residents review videos of successful surgeries.

Residents at LUMC study a variety of procedures in the wet lab, such as incisions, capsulorhexis, hydrodissection, phaco, lens implantation and suturing. When the student is ready to perform his or her first surgery, they are videotaped. Following the procedure, residents and educators discuss what went well and what could be improved.

Surgical Simulation

Robert A. Mazzoli, MD, FACS

Madigan Army Medical Center, United States

"The goal of education through surgical simulation is to minimize the stress on the resident and on the staff," according to Robert Mazzoli, MD, FACS. "A better, safer outcome for our patients is an obligation. We must try to train our residents to the expert level our patients deserve."

There is an increasing interest in simulation worldwide due to the desire to ensure patient safety, document competency of surgical skills and diminish the educator's reliance on training with animal parts. Simulation options today range from inexpensive to very expensive, from physical models to virtual reality, including biologic mimics, schematic and silicone eyes. In addition, augmented reality and cognitive mentors are in the early stages of development.

Ophthalmology is slightly behind other medical specialties in the development and use of simulation. This is a benefit however, because it affords educators the ability to select the most effective and practiced simulation methods.

How Simulation Should Be Used

Simply put, simulation should accelerate the learning curve. It should help develop resident expertise outside of the operating room and not at the expense of the patient.

Simulation can train routine, basic, manual skills such as how to make incisions or tie knots. Ideally though, simulation would train residents to react to the uncommon complication. Students would practice high risk, stressful, crisis scenarios in comfortable, realistic situations.

"Even if the simulation experience does not result in a successful outcome, disaster training can teach the resident teamwork, communication and crisis management," claims Dr. Mazzoli. "We need residents to practice these situations – torn capsule, dropped nucleus, etc – so that when it happens in real life they know what to do. No patient wants to receive surgery from a doctor who can only perform in ideal situations."

Where Simulation Will Not Succeed

Simulation will never replace a crisis situation entirely. Neither will it replace mentorship or teach the thought process. Simulation is an exceptional tool for a well-structured curriculum.

Using surgical simulation efficiently

from Dr. Mazzoli

1. Support exercises with a solid curriculum, including mentoring, feedback and graduated responsibility
2. Collect expert performance data to set simulation standards
3. Simulation does not have to be expensive, but it does have to be validated
4. Simulation should challenge the thought process as well as manual skills
5. Use simulation as a tool for skills maintenance

To use even the most advanced simulation effectively, educators must build it into the overall educational experience and guide the student appropriately. The educator has the responsibility to set the stage for the resident's interaction with the simulator and make the student think, even fail. There is still a need to mentor residents with graduated responsibility. Educators should support and enrich the Osler/Halstead model of surgical training through simulation, not replace it entirely.

What is Needed from Simulation Technology

An effective simulator will allow residents to practice incisions, suturing, open surgery and more. A simulator that could go beyond the basics and randomly generate trauma situations and generate complications would be ideal.

Beyond procedural flexibility, there is a significant need for simulation to document competency. Validation data must be developed to achieve realistic documentation. In order for residents to meet “expert level” requirements, research must be completed to establish what expert performance is on the simulator. Additionally, the validation criteria must be able to respond quickly to the continually improving technology.

Overall, measurements of fidelity in simulation must be added to ensure its efficiency and enable its use as a training and assessment tool. Regarding the tactile fidelity, termed “haptics” in the field of simulation, there is an ongoing debate about whether or not haptic feedback is useful. However, substantial evidence as to the efficiency of haptics in simulation is about two to three years away.

ONE and the Resident Education Center Skills Transfer

Andreas K. Lauer, MD

Casey Eye Institute, Oregon Health & Science University, United States

Although access to educational resources at training programs are strained, there are educational tools available that can help teachers manage their time efficiently and prepare substantial, consistent and quality curricula. The AAO's Ophthalmic News and Education (ONE™) Network is a comprehensive educational resource for ophthalmologists worldwide. Its goal is to provide a single, readily accessible and globally available web-based portal for ophthalmic news and education.

In the United States, the Resident Education Center (REC) is one tool educators can use to help residents develop their medical and surgical ophthalmic knowledge and can aid in creating and managing a comprehensive curriculum for a residency program. The REC is an online program that is accessed through the ONE Network. It is based on the educational content of the ONE Network and was developed in partnership with ophthalmology residency programs across the United States.

Through the ONE Network and REC, program directors can access an array of interactive cases, courses, test questions, focal points and expert opinion, as well as full text access to textbooks, six journals and over 200 clinical videos. The resources encompass all areas of ophthalmic education and provide material pertaining to all core competencies.

Included in the REC are integrated functions designed to help program directors, including a course-builder tool, rotation scheduler, course scheduler, powerful test-builder and the ability to share course content with other program directors. Through the course-builder, program directors can create custom courses using clinical content that can be enhanced and modified year to year.

In addition, the REC provides a common location for educators to collaborate and share educational content. Based on the preference of the educator, course content can remain confidential or can be shared with the other residency programs using the REC. Similarly, educators can access courses that have been shared by other programs and use them as is or modify them to suit the specific programs' needs.

With the Resident Education Center, educators have the capacity to customize, modify and schedule curricular material in one readily accessible, online location. The REC is expected to be available for international programs in the summer of 2010.

Effective online education

from Dr. Lauer

1. Familiarize yourself with the available resources on the ONE Network and REC
2. Integrate online assignments with clinical rotations or didactic sessions
3. Be sure to clarify the goals and objectives of all assigned content
4. Solicit feedback and help from other educators to help with course design and content
5. Periodically provide verbal feedback to the student on their performance

Collective Wisdom: Findings from the WOLFE Roundtables

Topic 1: Mentoring Trainees

Discussions were led by: Kgaogelo E. Legodi (South Africa)

The discussion centered on the difficulties and solutions surrounding appropriate mentorship of trainees. Differences in the programs included how feedback is delivered and how much interaction exists between residents and surgeons or patients.

In some programs, all of the residents meet with every patient to discuss the full procedure, whereas in others there is a selective process to determine which residents will interact with which patient. In all programs there existed some sort of joint effort between residents and surgeons on interaction with the patient. It was recommended that the trainee accompany the surgeon for all steps of a case, including preoperative assessment and postoperative review with the patient.

There were questions raised about who should be the primary educator and at which step in the educational process. It was agreed that typically the most senior surgeons are the most desirable teachers, but they are both strained for time and can be intimidating for the residents.

Intimidation was an important concern as mentors must be able to instill confidence in the trainees. This includes the ability to provide a comfortable surgical experience, match trainee skills with appropriate cases, ensure that they know all of the steps of the procedure(s), allow time for each case and deliver helpful feedback. It is also important to match trainees with mentors that match their learning style and personality.

The challenges that face mentors were primarily time and economic restraints. When surgeons spend more time teaching, productivity decreases as does profit for the hospital. As a result, there is no time for constructive review and personal mentorship. Often this results in the loss of good teachers to other institutions. There must be a concerted effort from the department to support the training of ophthalmic surgery both in theory and financially. An additional solution is to encourage trainees to deliver feedback to each other and review cases collectively.

Topic 2: Performance Evaluation

Discussions were led by: Louis B. Cantor (USA) and Susan H. Day (USA)

The expectations of ophthalmic surgery patients (that surgery be perfect, fast and inexpensive) conflict with the ability to appropriately train surgical residents. Furthermore, the combination of increased transparency and higher expectations provides a growing demand for substantiation of surgical prowess. The challenge is how to accurately assess performance and capability prior to real-life surgical experience.

‘What level do we want our students to reach?’ was one of the main questions raised in the discussion. There must be an established goal of expertise by which student performance is measured in order to create a reliable evaluation. In the United Kingdom, there are rates per complications established by the national board of cataract

surgery. The rate does not automatically disqualify the trainee, but it does call attention to any potential issues. There was a general approval by attendees of the idea to establish standardized, but flexible, surgical assessment.

Another challenge was how to educate and evaluate the educators - how to teach the surgical experts to accurately assess their trainees. One recommendation was to first identify interest, incorporate educational training and methods as much as possible, and funnel residents to the surgeons who are interested in teaching. Other recommendations included asking the residents to fill out evaluations of their educators and creating a surgical teaching certification.

Lastly, there was significant discussion surrounding procedural assessment. Assessments could be given at different stages of the surgical experience and with different levels of detail and different areas of focus. In some countries, such as Switzerland, students can become medical ophthalmologists (without practicing surgery). Regarding evaluation, it may be helpful to assess students on the details of a wet lab-based surgical process, as well as deliver a more comprehensive assessment, from patient intake to anesthetic, instrumentation and management of complications.

Topic 3: **Barriers and Solutions to Skills Transfer**

Discussions were led by: Richard L. Abbott (USA) and Nicholas J. Volpe (USA)

Of all the topics discussed, barriers to skills transfer had the widest variety of issues faced by training programs. Everything from political pressure to internal fellow competition and a lack of organizational structure was addressed. However, some of the issues were similar for all of the educators; how to instill and identify manual dexterity, how to access patients willing to be part of the curricula, how to establish a standard for education and how to educate with limited resources.

Systematic or step-by-step learning was widely regarded as a necessity in teaching skills transfer. The trainee must have knowledge of the complete process before entering the surgical experience. Separately, the trainee can learn about instrumentation in a wet lab environment and practice manual dexterity.

In addition to the residents' step-by-step surgical education, the medical school needs to fully support the training program. The issue of informed consent must be handled appropriately and with confidence. Both Venezuela and Brazil mentioned the difficulty of standardization of the curriculum for all students, due to time constraints upon educators and fluctuating costs.

Some of the potential solutions that were discussed included sending residents to fellowships for advanced training, formally educating the educators as to how to best deliver a teaching program and organizing comprehensive wet labs for manual dexterity. Furthermore, it was recommended that global ophthalmic leaders develop formal guidelines on how surgery should and needs to be taught, so that countries responding to educational demands from the government would have a respected reference in the field.

Additional Information and Resources

2009 Speaker Presentations

Curriculum Design and Sequencing of Skills Transfer - Nicholas J. Volpe, MD [\[download PDF 175K\]](#)

Use of Wet Labs/Technology - Jan Geert Bollemeijer, MD [\[download PDF 3257K\]](#)

Surgical Simulation - Robert A. Mazzoli, MD, FACS [\[download PDF 1645K\]](#)

ONE Network and the Resident Education Center Skills Transfer – Andreas K. Lauer, MD [\[download PDF 519K\]](#)

Setting Goals and Objectives for Residents

Nicholas Volpe, MD

What is the difference between a goal and an objective?

A goal is a broad educational hope whereas an objective is a specific, measurable, timed educational outcome.

Example Goal

To understand the theoretical and practical application of phacoemulsification to remove the lens.

General Learning Objectives Examples

- how, what, why, and when to practice
- interactions with the pre-operative patient
- steps in preparation of the surgeon
- how to evolve technique after residency
- preparation of and interaction with OR personnel
- recognition of surgical judgment and practiced judgment scenarios

Procedural Learning Objectives Examples

- indications for procedure
- understanding of informed consent
- technical aspects of procedure
- controlling and managing “variables”
- possible complication awareness and management
- post-operative care
- individual limits
- when to ask for help

Unit Sample for Goals and Objectives: Preoperative Assessment of the Surgical Patient

Goal: to understand the indications for cataract extraction and the preoperative evaluation and workup.

Objectives:

1. Describe when to perform surgery in terms of
 - Snellen acuity
 - glare/contrast impairment
 - visual dysfunction
 - other medical need
2. Be knowledgeable about preoperative assessment

2009 Attendee List

| | |
|-------------------------|-----------------|
| Richard L. Abbott | USA |
| Bernice O. Adegbehingbe | Nigeria |
| Benedictus G.K. Ajayi | Nigeria |
| Amir Bedri | Ethiopia |
| Lorne D. Bellan | Canada |
| Susanne Binder | Austria |
| Jan Geert Bollemeijer | The Netherlands |
| Michael W. Brennan | USA |
| Louis B. Cantor | USA |
| Susan H. Day | USA |
| Yvonne M. Delaney | Ireland |
| Alaa M. El Danasoury | Saudi Arabia |
| Christianah O. Fadamiro | Nigeria |
| Lamia Fekih | Tunisia |
| Albert Franceschetti | Switzerland |
| Hanna Johnny J. Garzosi | Israel |
| Bente Haugom | Norway |
| Marko Hawlina | Slovenia |
| Martine J. Jager | The Netherlands |
| Randolph L. Johnston | USA |
| Moshen B. Kashkouli | Iran |
| Dida Kazakova | Bulgaria |
| Shigeru Kinoshita | Japan |
| Andreas K. Lauer | USA |
| Kgaogelo E. Legodi | South Africa |
| Xiaoxin Li | China |
| Nancy M. Martinezy | Venezuela |
| Robert A. Mazzoli | USA |
| Geeta Menon | England |
| Maria E. Mottola | Venezuela |
| Sundaram Natarjan | India |
| Jeffery A. Nerad | USA |
| Amel Meddeb-Ouertani | Tunisia |
| Jacob J. Pe'er | Israel |
| Karen Salcedo | Venezuela |
| Gregory L. Skuta | USA |
| Ronald E. Smith | USA |
| Alfred Sommer | USA |
| Remo Susanna | Brazil |
| Hugh R. Taylor | Australia |
| Carlo E. Traverso | Italy |
| Harvey S. Uy | The Philippines |
| Petja I. Vassileva | Bulgaria |
| Liana O. Ventura | Brazil |
| Nicholas J. Volpe | USA |
| Khalid Zaghoul | Morocco |
| Jialiang Zhao Sr. | China |