Despite economic woes, this past academic year (2008-09) has been great in many ways for ASTEC. Its utilization continues to double, just as it has during each of the last three years. Each month brings new record levels of participation.

ASTEC has been recognized for its academic excellence as one of the leading medical simulation centers in the entire nation. It remains the foremost center pioneering the development of simulated, artificial tissues: its charter guarantees that all of its simulation training will occur without the sacrifice of a single animal.

Clearly, ASTEC has been one of the most successful initiatives in the history of our medical school. Yet even though simulation is one of the most important innovations in medical training in the last one hundred years, educational funding has been decimated in the last eight quarters by the recession. As ASTEC grows and its mission expands, new sources of revenue are needed, whether from the philanthropic, industrial, or educational sectors. We must reach out to the emerging markets of new users outside the academic community and forge new alliances with other healthcare partners, bringing new priorities to the forefront of the simulation field. In addition, we must continue to expand our research and clinical collaborations, enhancing creativity and inspiring new applications of ASTEC’s ambitious mission.

But we also must remember that clinical simulation has, at its core, the notion of reducing medical errors and mitigating their impact on patients. Just as addressing the health and wellness of all citizens is a sacred trust, so is the principle that we, as caregivers, will exert ourselves to the utmost to ensure that medical and surgical services are delivered unmarred by preventable errors. ASTEC is founded upon that most hallowed dictum: nihil nocere (do no harm). There is simply no better way to follow this wise guidance than to give medical students, residents, nurses, first responders, and other healthcare personnel ample opportunity to practice and perfect their craft without putting any human soul at risk. At its heart, ASTEC represents a noble effort to do blessed work—a goal upon which no price tag can be placed, for which no ally’s help will go unrecognized, and for which every obstacle must be overcome.

Allan J. Hamilton, MD, FACS
Executive Director, ASTEC
Professor of Surgery

A Message from the Executive Director of ASTEC

“Aggressive fighting for the right is the noblest sport the world affords.”
—Theodore Roosevelt

A simulated carotid endarterectomy model with realistic tissue created here in the ASTEC lab enables advanced surgical training for the removal of atheromatous plaque from the bifurcation of a common carotid artery.
Executive Overview:

- ASTEC has completed its fourth year of operation.
- Over the past 3 years ASTEC has been steadily increasing its average monthly participant training hours from 193 hours per month in AY 2006-07 to 247 hours per month in AY 2008-09 (28% increase in monthly training hours).
- 77% of ASTEC’s attendance consists of Arizona Health Sciences Center participants. AHSC Participation has increased 53% since AY 2007-08.
- ASTEC is approaching maximum levels of scheduled training with up to 75% of its available teaching time allotted to a 40-hour workweek and a 13% increase in requests for scheduled time.
- In February 2009, ASTEC facilitated simulation training for 242 students participating in the Interprofessional CPR Sessions, which included the College of Medicine, College of Nursing and the College of Pharmacy.
- ASTEC will provide 180 new participant hours of training to meet educational objectives for the newly implemented AY 2010 transition block for all College of Medicine medical students. An additional 200 hours will be provided by ASTEC for intersessions throughout AY 2009-10.
- ASTEC has doubled its new training modules since AY 2007-08, adding 10 new modules to accommodate the needs of Internal Medicine, Emergency Medicine, Pediatric, Pulmonology, and Surgery.
- ASTEC was recently selected as 1 of 10 national simulation centers in the United States by Medical Education Technologies, Inc., to serve as a mentor institution for simulation curriculum development.
EDUCATION & TRAINING

ASTEC’s weekly schedule is filled more and more with recurring training. Half of this time is filled by the following College of Medicine programs:

- Surgery Clerkship
- Internal Medicine Clerkship
- Emergency Medicine Clerkship
- Pediatric Clerkship
- Societies
- Interprofessional Sessions
- Telemedicine / Telehealth
- Emergency Medicine Club
- Surgery Club

As part of the new College of Medicine curriculum for AY 2009-10, ASTEC will provide up to 700 additional training hours for the following:

- Transition Block Sessions
- Year III Intersessions

Other recent additions to ASTEC’s regular schedule include:

- Intensive Laparoscopic Training Course for Surgery Residents
- Neonatal Resuscitation Program Codes in the Neonatal Intensive Care Unit
- Emergency Department Competency Day Program for RNs and Paramedics
- Telehealth High School Fellowship Program

Residency participation includes the following:

- Surgery Residents
- Emergency Medicine Residents
- Internal Medicine Residents
- Internal Medicine Residents (Kino)
- Family Practice Residents
- Pediatric Residents
- Urology Residents
- Pulmonary Residents
- Neurosurgery Residents
- OB/GYN Residents

Other AHSC and UA participation in ASTEC includes:

- Nurse Practitioners
- Registered Nurses
- Campus Health
- College of Nursing Students
- Faculty Instructors
- Undergraduate Clubs
- Middle & High School Programs

ASTEC continues to be a primary resource for community first responder simulation training, generating revenue from the following:

- Tucson Fire Department EMT
- Air Evac Helicopter Program
- LifeNet Helicopter Program

Faculty proctoring is encouraged for all scheduled training and is considered an essential component for simulating cases and providing debriefing. Currently, 80% of all departments provide an instructor so that learning objectives include integrating simulation training with the respective medical environments.

ASTEC’s popularity is demonstrated by the enthusiastic and positive data generated from feedback and satisfaction survey data. On standardized, anonymous feedback questionnaires, ASTEC has consistently scored in the 90th percentile as a favorable educational experience by medical student and resident respondents.

This past year ASTEC was recognized by Karl Storz Endoscopy as the Center of Excellence that generated the highest participant utilization of instrumentation. ASTEC’s ongoing partnership with Storz creates a consistently high standard of practice for emergency medicine and surgical simulation training and education.

To further address the fidelity of simulation training, ASTEC’s neonatal patient simulator is being utilized within University Medical Center’s (UMC) Neonatal Intensive Care Unit (NICU). This way, residents and nurses can respond to Neonatal Resuscitation Program (NRP) codes and carry out the necessary procedures just as they would in any given day in the NICU environment. The pediatrics department has also taken advantage of the mobility of ASTEC during their morning report where they just recently demonstrated a double volume transfer and held an IV workshop using ASTEC artificial tissue.

ASTEC has implemented a fully operational training and testing station in response to the mandated laparoscopic training for general surgery certification by the Accreditation Council for Graduate Medical Education (ACGME). Residents are able to view the web-based study guides and at the same time practice their manual skills.

In addition, ASTEC also has a separate training station for the Laparoscopy 101 curriculum for first- and second-year residents. With these two additions, ASTEC now has six separate laparoscopic training stations.

ASTEC was a major part of the success of the second annual advanced life support resuscitation training held simultaneously with the College of Medicine, College of Nursing, and College of Pharmacy as part of the Office of Continuing Medical Education Interprofessional Sessions. The simulation training focused on team dynamics and involved 240 students and 25 faculty members from all three colleges. ASTEC operated out of two separate locations: providing resources for 75% of participating students and faculty.

With the help of a proposal submitted by the UMC Foundation, ASTEC was awarded a grant from The Wings Like Eagles Foundation-Golden Eagle Distributors to obtain electronic videotape equipment. The new equipment will expand upon the education capabilities of ASTEC by providing an enhanced multimedia component to the existing curriculum.
NEW TRAINING MODULES

In conjunction with the UMC Foundation ASTEC secured a grant for a Laerdal MegaCode Kid™ for pediatric advanced life support skills in pre-hospital emergencies. The mannequin comes equipped with interchangeable trauma limbs and is extremely mobile for off-site simulations. ASTEC has developed an artificial tissue model for ultrasound (US)-guided line placement to training residents and practicing attendings how to place peripheral IV’s on patients. Using US-guided placement, nearly any patient can have a peripheral vein cannulated with an 18-gauge intravenous line catheter, allowing for safe blood draws, Access for fluids or medications, and gaining peripheral access for contrast for angiograms. The same skills can be directly applied to US guided central line placement, which is becoming the standard of care for central line placement for femoral and jugular lines, enabling simulation of a bleeding tumor that can be retrieved by introducing grasping forceps.

One of several coordinated education and research initiatives with Karl Storz Endoscopy, the development of ASTEC’s bronchoscopy prototype allows participants to orient themselves and improve their navigational skills using a fiberoptic bronchoscope. The model comes equipped with interchangeable healthy and diseased bronchial trees, enabling simulation of a bleeding tumor that can be retrieved by introducing grasping forceps.

Another recent artificial tissue model developed in-house is ASTEC’s tibia compound fracture that includes arterial bleeding operated by a pulsating pump system. This model is among a series of additions to better accommodate pre-hospital EMT scenarios conducted on a regular basis with Tucson Fire Department, LifeNet® and Air Evac.

In addition to these recent simulation training tools, ASTEC continues to offer:

- High-fidelity adult patient simulators
- High-fidelity pediatric simulator
- High-fidelity neonate simulator
- Virtual reality laparoscopic trainer
- Laparoscopic training stations
- Storz videoscopes & instrumentation
- Neurosurgical microscope
- Specialized task trainers
- Simulated tissue models

RESEARCH

In 2008-09 ASTEC has been involved in a variety of research initiatives involving two attending physicians, one PhD dissertation, one master’s thesis, four graduate students, and two medical students. The following is a brief overview:

Under the leadership of Dr. Jerzy Rozenblit, head of the Department of Electrical and Computer Engineering (ECE), graduate students continue to collaborate with ASTEC on the development of a prototype binocular surgical-assisted laparoscopic trainer that has now entered its fourth generation. The goal is to bridge the gap between virtual reality simulators and pelvic trainers, achieving a fully integrated training system for minimally invasive surgery. A Situational Awareness Enhancing System (SAES) has been developed by utilizing multiple sensors and computerized processing technology on real surgical instruments. SAES supports real operating room procedures, including real-time sensor fusion, run-time surgery guidance, and emergency safety reinforcement. The SAES provides a high-fidelity training environment, as well as objective performance assessment capabilities that can measure a trainee’s progress in acquiring psychomotor skills.

Mike Hudson, MD, UA Department of Emergency Medicine, is entering the second phase of a two-part study that will evaluate retention thresholds following medical simulation training. Randomized groups have been trained within ASTEC utilizing different teaching styles. The second phase will test for any difference in knowledge retention and skills when surprising residents with the same case in the emergency department.

Ongoing is ASTEC’s research to develop and perfect biosynthetic materials for surgical dissection, intravenous therapy, suturing, and microsurgery simulation. In the past year, we have added five new artificial tissue models developed in-house to better meet the needs of each of the 8 departments utilizing ASTEC on a regular basis. The following is a list of artificial tissue developed by ASTEC:

- Peripheral Intravenous Access
- Arterial Line Placement – New
- Pediatric Chest Tube – New
- Adult Chest Tube – New
- Tibia Compound Fracture with Arterial Bleeding – New
- Various Wounds for Suturing
- Ultrasound-guided Line Placement - New
- Umbilical Cord Access
- Bifurcation of Common Carotid Artery
- End-to-side Anastomosis

ASTEC was also home to an international pilot study that focused on determining the effect of hand dominance on the efficacy of hand movement. Participants used a Computerized Assisted Surgical Trainer (CAST) while performing predetermined randomized tasks. Results showed the non-dominant hand produced the best performance. Future studies will incorporate more complex tasks to better determine hand dominance during surgical procedures.
FUTURE INITIATIVES
ASTEC is working with the College of Medicine to find additional space for a larger, centralized simulation facility to serve the current and future needs of the college. Currently, ASTEC is serving all four classes of medical students, as well as residents. The current ASTEC facility covers fewer than 1500 square feet. Acquiring more space and centralizing all of the simulation equipment would produce significant savings in support and teaching personnel, allowing the simulation capacity of ASTEC to more than double.

Dr. Heather Cahan has begun preliminary efforts to design a pediatric mega-code simulation session to include a neonate, infant and school-aged patient simulator. Collaboration is also underway for a multidisciplinary mega-code which will include the Emergency Medicine, OB/GYN, and Pediatric departments and up to six simulators.

ASTEC is playing an integral part in the Department of Surgery’s Intensive Laparoscopic Training Course for Surgery Residents. Each surgery resident receives five hours of simulation training in ASTEC before moving on to the training operating room. Residents are introduced to laparoscopic instruments and use them to practice procedures on ASTEC’s artificial tissue models.

ASTEC’s staff is participating in the development of a simulation lab at the University of Arizona College of Medicine – Phoenix in partnership with Arizona State University. Designed to further integrate telemedicine and telecommunications, the lab will be a vital component of ongoing telemedicine initiatives.

Oral Presentations / Lectures for 2008-09:


RECENT PUBLICATIONS


