An Innovative Approach to Avoid Reinventing the Wheel: The Anesthesia Education Toolbox

Glenn Woodworth, MD
Amy Miller Juve, MEd, EdD
Christopher E. Swide, MD
Robert Maniker, MD

Setting and Problem

Graduate medical education programs are struggling to evolve toward a competency-based educational model utilizing milestone assessments and modern innovations like e-learning and flipped classrooms. At the same time, programs have limited financial and other resources to create new educational materials. One solution is to share resources between programs. Although resource sharing exists, it does not historically provide for the *extensive* cooperation outlined in this report.

The Department of Anesthesiology and Perioperative Medicine at Oregon Health & Science University (OHSU) created the Anesthesia Education Toolbox to provide a business model and infrastructure to facilitate educational collaboration between anesthesiology programs.

Intervention

In 2013, faculty from 5 academic institutions jointly developed a pilot project to demonstrate how anesthesiology programs could collaborate in the creation and sharing of educational resources in the subspecialty of regional anesthesia. Necessary infrastructure support, provided by OHSU, included (1) governance, (2) an agreement to protect the intellectual property rights of authors while granting toolbox members a license to use content, (3) a business plan, (4) a peer review and editorial process, (5) support for medical art production, (6) licensing of a learning management system (LMS), and (7) customer support. The common LMS platform was chosen to facilitate collection of standardized assessment data for education research. A faculty steering committee of experts in a single subspecialty was selected from the initial institutions and was responsible for developing a standard curriculum. The committee reviewed the American Board of Anesthesiology key words, the Anesthesiology Milestones, and the published curricula before reaching a consensus on the goals and objectives for the curriculum, which were summarized in a "curriculum map" (TABLE). The committee also delineated the teaching and competency assessment methods for each learning objective to complete the curriculum map. The map defined the necessary resources to support self-guided learning and assessment, as well as faculty-directed learning activities to fulfill the curriculum.

After completion of the map, at-large faculty from participating institutions were solicited to serve as volunteers to develop the required resources. Submitted resources were peer-reviewed by 2 outside experts in the content area. Content accepted after the peer review process was published in the LMS. Resource types in the LMS include:

- E-learning modules for self-guided learning
- Lectures that can be viewed online or given as a traditional lecture
- Problem-based learning discussions and interactive learning exercises ("flipped" classroom)
- Hands-on training session guides for faculty to conduct skills training
- Simulation scripts to support low- or high-fidelity simulation
- Video clip/image library
- Ask the experts: a curated discussion
- Lists of required and suggested reading
- Competency assessment tools: medical knowledge tests, objective structured clinical examinations, and direct observation of technical skills assessments

The toolbox was deployed in the founding anesthesiology departments. Over time, other program directors and additional programs requested inclusion in the project. Based on feedback from residents and faculty in the pilot program, the resources were revised and the curriculum was redeployed using a new LMS (named "COACH") developed by Columbia University; COACH allowed for better learner tracking and the sharing of resources with academic departments in other specialties (eg, anatomy, surgery, etc).

Outcomes to Date

The pilot project demonstrated the feasibility and value of a collaborative effort to develop and share educational resources. Currently, 30 anesthesiology residency programs and more than 2000 residents, fellows, and faculty use the toolbox. The toolbox is being scaled, using the same administrative processes to develop curricula and resources

DOI: http://dx.doi.org/10.4300/JGME-D-14-00724.1

TABLE **Sample Toolbox Curriculum Map (Regional Anesthesia)**

Topic	Curriculum	Resource	Assessment
US physics	CA 1 Regional—Week 1	E-learning 1—Intro to US Physics	MCQ 1—Core Regional Knowledge Test
US machine operation	CA 1 Regional—Week 1	E-learning 2—Knobology	MCQ 1—Core Regional Knowledge Test
US probe handling	CA 1 Regional—Week 1	E-learning 3—US Probe Handling	MCQ 1—Core Regional Knowledge Test
Needle guidance with ultrasound	CA 1 Regional—Week 2	E-learning 4—Needle Guidance with Ultrasound	Direct Observation 1—Needle Skills Checklist
		Regional Reading List 2—Sites Characterizing Novice Behavior with USGRA	
		Hands-on 1—Needle Guidance	
Local anesthetic pharmacology	CA 1 Regional—Week 1	Lecture 1—LA Pharmacology	MCQ 1—Core Regional Knowledge Test
		Regional Reading List 1	
	CA 1 Regional—Week 2	PBLD 1—LA Pharmacology	
Neuraxial anesthesia—anatomy and physiology	CA 1 Regional—Week 1	Lecture 2—Neuraxial Anatomy and Physiology	MCQ 1—Core Regional Knowledge Test
		Regional Reading List 1	
Neuraxial anesthesia—lumbar epidural technique	CA 1 Year	E-learning 5—Lumbar Epidural Technique	
	CA 1 Year	Regional Reading List 2—Boon Lumbar Puncture	
	OB Month 1	Hands-on 2—Lumbar Epidural/SIM	OSCE 2—Lumbar Epidural Checklist, Direct Observation Regional Procedural Skills GRS
Neuraxial anesthesia—thoracic epidural technique	Mid-Regional Week 2	E-learning 7—Thoracic Epidural Technique	OSCE 4—Thoracic Epidural Checklist, Direct Observation Regional Procedural Skills GRS
		Hands-on 3—Thoracic Epidural/SIM	

Abbreviations: US, ultrasound; CA, clinical anesthesiology year; MCQ, multiple-choice question; USGRA, ultrasound-guided regional anesthesia; PBLD, problem-based learning discussion; OB, obstetrics; SIM, simulation; OSCE, objective structured clinical examination; GRS, global rating scale.

for other anesthesia subspecialties, to fulfill a comprehensive anesthesiology curriculum.

A toolbox research group is developing projects to collect data from the standardized competency assessment tools to facilitate education research, including evaluation of educational program effectiveness, assessment tool validation, and competency milestone achievement in anesthesia training.

The major lesson learned from this project is that provision of the appropriate infrastructure and business processes can spread development costs while increasing the rapidity of development of high-quality shared educational resources.

Glenn Woodworth, MD
Associate Professor and Program Director, Regional Anesthesiology, Oregon Health & Science University

Amy Miller Juve, MEd, EdD
Assistant Professor and Administrative Director for Education, Department of Anesthesiology and Perioperative Medicine, Oregon Health & Science University

Christopher E. Swide, MD
Clinical Professor and Vice-Chair for Education, Oregon Health & Science University

Robert Maniker, MD
Assistant Professor and Director, Acute Perioperative Interventional Pain Service, Columbia University Medical Center

Corresponding author: Amy Miller Juve, MEd, EdD, Oregon Health & Science University, Anesthesiology and Perioperative Medicine, UHS-2, 3181 SW Sam Jackson Park Road, Portland, OR 97239, 503.494.4205, 503.418.1389, juvea@ohsu.edu