The University of Toronto Surgical Skills Centre at Mount Sinai Hospital

Annual Report 2005-06

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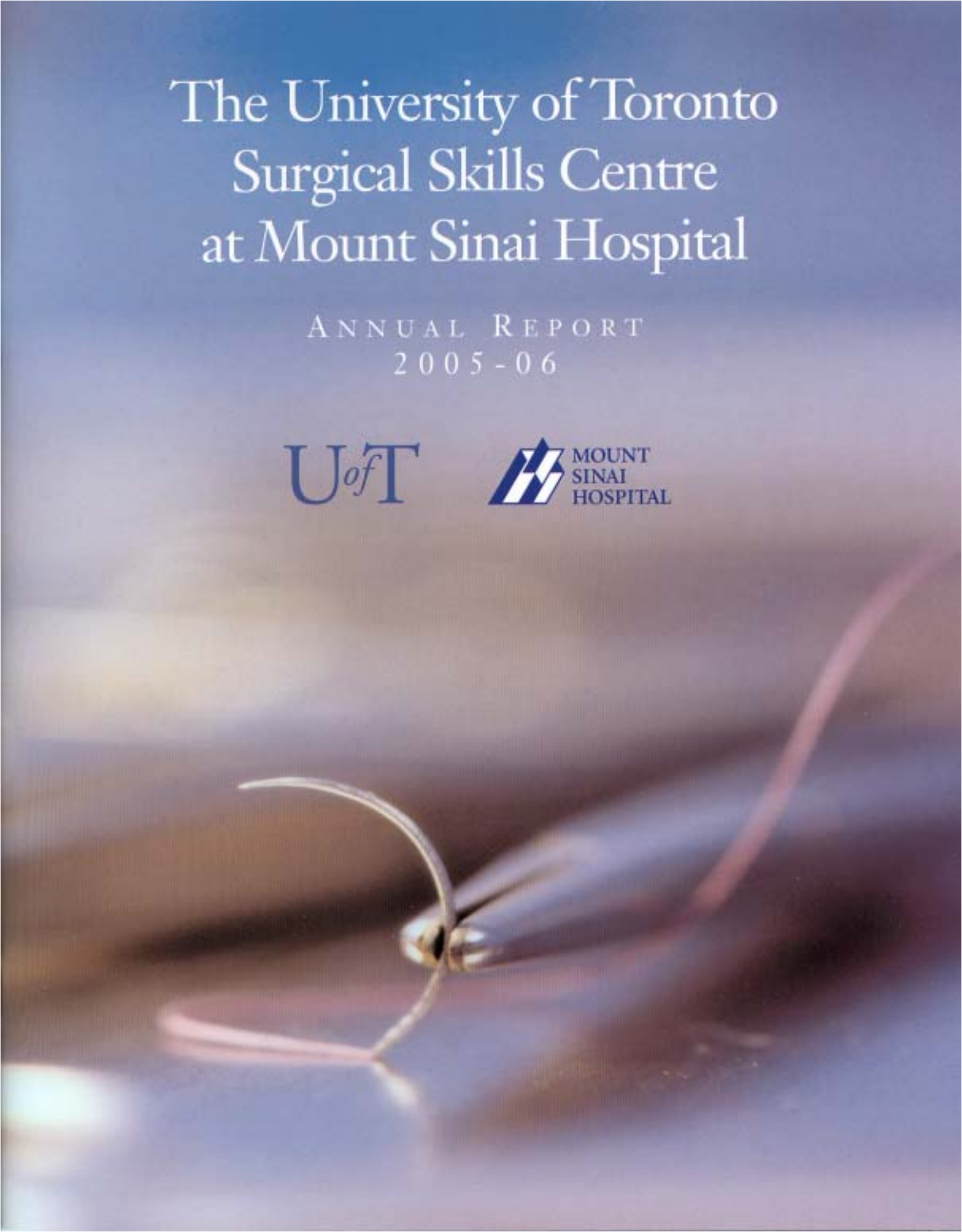
MOUNT SINAI HOSPITAL



Vision

Traditionally, surgical skills have been acquired in the operating room. The complexity of surgical procedures and the premium placed on surgical time has increased. We can no longer expect surgeons to acquire novel skills in the operating room.

The University of Toronto Surgical Skills Centre at Mount Sinai Hospital provides a laboratory setting where basic and complex surgical procedures can be learned and practiced. Surgeons will achieve a higher level of expertise more rapidly in a laboratory setting where they can employ educational principals of repeated practice with feedback. Educational research is conducted in skills acquisition and evaluation. This research will provide answers to fundamental educational issues and allow testing of innovations in surgery.

It is our goal that this facility become an internationally recognized centre of excellence in surgical education.

Mission

1. To change the way fundamental surgical skills are taught and evaluated.
2. To provide a platform for continuing education in surgical skills.
3. Create a laboratory for research and development of surgical skills innovation.
4. The promotion and enhancement of teaching surgical skills through the Surgical Skills Centre.

"We are responding to a series of challenges that are changing our ability to train surgeons in a classic way."

Richard Reznick, MD, FRCSC, R.S. McLaughlin Professor and Chair
Department of Surgery, University of Toronto

Director's Letter

Dr. Helen MacRae practicing lap suturing techniques on one of the many models available in the Surgical Skills Centre.

Since its inception in 1998, The University of Toronto Surgical Skills Centre at Mount Sinai Hospital has seen continued growth and innovation. We are now hosting over 300 events per year, and more than 4,000 individual visits. This is a testament to the value seen in the offerings of the Centre.

Lisa Satterthwaite, Manager of the Centre, continues to set the standard of how a skills centre should be run. Lisa has been a consultant for the American College of Surgeons, as well as numerous individual centres, all of whom have found her extensive knowledge and enthusiasm of great value in initiating their own labs. Shunne Leung, Assistant Manager, and Dezan Rego, and Marina Romanova, Surgical Technicians complete our team, each adding important skills to the Centre. This team has been very important in ensuring the delivery of high quality curricula, and keeping the Surgical Skills Centre at the forefront of this area.

The Centre's use by the University community continues to grow in all stages of the medical education continuum. This growth underscores the increasing recognition of the value and need for technical skills training outside the clinical setting. Dave Backstein has implemented a highly evaluated undergraduate curriculum in technical skills training. We continue to offer a core curriculum to all junior surgery and otolaryngology residents. This has served as a model for a curriculum being developed by the American College of Surgeons. Division specific courses within the Department of Surgery are growing in number and diversity. The Skills Centre has also been more active than ever in the area of continuing medical education, with approximately 36 courses for physicians in practice being held this year.

The Centre also has focused on research in skills acquisition, with $230,000 in research grants over the past year. Adam Dubrowski, PhD, was hired with the goal of continuing the Centre's reputation for research in the area of skills' acquisition. With 25 publications and 16 grants in the short time since joining us, the goal of hiring a full time PhD has clearly been met. With this type of success comes growth. Heather Carnahan, PhD, who also has a background in Kinesiology, will join Adam, with a 30 per cent commitment to the Skills Centre. We are excited at this recruitment, and I am positive Heather and Adam will work synergistically, capitalizing on the strengths of the Centre in the research arena.

It has been an honour to continue to serve as D.H. Gales Director of the Skills Centre. The upcoming expansion is a testament to the impact the Centre has had on the Surgical Community at the University of Toronto. The growth and success can be attributed to the fabulous staff at the SSC, as well as the enthusiasm and support of Richard Reznick, Chair of the Department of Surgery. My deepest appreciation goes to all of these individuals, as they make my job easy.

Helen MacRae, MD, FRCSC
D.H. Gales Director
Surgical Skills Centre

Surgical Skills Centre

Traditionally, surgical skills are acquired in the operating room, but with the increasing complexity of surgical procedures and surgical time at a premium, it is critical students have a setting where these skills can be learned and practiced.

Since opening in 1998, the University of Toronto Surgical Skills Centre at Mount Sinai Hospital - the first of its kind in Canada and one of the most unique training facilities in the world - has celebrated unparalleled programmatic success in the areas of: Surgery, Otolaryngology, Obstetrics and Gynaecology, Anesthesiology and Continuing Professional Development courses in all surgical disciplines. A recognized leader in the area of technical skills training and innovation, the Skills Centre allows students, residents and experienced surgeons alike, to practice on realistic models and use computer simulations to develop and strengthen their surgical expertise, creating more confident and prepared surgeons in the operating room.

The Surgical Skills Centre is also at the forefront of the emerging field of surgical skills research and the expanded space will help increase research efforts. In partnership with the Wilson Centre for Research in Education, the Surgical Skills Centre assists surgical education research fellows (SERFS) in developing new ways of training surgeons, studying teaching and learning approaches. With rapid technological advancements, the Centre has an active research program in the area of technical skills training and transfer across many areas of surgery, focusing on new techniques, such as laparoscopic surgery for colon cancer.

The Skills Centre has demonstrated the benefit of isolated skill acquisition and practice gaining both recognition and value on an international scale. Based on our strong reputation, staff from the Centre have been recruited to travel across Canada from Vancouver to Montreal, and around the world to assist educational facilities develop their own surgical skills programs.

In addition, the Centre's success has led to a recent mandate that by 2008, all residency programs in the United States must have access to a Skills Labs, forcing organizations to scramble to get them up and running to be at the leading-edge of surgical skills training. The University of Toronto's Surgical Skills Centre - considered to be the gold standard in skills training, acquisition and research - has been actively collaborating with the American College of Surgeons to assist them in creating their own accreditation guidelines. Further collaborative work is now taking place with the American College of Surgeons to create a comprehensive teaching syllabus, including both literature and teaching tools, for all surgical skills centres in Canada and the United States.

Staff

Dr. Helen MacRae, D. H. Gales Director

Dr. MacRae is a General and Colorectal surgeon at Mount Sinai Hospital, with a special interest in laparoscopic colorectal surgery. She completed medical school and general surgery residency in Edmonton, Alberta, and fellowship training in colorectal surgery at the University of Toronto. Dr. MacRae has a Master's degree in Medical Education from Springfield, Illinois. Her research interests are in the areas of Evaluation of Clinical Competence, and Acquisition of Technical Skills.

Lisa Satterthwaite, Manager

Ms. Satterthwaite holds an RPN diploma from Scarborough General Hospital and an honours diploma in Operating Room Techniques from Humber College. Before joining the Skills Centre in May 2000, she worked in the Toronto General Hospital OR; her primary surgical focus was the Liver Transplant Team, where she was a senior team member focusing on training and development for new staff members.

Shunne Leung, Assistant Manager

Mr. Leung holds a B.Sc. degree in Pharmacology and a Certificate in Business from the University of Toronto. Before joining the Skills Centre in May 2001, he was Shift Supervisor in the Toronto General Hospital's Central Processing Department, where he contributed to meeting the supply and sterile processing requirements of operating suites in the Toronto General and Princess Margaret Hospitals.

Dezan Rego, Surgical Technician

Ms. Rego has worked at Mount Sinai Hospital since 1978. In 1983 she began working for the Operating Room. During this time she was a senior OR instrument technician and team leader where she trained the majority of new staff and became an invaluable team member. Ms. Rego holds a diploma in Sterile Supply Processing from Centennial College.

Marina Romanova, Surgical Technician

Ms. Romanova holds an M.D. diploma from Riga Medical Institute, Latvia and a PhD in Medical Science from University of Russia. She attained a certificate in Small Animal Care from the University of Toronto. Before joining the team, she was a Research Technician at St. Michael's Hospital.

Serenity Thomas

Ms. Thomas holds a BA in Medical Ethics from Univesity of Toronto. She currently works in part-time in the lab assisting with all course duties, lab set-up and syllabus revisions.

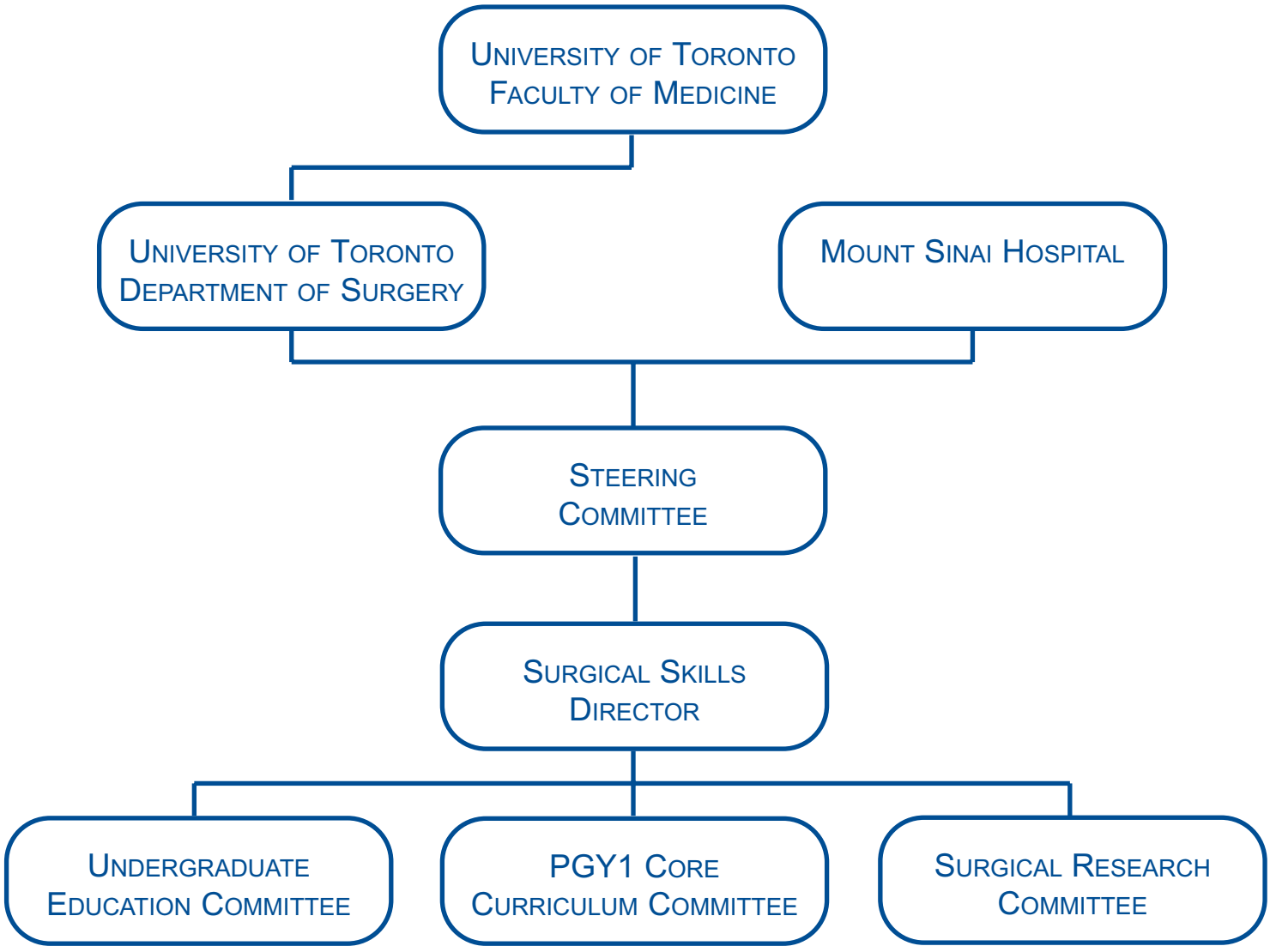
Governance

The Surgical Skills Centre is a joint initiative of the University of Toronto Department of Surgery and Mount Sinai Hospital.

The Faculty of Medicine at the University of Toronto is responsible for the administration of funds and liaison with industry.

A steering committee, with representation from both the University of Toronto and Mount Sinai Hospital, oversees the Centre's operations in consult with the D.H. Gales Director.

A Curriculum Committee, chaired by the Director, guides the development and delivery of the Surgical Skills Centre's core curriculum. The Committee has representatives from each of the Divisions in the Department of Surgery, the Department of Otolaryngology, the Department of Obstetrics and Gynaecology and surgical residents and educators.



The Skills Centre offers an opportunity for even experienced surgeons to practice their technique. Here, Drs. Ricardo Carray and Ian Witterick demonstrate the use of a navigation instrument during a Minimally Invasive Surgery and Endoscopic Skill Based Dissection course in the ENT program.

Realistic models are essential to successful practice of skills and technique. Porcine stomach and bowel are often used for pyloroplasty training.

Simulators, such as this one for intubation immersion, are used regularly in the lab as part of the training curriculum to provide a more realistic experience.

"We're expanding out of necessity. We're expanding because of success."

Richard Reznick, MD, FRCSC, R.S. McLaughin
Professor and Chair, University of Toronto

The success of the Surgical Skills Centre and the resulting need to meet the increasing demand for expert surgical training and education has led to a major expansion of the Centre, which began in March 2006.

The state-of-the-art facility has enjoyed tremendous success over the past eight years, experiencing exponential growth in the number and types of skills courses offered annually. In 2004, more than 4,000 medical students, residents and surgeons of all ages and skill levels from across North America, benefited from training in the Surgical Skills Lab. By 2008, this number is expected to double.

The expansion will:

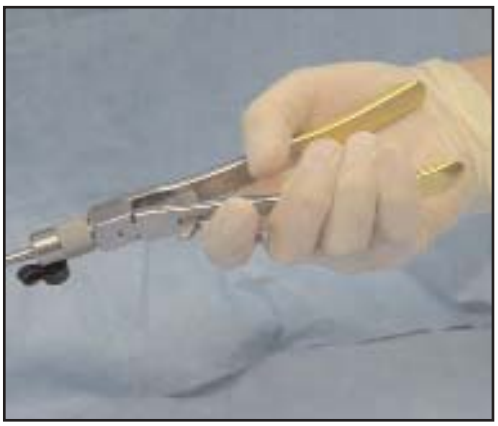
* Address the demand for surgical training in complex procedures, including minimally invasive techniques, and provide opportunities for surgeons to rehearse rare, intricate procedures
* Furnish established surgical experts with the finest continuing education programs
* Create an optimal environment, a virtual operating room, to respond to increasing technical needs of residents, undergraduate medical students, postgraduate trainees and University of Toronto faculty
* Provide opportunities for further leading-edge surgical skills research, including the best surgical training techniques and the influence of senses during surgery

One of the expansion highlights is the addition of a dynamic and leading-edge Virtual Operating Theatre, which will enhance the skill set, confidence and communication of the interdisciplinary staff who work in the operating room. The Theatre - a functional, high-tech simulated operating room - will allow students, doctors, nurses, respiratory therapists and anaesthesiologists to not only practice their own skills but to have this interdisciplinary group practice working together as a team. Equipped with an operating table, surgical lighting, a cadre of patient-monitoring and therapy devices and supplies, the simulated OR will allow clinicians to work naturally, enhancing their practice experience.

Also equipped with state-of-the art audio and video capabilities, this simulated OR will be connected to six locations within the Hospital campus and be compatible with video conferencing facilities world-wide. This technologically rich operating room also provides the opportunity for even the most experienced surgeons to rehearse complex surgeries with the latest technology and develop new, more sophisticated surgical techniques on simulated patients before stepping into a real operating room with real patients.

Research is also a vital component of the Virtual Operating Room. The monitoring room adjacent to the operating room will be equipped with one-way mirrors and video cameras for unobtrusive observation and documentation of simulator activities, including usability tests of medical devices. Video capabilities also allow for review of technique by both researchers and the surgeons and teams. Some exciting research initiatives include studying hand-eye co-ordination, team communication and fatigue.

State-of-the-art technology enables a resident learning drilling techniques on a cadaveric temporal bone model, to be better prepared for the Operating Room patient setting.



Learning how to properly use instruments, like how to hold a laparoscopic needledriver, is a basic function taught in the Skills Lab.

Video taping lab work enables researchers to closely examine their technique for learning and for research.

"They provide a world-class facility with excellent equipment for resident and continuing education training."

Ian Witterick, MD, FRCSC, Post Graduate Director
Department of Otolaryngology, Mount Sinai Hospital

The main thrust of the Surgical Skills Centre is offering students the opportunity to acquire fundamental skills in an appropriate learning environment that allows for repeated practice with feedback. This approach to teaching, combined with excellent operative experiences has the potential to greatly enhance the learning and acquisition of surgical skills.

This academic year has seen the largest number of practice sessions for residents and medical students hosting more than 150 individual practice sessions for students from the Departments of Surgery, Obstetrics and Gynaecology and Otolaryngology. In addition to resident and medical student practice, we have seen an increase in faculty practice sessions augmenting new procedural skills and surgical teamwork, marking a definite cultural change in attitude towards practicing surgery outside the operating room. To encourage this continued use, a trial 24-hour practice room will be housed in the new expansion area.

The focus on developing technical skills at all stages of the education continuum, across disciplines, coupled with leading edge research in skills acquisition, provides the opportunity to make major contributions to the practice of surgery.

The models used in the Skills Lab, vary from very basic knot-tying boards used for basic skills, to cadavers, to virtual reality simulators. The model fidelity is tailored to the needs of the learners and the course, again enabling the Lab to be relevant to learners at many levels.

To enhance the learning experience, the Surgical Skills Centre is equipped with telecommunications capability. Directly linked with two operating rooms in Mount Sinai Hospital, participants in the lab have the opportunity to view live surgery in the context of the course and are able to interact directly with the operating surgeon. Using this telecommunications system, the Skills Lab is able to connect with any similarly equipped facility in the world and continues to expand their video conference capabilities.

In-house video taping of expert surgeries has also provided a number of key applications: first, the surgeon who performed the surgery has the opportunity to reflect and evaluate their technique and second, students have the opportunity to review and learn from the taped expert. With research confirming video learning is an effective way of training, particularly for early learners, the Skills Lab has placed a strong emphasis on this style of education.

"The residents love the core curriculum. It enables them to practice surgical skills without the pressure of an operating room."

Michael Borger, MD, FRCSC, Program Director
Division of Cardiac Surgery, Mount Sinai Hospital

Apporximately 42 first-year residents from all disciplines participate in the 28-week Core Curriculum, which involves weekly sessions that concentrate on skills required across surgical disciplines. Student to faculty ratios are one faculty to six students, allowing residents to receive independent teaching and feedback on their techniques. The core curriculum is set and administered by a Core Curriculum Committee made up of surgeons, educators and residents from across divisions.

Calendar -- September 2005 - May 2006

Principle of Asepsis
Instrument Handling and Knot Tying & Advance Suturing
Tissue Handling Dissection and Wound Closure
Tendon Injury and Carpal Tunnel Repair
Tissue Handling Advanced
Airway Management & Surgical Airway
MOSATS 1 (Mini Objective Structured Assessment of Surgical Skills)
Catheterization
Electrocautrey & Skin Biopsy
Chest Tube Insertion
Bowel Anastomosis- Hand Sewn and Stapled
Bone Casting
MOSATS II (Mini Objective Structured Assessment of Surgical Skills)
Intro Microsurgery I / Skin Grafting
Intro Microsurgery II / Bone Harvesting & Bone Biopsy
Lap Skills Basic
Lap Skills - Suturing / Arthroscopy
Lap Skills- Cholecystectomy / Arthroscopy
Lap Skills Competition
MOSATS III (Mini Objective Structured Assessment of Surgical Skills)
Z plasty, Liver Biopsy, and Breast Aspiration
Vascular Control I - Arterial
Vascular Control II - IVC
MOSATS IV (Mini Objective Structured Assessment of Surgical Skills) & Pig Lab A
MOSATS V (Mini Objective Structured Assessment of Surgical Skills) & Pig Lab B
Line Insertion - Arterial, Jugular, Femoral
Practice Session for OSATS I
Practice Session for OSATS II
Objective Structured Assessment of Technical Skills Exam

Dr. John Rutka leads a temporal bone drilling training session for international otolaryngology faculty, demonstrating the far-reaching use of the Surgical Skills Centre.

As in the operating room, the Surgical Skills Centre boasts all the necessary tools for surgeons to practice their techniques.

Taking advantage of the free lab time offered by the Skills Centre, an undergraduate student practices a lumbar puncture.

"The Surgical Skills Centre sessions were invaluable in helping me acquire fundamental surgical skills, instilling confidence and enhancing my future learning in the operating room, enabling me to be a valuable addition to the surgical team."

Nathan Jowett, third year medical student, University of Toronto

A new initiative in the Surgical Skills Centre is the development of a formal undergraduate training program. Led by Dr. David Backstein, this format offers the most intensive undergraduate surgical skills program and students have responded positively.

The goal of the formalized curriculum is to increase not only the technical competence of the students, but to act as a springboard into the surgical field by offering a more comfortable, relaxed environment in which to learn in. An indirect goal has been to improve students' exam scores both practical and applied.

Every six weeks, before beginning their surgical rotation, 40 third year students spend a full week of training and seminars in the Skills Centre, up from a day and a half. Here, students gain a better understanding of the field of surgery and the surgical patient while learning and practicing fundamental technical skills, including suturing, knot tying, chest tube insertion, casting, lumbar puncture and catheterization.

The acquisition of these basic skills has resulted in more confident and capable students who feel more comfortable contributing once they enter the operating room.

Fourth year students, at the end of their rotation, are encouraged to spend time in the Skills Lab to hone their skills. At this point, they are much more self-directed, but do have the opportunity to be supervised. Lab use has been extensive and very promising.

While there is no formal data, preliminary feedback for the program has been positive and students are demonstrating more of an interest in the surgical field.

With the number of medical students entering the University of Toronto increasing, the expansion of the Skills Lab is incredibly important because it will allow faculty to continue their didactic teaching in the lab environs as opposed to distant, non-surgical areas.

Undergraduate Curriculum

Day 1 -- Knot tying, suturing, gowning and gloving
Day 2 -- Suturing and Catheterization
Day 3 -- Casting
Day 4 -- Chest tube insertion and lumbar puncture
Day 5 -- Trauma training (at St. Michael’s Hospital)

Learning can be fun! Not all learning occurs at a lab bench. Here, students practice intubating in any position -- a more realistic situation -- while participating in the Annual Airway Olympics at the Surgical Skills Centre.

Students learn on a human patient simulator how to treat patients, while donned in protective gear, in an emergency practice session post-SARS.

Dr. Goldman teaching a heart valve replacement using the in-house telecommunication device. **Inset:** the surgery as it appears on the video screen.

Education - Additional Curricula

For the more senior residents, divisional-specific courses that focus on discreet operations or specialty-specific techniques are offered. In continuing medical education, the Skills Lab is an important setting for the acquisition of new techniques and operative approaches.

Department of Surgery

The Divisions of Surgery have established a successful annual curriculum. Courses vary in format from weekly to monthly to summer sessions. Listed below are the sessions for each division.

Division of Cardiac Surgery

Sessions included:

- Aortic Valve Anatomy, Replacement and Replacement Technique Assessment
- Aortic Stentless Valve Replacement
- Mitral Valve Anatomy, Replacement, Annuloplasty and Repair

Division of General Surgery

Sessions included an introduction to some basic skills including knot tying, suturing, abdominal closure and minimally invasive surgery.

Division of Neurosurgery

Session topics included using the operating microscope, microsurgery and microvascular anastomosis, cerebral angiography, understanding cerebral arteries and venous systems, whole head brain dissection and surgical approaches to the brain.

Sessions included:

- Endoscopy
- Skull Bone Plating Course
- Spinal Surgery

Division of Orthopaedic Surgery

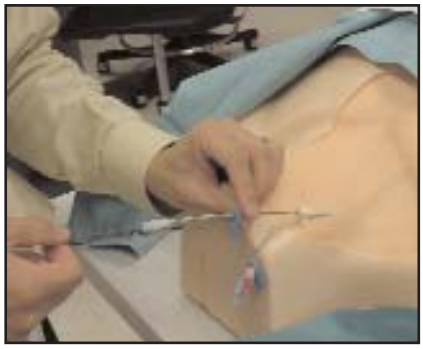
Sessions included:

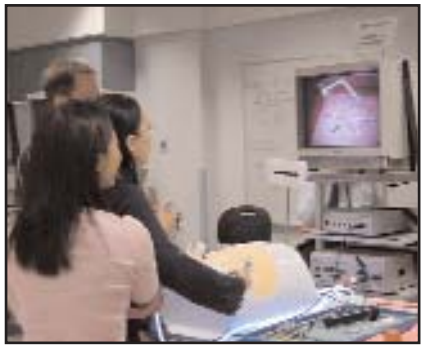
- Knee Scoping
- Shoulder Arthroscopy
- Hand Surgery
- External Fixation Knee and Hip

Division of Plastic Surgery

Sessions included:

- Multiple site flap creation
- Microsurgery
- Craniofacial plating
- Hand fixation





Division of Urology

Sessions included:

- TURP and bladder resection
- Micro surgical anastomosis
- Laparoscopic techniques
- Cystectomy and uretoscopy

DEPARTMENT OF EMERGENCY MEDICINE

The Department of Emergency Medicine offered courses for 16 residents.

Sessions included:

- Fibreoptic Bronchoscopy
- Chest tube insertion and Thoracostomy
- Interosseous IV insertion
- Cricothyroidotomy
- Lumbar Punctures

DEPARTMENT OF FAMILY MEDICINE

This was first year Family Practice joined the ever-expanding group of affiliates at the Surgical Skills Centre with one day Obstetrics course.

Sessions included:

- Suturing
- Normal Vaginal Delivery
- Shoulder Dyscotia

DEPARTMENT OF INTERNAL MEDICINE

The Department of Internal Medicine, led by Dr. Ken Locke, hosted four sessions with approximately 26 residents during the Fall. The four three-hour sessions included stations on:

- Bone marrow aspiration
- Thoracentesis
- Lumbar puncture
- Knee arthrocentesis and injections

DEPARTMENT OF RESPIROLOGY

The Department of Respirology offers an annual summer bronchoscopy course for residents. The course, organized by Dr. Jae Yang from St. Michael's Hospital, concludes each year with a "Scope Me" competition!

Various Curriculum Stations

DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY

The Department of Obstetrics and Gynaecology educational curriculum, led by Dr. Richard Pittini, offered 23 PGY1-2 courses and seven PGY3-5 courses. Core residents and fellows also use the Centre to enhance advanced laparoscopic skills.

Some aspects of the Centre the Department uses include commercial models such as laparoscopy trainers and vascular repair models. Specifically designed models for the curriculum, such as obstetrical birthing models and a fourth degree perineal repair model are also valuable for the program. The Centre also allows for exposure to critical incidents that are not suitable for training in a clinical environment, such as management of shoulder dystocia.

A course in Advanced Endoscopic Surgery is provided for the senior residents with the objective to teach the residents to be safe and knowledgeable endoscopists. It supplements the training that they receive as junior residents both in the lab and in the operating room. Didactic sessions are given on the potential complications related to laparoscopy and hysteroscopy. These sessions include topics on the prevention, recognition and treatment of complications related to minimally invasive surgery as well as a session on electrosurgery. Both inanimate and animate lab sessions are also included to provide an opportunity for the residents to get "hands on" training out of the operating room.

One of the benefits of the Surgical Skills Centre to the Department of Obstetrics and Gynaecology, is the ability to conduct OSATS at the beginning and end of the two-year core curriculum, allowing the Department to individualize learning programs for each of the residents.

Some sessions include:

* Perineal Repairs
* Vascular Injury
* Bowel: Enterotomy repair, stapling, hand sewn anastomosis
* Bladder: Foley and SP catheters, cystoscopy and cystotomy repair

A delivery of great courses! A Family Medicine student and instructor in the midst of a virtual delivery.

DEPARTMENT OF OTOLARYNGOLOGY

The Department of Otolaryngology curriculum, led by Dr. Ian Witterick, used the Surgical Skills Centre to offer their residents a variety of courses.

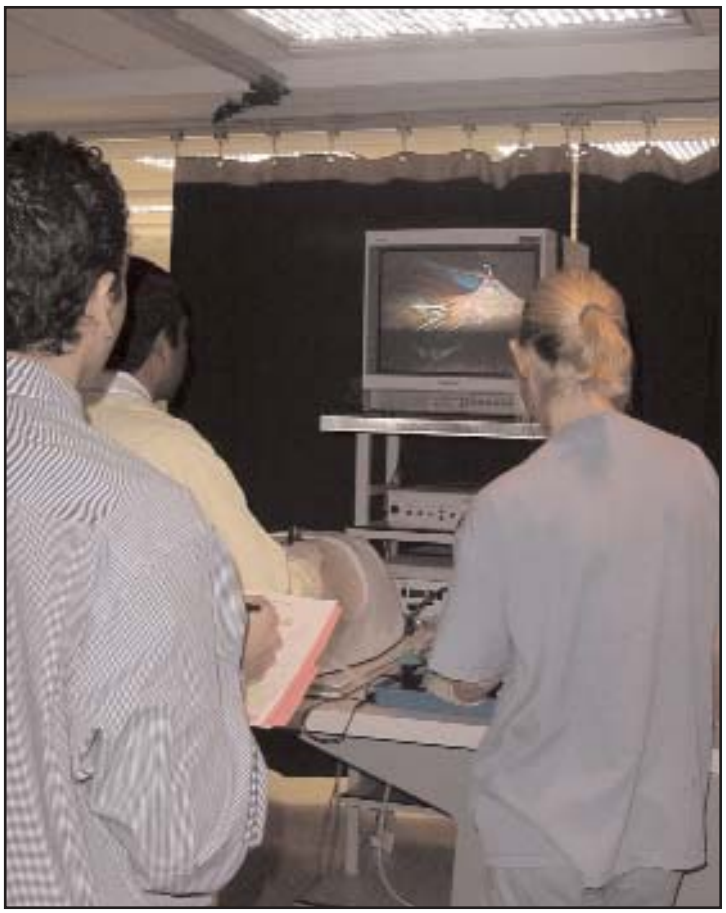
The Department used the Centre for didactic lecture, hands on practical courses and video conferencing around the world, including to Israel.

Some sessions included:

* Temporal bone drilling
* Neuro Endoscopic sinus course
* Larynx and voice course
* Rhinoplasty
* Laser course
* Sinus course

INTERNATIONAL MEDICAL GRADUATES ONTARIO (IMGO)

For the past the past three years the International Medical Graduates Ontario (IMGO) an assessment centre providing assessment services to candidates for 15 medical specialties, has utilized the Surgical Skills Centre as a testing venue for candidates in technical skills acquisitions. The Skills lab prepares and runs the Objective Assessment of Technical Skills (OSATS) examinations on an annual basis. Surgical disciplines include: General Surgery, Obstetrics and Gynaecology, Orthopaedics and Otolaryngology



Testing is an important aspect of the Surgical Skills Centre. Here, students demonstrate laparoscopic cholecystectomy at an Objective Assessment of Technical Skills medical examination station.

Education - Outreach

Medical interest and education does not simply begin at the undergraduate stage in the Surgical Skills Centre, it is open to anyone and everyone. To that end, the Surgical Skills Centre offers a variety of educational opportunities for students of all ages to explore the medical profession and its many career paths.

The Surgical Skills Centre boasts a flourishing volunteer and co-op program, available to both high school and university students. Students are immersed in the surgical environment. They assist with the preparation and set-up of courses, they observe students and expert surgeons perform and practice surgical techniques and they also have the opportunity to experiment with the equipment and models.

Students ask keen questions, offer fresh ideas to the Centre and stimulate discussion about the programs the Surgical Skills Centre offers. A number of students who have participated in the co-op and volunteer program have successfully entered the medical profession.

Take Your Kids to Work Day is a popular and successful annual event hosted by schools across Toronto and the Surgical Skills Centre always receives rave reviews for its hands on sessions and informative environment. The half day sessions offer high school students insight into the medical profession and opportunity to explore their options in a fun and interesting manner.

In addition, the Centre regularly offers tours and sessions for elementary and high school classes as well as for Mount Sinai Hospital staff and prospective donors.

Teaching gowning and gloving techniques to students on
Take Your Kids to Work Day.

Course List 2005 - 2006

"We are honored to be associated with the Surgical Skills Centre. Our sponsorship of this facility is consistent with our corporate value of investing in the future of surgery and the well-being of patients. The Centre is a world-class training environment dedicated to the development of surgical skills by residents and practicing surgeons alike. It is a shining example of the successful collaboration between industry suppliers, providers and educators."

Romeo Catracchia, President, Tyco Healthcare Group Canada

2005

April
- International Medical Graduates Ontario General Surgery Exam
- Styker Shoulder Arthroscopy

May
- Kyphon - International Kyphoplasty Spine Course
- BARD
- LVHR course
- Medtronics Canadian Contemporary Spinal Techniques

June
- ENT - Temporal Bone Dissection Course
- Tyco Biomed Training Course
- 2nd Year Medical Students Intro to Ortho

July
- Stryker Mid-Year Meeting

September
- Department of Cardiology Pacemaker Course

October
- The Use of Contour Threads in Facial Lifting
- Zimmer Hip Revision
- Tyco IVS Tunneller

November
- BARD Pelvic Sling
- Stryker Total Knee
- UHN Central Processing Education Day

December
- Stryker Resident Knee Arthroscopy course

2006

January
- Tyco Laparoscopic Colon Resection

February
- Brainlab Navigation Session
- Lornez Cranial Platting in Neurosurgery
- International Medical Graduates Ontario Gynaecology Exam
- BARD Open Ventral Hernia Repair

March
- Surgical Specialties Contour Breast Threading
- Tyco Laparoscopic Assisted Vaginal Hysterectomy
- Kyphon Vertebralplasty
- Stryker Knee Arthroscopy
- International Medical Graduates Ontario Orthopaedics Exam
- Tyco Laparoscopic Liver Resection Lab
- Sunnybrook and Women's Nurses Colonoscopy Simulator Training and Examination

April
- Zimmer Minimally Invasive Solutions - Hip and Knee
- Cochlear Implant
- Tyco IVS Tunneler

May
- Tyco Laparoscopic Thoracic Surgery Approaches
- Zimmer US Minimally Invasive Solutions - Hip and Knee
- Medtronics Canadian Contemporary Spinal Techniques
- Surgical Specialties Contour Breast Threading
- Introduction to Surgical Skills for International
- Traveling Undergrads

June
- Surgical Specialties Contour Breast Threading
- Stryker Knee
- Tyco IVS Tunneller
- Dr. Eric Masicotte Spinal Techniques and Approaches
- Stryker Cranio Facial Platting

Research is a vital component of the Surgical Skills Centre and all students are encouraged to participate in research studies. Here, students are observed as they learn vascular anastamosis on dry models.

As part of a research study, a student practices bone drilling and plating using a hand motion detector, which analyzes his movements.

Research is a fundamental and vital component of the Surgical Skills Centre. As a leader in skils aquisition reserach, it is spearheading the shift towards evidence-based learning. What sets the University of Toronto's Surgical Skills Centre apart is a full-time Research Scientist, Adam Dubrowski. The Skills Centre is also eager to welcome Heather Carnahan, a Research Scientist, who will start in Fall 2006.

Working collaboratively with surgical faculty in technical skills acquisition, Dr. Dubrowski, a Ph.D. in Kinesiology, is driving the research agenda of the lab. This valuable research has given the skills lab a better understanding of the learning needs of faculty and trainees and has the ultimate goal of determining how to enhance the learning experience for novice students and surgeons.

The ability of humans to move and adapt in a constantly changing - and often difficult - environment forms the basis of Dr. Dubrowski's basic and applied research. The basic research explores how environmental cues are processed to optimize the control of fine manual movements when interacting with small objects. In a surgical application, this dexterity is invaluable for proficiency in techniques related to minimally invasive surgery, when you can't rely on vision, the most dominant sense.

The applied research agenda primarily focuses on facilitating skills acquisition and developing experimental tools for the assessment of competency of fundamental surgical skills and tasks. The two targeted areas of his research are the application of motor learning theories to improve teaching and the development of valid measurement systems to both evaluate proficiency and provide standardized feedback.

The pending collaboration with the Canadian Space Agency has prompted Dr. Dubrowski to focus some of his research on space surgery. Together with his research team, Dr. Dubrowski has already conducted zero-gravity research into basic motor skills such as touching one's nose or tying one's shoes. A weightless environment affects a person's hand-eye co-ordination, aim and ability to apply a certain amount of force when undertaking tasks.

With a goal to determine how to train surgeons in a remote environment, there are a variety of applications to this research. Working collaboratively with surgeons in remote locations including Northern communities and Africa, Dr. Dubrowski and his team are exploring how surgeons learn independently and how proficient they become. They are also actively evaluating and plotting a "forgetting curve" - how quickly you forget or your skill proficiency declines.

Adam Dubrowski, Research Scientist

Dr. Dubrowski holds a Ph.D. in Kinesiology from the University of Waterloo. His dissertation work focused on manual interception of moving objects, anticipatory control of finger forces, effects of visual illusions on force control and how learning effects the integration of visual and haptic information for force control. Dr. Dubrowski completed an NSERC postdoctoral fellowship with Dr. P. Servos. He is also currently an Assistant Professor at the Department of Medicine and an Educational Researcher at the Wilson Centre for Research in Education.

Other research activities have related to the effectiveness of our curricula, the development and validation of effective simulators and models, the retention of technical skills to follow training and the prediction of success in surgical training. In the past academic year, research in surgical education at the Surgical Skills Centre has touched on many of these areas.

Curriculum Development
Research into curriculum development addressed two issues: optimal faculty to trainee ratio and the influence of simplified practice in the initial acquisition of technical surgical skills.

Research has determined the most optimal faculty to trainee ratio is 1:4 and lower ratios such as 1:2 or 1:1, do not improve technical skills learning and higher ratios such as 1:12 can be detrimental to the learning process.

Research has also identified that for the acquisition of complex technical skills, initial simplified, context non-specific training is as beneficial as training the actual task. This exemplifies that the use of games and drills with internal feedback about reaching training goals may be an effective alternative to the introductory training of complex tasks without extensive demands on faculty resources.

Evaluation of Performance
Expert-based evaluations, sub as Objective Structured Assessment of Technical Skills, pioneered at the Surgical Skills Centre, are time and resource consuming. It is a common knowledge that performance feedback is necessary for optimal technical skills learning. This year, Dr. Dubrowski's team tested several computer-based evaluation methods to offset the costs associated with intermittent assessments.

The research team has shown the construct and concurrent validity of tensiometry, testing the properties of knots, as well as movement process measures during the performance of general, orthopaedic and neurosurgery fundamental technical skills. Finally, they have demonstrated a new dimension of construct validity of magnetic based motion analysis device for assessment of technical performance.

Collectively, this research shows hat computer-based assessment systems are valid, reliable and feasible. However, although they may serve to assess the training progress, they have very little educational value as trainees do not improve their performance based on the outcome measures that these systems provide.

Use of Alternative Training Models
Dr. Dubrowski's team has also investigated the use of computer-based video instruction for training fundamental technical skills to undergraduate medical students. We have demonstrated that if used properly, computer-based video instruction can be as effective as expert guidance and feedback for the very early acquisition of technical skills. In addition, trainees are good as assessing their own performance levels. Therefore, it is possible to use a combination of computer-based video training models to redirect some of the initial acquisition of the fundamental skills training from the laboratory setting to independent, self-guided practice.

Research Team

Over the past four years, the Surgical Skills Centre has played a leading role in research in education. The Centre has guided a number of students and residents through their research projects as part of their education curriculum.

All research projects are headed by Adam Dubrowski, the Centre's research scientist. Each year, team members change and new and innovative projects are developed enhancing the Centre's research profile.

This year's research team is conducting a variety of projects, including:

- studying neuroplasticity associated with learning complex motor patterns such as those found during learning surgical techniques
- exploring the development and validation of tensiomentry -- computer based measurement system that evaluates tensile strength of knots. This measurement system may prove to be useful to objectively assess technical proficiency of basic surgical skills in novice trainees
- examining the effects of technical skill training on the ability of senior medical students to engage in technical skills performance and concurrent learning of clinically relevant information
- studying the effects of altered gravity on the ability to perform various dexterous skills, including newly acquired surigcal skills and over-learned skills
- studying the effect of training of technical surgical and procedural skills on the ability of novice medical trainees to interact with awake patients. This may have potential implications on patient safety

Research Activities 2005-06

Research at the Surgical Skills Centre adheres to the Centre's mission statement which strives to provide surgical trainees with an environment tot achieve a higher level of technical proficiency more rapidly, though the employment of educational principles of repeated practice with feedback. The educational research is conducted in skills acquisition and evaluation. In addition, to stimulate this applied research, though our basic research we are developing theoretical models of motor control and motor learning. We view both areas as mutually
beneficial, and equally important in addressing the mission statement.

1. PRACTICE CONDITIONS LEADING TO OPTIMAL LEARNING WITHIN SIMULATED ENVIRONMENT

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2. NON-EXPERT APPROACHES TO TECHNICAL PROFICIENCY EXAMINATION

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3. HUMAN-INSTRUMENT INTERACTION IN SURGERY

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Shang, D., Carnahan, H., and Dubrowski, A. (2005). Modeling of a laparoscopic needle driver: Implication for the design of virtual reality simulators. Studies in Health Technology and Informatics. 119:503-5.

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4. BASIC MOTOR CONTROL AND LEARNING

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"We are pleased to be working with the Surgical Skills Centre to help advance the art and science of orthopaedic surgery. Mount Sinai joins Johns Hopkins University and other world-class institutions as part of a global network that has been assembled to teach the latest advances in orthopaedics, as well as to share best practices for the total treatment of the orthopaedic patient."

Ray Elliott, Chairman, President and Chief Executive Officer, Zimmer Holdings, Inc.

Media

The Surgical Skills Centre's international reputation has garnered significant media attention. The Centre's facility has also been used as a backdrop for press conferences and television shows.

The Gift of Life, Reader's Digest, November 2004

Surgical Skills Centre, The Hospital News, April 2005

The Terry Fox Story, CTV, August 2005

Heart Valve Show, Daily Planet on
Discovery Channel, 2005

Mount Hope, The Globe and Mail, November 2005

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Canadian Healthcare Technologies, Spring 2006

Training the Next Generation of Surgeons,
Your Health Report, Spring 2006

VISITORS

Dorace Ramage, Registered Nurse
Learning Coordinator
CSTAR (Canadian Surgical Technologies & Advanced Robotics)
London, Ontario

Conor P Delaney, MD, MCh, PhD, FRCSI, FACS
Professor and Chief, Division of Colorectal Surgery
Vice-Chairman, Department of Surgery
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Ronald Lett, MD MSc. FRCSC, FCS (ECSA)
President & International Director
Canadian Network for International Surgery

Dr. Paul Abrams
Bristol Urological Institute
Southmead Hospital
Bristol,United Kingdom

Sanjeev Shar, Consultant
Obstetrician and Gynaecologist
Southport and Formby District General Hospital
Southport, United Kingdom

Hisayuki Hamada, MD, PhD
Department of Medical Education,
National Nagasaki Medical Center
Technical Official, Japanese Ministry of Health, Labour and Welfare

Dr. Roger Kneebone
Senior Lecturer in Surgical Education
Department of Biosurgery & Surgical Technology, Imperial College
London, England

Mr. Arnold DK Hill, Consultant Surgeon / Lecturer in Surgery
St. Vincent's University Hospital
Dublin, Ireland.

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Clinical Sciences at East Campus at Laurentian University
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By The Numbers

NUMBER OF:

Co-op students attending school for:	
Medicine	6
Dentistry	1
Nursing	1
Individual resident practice sessions	369
Square feet of new expansion area	3,200
Surgical Scissors	194
Volunteer students	4
Internal disasters (flood, fire and blackout)	3
Invoices signed	123
Computer contact list members	2,922
External consults	15
Lab benches	14
Miles of longest telesurgery connection	5,748
Gowns and gloves used	3,958
Presentations given by Lisa	10
Awards received	4
Research students	11
Electrical Outlets	184
Pounds of Turkey purchased for model making	115

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From one person learn all persons

The University of Toronto Surgical Skills Centre
at Mount Sinai Hospital

600 University Avenue
Room 250
Toronto, Ontario
M5G 1X5

T: 416-586-4800 x. 2766
F: 416-586-8829
E: skills.centre@utoronto.ca

www.utoronto.ca/ssc