

**NORTHWESTERN MEMORIAL HOSPITAL
NORTHWESTERN UNIVERSITY**

Profile

- Chicago, IL
- www.nmh.org
- Average daily census: 543
- Teaching hospital, Northwestern University affiliate

Key Priorities

- Improved training

Simulators and Modules Used

- Endoscopy AccuTouch System
 - Introduction to Bronchoscopy
 - Transbronchial Needle Aspiration
 - Pediatric Difficult Airways
 - Bronchoalveolar Lavage and Endobronchial Sampling

Key Benefits of System

- Fast skills acquisition
- Better understanding of anatomy
- Enhanced patient comfort
- Better focus



Given time on the simulators, students develop a systematic way of inspecting all of the bronchi and their branches so that it becomes a matter of routine.

Immersion Simulator Speeds Bronchoscopy Training

“Residents assigned to the simulator spent about 45 minutes on it. I was not told who had worked on the simulator, but it was immediately obvious when they began their intraoperative bronchoscopy. Within 30 seconds I could tell by the way they held the scope, their understanding of anatomy, and their understanding of the maneuvers that they needed to do to get to where they needed to go.”

—Dr. Matthew Blum, Section Chief of Thoracic Surgery, Northwestern Medical Faculty Foundation, Northwestern University Feinberg School of Medicine

Random Survey on Simulation

As a member of the Northwestern Medical Faculty Foundation, Dr. Matt Blum oversees the residents' rotation in thoracic surgery at Northwestern Memorial Hospital. The rotation requires residents to become familiar with the bronchoscope and its operation.

"General surgery residents rotate through the a trauma/ICU service and through the ER. They need to be familiar with the bronchoscope and airway anatomy to identify traumatic airway disruptions and perform therapeutic bronchoscopy in the ICU," explains Blum.

When the hospital's Department of Surgery purchased an Immersion Medical Endoscopy AccuTouch System, Blum and a colleague set up a study to see if training could be improved by using it.

"We set the study up for about ten first year surgical residents. We randomized half of them to work with the simulator prior to performing bronchoscopy in the O.R., the other half went straight into the operating room to perform bronchoscopy," says Blum.

ROI

A source for return on investment is reduced procedure time. "In the operating room, charges are made by the minute. The repetition provided by the simulators can reduce procedure time in the O.R. This translates to costs savings without compromising quality of care."

—Dr. Matthew Blum

Simulator Training Results Immediately Evident

"Residents assigned to the simulator spent about 45 minutes on it. I was not told who had worked on the simulator, but it was immediately obvious when they began their intraoperative bronchoscopy. Within 30 seconds I could tell by the way they held the scope, their understanding of anatomy, and their understanding of the maneuvers that they needed to do to get to where they needed to go," states Blum.

Blum says that there wasn't a large time discrepancy for completion of the procedure between the two groups because he maintains the pace of the procedure.

"I give verbal cues: 'Now you have to straighten out. Turn left.' But, I didn't have to give nearly as many cues to those who had trained on the simulator," he says.



Endoscopy AccuTouch System

A realistic, computer-based system for teaching and assessing motor skills and cognitive knowledge of flexible bronchoscopy and upper and lower gastrointestinal flexible endoscopy. Real-time computer graphics include anatomic models developed from actual patient data. Force feedback is transmitted through the flexible scope to provide tactile sensations mimicking the actual feel of a procedure.

The key to good technique is a realistic training experience. "I would say this trainer is very realistic."

—Dr. Matthew Blum

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Realistic Simulation Promotes Focus, Confidence, Quickness

Blum believes that when residents can practice on the simulator before doing an actual procedure, they don't have to be so focused on the actual operation of the scope. Instead, they can focus on what path they need to take and on identifying any unusual features.

Given time on the simulators, students develop a systematic way of inspecting all of the bronchi and their branches so that it becomes a matter of routine. With this preparation, when it comes to a real procedure, they're able to focus on what they are trying to accomplish—which is patient safety and satisfaction, and thoroughness of the inspection in a timely fashion.

Patient Anxiety and Discomfort Reduced

“If a resident approaches a patient but it seems like they don't know how to use the equipment, it understandably makes patients very anxious,” he adds.

“The other thing is that a lot of bronchs are done on consciously sedated patients, so patient discomfort is a factor. Docs need to get through the procedure rapidly, yet thoroughly.”

The key to good technique is a realistic training experience. Blum says, “I would say this trainer is very realistic.”

What About Return on Investment?

Blum says a source of ROI is reduced procedure time. “For somebody doing outpatient bronchoscopies, they would make more money if they could train someone to be proficient, so there would be a financial benefit for these outpatient procedures. In the operating room, charges are made by the minute. The repetition provided by simulators can reduce procedure times in the O.R. This translates to cost savings without compromising quality of care.”

“I was just impressed with how good people's bronch skills were after working with the simulator for just a short time,” he says.

What's Next?

Blum believes that the number of clinical bronchoscopies needed to become proficient would be fewer after training on the Immersion Medical Endoscopy AccuTouch System.

His study results will be published in the *Annals of Thoracic Surgery*.



MODULES

Introduction to Bronchoscopy

This module includes videos covering the entire procedure, an interactive 3D model emulating the tracheobronchial tree and adjoining anatomic structures, and software that teaches the navigation of a bronchoscope in the simulated anatomy. An external view of the procedure helps students understand the location of the scope.

Transbronchial Needle Aspiration (TBNA)

Users learn correct use of a cytology needle to biopsy a lymph node. Four cases present progressively difficult anatomies and pathologies, supplying broad experience to extend proficiency. The virtual attending feature advises the user on correct technique and warns of potential harm to the patient.

Pediatric Difficult Airways

The patients in this module range in age from neonates to school age children. The user places an endotracheal tube in either static anatomy for novice users, or dynamic anatomy, in which the patient breathes spontaneously.

Bronchoalveolar Lavage and Endobronchial Sampling

The sampling tools for this module, a needle, forceps, and brush, appear on the simulated environment after they have been inserted through the working channel of a realistic bronchoscope. Use of the tools will cause tissue deformation and realistic bleeding. The patient breathes, coughs, and exhibits changes in vital signs based on user actions.

Endoscopy AccuTouch® System **SUCCESS STORY**

Northwestern Memorial Hospital

Northwestern Memorial Hospital is one of the nation's preeminent academic medical centers, with centers of excellence in cardiovascular services, women's health, oncology, the neurosciences, orthopedics, transplantation, gastrointestinal disease, psychiatry, and infectious diseases. As a major referral center, patients have access to advanced diagnostic and therapeutic modalities, including medical imaging, laser technology, minimally invasive surgery, organ and stem cell transplantation, and biologic therapies. Physicians serve on the faculty of Northwestern University Feinberg School of Medicine, and participate in both medical education and research programs.

Northwestern Memorial is Chicago's only academic medical center hospital participating in city and state Level I trauma networks and as a Level III neonatal intensive care unit. Its Department of Surgery is one of the most active in metropolitan Chicago. The surgery staff provides the full range of surgical procedures, from minor outpatient operations to state-of-the-art minimally invasive procedures, to the most demanding transplantation operations, including cardiac transplants.

Immersion Medical, Inc.

Immersion Medical designs, manufactures, and markets computer-based medical training simulation systems worldwide. The systems integrate proprietary computer software and tactile feedback robotics to create highly realistic medical procedure simulations that help train doctors. The company's four key product lines are the CathSim® AccuTouch System, the Endoscopy AccuTouch System, the Endovascular AccuTouch System, and the Laparoscopy AccuTouch System.

Immersion Corporation

Founded in 1993, Immersion Corporation is a recognized leader in developing, licensing, and marketing digital touch technology and products. Bringing value to markets where man-machine interaction needs to be made more compelling, safer, or productive, Immersion helps its partners broaden market reach by making the use of touch feedback as critical a user experience as sight and sound. Immersion's technology is deployed across personal computing, entertainment, medical training, automotive, and 3D simulation markets. Immersion and its wholly-owned subsidiaries hold more than 230 issued patents worldwide.



Northwestern Memorial Hospital

Dr. Matthew Blum

Dr. Blum's area of clinical focus is in transplantation, cancer, and thoracic surgery. He attended Johns Hopkins University School of Medicine and residency programs at Vanderbilt University Medical



Center and Northwestern Memorial Hospital. The co-author of many books and papers, he is American Board certified in Surgery and Thoracic Surgery.

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