2nd World Congress on Surgical Training

SurgiCON

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Congress Book

Scientific Advisory Board
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Lecture Summaries

References

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INTRODUCTION

The human anatomy does not differ between countries, cultures or continents. For this simple reason the surgical profession should be the same anywhere on the globe. In reality, surgical training programs are different not only between countries but also within countries. Competition between educational models seems, from this perspective, to be contra-productive. In addition, future surgical curriculums will no longer be fixed entities but eternally developing processes, due to the rapid technical development taking place.

Ongoing retirements in surgery, regulated working hours for young surgeons and technical access to surgical simulation systems have created a paradigm shift from time-based to competency-based surgical training. Transformation of a medical student into a skilled surgeon must not take 10 years, and efficient training programs with in-built checkpoints along the process are necessary – like a*"Surgical Staircase"*. In addition, modern surgery requires consistent high quality and documentation, probably by videofilms included in the medical record as the next step.

To create a basis for a global discussion about these topics, the Surgicon Project was launched in 2010, counting the 1st Surgicon Congress in 2011 as its starting point. In three years it has grown into a global informal network engaging world leaders in surgery from the US and Canada to Australia, New Zealand, India, Africa, Turkey, and several European countries. Breaking out one single question has allowed all kinds of organisations and engaged surgeons to take active part in this work, resulting in the 2nd Surgicon Congress, Gothenburg, June 17-19, 2013. Formal decisions might in the future be replaced by more ephemeral but global agreements adopted to new scientific data on validated efficient training methods, as soon as they are published. Modern surgical development requires modern surgical training.

The target audience is a mixture of people dealing with these questions in their daily work, being surgeon's in practice, surgical teachers, residents in surgical training and decision makers of educational programs in surgery - or surgical course creators in surgical instrument companies.

Margareta Berg MD PhD
Consultant orthopaedic surgeon
Surgicon Project Director

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PROFESSIONAL MODERATOR

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Karin Klingenstierna is a moderator, compère and artist from Gothenburg, Sweden. Over the years, she has worked with hundreds of events , congresses, seminars, festivals, TV and radio broadcasts, and concerts in Sweden and abroad. Her assignments as a moderator have covered a wide range of subjects and sectors: medicine and health care, pharmaceutical innovation , business and enterprise development, the automotive industry, urban planning, education, politics, environmental issues, public spending, culture, to mention a few. She counts among her employers The City of Gothenburg, AstraZeneca, AstraTech, The University of Chalmers, E.On, Volkswagen, Gothia Cup, Volvo, Öhrlings Pricewaterhouse Coopers, Lindholmen Science Park, The Swedish Agency for Economic and Regional Growth.

Karin Klingenstierna is also a soul and jazz singer and has been the leader of the band in one of Sweden´s most popular quiz shows, released a solo jazz album ”Come Closer” in 2007, and has written the librettos of two masses, broadcast on TV and radio in 2010. She is a qualified Upper Secondary School teacher of English, Swedish, Spanish and Drama but for the past fifteen years she has been running her own business as a consultant.

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Dr. Wedin grew up in Sundbyberg outside Stockholm. 1972 she spent one year as an AFS exchange student in Ohio. She obtained her MD at the Karolinska Institutet in Stockholm and did internship at the hospital of Helsingborg where she now is a consultant orthopedic surgeon. She is member of the association of female orthopedic surgeon in Sweden.

1998-2004 she was president of the Nordvästra Skånes doctors association. During these years the hospitals of Helsingborg and Ängelholm went through several reorganizations which increased her interest for the connections between leadership and working environment.

2004-2011 she was president of the Swedish Association for Hospital Doctors and wrote the editorials for the magazine Sjukhusläkaren. She was member of the board of the Swedish Medical Association and led the delegation of working life.

In 2010 she was elected president of the Swedish Medical Association where she is head of the delegations of negotiating and health politics.

She leads the Swedish delegations to CPME (European Medical Association) and WMA (World Medical Association).

Dr. Wedin is since 2011 member of the board of SACO (the Swedish confederation of professional associations).Confederation of Professional Associations

To be a surgeon is to keep on learning.

To become a surgeon it´s necessary to acquire professional knowledge of previous, as well as, current surgical processes and practices. High quality education and training is the essential base for surgeons. It is also important to learn to recognize where your own knowledge is insufficient and how and where more and better knowledge and techniques can be obtained. As surgeons we have a professional duty to keep our knowledge good and updated since our patients rely on us.
To become a surgeon is learning to make use of your own experience. Professional experience of how and when you acted right and wrong is very valuable. Personal experience is also important. Your personal experiences of how to give and receive empathy are, for example, the base of the quality in your meetings with patients. Communication skills are likewise valuable tools when doing professional tasks. Good ways of communicating are necessary to keep the professional knowledge in shape. The professional dialog and the daily discussions between colleagues are very important.
To become a surgeon is also to become a craftsman. You have to learn how you, with professional glasses, inspect the current state of things, diagnose the problems, see the possibilities and repair or reduce the damaging effects. To become a handy craftsman you need a good education and training as well as regular practice of procedures. To be even better you must also have possibilities to try new paths. To be able to develop your skills you need mental and practical space to progress. Therefore there must be good supervision and smart routines to minimize the negative effects of solving problems out of the box.
As you invest time, money and effort to become a surgeon you grow aware that knowledge, experience and skill are not qualities you just acquire to keep for a lifetime. They require maintenance. As you go on with your professional life you frequently find it increasingly hard to keep up with the medical, technical and political developments. The Swedish medical association estimates the amount of continuous medical education (CME) and continuous professional development (CPD) that the Swedish doctors complete every year. In the last years the amount of CME/CPD has declined. I think the reason for that is economics. There is less time and money set aside for maintaining medical knowledge of doctors in Sweden. What will be the consequences if this trend continues? Maybe the medical knowledge and skills of the doctors will be reduced and we go for “second best”? Will our patients accept that? Maybe there are better ways to develop knowhow as surgeons than to meet at an inspirational meeting like this?
Medical ethical rules say we shall focus on what is best for our patients. When we as doctors cannot parry the threats against our professionalism and threats against the safety of the patients appears, we ought to warn our patients and our society. That is a large and heavy burden for a single surgeon to carry. Therefore professional quality should be dealt with in a systematic way at all levels.
A good education and a good surgical training is the base of professional surgical medical care. The big challenge today is to empower the patient and build professional teams around them. The different professionals must be good at their own skills and able to communicate with their patients but they also need to know how to handle their teammates and their society.
To become a surgeon is to go through a lot of education, training, CME and CPD for the sake of the patients, the development of medicine, the professional status of doctors and for the great fun of it.

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Carlos A. Pellegrini received his M.D. in 1971 and completed a residency in general surgery in 1975 at the University of Rosario in his native country of Argentina. He came to the United States in 1975 and took a fellowship in esophageal surgery with Dr. David Skinner at the University of Chicago where he also completed a second residency in general surgery. In 1979 he was appointed to the faculty of the University of California, San Francisco where he rose rapidly through the ranks to become Professor of Surgery in 1989. During his years at UCSF he developed a major clinical practice on upper gastrointestinal surgery while continuing his research on esophageal physiology. He was recognized several times for his dedication to the education of students and residents.

In 1993 Dr. Pellegrini was appointed Chairman of the Department of Surgery at the University of Washington in Seattle. In 1996, in recognition for his role in the strengthening of all clinical, teaching, and research programs of the Department he became the first holder of The Henry N. Harkins Endowed Chair, honoring the first Chairman of the Department of Surgery at the University of Washington; as such, his commitment is to support new research in gastrointestinal and oncologic surgery.

Dr. Pellegrini is a world leader in minimally invasive gastrointestinal surgery and a pioneer in the development of videoendoscopy for the surgical treatment of gastroesophageal reflux disease and esophageal motility disorders, particularly achalasia. Shortly after coming to the University of Washington he developed the Center for Videoendoscopic Surgery, and the Swallowing Center. Working in combination, these centers have attracted numerous patients with gastrointestinal disorders, from the state of Washington and beyond. This steady flow of patients has made the department an ideal training ground for physicians wishing to learn

physiology, pathology and management of esophageal disorders and provided opportunities to develop outcome studies and other research projects related to these problems. In 2005 Dr. Pellegrini developed the Institute for Simulation and Inter-professional Studies (ISIS), a comprehensive, multidisciplinary and multi-institutional center for teaching and research using state-of-the-art modeling and simulation techniques. Today he chairs the Board of Directors of this world-renowned institute.

Dr. Pellegrini has devoted much of his career to leadership in the foremost national and international surgical associations. For example, he has served as President of the San Francisco Surgical Society, The Northern California Chapter of the American College of Surgeons, The Society for Surgery of the Alimentary Tract, and has been Chair of the Digestive Disease Week Council. In 2005 he was elected President of the American Surgical Association, the oldest and most prestigious association of surgeons in the United States. In 2008 he presided over the World Congress of the Organization for Specialized Studies of the Esophagus (OESO). He has served the American College of Surgeons in several capacities and was elected to the Board of Regents in 2003. In 2010 he became Chair of the Board.

In the area of medical education he has strived to make the UW Department of Surgery known for its educational programs. Innovation in education, changes in the structure and functioning of the residency program and development of unique learning methods are recognized features of the UW Department of Surgery. His work in this field led him to be appointed to the American Council of Graduate Medical Education (ACGME), where he served first as a member of the Residency Review Committee for Surgery (of which he eventually became Chair), later as one of 3 surgeons members of the panel that developed the work hour limitations for residency programs, and now as a member of ACGME's Appeals Panel. Additionally, he served 6 years as Director of the American Board of Surgery and currently serves on the National Advisory Committee of the Robert Wood Johnson Foundation Clinical Scholars Program.

Dr. Pellegrini serves on several editorial boards, and publishes regularly in the field of minimally invasive surgery for upper gastrointestinal diseases, esophageal cancer, and related areas, as well as education, simulation and new technologies for preparing the next generation of physicians and surgeons His bibliography includes more than 300 articles, chapters, editorials, and books, as well as 11 surgical videos and movies.

Developing leadership traits among surgeons

Carlos A. Pellegrini

> **Leadership is a combination of a *meaningful vision anchored in deep moral values* with the ability to *influence others by non-coercive means,* in a certain *environment,* at a given *time* and set of *circumstances.***

Leadership is important in all aspects of a surgeon's professional life. Examples include:

- As you aspire to influence health care
- As you become leaders of divisions/departments
- As you create your research team
- As you try to get funding

Physicians and surgeons in particular practiced as "individuals" in the last 100 years. In fact the emphasis was on working with dedication to the patient, with knowledge of the subject and for long hours "making sure that everything under one's control was done". Over the last decade, and looking ahead into the future, medicine is being practiced more by teams that work within systems of care. The successful surgeon of the future will be the one that can lead high performance team. In fact, medicine has moved from Autonomy to Collaboration, from Authority to Evidence and from Assertion to Measurement. While in the past surgeons exercised "control" through authority, the future points to "transparency" with leadership.

How does one become a leader? There are at least three theories:

1. Great Man Theory – Leaders are Born, not made (T. Carlyle, 1841). This theory asserts that "Great men, born with personal talents, skills or physical characteristics" have the capacity to effect change. Today it is thought that this applies to about a third of leaders.
2. Times (circumstances) make the leader–a situation calls for leadership and someone rises to the challenge. This theory is known as "Situational Leadership" (Herbert Spencer 1884)
3. Leaders are individuals who can look into their own "soul" and lead "from within" Known as the "Look and Listen" theory (Deepak Chopra)

Styles of Leadership. There are many styles of leadership including the "democratic", the "authoritative", the "affiliative", etc., It is known today that a leader must use a certain style depending on the circumstances and sometimes several styles within a single interaction. From another perspective one can look at leadership in two broad "styles"

1. Transactional Leadership: This style refers to the traditional "carrot and stick" approach. It rewards good behavior and it punishes bad behavior. In general this form of leadership is effective, but usually for relatively short periods of time and does not lead to the establishment of a solid "platform" of TRUST, the essential element that joins the leader and the follower.

2. Transformational Leadership. This style is not based strictly on reward and punishment. Instead if is focused more on the "transformation" of peers and/ or subordinates emphasizing collective efforts based on values and principles and questioning existing assumptions and creating new solutions. It usually leads to TRUST as it is inspiring, it has a "purpose" and it creates a "meaning" for followers.

Elements of Leadership

There are 4 important elements in leadership:

- Create the **Vision:** The first element is the creation of a vision. It is important that in doing so the leader be able to "see beyond the horizon", to "aim high" and yet to be realistic. A powerful vision that is too esoteric will undermine the credibility of the leader, a simple description of the present will also undermine the leader. In creating a vision the leader must check his/her moral compass at every turn, to make sure that there is meaning for the followers and that there is purpose.

- Articulate **Purpose**: A leader must be able to communicate his/her vision to the followers in a way that is enthusiastic, engaging and at the same time conveys realism. It is important that the potential benefit of the vision be expressed as well as the identification of the beneficiaries. At the same time the risks must be discussed, particularly the risks to the followers themselves

- Generate and Sustain **Trust:** Perhaps the most difficult task of the leader is to establish a strong bond with the followers. The bond is trust. A leader is someone who inspires trust, someone who the followers want (although not mandated) to follow. One of the most important considerations is that the establishment of trust takes a fair amount of time and interaction with followers. On the other hand it is important to remember that violation of that trust (by not doing what was promised, by lies, etc.,) leads to the destruction of trust in a very rapid fashion. Trust takes years to build and seconds to destroy.

- Bias Toward **Action:** A leader must have a bias towards action. A leader that cannot perform the duties assigned to followers will lose his/her credibility rapidly.

Leadership is doing what is right – not what you have the right to do.

Notes

Notes

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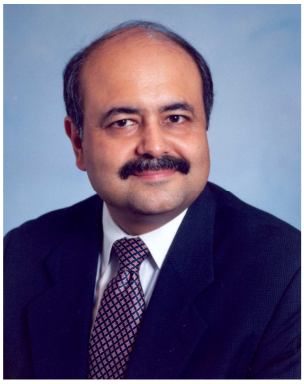

Ajit K. Sachdeva, M.D., is the founding Director of the Division of Education at the American College of Surgeons. Dr. Sachdeva also serves as Adjunct Professor of Surgery at The Feinberg School of Medicine at Northwestern University. Previously, he was the Leon C. Sunstein, Jr., Professor of Medical and Health Sciences Education, Professor and Vice Chairman for Educational Affairs, Department of Surgery, Director, Division of Surgical Education, Associate Dean for Medical Education, and Director of the Academic Center for Educational Excellence at MCP Hahnemann School of Medicine. Dr. Sachdeva also served as Chief of Surgical Services at the Philadelphia Veterans Affairs Medical Center.

Dr. Sachdeva received the Distinguished Educator Award (Lifetime Achievement Award) from the Association for Surgical Education, Margaret Hay Edwards, M.D. Achievement Medal from the American Association for Cancer Education, Award for Outstanding Contributions to Healthcare Simulation from the Society for Simulation in Healthcare, Frances M. Maitland Award from the Alliance for Continuing Medical Education, Lindback Award for Distinguished Teaching, Blockley-Osler Award for Excellence in Clinical Teaching, and the Gold Medal in the Excellence in Government Awards Program. He has served as Chairman of the Scientific Review Group Education Subcommittee (Study Section) of the National Cancer Institute and on the Boards of both the Accreditation Council for Continuing Medical Education and the Accreditation Council for Graduate Medical Education.

Dr. Sachdeva has served as President of the Association for Surgical Education, the American Association for Cancer Education, the Alliance for Clinical Education, and the Council of Medical Specialty Societies.

Training to improve quality and safety in surgery: Advances, Challenges and Opportunities

Ajit K. Sachdeva

Imperatives to improve quality and safety continue to dramatically impact surgical care. The practice of surgery continues to evolve and the milieu of surgical training continues to change. These external forces present a variety of challenges, as well as unprecedented opportunities. Innovative education and training directed at individuals and teams are key to improving quality and safety in surgery, and use of simulation is vital to such efforts. A useful framework to link quality improvement activities with innovative education and training is the cycle of practice-based learning and improvement (PBLI). This cycle is composed of four steps: identifying an area or areas for improvement; engaging in learning through selection and participation in appropriate education and training; applying new knowledge and skills to practice; and checking for improvement. Verification of knowledge and skills using valid and reliable tools must be integral to training interventions. Systems change should also be considered to improve quality of care. Latent conditions in systems need to be identified and addressed to provide safe care to patients. Individuals and teams should be trained in quality improvement methods and encouraged to participate in programs to enhance quality and safety. Effective leadership is key to delivering high-quality surgical care and promoting a culture of safety. National and international collaborations should help in harnessing the opportunities ahead and supporting delivery of the best care to surgical patients, now and well into the future.

Notes

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Dr. Wright is Associate Professor of Surgery at the University of Washington, where he specializes in advanced gastrointestinal and hernia surgery. He is Assistant Program Director for Technical Skills Education and has special expertise in curriculum development and design. Current research interests include basic skill acquisition, central venous catheterization, and surgical warm-up. He also works with the BioRobotics Laboratory at the University of Washington, developing new technologies for surgical applications. This has included new devices for ablation of liver tumors, a novel robotic platform, simulation tools, and smart surgical instruments.

The University of Washington Central Venous Catheterization experience: enhancing patient safety through education

Andrew S. Wright

Unfortunately, the rate of complications from Central Venous Catheterization (CVC) is high. We identified several areas of variation in care at our institution, due to: 1) lack of knowledge in modern concepts in CVC such as maximal barrier precautions, 2) lack of training in ultrasound-guided CVC placement, and 3) lack of standard technique and equipment. We committed ourselves to change the culture and practice of care in CVC through intensive simulation-based education combined with a system-wide quality improvement process.

We developed a cognitive trainer consisting of three online modules: one for all learners (focused on indications and patient preparation), one for physicians and other providers who place lines (focused on technical issues around positioning, sterile barrier use, ultrasound, venous access, and wire and catheter insertion), and one for nurses alone (focused on monitoring, documentation, and maintenance of CVCs). Knowledge is assessed with a multiple-choice examination. This is followed by a "full-procedural" technical skills simulation. We felt that it was important to include the entire procedure from patient consent to final verification of proper line positioning in order to ensure that all learners are comfortable with the entire standardized process for line placement. Technical competence is assessed with a validated checklist and global rating scale.
In parallel with our efforts to develop and implement our enhanced educational process, we also began a comprehensive system-wide quality improvement process. A key component of this QI process is a clinical checklist for CVC insertion. This mandates and documents compliance with key elements of our standardized protocol such as patient preparation, hand hygiene, use of ultrasound, and venous pressure monitoring (manometry) for CVC lines.

To date we have certified more than 1150 physicians through the combined didactic and technical skills simulation. We have performed several evaluations of the effectiveness of our training platform. Pre/Post testing on the multiple choice examination shows improved knowledge after completion of the training. More importantly, completion of the technical skills simulation dramatically improves compliance with the checklist (from an average of 22 checklist errors before training down to 3 after training). Clinically we have seen improved compliance with and documentation of the central line bundle, from 0% documentation in January of 2008 to near 100% currently. The rate of central line has decreased by roughly 200%. Although there were significant costs involved in development of this program, based on our internal surveillance data we estimate that it prevents 35 line complications per year, saving US $30,000 dollars per complication, for a total savings of $1,050,000 annually.

Notes

Notes

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Oscar Traynor is Director of the National Surgical Training Centre and Professor of Postgraduate Surgical Education at the Royal College of Surgeons in Ireland. He is also a consultant surgeon at St. Vincent's University Hospital, Dublin, Ireland and Director of the National Liver Transplant Programme for Ireland.

As Director of the National Surgical Training Centre at RCSI, he has been responsible for introducing several innovations to surgical training in Ireland including the world's first e-learning programme for surgical trainees, a comprehensive curriculum based surgical simulation programme for teaching technical skills and an integrated human factors training programme. He has developed a comprehensive assessment process for surgical trainees (Competence Assessment and Performance Appraisal) which is now used for all surgical specialties in Ireland. He has published widely on various aspects of surgical training and has also lectured extensively on the subject of Human Factors in Surgery in Europe, Australia and in the United States.

His clinical interests are based around Hepatobiliary and Pancreatic Surgery, including Liver Transplantation. He heads up a very busy HPB Surgery unit at St. Vincent's University Hospital in Dublin. He played a leading role in developing the National Liver Transplant Programme in Ireland in the early 1990s. The HPB unit at St. Vincent's University Hospital in Dublin is the sole national tertiary referral centre for Liver Transplantation and for Pancreas Cancer surgery in Ireland.

Improving patient safety through a structured simulations-based education program

Oscar Traynor

For countless generations, safety of the surgical patient was assured through high quality surgical training around the world. This involved trainees working long hours over many years along the traditional apprenticeship model. Competence was achieved by experiential learning in the workplace. However, a variety of factors are currently challenging the traditional apprenticeship approach to surgical training. Most importantly, work hour restrictions limit surgical exposure and reduce contact between trainer and trainee. This has resulted in a requirement for a new approach to surgical training, in particular the use of simulation for teaching both technical and non technical (human factors) skills. Here, we report the experience of our College in the use of simulation in surgical training over the past 10 years.

All surgical trainees at the start of surgical training (before clinical rotations commence) come to our National Surgical Training Centre (NSTC) for a 1 week intensive Surgical Bootcamp. This comprises 40 hours of "hands on" simulation based education in core technical skills (20 hours) , non technical skills (human factors), critical care, and emergency management. They are formally assessed at the start and at the end of Bootcamp. Trainees are expected to have reached basic levels of proficiency in both technical and non technical skills before moving to clinical training in the workplace. Throughout the remainder of surgical training, all trainees then attend the NSTC for 6 individual days each year, at intervals of approximately 6-8 weeks, for technical skills training. These training days are largely based on simulation, using both bench models and VR simulators. Teaching is based on a clearly defined curriculum and is delivered by senior surgical faculty with a high tutor to trainee ratio. Great emphasis is placed on surgical anatomy : the first hour of each training day is spent in the cadaver based Anatomy Room. A Mobile Surgical Skills Teaching Unit travels around Ireland to facilitate trainees who are geographically distant.There is an annual assessment of technical skills using objective scoring methodology and benchmark proficiency levels. All trainees also attend 3 times each year for non technical (Human Factors) training. This curriculum includes communication skills, teamwork and leadership,crisis management, negotiation and conflict resolution, and management and disclosure of error. Teaching is largely through scenario based simulation, often using professional actors. There is extensive use of video for feedback purposes. There is also a formal annual assessment of Human Factors skills, using a structured objective marking system. The assessment of both technical skills and non technical skills feed into the annual Competence Assessment and Performance Appraisal (CAPA) process --essential for progression in surgical training in our country.

The use of simulation to teach both technical and non technical skills has allowed us to STANDARDISE both the teaching and also the assessment of surgical trainees across the entire country. We believe this to have an important implications for patient safety.

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Professor Guy Maddern is the RP Jepson Professor of Surgery, University of Adelaide, Director of Surgery and Director of Research at The Queen Elizabeth Hospital. He has over 400 publications in scientific journals and has contributed over a dozen surgical books. His current research focus brings together the development, assessment and introduction of surgical techniques, processes and technologies into practice. Professor Maddern is also a practising heptobiliary and pancreatic surgeon with a particular interest in liver tumour ablation and minimal access surgery.

He is the Surgical Director of the Australian Safety and Efficacy Register of New Interventional Procedures – Surgical (ASERNIP-S). This program, run by the Royal Australasian College of Surgeons is designed to perform rigorous assessment of the safety and efficacy of new procedures and technologies available in surgical practice and fed back this information to surgeons and the community. As the research arm of the Royal Australasian College of Surgeons, it has also been involved with a large Australian Government grant looking at the place of surgical simulation, both high and low fidelity, and the development of a mobile simulation unit.

Surgical Skills, Technology and Evidence

Guy Maddern

While simulation to enhance the acquisition and retention of surgical skills has been advocated for decades, the evidence to support the approach has been lacking. Over the last decade there has been an increasing number of reports supporting the value of simulated training over no simulated training at all. This hardly surprising result has, however, been followed by well conducted studies assessing simulated experiences being transferred into the operating theatre in limited situations. These studies have indicated that real benefit can accrue to individuals exposed to a simulated environment prior to having to perform tasks within the operative setting. More recently, the use of team simulations have been advocated and tested in the operating room environment to deal with the non-technical skills required by the surgical team.

More challenges, however, remain. The cost of expensive, high fidelity simulators and their need and value compared with simpler low fidelity simulators has now been evaluated. The use of “expensive” and “time poor” surgeons as trainers for basic skills is not only unnecessary but may be an inferior option. Indeed, well trained trainers, educated by surgeons experienced in simulation, offer a cost effective, reliable and, it appears, more rapid means of conducting simulated training for basic surgical skills.

The concept of a fixed “skills centre” is perhaps also in some cases inappropriate and the use of mobile simulation centres capable of serving a region of hospitals and trainees may be more appropriate, cost effective and engaging than the capital intense and inflexible “simulation centre”. Indeed, such mobile systems can, of course, be linked to a fixed simulation facility but can move staff and equipment out to areas where the clinicians are actually working and therefore more available, rather than relying on the clinicians and trainees needing to come to the facility. Simulation training is not a replacement for real surgical experience which brings together the technical and non-technical skills required to practice surgery. It does, however, offer the chance to rapidly acquire the necessary technical skills. In team simulation, experience that can take years to acquire can occur over a period of days or weeks and maybe identify individuals needing particular help in acquiring the skills, or even selecting unsuitable candidates for surgical training. The need for more carefully controlled larger studies is still required. Just as in clinical studies, a multi-centre approach will be needed to gain sufficient evidence to progress the field.

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Dr. Anthony Gerald Gallagher completed a B.Sc (Hons.) in Psychology 1994-1988 at the University of Ulster at Jordanstown, in Northern Ireland. He was awarded a Scholarship to study for his Ph.D. in Psychology at the Trinity College Dublin between 1989 – 1992. During his Ph.D. he investigated drug resistant auditory hallucinations in schizophrenia. He also developed and validated new behavioral treatments for 'treatment resistant' psychotic symptoms. After completing his Ph.D. he was appointed at Queen's University Belfast, as a Research Officer (1992), Research Fellow (1993), Lecturer in Psychology (1995) and Research Director of the Northern Ireland Center for Endoscopic Training and Research. In 1998 he was appointed as Consultant Psychologist (Hon.) Royal Group Hospitals Trust and in 1999 Assistant Director, The Queen's University Centre for Health Care Informatics. He was the first academic from Ireland to be awarded a Fulbright Distinguished Scholarship and during this time worked with Prof. Richard Satava at Yale University (2000 – 2001). Before leaving Yale he was appointed as a visiting Professor in the Dept. of Surgery.

In 2003 he moved full-time to the US to take up appointment as Director of Research at Emory Endosurgery Unit and Adjunct Professor at Emory University. From 2005 – 2009 he worked as Professor of Human Factors at the National Surgical Training Center at the Royal College of Surgeons in Ireland (Dublin). In 2010 along with his colleague Prof. Gerry O'Sullivan (University College Cork) he completed an authored book, *Fundamentals of Surgical Simulation; Principles and Practices* which will be published in 2011.

His principal research interests currently include virtual reality, minimal access surgery, endovascular interventions, pacemaker implantation and validation of medical devices for training and assessment. During his time at Yale he was the scientific lead in the first group to demonstrate in a prospective, randomized double-blinded study the power of virtual reality training for improved operating room performance. Dr. Gallagher is also a regular keynote and invited speaker at national and international medical, surgical, cardiology, science and ergonomics conferences. He is considered one of the leading exponents and international experts in the world for the design, application and validation of VR in medicine.

The Imperative of Metrics in Assessment and Surgical Training

Anthony G. Gallagher

A growing body of published evidence demonstrates that simulation is an effective tool for training surgical skills.[1] To develop a simulation curriculum the trainers must develop a metric-based representation of the skills and performance characteristics required. This approach is much more exacting than simply describing a skill or rating it on a qualitative Likert scale. Performance and performance thresholds must be explicitly defined for scoring purposes. The up-shot of this methodical approach is the construction of simulations that accurately capture a 'reference standard' to the performance of an individual component skill or indeed a full surgical procedure. Simulation can thus be defined as an artificially created or configured 'learning' situation that allows for the practice or rehearsal of all or salient aspects of a procedure. Thus an effective simulation [2] based programme must:

(1) Provide the span of appropriate sensory responses to learner physical actions that are behaviourally consistent with what would be experienced in real life (including the opportunity to enact both appropriate and inappropriate learner actions (i.e., errors)).

(2) Afford the opportunity to perform the procedure in the same order and with the same devices that the procedure would normally be performed.

(3) Crucially, it should also afford reliable and valid metric-based assessment of performance.

(4) Provide summative assessments per se should be at a minimum, rather, the programme should provide formative feedback on procedure performance proximate to task execution, particularly for metric errors.

Thus, metric-based characterisation of what a surgeon does shapes the configuration of simulations and the fidelity of the simulation should reflect the clinical application of the skills. The level of simulation fidelity will be correlated to transfer of training[3] and also the costs of implementation. Furthermore, there seems to be an urgent need for educators to understand that simulation fidelity does not simply mean 'pretty'. Simulation fidelity does relate to the reliable scoring of metric-based performance units across a variety of skills different levels of experience. Thus, a detailed and in-depth understanding of metrics as they relate to simulation is imperative.

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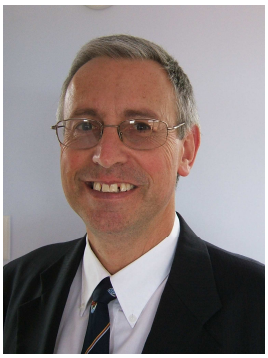

Spencer Beasley is a paediatric surgeon, formerly at the Royal Children's Hospital in Melbourne, but now working at Christchurch Hospital, Christchurch, New Zealand from where he set up the South Island regional paediatric surgical service. He is a past President of the Australasian Association of Paediatric Surgeons and the New Zealand Society of Paediatric Surgeons. He is on Council of the Royal Australasian College of Surgeons, the Chair of the Court of Examiners and Deputy Censor-in-Chief. Until recently he was the Chair of the Board of Surgical Education and training. He has a professorial appointment at the Christchurch School of Medicine and Health Sciences, University of Otago, and runs a paediatric surgical research unit. His research interests have included oesophageal atresia, the VATER association, and the influence of Sonic Hedgehog on early embryogenesis of the foregut and hindgut.

His interest in surgical education started when he was Chair of the Board of Paediatric Surgery, RACS and senior examiner in paediatric surgery RACS. He was involved in the development of the RACS Surgical Education and Training (SET) programme. He has an ongoing interest in assessment of higher cognitive function in surgeons. His 7 books and over 200 publications have meant he has not spent as much time with his 7 children as he might have (or should have) but nevertheless he sees them as his most important achievement.

Validation of metric-based training and assessment in a national training programme

Spencer W Beasley

In this context metrics is defined as the measureable parameters of surgical competence and performance. Competence refers to the knowledge, skills and attitudes expected of a surgeon. Validation implies that the tools used are appropriate for and effective in achieving their stated purpose. The discussion assumes that the training programme is supported by a sound governance structure.

Monitoring trainee progression necessitates establishing metrics for all the defined areas of surgical competence and performance. Historically, there have been few tools to measure expertise and performance in the area of non-technical skills, and even for domains such as clinical decision-making there has been very limited understanding of the processes involved and how they can be measured. Recent work in this area, now incorporated in the RACS surgical training programmes, is discussed in more detail elsewhere at this meeting (Crebbin W et al.).

Metrics around the surgical science examinations (generic and specialty-specific) have relied on accepted processes validated elsewhere. In-training assessments (formative) rely on multiple assessors and range across all areas of surgical competence. The final "exit" examination has increased its validity by increasing the number of marking points (more "biopsies"), by having clearly defined marking descriptors against objective criteria for standard setting, and by blueprinting for scope of content, against specific competencies and for the correct cognitive level. The selection tools themselves are analysed for their predictive power for subsequent performance during training. Having measureable parameters around the acquisition of surgical expertise and performance has allowed a move to a more hybrid competency-based/time-based training programme (where those who can demonstrate rapid acquisition of competence can have their programmed shortened, and those who take longer can be provided with an extension). In addition, it enables the training boards to tailor training to best fit the ongoing educational requirements of the trainee.

With any competency-based training programme there comes an obligation for the training board to validate the metrics used to assess trainee progression. This paper outlines our progress in this area, including recent research into the predictive power of the selection tools on subsequent trainee performance.

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Dr. Andersen completed his undergraduate and medical degrees at Duke University, where he also trained in Internal Medicine as well as General Surgery. His career includes appointments at the State University of New York Health Sciences Center at Brooklyn, at the University of Chicago and Yale University, where he was Professor and Chief of General Surgery, at the University of Massachusetts where he was Chairman of Surgery, and at Johns Hopkins where he was Vice-Chair of Surgery and Surgeon-in-Chief at Johns Hopkins Bayview Medical Center.

His research on pancreatic and gastrointestinal hormone physiology was funded by the National Institutes of Health, and he was a member of the NIH Surgery and Bioengineering Study Section. Dr. Andersen's clinical interests focus on disorders of the pancreas and organ-sparing forms of pancreatic surgery. His educational interests focus on the application of simulation methods in teaching and assessing clinical competence.

He is a past president of the Association for Academic Surgery, and a co-editor of Schwartz's Principles of Surgery.

The Use of Simulation Methods for Board Certification – Where Are We?

Dana K. Andersen, M.D.

Introduction
The development of objective, transparent, metric-based systems of assessing competency is the goal of certifying agencies that are entrusted with assuring the competency of both newly trained as well as established clinical practitioners.

Methods
To assess the current status of the adoption of simulation applications by certifying boards of the procedure-related medical specialties in the United States, a survey was conducted in which representatives from surgical (12), medical (3), anesthesiology (1) and radiology (1) boards were queried.

Results
Nearly all of the procedure-related specialties have embraced simulation applications in their training programs. The only certifying board which requires successful completion of a simulated series of tasks is the American Board of Surgery (ABS), which requires applicants to have passed the Fundamental of Laparoscopic Surgery (FLS) program. In addition, the ABS has recently approved the phase-in use of the Fundamentals of Endoscopic Surgery (FES) simulation program for the assessment of basic endoscopy skills.
The American Board of Anesthesiology (ABA) does not currently require candidates to have demonstrated proficiency on any simulation application, although computerized mannequin simulators combined with monitoring devices are now widely used in anesthesia training programs. However, the ABA does require demonstrated proficiency on one of several simulator devices for recertification of its diplomates.
The Interventional Cardiology section of the American Board of Internal Medicine (ABIM) and the Interventional Radiology section of the American Board of Radiology have conducted trials of content-, construct-, and concurrent-validity on different simulators of catheter-based intravascular tasks. Issues regarding availability, cost, and access by all candidates are being addressed as final steps to implementation of simulation-based testing. The Interventional Cardiology section of the ABIM currently offers a voluntary, simulation-based self-assessment module in its maintenance of certification program.A combination of computer-assisted and hybrid synthetic simulators has been developed for the learning and assessment of cardiac surgery skills. The system includes multiple procedures and scenarios, and has been assessed as a valuable teaching method for the management of rare adverse events. Studies are underway to validate its use by the American Board of Thoracic Surgery. A physics-based, computer-assisted simulator of intracranial tumor resection (NeuroTouch^{TM}) is currently undergoing construct- and concurrent-validity testing in Canada and the United States, preparatory to being evaluated for use by the Canadian Board of Neurological Surgery.

Conclusion
Simulation applications have now been endorsed by the ABS for certification, and by the ABA for recertification. Other boards are in various stages of evaluating specialty-specific simulators for inclusion in their certification processes. Issues of access and cost are major concerns of the boards which must process large numbers of applicants, whereas simulation systems which assess the skills of smaller specialty groups has allowed the development of more advanced systems which are more procedure-specific and which may have a greater impact on safety and outcomes.

Notes

Notes

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Dr Richard Hanney is a General Surgeon and Clinical Senior Lecturer in the University of Sydney Department of Surgery.

He obtained his FRACS in 1995 and completed a Clinical Fellowship in Upper GI surgery at the Royal Infirmary of Edinburgh before taking over a retiring colleague's surgical practice in western Sydney in 1999.

He is a former elected member of the RACS NSW State Committee, and in 2005/6 chaired the RACS Younger Fellows Committee which represents 1500 fellows of the RACS. A significant achievement during this period was establishing the RACS Trainees Association in conjunction with other colleagues. He has a strong interest in medical education, having instructed ATLS courses in Australia and the UK, directing courses in Australia since 2001. He has been Supervisor of Surgical Training at Mt Druitt Hospital in Sydney and a member of the regional Board in General Surgery since 2002. He is the Australian Medical Association Federal Councillor representing the craft group of Surgery.

Since 2008 he has convened the "Developing a Career in Academic Surgery" course which has had a significant role in helping reinvigorate interest and activity in academic surgery in Australia and New Zealand, and is now Chair of the RACS Academic Section.

We never stop training, so research fits in – how?

Richard Hanney

Surgery represents a lifestyle as much as it does a profession. The so-called "quadruple threat" of academic surgery demands resources for clinical, research, administrative and teaching activity. These resources are demanded of both individuals and organisations, and come at a financial cost in addition to demanding time be sacrificed by both individuals and their families.

Research resulting from academic medicine in the broad sense – xrays, penicillin, insulin, understanding of Helicobacter - produces valuable outcomes for those involved: the individuals, their institutions, the profession and the community. Much of this value is difficult to quantify – prevention of poor outcomes, expansion of one's thought processes, prestige for organisations, inspiration of the next generation. The financial resources required for such progress, however, are required "up front". Traditional public funding is increasingly limited as healthcare delivery costs increase. Options increasingly exist, and must be found, elsewhere – including the private sector, and from the profession itself. Time and family/social cost can be innovatively managed.

Current surgical clinical practice increasingly incorporates collaboration and multidisciplinary care. A similarly inclusive and laterally thinking approach provides opportunities to optimise existing resources in the fundamentals of surgical education: the training of surgeons and the promotion of surgical research. Modern collaboration is not only across disciplines, but across generations. Our training is, coincidentally, continuous, as we train both ourselves and succeeding generations.

The youngest of 9 surgeons awarded a Nobel prize to date was 25 years old at the time of his achievement. With 40% of Australia's medical students entering into graduate medical programs, many today are still medical students at that age. Programs to shorten surgical training have been thwarted by students graduating older before commencing such programs. Surgery has increasingly looked towards competency based training, but we move slowly down pathways of such fundamental change.

A one day course funded since 2009 by industry (Johnson and Johnson Medical) and the participants brings together students, trainees and academic surgeons to consider elements of an academic surgical career pathway. The inspiration and networking from this cross-generational approach has trebled the membership of the RACS Section of Academic Surgery, generated book chapters, contributed to the initiation of at least one new journal and spawned an annual international meeting of medical students specifically interested in and committed to careers in surgery.

Ayn Rand's philosophy of objectivism teaches that we can only be bullied if we acquiesce. The adversity faced by modern research and academic surgery can be overcome by innovative thinking and engagement of likeminded individuals.

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Sarah Andvik is a Norwegian fifth-year medical student at the University of New South Wales (UNSW) in Australia. In 2009, she completed a Bachelor of Science at the University of Melbourne, majoring in Anatomy. She is a past president of UNSW Surgical Society and in 2011 she undertook a surgical placement at Rafidia Surgical Hospital in Nablus on the West Bank.

In 2011 she completed a research project on CPR-ECMO for in-hospital cardiac arrest at St Vincent's Hospital, which she presented at the Extracorporeal Life Support Organization (ELSO) Annual Congress in Rome, Italy in 2012. Sarah is also interested in, and has presented papers on, genetic aortopathies and malignant pleural mesothelioma.

Sarah is currently undertaking research with the Baird Institute under the supervision of Professor Paul Bannon, Associate Professor Michael Vallely and Dr Paul Forrest. She is examining veno-arterial extracorporeal membrane oxygenation (VA-ECMO), a highly specialised cardiopulmonary technology that can be used in a prolonged fashion in the intensive care unit, by patients with significant cardiac and/or respiratory failure. This work has the potential to improve our ability to determine which patients will benefit from VA-ECMO.

The Value of Scientific Achievement by Medical Students Committed to Surgical Training

Sarah Andvik

History documents many important contributions made by medical students to scientific achievement. Tom Fogarty developed the balloon embolectomy catheter while in medical school. As a second year student Charles Best played a central role in the discovery of insulin. Jay McLean discovered heparin during his second year of medicine. In Australia, medical students committed to a surgical career increasingly appreciate the value of surgical research. Admittedly, none of us has become famous (yet!), but our participation in international meetings suggests an importance and value of medical students' contribution to surgical research.

Research can be enormously rewarding, but can come at a cost. There have been days when I have had my doubts about the viability of researching and studying medicine at the same time. Research activities are often quite time consuming and can easily result in neglect of routine studies. A Norwegian study[1] reported the challenges facing medical students who choose to combine research with their regular studies. Time constraints, negative impact on studies and clinical skills, inadequate mentoring, lack of opportunities, and no ownership of projects were reported as the most significant obstacles.

With all these challenges, one might ask, why would any medical student want to do surgical research? Aside from being able to give back to medicine and hopefully assist in furthering the understanding of whatever it is you are researching, there are significant personal gains to be had. Amongst other things, I have learned how to incorporate research into my future professional career. I have been fortunate to have been given research and academic experiences I might not otherwise have had, including travel opportunities and organizing what I have been told was a seminal international student conference. I have developed connections with surgeons who serve as my mentors and role models. This has all helped me greatly with clarifying and identifying my future career (Cardiothoracic Surgery).

In addition to personal rewards for the students, such formal research work benefits institutions, as these student contributions can significantly add to the published output of an institution. Surgeons benefit from medical student participation in research as it affords them a unique opportunity to promote their subspecialty and attract the best and brightest medical students to their field.

In my experience, the benefits of being involved in research, in combination with the abundance of scientific achievements made by medical students far outweigh the costs. In saying that, I also believe that we need to do more to counteract some of those hurdles that may arise for students willing to get involved. Furthermore, I believe those students passionate about surgery should be fostered and assisted where possible with research methodology, skills and experience. As William Stewart Halsted once said, we need "surgeons of the highest type, men who will stimulate the first youths of our country to study surgery and devote their energy and lives to raising the standard of surgical science" [2].

References: see page X

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Tristan D. Yan is a cardiothoracic surgeon and an Associate Professor in the Division of Surgery at the Central Clinical School, University of Sydney (USyd). Professor Yan has a special clinical interest in aortic surgery, valvular surgery and minimally invasive thoracic surgery. His current research expertise is on multi-institutional database, systematic review, meta-analysis, propensity score analysis and longitudinal data analysis. He graduated from the University of New South Wales (UNSW) with BSc MBBS in 2004. At the age of 32, he had also completed three higher degrees, MS, MD and PhD; authored or co-authored more than 160 articles and textbook chapters; obtained Cardiothoracic Surgery Fellowship from the Royal Australasian College of Surgeons; and was appointed as Associate Professor of Surgery at the University of Sydney. Professor Yan has an h-index of 22. Professor Yan's team of twenty individuals is amongst the most productive in the world of clinical research and evidence synthesis in surgery, with a specific focus on cardiothoracic surgery. He has personally trained members of his team in systematic review, meta-analysis, propensity score analysis and academic writing. His collaborative research (CORE) group has particular characteristics demonstrating coherence and efficiency in collaboration between team members.

Tristan Yan is the Editor-in-Chief for the Annals of Cardiothoracic Surgery. This journal reflects his unique vision in surgical research. He has several other editorial commitments including Executive Editor-in-Chief (Cardiovascular Surgery) for the Journal of Thoracic Disease, European Journal of Cardiothoracic Surgery Editor and CTSNet Editor. He is an external reviewer of National Institute of Clinical Evidence (NICE). He is also on the journal review board for 15 journals, including Ann Surg, Ann Surg Oncol, BJS, Cancer, Heart and amongst others.

Academic Research – Where are we going to start?

Tristan Yan

THE COLLABORATIVE RESEARCH GROUP

The collaborative research (CORE) group is formed by a team of dedicated academic cardiothoracic surgeons and research fellows. Our mission is to improve the survival and quality of life of patients by promoting collaborative research, evidence-based medicine, surgical innovations and continuous medical education. We pursue a respectful attitude towards international colleagues and operate as a cohesive and highly networked research organization in cardiovascular, thoracic and oncologic surgery.

We specialize in conducting systematic reviews, meta-analysis, consensus guidelines and clinical research. The CORE group emphasizes a global collaboration and strengthens the link in clinical research between Australasia, Asian, Europe and the United States.

To answer the question ‘where and when are we going to start with academic research’, firstly, I would like to focus your attention on our key team members and tell you a story about how each of the CORE member started their academic research career.

In the second part, I will share with you my personal experience on how to start an international surgical journal. It cannot be over-emphasized that the importance of publication, collaboration, innovation and mentorship to a successful academic research program.

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Professor Andrew Hill completed a Doctorate in Surgery from the University of Auckland in 1996 and a Doctorate in Education in 2011. Following a research fellowship at Harvard University in 1993 and 1994, Andrew completed surgical training in 1997 and worked in Kenya as a medical missionary. Andrew returned to the South Auckland Clinical School at Middlemore Hospital in 2002 where he now practices as a Colorectal Surgeon and is the Head of the South Auckland Clinical School. He has received extensive research funding from the University and from External Sources and has used this to develop a significant research portfolio.

Andrew also is involved in the development of academic surgeons through involvement in the Royal Australasian College of Surgeons academic section and Association for Academic Surgery and he runs the annual Developing a Career as an Academic Surgeons course (DCAS).

Andrew's research interests are in improving outcomes from major abdominal surgery and medical education and he has published over 140 peer reviewed papers in these areas. Andrew leads the Auckland Enhanced Recovery after Surgery (AERAS) group that is in an interdisciplinary research group aiming to improve patient outcomes after major surgery. This group runs a once yearly international symposium on enhancing recovery.

Mentoring residents undertaking research surgical training – approaches and outcomes

Andrew G. Hill

Mentoring Residents Conducting Surgical Research

Surgeons drive both scientific and clinical research and have the unique privilege to take scientific advances from the bench to bedside, thereby improving patient outcomes. However, a dedicated period of medical research is not common amongst medical graduates with surgical ambitions. For this select group of potential surgeon scientists mentorship is crucial.

The meaning of mentorship

Mentorship originates from Greek mythology when Odysseus left his son, Telemachus, to fight the Trojan War. Odysseus entrusted a friend, Mentor, to educate, protect, and guide Telemachus. Mentorship is a dynamic reciprocal relationship between an advanced career incumbent (the mentor) and a beginner (mentee) aimed at promoting the development of both. In the context of research, mentoring is a process through which emerging surgical scientists acquire the values, skills, knowledge, and behaviours to develop into successful independent researchers.

The South Auckland Model

At the South Auckland Clinical School a full-time clinical research option for medical post-graduates years two and above who are interested in exploring surgical academia has been developed. Since entry into surgical training is partly dependent upon specialty-specific experience and research accomplishments, a dedicated period of clinical research is advantageous to increase knowledge, develop research and critical thinking skills, increase research output in the form of publications and demonstrate commitment to a surgical career.

The internship and pre-vocational training years are a transition period when important career choices are still being made. The stressors associated with being a junior doctor are well known and can persist amongst senior clinicians. Many interns express regret at their career choice in retrospect. Thus, this opportunity to take a step back from clinical work, in a mentorship relationship, also aids junior doctors to gain other important life skills and perspective on their career pathways.

Further, the research positions offered are coupled with undergraduate student teaching and mentoring responsibilities that broaden the research fellow's capabilities and expertise. The educational component of the research fellow's job description is suitable preparation for a potential future in academia whilst also benefiting students and relieving workload demands on senior clinical academics.

Further, a period of dedicated research is an intensive course in critical thinking. This ability, coupled with the more tangible skills of public speaking, and scientific writing is beneficial for all junior doctors. Doctors who complete a formal research period are more likely to be familiar with research methodology and are able to scrutinise the medical literature with better understanding.

Mentorship of surgical trainees is an enormous privilege and goes beyond the traditional research fellowship. The South Auckland Clinical School model discussed in this presentation provides some guidance as to how mentorship in surgical research can be developed.

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Peter Naredi is Professor of surgery at the Sahlgrenska university hospital. He is subspecialized in Surgical oncology and mainly Hepatopancreatobiliary surgery. After his Ph.D. in Surgery 1992 he did a postdoctorial period at the Cancer Center at UCSD in San Diego, California. He returned to the Sahlgrenska university hospital in Göteborg, Sweden before he in 1997 moved to Umeå in Northern Sweden. In 2003 he became the professor and chair at the Department of surgery. In 2012 he returned to Sahlgrenska as professor of surgery. Naredi has been the initiator and Principal investigator of several global clinical studies with immunotherapy in melanoma and renal cell carcinoma. Presently his research focus is on cancer chemotherapy resistance and the interaction of tyrosine kinase inhibitors and platinum based cytostatics. He is Past-president of the European Society of Surgical Oncology (ESSO) and Past-president of the Swedish surgical society. He has been the supervisor and co-supervisor of ten PhD students completing their thesis.

Why surgeons should expand their research training to receive a PhD

Peter Naredi

In a time period where salaries are mainly based on clinical incentives and our professional duties are challanged by more social orientated life styles there are worries that academic training towards the PhD degree has lost most of its attraction. Employers in health care systems tend to value non-professional skills, e.g. administrative skills, high and the surgeons role as chief of the department is contradicted. Still, the professional knowledge is needed and a surgical unit can not be run without a person having the legal medical responsibilities.

Recently new demands have been added to the core assignments of a surgical department. We need to be more proactive in patient safety, avoiding medical and process divergencies and we must achieve settled quality indicators of medical diagnosis and treatment.

As a consequence of the requirements, competetive surgical units must have a leadership that integrates governing with a scientific analytic capacity. While legal and administrative duties can be easily learned or delegated, it is not that easy to fulfil the scientific requirements without training to at least the PhD level.

Primarily financial orientated management will always have the weakness that clinical and scientific quality must be given a price and often has to be bought to a high price or not being fulfilled. If instead clinical quality is the primary goal the management can be scientically driven and supported by a financial manager. Some hospital directions do take notice of these circumstances and prefer professionals with a PhD exam for chief positions.

In my view this is a valid requirement because the “scientific learning curve” can be longer or shorter but has to pass several steps of maturation. Knowledge is not enough but analysis, synthesis and evaluation are necessary ingredients of scientific skills. The award for the individual with a PhD might not always be a financial payoff but the scientific skills lead to better decision making achieved in a time efficient process. The award for the health unit managed by professionals with PhD exams is quality management achieving internal and external requirements. The award for the patients is better evidence based health care for the individual.

Scientific training reaching a Master degree in many medical student programs and additional minor scientific projects during resident training is an excellent start but not enough to reach scientific skills. Continuous research periods with the aim that the surgeon receive a PhD should be supported.

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Phil Crowe obtained his Medical Degree from the University of Sydney before obtaining a PhD (D. Phil) at the University of Oxford in 1986. He then completed surgical training in the Gallie Course of the University of Toronto, Canada before fellowship positions at University of Capetown and Prince of Wales Hospital (POWH), Sydney in 1992. He has been a clinical academic and consultant surgeon at University of New South Wales since then, practising as a surgical oncologist at POWH. He has been Professor of Surgery at UNSW since 2004, and Head of Department of General Surgery, POWH, and Director of the Sydney Sarcoma Unit and Surgical Oncology Research Group, at the Lowy Cancer Research Centre, University of New South Wales. As a Surgical Oncologist, his main areas of clinical and research interest are soft tissue tumours, breast and endocrine tumours and he has published widely in all these areas.

Phil also has a long standing interest in medical education obtaining a Diploma in Higher Education in 2000. His publications in this area are focused on surgical education, particularly informal and operating room teaching.

Career in Academic Surgery

Philip J. Crowe

Surgical research and innovation is a vital component of the health system. The reasons for doing research during surgical training is primarily to allow the trainee to develop an understanding about how new knowledge is produced and tested. However, for those who want to learn more than just how to interpret the literature, and perform high-level research as a major component of their career, a higher degree or specific additional training in epidemiology, including clinical trials design or advanced basic science is a great way to obtain the appropriate research skills.

When choosing a career in academic surgery whether as a teacher, clinical researcher or combining surgery with a basic science interest, there are many things to consider. Deciding what area really interests you as a researcher is clearly important. However, one also needs to be realistic about what an active surgeon can do within particular research fields. For example, it would be very difficult for a busy surgeon to also have an active research career in a highly competitive area, such as the molecular biology of cancer, particularly if you want to maintain a healthy work-life balance. However if that was what you passionate about – another basic requirement – developing strong collaborations with laboratory scientists, if they exist in your institution, is likely to be the best way of maintaining a surgical and research career within these fields.

Most academic surgeons, with or without higher degrees, will become involved with clinical research. Research funding is always a consideration as cash strapped universities and hospitals may provide "emotional support" but may not financially back your research endeavors. Clinical trials have the added advantage of attracting funding from government or industry sources, and may draw further funding for other studies. Other areas where research skills are valuable are the design and performance of specific clinical studies aiming to answer an everyday surgical question. Thus the ability to identify good, clinical research questions that can be answered by a well-designed, achievable, often randomized study is an important trait to develop. Other areas of research include product design and surgical outcomes studies, both from the patients and the health system perspectives.

It is often said that all surgeons should be academic surgeons, so it is also important to encourage and stimulate the next generation of surgeons to become academics in the broad sense. Establishing journal clubs to evaluate research, as well as involving trainees in clinical studies at the design stage, implementation stage and the final write-up stage, can be a very rewarding and stimulating exercise for the medical student, resident or surgical fellow and spurn a career in academic surgery.

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Prof. Shekar Kumta obtained the qualification MB.B.S. at Bombay University in 1979. He qualified as Master of Surgery (M.S. Orthopaedics) also at Bombay University in 1983 and did his Ph.D. at The Chinese University of Hong Kong in1998. He is presently the Assistant Dean (Education), at the Faculty of Medicine at the Chinese University of Hong Kong.

Prof. Kumta is currently Professor in the Department of Orthopaedics & Traumatology at The Chinese University of Hong Kong.

Prof. Kumta has received several research grants and has done research on degradation characteristics of bio-absorbable implants, bone allografts, several aspects of osteosarcoma and malignant musculoskeletal tumours. He has also done research in training of undergraduate students including work on web based self-assessment. Prof Kumta is also involved in workshops enabling the development of interactive web-based strategies designed to foster critical thinking in students. His research has been published in several peer-reviewed journals.

Surgical Training in Developing Countries: Challenges and Opportunities

Shekhar M. Kumta

In most developed and a majority of developing countries, full licensure for independent surgical practice requires the participation in an accredited hospital based residency program. Following successful completion, certification and licensure is attained through an examination. Many factors influence the quality of surgical residency training.

1. **Academic & Curricular Framework**

Competencies and training standards are often determined by academic colleges or certified training authorities. A framework is essential for the implementation of these standards and effective assessment of competencies. The training of trainers is often a key element that is overlooked. The practice of surgery is dynamic - practices and guidelines change as new technologies are developed and new evidence regarding established practices is revealed. The curriculum should reflect what is contemporary and yet should be sensitive enough to absorb the impact of scientific advances with scrutiny and diligence

2. **Training Opportunity**

Abundance of clinical material is essential for trainees to develop clinical competence and decision-making capacity. This may vary according to geographic location and practice; there may be significant differences in caseload and case distribution across territories. Rotation of residents is one means to provide a balanced exposure – indeed one does not want to overwhelm residents while on the other hand some minimum surgical exposure is obligatory for the development of good surgical skills and decision-making ability.

3. **Supervision Mentorship & Support**

Support and scaffolding are obligatory components of a good residency-training program. Yet availability suitability and enthusiasm of surgical residency mentors varies tremendously and has a major impact on the education of the surgical resident. While many public health care services are staffed by full time qualified trainers in others honorary or attending staff may not have the time to supervise residents.

4. **Trainee Variability**

Good mentorship enables us to accommodate a wide variety of learners. Mentoring identifies weaknesses and strengths in trainees and is the hallmark of a good program. Skills training and simulation training is one of the means of achieving a reasonable degree of concordance and uniformity in surgical skills. Yet this is easier said than done. Often trainees with weak surgical skills fall behind and may sometimes hide their deficiencies through poor decision-making and procrastination.

5. **Man-power constraints & controls**.

Healthcare manpower, capacity for service, and the supporting infrastructure available are key determinants of an effective residency-training program that can deliver. There is tremendous variation in these across developing and developed countries – trainers often have little or no control over these elements.

6. **Economic Considerations**

Socioeconomic factors have a significant impact on residency training. The attrition of qualified trainers in the training system who may migrate to private health care practice and may be reluctant to provide their time as trainers has had a major negative impact.

My presentation is an attempt to engage the participants so that we may discuss debate challenge and identify key threads and issues that connect us so that we may improve surgical training in our respective countries.

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Dr. Sudhir Warrior completed his post graduate training in Orthopedics at the Grant Medical College, Mumbai, India in 1987. He trained with the legendary Dr.B.B.Joshi for 9 years. He did Fellowships and Scholarships in South Korea, Japan and Hong Kong, and he also patented external fixation and distraction devices for hand and foot problems.

Dr Warrior is currently president of the Bombay Orthopedic Society. He is also the international corresponding editor for eRadius and he serves on the faculty of the Ethicon Microsurgery Course. He is also a member of the College of Physicians and Surgeons and the ex-convener of the Hand Surgery Section of the Indian Orthopedic Association for two years. He was the co-opted editor of the Indian Journal of Orthopedics. He is involved in annual workshops on hand surgery, cadaveric exposures and flaps.

Surgical Skills Training in India –A Paradox

Sudhir Warrier

I trained in India. I became an Orthopedic Surgeon in 1988. I was trained by teachers who were either British Trained or trained by Britishers in India! The training was structured in true Halsteadian style. I am quite a satisfied surgeon. I believe my training was wholesome and well rounded. I continued as an apprentice in a subspecialty and 8 years later, I began my own practice. Indian surgeons have found favour and have proven their mettle all over the world. Things have changed in India. Considerably. While much of this change is planned, a major part of these changes have crept in surreptitiously and have now become the norm.

Surgical Degrees:
M.S. (Master of Surgery) (Universities, Deemed Universities) -3yrs
DNB (Diploma of the National Board of Examinations) -3yrs
Diploma (in Orthopedics, ENT, Gynaecology & Ophthalmology) College of Physicians and Surgeons in Mumbai – 18 months!

Entry: Entry into a surgical training program is largely through a competitive written countrywide examination of successful MBBS graduates. While this is true for the MS and the DNB degrees, the diploma may be aspired for by any medical graduate!

Training: This is one of the major problem areas for my country. The Halsteadian method has succeeded in creating generations of competent surgeons over the years. However, the large population, one of the worst patient-surgeon ratio in the world, the lack of uniformity and many other factors combine to make this problem insurmountable in the present scenario. The units in University hospitals continue to be the most sought after for the opportunity to have ample instruction and hands-on opportunity to develop and hone surgical skills. The other degrees offer very little assurance of such opportunity. In fact, it is theoretically possible to get a post graduate degree in a surgical stream without even handling the scalpel! This is frightening and quite a dismal situation.

Exit and Certification: Subjective Examinations in most surgical branches do not test the surgical skills at all. The dissertation (Thesis) offers a chance for students to research the wealth of clinical material. This is however not optimally utilized and often is abused by students who choose to use material from previous dissertations. Cadaveric dissections are not compulsory and often never encouraged. Simulators are a far cry. Our redeeming factor has always been the rich wealth of available clinical material. Though it does seem unfair to learn on actual patients, that is currently the only way in which surgeons in India can expect to expand and perfect their skills. That danger lurks in this method is quite obvious and that danger is multiplied because India has a very poor record of auditing and policing outcomes. Litigations are also the exception. For a vast nation comprising 28 states and 7 centrally governed areas, speaking multiple languages and over a billion people, we have only around 8000 (estimated) surgeons entering medical colleges for training each year. With minimal outlays for healthcare (one of the worst in the world, again) and very widely variable GDP (from $3545 in Goa to only $426 in Bihar) it is one of the problems that cannot have a simple solution. A large rural population with a low literacy rate and many (over 27%) living below the poverty line (set at an unimaginable $0.40 / day !!!!) the looming problem only becomes more daunting. The good news is that at the current rate of growth (13% in this decade), some efforts from the corporate sector and opening up of centers for cadaveric and animal model training and simulator based training, India is on the threshold of a surgical revival. The will and the means are in place.

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Professor Nyengo Mkandawire is head of the Department of Surgery at the College of Medicine, University of Malawi in Blantyre, Malawi. He did his undergraduate medical training at Flinders University in South Australia from 1985 to 1990. He did his orthopaedic residency and training between 1994 and 1999 in the Mersey Deanery in the United Kingdom. He returned home in 1999, after orthopaedic training take up a position of lecturer in the department of surgery. He has risen through the ranks and became full professor in June 2012. He has a special interest in spinal surgery.

He is a Fellow of the Royal College of Surgeons of England, a Foundation Fellow of the College of Surgeons of East Central and Southern Africa, and a Fellow of the Foundation for the Advancement of Medical Education and Research (FAIMER).

He has in the past been external examiner for orthopaedic postgraduate examinations at universities of Addis Ababa, Zambia, and the Muhimbili University of Health and Allied Sciences. He has also been chief examiner for orthopaedics fellowship in the College of Surgeons of East Central and Southern Africa. Prof Mkandawire is the clinical director of the Orthopaedic Clinical Officer Training Programme in the Malawi College of Health Sciences. He is a member of the Medical Council of Malawi in charge of the Education and Training sub committee.

He has wide interest in research including medical education, task shifting in health professionals and cost effectiveness of surgical training programmes. He is on the editorial board of the Malawi medical journal and the East and Central Africa Journal of Surgery.

Surgical Education: collaboration between low and high income countries

Nyengo C Mkandawire

Surgery as a global health priority

Surgery accounts for 11% of disability-adjusted-life-years (DALYs); surpassing the DALYs of HIV, TB and malaria combined. Surgical interventions can be provided at a cost per DALY that is similar to interventions such as immunization for measles (Debas et al). The poorest 35% of the world's population undergo only 3.5% of the 234.2 million surgical procedures performed annually (Weiser et al). A Sierra Leone survey revealed that 25% of the population had conditions treatable by surgery and 25% of deaths could be avoided by surgery (Groen et al. 2012). Sub Sahara Africa spends $5 per capita per year on health; carries 25% of the world's disease burden but has only 2% of the world's health workforce worsened by 'brain-drain' to high-income countries.

Need for collaboration in surgical training, education and research

There is a great need to support surgical training and research in low-income countries (LIC) to strengthen academic and research productivity; improve the standard of medical care, job satisfaction and career opportunities for physicians in their countries and thus mitigate against brain drain.

Collaborative measures that can strengthen surgical training and research include:

- Support for the regional surgical associations and colleges such as the College of Surgeons of East Central and Southern Africa (COSECSA).
- Skills transfer through courses, workshops and fellowships.
- Quality assurance through curriculum development; external evaluation of assessment and examination; development and access to educational resources; faculty exchange and development
- Formalization of overseas electives for residents from HIC.
- Transfer of appropriate technology.
- Collaborative research to redress the "10/90 gap" where by 90% of the world's biomedical research concerns the health needs the rich 10%. (Davey).

Examples of Formal Collaborations

- Among USA residency programmes12% have formal international rotations for their residents; and 20% are planning to initiate ''twinning'' relationships (Rivielo and Ogdezi)
- University of Toronto, Ptolemy Project provides free access to its electronic library for the COSECSA.
- Canadian Network for International Surgery conducts surgical skills courses LICs such as Ethiopia, Zambia, and Mozambique.
- The Royal Colleges of Surgeons of Edinburgh and Ireland and the Association of Surgeons of Great Britain and Ireland support COSECSA with funding for operations; curriculum development; training of examiners; surgical courses; and external examiners.
- Johnson & Johnson has established infrastructure to conduct courses in basic surgical skills, laparoscopy and advanced trauma operative management in COSECSA region and West Africa
- Specialists Without Borders (Australia) runs courses and has programmes in Rwanda and Malawi.

Sustainability and evaluation

Sustainability of the collaborations relies on the goodwill of individuals and institutions and the evaluations of the programmes are difficult as there are no standard assessment tools.

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Prof. Leon Snyman obtained the qualification MB ChB in 1988 at the University of Pretoria, South Africa. He worked as a general practitioner for nine years and completed the M.Prax.Med degree in 1996. He completed his post-graduate studies as an Obstetrician and Gynaecologist in 2002 by obtaining his MMed (O&G) degree from the University of Pretoria, as well as a Fellowship from the College of O&G of South Africa.

Prof. Snyman is currently working as a principal specialist and adjunct professor in the Gynaecological Oncology Unit, Department Obstetrics & Gynaecology, University of Pretoria, South Africa. He is a registered gynaecological oncologist and head of Gynaecology and the Gynaecological Oncology Unit at the Kalafong Academic Hospital. Prof. Snyman also heads the Endoscopy Training Unit of the department. This unit is involved in surgical skills training of registrars as well as specialists in operative gynaecological laparoscopy.

His research interests include cervical cancer, HPV and laparoscopic surgery. He is also involved in undergraduate training of medical students, post-graduate training of registrars in gynaecology and fellowship training in gynaecological oncology.
Prof. Snyman serves on the editorial boards of the *Southern African Journal of Gynaecologic Oncology* and the *South African Journal of Obstetrics & Gynaecology*. He is as an elected member on the council of the College of Obstetricians & Gynaecologists of South Africa and he is also an elected member of the Federal Council of the South African Society of Obstetricians & Gynaecologists.

Prof. Snyman is the founder and chairman of the Representative Academic Endoscopy Training Forum of South Africa. This forum represents all the O&G academic departments and aims to standardise curricula for registrar training in operative endoscopy in South Africa.
He is also a member of the International Society of Gynaecologic Oncology, International Society of Gynaecological Endoscopy and the South African Menopause Society.

Laparoscopic Surgery in Evolving Countries

Leon C Snyman

Operative laparoscopy has evolved dramatically over the past two decades. Available evidence suggests laparoscopic versions of many procedures are fast replacing the open versions as the standard treatment of choice for both benign and oncological procedures. Some procedures such as surgical treatment of endometriosis, cholecystectomy and hernia repairs are almost exclusively nowadays performed laparoscopically.

The most important benefits of laparoscopic surgery include shorter hospital stay, less pain and quicker recovery time. In most evolving countries these benefits are very important as the majority of patients requiring treatment are not employed in the formal economic sector, and for them shorter hospital stay and quicker recovery are not just "nice to have" benefits.

Many evolving countries experiences shortages of hospital beds and theatre time. The cost-effectiveness of shorter hospital stay and outpatient procedures is obvious, and data suggests that laparoscopic procedures are indeed cost–effective for both the patient and the health system.

The large number of people living with HIV and AIDS tend to have more surgery related morbidity than HIV uninfected people, and they might benefit from operative laparoscopic procedures where indicated. Laparoscopic surgery should also provide some protection to health care workers, as the risk of needle stick injury and exposure to infected blood is reduced significantly.

Laparoscopic surgery requires some capital expenditure in terms of investment in technology and equipment, as well as investment in skills training of personnel. Operative laparoscopy can only be cost-effective if skilled operators are performing it. Inappropriately or unskilled and inexperienced operators attempting operative laparoscopy rely on expensive disposable technology as a substitute for the lack of skills and experience. This practice makes laparoscopy unsustainably expensive, with unacceptable complications resulting in prolonged hospitalization.

One of the important ethical discussion points is justifying the use of relatively expensive technology in evolving countries where children are dying from pneumonia and diarrhoea, screening programmes for cervical cancer are non - existing, and thousands of people suffer from diseases such as HIV, TB and AIDS. Available resources need to be distributed equally ensuring maximum benefit to all.

Training institutions in evolving countries will have to invest in the necessary equipment and in the appropriate training facilities and programmes. It might be necessary to form collaborations between institutions on a national and, if necessary, regional basis to ensure access to training facilities. Possibilities of international collaboration should also be explored; especially as far as skills training is concerned.

There is a need to fast track the evolution of minimally invasive treatment modalities such as operative laparoscopy in evolving countries. It has become a necessity and an essential skill required by modern and future surgeons. At the heart of this argument is the fact that the people who would benefit most from this treatment modality are the population living in these countries.

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Prof Ogendo trained in cardiothoracic surgery at the Kenyatta National Hospital Heart Unit from 1989 to 1994, the Queen Elizabeth Hospital, Birmingham (UK) from 1994 to 1996, and Walsgrave Hospital, Coventry (UK) 1996 to 1997.

Prof. Ogendo is currently Professor in the Department of Surgery, University of Nairobi Medical School, Kenyatta National Hospital in Nairobi. He is also a member of the Kenya Medical Association, the Surgical Society of Kenya, the Kenya Cardiac Society, the Pan African Association of Cardiology, the Pan African Association of Surgeons and the Pan African Society of Cardiothoracic Surgeons.

In December 2011 Prof Ogendo was elected vice president of the College of Surgeons of East Central and Southern Africa, a position he currently holds.

Surgical Training in the East central and Southern Africa region

Stephen Ogendo

Provision of adequate and quality surgical care remains a challenge in sub Saharan Africa. The region faces many surgical challenges the most crucial being a shortage of surgical manpower. In the ECSA region the average surgeon to population ration is 1:300,000 compared to approximately 1:2500 in the United States of America. This shortage poses challenges in surgical service delivery within the region.

This presentation mainly focuses on the surgical situation in 10 countries. Presentation will highlight the development of surgery in the region and ways in which the region Southern Africa region as a whole is rising to address these challenges.

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Prior academic positions include Professor of Surgery at Yale University and a military appointment as Professor of Surgery (USUHS) in the Army Medical Corps assigned to General Surgery at Walter Reed Army Medical Center. Government positions included Program Manager of Advanced Biomedical Technology at the Defense Advanced Research Projects Agency (DARPA) and Senior Science Advisor at the US Army Medical Research and Materiel Command in Ft. Detrick, Maryland.His undergraduate training was at Johns Hopkins University, Medical School at Hahnemann University of Philadelphia, Internship at the Cleveland Clinic, Surgical Residency at the Mayo Clinic, and a Fellowship with a Master of Surgical Research at Mayo Clinic.
He has served on the White House Office of Science and Technology Policy (OSTP) Committee on Health, Food and Safety. He has been a member of numerous committees of the American College of Surgeons (ACS), currently serving on the Committee on Emerging Surgical Technologies and Education (CESTE) and ACS-Accredited Education Institutes (ACS-AEI) and Alliance of Surgical Specialties for Education and Training (ASSET). He is a past president of the Society of American Gastrointestinal Endoscopic Surgeons (SAGES), the Society of Laparoendoscopic Surgeons (SLS) and the Society of Medical Innovation and Therapy (SMIT). He was on the Board of Governors of the National Board of Medical Examiners (NBME) and is currently on Board of a many surgical societies and on the editorial board of numerous surgical and scientific journals, and active in a number of surgical and engineering societies. Dr. Satava has been continuously active in surgical education and surgical research, with more than 200 publications and book chapters in diverse areas of advanced surgical technology, including Surgery in the Space Environment, Video and 3-D imaging, Telepresence Surgery, Virtual Reality Surgical Simulation, and Objective Assessment of Surgical Competence and Training and the Moral and Ethical Impact of Advanced Medical Technologies.
During his 23 years of military surgery he has been an active flight surgeon, an Army astronaut candidate, MASH surgeon for the Grenada Invasion, and a hospital commander during Desert Storm, all the while continuing clinical surgical practice. While striving to practice the complete discipline of surgery, he is aggressively pursuing the leading edge of advanced technologies to formulate the architecture for the next generation of Medicine.

Full Life-Cycle Curriculum Development: Breaking Down the Silos

Richard M. Satava

"It is not about the simulator – it is about the curriculum"

There has been over 90 years of curriculum development using simulators in the aviation, military and nuclear industries, to name a few. The following is a synthesis of 20 years of learning from these communities as well as behavioural psychologists, psychometricians, medical educators and eminent clinicians. There is a science that has been developed and validated, and this manuscript summarizes these successes to date.

There are two critical components that differentiates simulation based training from the other forms of medical education: Objective metrics - to assess performance, and benchmarks (of proficiency) - which the learner must achieve before allowed to perform a procedure on a patient. The result of implementing this process (simulation) is that the learner does not train for a specific amount of time or number of trials nor is given a "passing score"; rather, the learner must continue to train until they have reached the "benchmark" of proficiency which experienced surgeons (physicians) have established (by taking exactly the same curriculum). In short, the learner must continue until they achieve 100% "score" (especially including no errors), they may not operate upon a patient with a "passing score" of 85 or 90%.

The essence of the curriculum development process can best be understood by figure 1,that was developed by the Alliance of Surgical Specialties for Education and Training (ASSET), which consists of representatives of 14 Surgical Specialty Societies, the Department of Defence, the Veterans Administration Hospital and System. This curriculum development process was then applied to the development of the Fundamentals of Robotic Surgery (FRS), which included not only the participants of the ASSET, but many international representatives, to include members of the Royal Colleges of Surgeons.

There are numerous stakeholders that need to have participants in the development of a curriculum: The accrediting bodies that oversee the training programs (in the USA, the Accreditation Council of Graduate Medical Education – ACGME) and their representative Resident Review Committees (RRC); the certifying organizations, in the USA are the various "boards" such as the American Board of Surgery (ABS); the educating organizations, specifically in the USA the surgical specialty societies, such as the American College of Surgeons or ACS (the Royal Colleges of Surgeons – RCS - serve as both educators and certifiers); the training program directors who will be responsible for training and assessing residents in their programs, and clinical faculty members who will be teaching the curriculum.

The most stringent method of developing the full life cycle for the curriculum is through the use of consensus conferences, which include the key stakeholders for the three main components of the curriculum (in this case, a course): Outcomes measures/metrics; curriculum development, and validation trial. Once the curriculum has been developed, it must be validated using a process that sets benchmarks that are set by experienced/expert surgeons for the learner to achieve. The role of High Stakes Testing

(HST) should be developed by and administered by an independent body in order to avoid conflict of interest between the roles of educators and certifiers.

The curriculum development process begins with the Outcomes Measures and Metrics. It is essential to define precisely what the final goals (outcome measures) that the learner must learn, and (as unambiguously as possible) the exact metric (quantitative value) that is use to determine when the learner has achieved the goal. This consensus conference should have some representation from a member of the intended certifying body – many simulators and curricula have been developed, only to be rejected by the certifying body because the curriculum did not train or assess the appropriate measures, especially those (such as errors) that are indicators of competence for patient safety. Most simulators measure time (how fast certain skills or tasks are performed), however usually speed is achieved at the expense of increased errors.

The content for the curriculum is developed again by a consensus conference, however this is principally with medical educators and clinicians. Task deconstruction and task analysis are used to define the components of the curriculum, and then these incorporate the appropriate outcomes measures and metrics

Upon completion of the curriculum the validation trial is needed to guarantee that the curriculum actually will teach what was intended to be taught. Initially, experienced and expert surgeons perform the curriculum – the value of their performance is used to set the 'benchmark' which the learner must achieve. The outcome measure metric for each task is the value of the mean of the experienced/expert surgeons – by definition, this mean represents a "proficient" performance. A rule of thumb might be that 1 standard deviation below the mean is a 'competent' (meaning good enough perform a procedure "safely" but certainly needs improvement to become proficient). On the other hand, those who are 1 standard above the mean are truly the 'experts'. For (definitions, descriptions and full explanation of these levels of performance see Dreyfus and Dryefus, 1985). Once the benchmarks have been determined, then a multi-institutional, multi-disciplinary (when appropriate) randomized clinical trial is conducted to guarantee the quality of the curriculum.

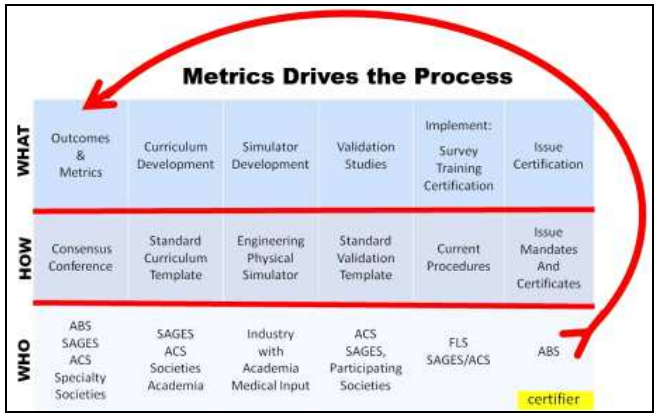

Figure1: Full Life-cycle Development of a Curriculum

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Simulation-based training; more than experience and mere repetition.

Prof. Anthony G. Gallagher, Ph.D., D.Sc.

Our understanding and use of simulation based training has evolved from simply practicing or learning performance in an accurate re-creation of the operating room as first envisaged by anaesthetist simulation pioneers. Current simulation models span low fidelity scripted patient encounter scenarios through to silicon models of surgical tasks (e.g., a sebaceous cyst, inguinal hernia etc.,) and full-physics virtual reality (VR) simulations of the cardiovascular or cerebral system. Despite simulation training having developed a strong foothold in the preparation of surgeons for the operating room, how a simulation looks continues to occupy a more important role in its perceived utility than it should do. There also appears to be an emergent understanding of the function and mode of effectiveness of simulation training.

The efficacy of simulation training has been quantitatively demonstrated in prospective, randomized, double blinded studies. Simulation training models used in these studies have varied from bespoke models for training intra-corporeal suturing skills, VR emulation models for basic laparoscopic skill acquisition through to full physics VR simulations for the learning of endovascular skills. An 'appropriate' simulation for training (irrespective of simulation model fidelity) is effective because it affords the trainer with the opportunity to deliver a unique configuration of the curriculum. This arrangement requires the trainee to integrate and apply procedural knowledge in a real-world rather than a theoretical or imaginary context which ensures that trainees have to experience and overcome basic (and complex) practical performance constraints, in a simulated but credible depiction of the task to be learned. A further requirement is that the simulation affords the trainee proximate feedback on their performance (i.e., formative assessment) as well as summative evaluations. This dual feedback configuration facilitates faster learning. In particular it informs the trainee what he/she did wrong or need to execute better. Metric-based training also allows the trainer to train more heterogeneous, quality assured skills levels by ensuring that trainees only graduate after demonstrating a benchmark performance level. Thus, the simulation skill acquisition process is driven by metric-based performance feedback rather than simply repeated experience of an accurately depicted simulation scenario. Metric-based simulation training to proficiency represents a new approach to training for procedural-based medicine.

Notes

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Robert Alan Pedowitz, M.D., Ph.D. is a Professor of Orthopedic Surgery at the David Geffen School of Medicine at UCLA. His clinical sub-specialty interests include arthroscopic surgery of the knee and shoulder and orthopaedic sports medicine. Dr. Pedowitz served for two years as Chair of the Department of Orthopaedics and Sports Medicine at the University of South Florida in Tampa. He started his academic career at the University of California San Diego, serving in a variety of roles including Residency Director for the UCSD Department of Orthopaedic Surgery.

Dr. Pedowitz received his undergraduate degree at UCLA with a major in psychobiology. He completed a medical degree and then a residency in orthopaedic surgery at UCSD. Dr. Pedowitz performed several years of laboratory research, focusing upon the pathophysiology of neuromuscular compression and ischemia, culminating in a PhD from the University of Gothenburg, Sweden. Formal clinical training was completed at Duke University with a fellowship in orthopaedic sports medicine.

Dr. Pedowitz is an active member and leader in multiple orthopaedic and sports medicine societies. He serves on the Board of Directors for the Arthroscopy Association of North America and sits on the Board of Trustees for the Arthroscopy Journal. He currently Chairs the Fundamentals of Arthroscopic Surgery Training (FAST) Program development team, which is a collaborative project of AANA, AAOS, and ABOS. He Co-Chairs the basic orthopaedic motor skills simulation and curriculum development project for the ABOS and AAOS, and serves on the executive committee of the Alliance for Surgical Skills in Education and Training (ASSET) project.

Dr. Pedowitz has published over one hundred original research papers and chapters in various focus areas including tissue physiology, orthopaedic imaging, sports medicine biomechanics, and clinical outcomes. He is editor of three books: Second Edition of Daniel's Knee Ligaments: Structure, Function, Injury and Repair (Lippincott, 2003), Practical Orthopaedic Sports Medicine and Arthroscopy (Lippincott, 2007), and Magnetic Resonance Imaging in Orthopaedic Sports Medicine (Springer-Verlag, 2008).

A New Mandate for Simulation-Based Orthopaedic Surgery Skills Training in the United States: Moving From Concept to Implementation

Robert A. Pedowitz

Motor skills education in orthopedic surgery has historically utilized the apprenticeship model of training. About a century ago, the Flexner report improved the overall structure and quality of medical education in the United States. However, the apprenticeship model was preserved, especially for training in the surgical specialties. In 2007, the ACGME introduced the six core competencies. Surgical motor skills training was obliquely mentioned under the "patient care" element, without specific requirements in terms of structured educational curriculum or defined proficiency metrics. As such, progression through surgical residency in the United States is still a function of "time allocation" (for example, allocation of a certain number of months on it particular service / sub-specialty). Basic and advanced surgical skills are developed in a somewhat unstructured manner. Technical proficiency is documented by relatively subjective evaluations of faculty during the years of surgical apprenticeship.

Viewed in a general sense, simulation has been used extensively in orthopedic surgery training for decades, for example, we have utilized bone models for fracture fixation training, joint models for arthroscopy practice, and cadaveric models for full procedural rehearsal. Virtual reality (VR has had a relatively small role, but recent technological advances have increased VR's potential for effective and efficient training in the orthopedic sphere. There are a growing number of factors that have increased the demand for simulation training, not the least of which is an increased awareness that simulation can enhance patient safety by moving basic motor skills training out of the operating room.

On November 4, 2011, the American Academy of Orthopedic Surgeons (AAOS) sponsored an "Orthopedic Surgery Simulation Summit". This meeting brought together key leaders and U.S. stakeholder organizations, including the American Board of Orthopedic Surgery (ABOS), the Orthopaedic Residency Review Committee (RRC) of the ACGME, and various orthopaedic subspecialty societies. Following this summit, the ABOS and RRC created and approved new mandates that fundamentally change the structure of orthopedic training in the United States. Beginning in July 2013, simulation-based motor skills training will be a requirement for all U.S. orthopedic surgery residency training programs. The new mandates require the programs to (1) implement well-defined curriculum, (2) devote specific time for motor skills training, and (3) dedicate laboratory space for simulation activities.

In order to help programs meet these new requirements, the ABOS and AAOS created a working committee that is developing approximately 20 sub-modules that will provide some *examples* of structured curriculum, with associated motor skills simulation exercises. Subspecialties have also aligned toward the same implementation objectives of the ABOS-AAOS initiative. The Arthroscopy Association of North America has created the Fundamentals of Arthroscopic Surgery Training (*FAST*) Program. The Orthopedic Trauma Association is developing modules for fluoroscopy skills and radiation safety training. This is an exciting new direction for orthopaedic basic motor skills training in the United States. The effort should enhance the quality and efficiency of surgical education, and will hopefully lead to measurable improvements in patient safety and better clinical outcomes.

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Notes

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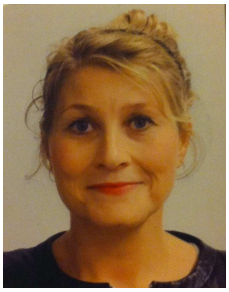

Dr. Strandbygaard completed medical school at University of Copenhagen in 2006, and after the obligatory internship rotation in the Zealand Region of Denmark, she began OBGYN specialist training in the Capital Region. However, specialist training was put on hold from 2009-2012 due to a PhD thesis on laparoscopic virtual reality training. She is now back doing clinical work although continuing her research. Dr. Strandbygaard's research has focused on developing a basic laparoscopic curriculum for first year residents in OBGYN, involving both skills training and theoretical testing. The idea is to firmly join the surgical world with the educational world. Besides the development of a sustainable curriculum, one of the main research topics has been to investigate the need for instructor feedback during laparoscopic virtual reality training.
Throughout her PhD thesis, which was outbound at department of OBGYN at Rigshospitalet, University Hospital of Copenhagen, she has been attached to St. Michael's Hospital in Toronto under Dr. Theodor Grantcharov's supervision.
Dr. Standbygaard is involved in several educational initiatives in Denmark concerning laparoscopic education and is also course educator for laparoscopic skills courses.

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Dr CR Larsen was born 1966 and graduated from University of Copenhagen, Copenhagen, Denmark in 1999. Already during the medical studies Dr Larsen was awarded a research scholarship in gynaecology, and during the years 2005-09 he did the Ph.D. thesis: "Virtual Reality Simulation in Laparoscopic Gynaecology".
Dr Larsen has been appointed at the national Hospital "Rigshospitalet" in Denmark and became consultant in gynaecology in 2011. He has now sub-specialized in pelvic floor reconstructive surgery and is still carrying out research on surgical training and simulation in healthcare.
Dr Larsen has been given lectures throughout the world on Virtual Reality simulation in laparoscopic surgery and has won several research prizes. Besides the clinical work and research, Dr Larsen is conducting reviews for several international journals and acts as a faculty member in a number of conference boards.

Development and Implementation of a Validated Four-Step Curriculum in Basic Laparoscopy

Jeanett Strandbygaard and Christian Rifbjerg Larsen

Various virtual reality (VR) simulators, mechanical or computer-based or hybrid, are available for training key laparoscopic skills, like hand-eye coordination and maneuverability, and VR simulation training shortens the time in training to achieve competence in gynecological laparoscopic surgery. Two recent systematic reviews of VR simulation training have shown that for trainees without prior surgical experience VR training decreased the time to complete a procedure, increased accuracy, and decreased errors compared with standard training (observe and assist), measured in real human operative procedures.
Assessing the efficacy of different VR simulators holds some pitfalls: The variation in the selection of test participants level of experience, the variation in the conduct of the training programs, fixed time training or proficiency based training, as well as subjectivity in methods of measuring the effect of VR training on the surgical outcome. There is mounting evidence in favor of VR simulator use for the novice laparoscopic surgeon. Nonetheless, an important lecture before investing in a VR simulator is to define clear learning objectives and educational goals along with considerations about plans of implementation, maintenance, and logistics.

Subsequent to purchasing a VR simulator the next step is to structure training and knowledge in a curriculum. However, despite of convincing research achievements proving the worth of laparoscopic simulators, development of structured training curricula is challenging. This is mainly due to lack of knowledge regarding the best methods for training and the best design of a curriculum in *your* hospital set up. When designing a curriculum to it is very important lean against an appropriate and usable theoretical framework, and to validate each element of the curriculum thereby establishing a valid process for assessment and reporting, and ensuring uniformity for the trainees.
Several considerations needs to be taken into account before creating a curriculum:

- Is it a regional, national or international curriculum?
- What elements should be included: practical elements, theoretical elements, test elements?
- Are the laparoscopic tasks and evaluation methods validated?
- It is a high stakes curriculum, i.e., should there be consequences for not completing?
- What specialties should be included, e.g. surgery, gynecology, urology?
- What is the time frame? And the financial frame?

The future challenge is therefore to develop and implement validated structured surgical curricula including validated VR simulator training. In this lecture we give an introduction to a newly designed regional curriculum in basic laparoscopy and reveal the results from the implementation process. The curriculum, which was build upon inspiration from the Miller's pyramid of competences, is used in the Zealand and Capital Region of Denmark.

Notes

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Dr Gorshkov started his studies at the Moscow Higher School of Economy, Nizhny Novgorod Subsidiary, at the Faculty of Management. Specialty: "Personnel Management".

Dr Gorshkov was educated at the Nizhny Novgorod, Medical Academy, Medical Faculty, and graduated with honors. Specialty: "Medical Doctor, Surgeon", with a post-graduate specialization in ophthalmic surgery.

He is Deputy Editor of the Journal “Virtualnye Technologii v Medizine” (Virtual Technologies in Medicine) – Russian language journal published since 2009, dedicated to virtual and simulation technologies in health care.

In addition he is co-founder of the Russian Society for Simulation Education in Medicine, ROSOMED – [rossomed], and Head of the Presidium of the Society (since February 2012).

He is a Board Member of the Russian Society of Endosurgeons, with special responsibility for virtual technologies in endosurgical practice and training.

Surgical Simulation Classification and Triplication of the Cost

- *Upgrade to the next realism level triplicates the cost of surgical simulation equipment*

Maxim D. Gorshkov

Since the surgical skills require extended training simulation techniques ensure it without risk for a patient. Wide variety of training tools is used: interactive e-learning media, visual aids, anatomy models, phantoms, box-trainers, virtual reality simulators, etc. They all differ by the grade of realism and the cost; however, simulators from different groups can serve for training of the same skills.

Any simulation process can be divided into several layers. Every new layer increases credibility and realism of the training stratifying over the previous one. Existing simulation typologies (offered by Miller, Gaba, Issenberg, Alinier) are mostly faced to the patient simulation field, not skill's acquisition. The goal of the project was to establish practical classification of surgical simulation equipment, to combine and link their realism, price and trained skills.

We suggest the following classification of surgical simulation training tools based on seven reality levels:
1. Visuality: explanations, visual interaction, realistic external view;
2. Tactility: realistic tactile characteristics of tissues;
3. Ergonomics: imitation of working place ergonomics, endosurgical movements' motorics;
4. Video: indirect visualization of surgery using video technologies;
5. Equipment: medical apparatus settings;
6. Interaction: active reaction of simulated organs, objective computer-based assessment;
7. Communication: imitation of complex, difficult or rare clinical cases and situations with training both technical and non-technical surgical skills.

The training tools being ordered according to the suggested classification show increase of their cost:
1. Anatomy model or e-book (Visuality) = 100-300 USD;
2. Phantom of organ (Tactility) = 1.000 USD;
3. Set of Lap instruments + Phantom + Box-Trainer (Ergonomics) = 3.000 USD;
4. Set of Lap instruments + Phantom + Video-Trainer = 10.000 USD;
5. Set of Lap Instruments + Phantom + Endovideosurgical equipment (Equipment) = 30.000 USD;
6. Virtual Reality Simulator (Interaction) = 100.000 USD;
7. Hybrid VR-technologies Simulation OR (Communication) = 300.000 USD and more.

This increase conforms to the certain regularity that we called COST TRIPLICATION RULE: "Upgrade to the next realism level triplicates the cost". Consideration of the Triplication Rule causes the number of principles for rational selection and effective usage of simulation equipment in surgical training centers.

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Richard L. Angelo, M.D received his medical degree from the University of Washington in Seattle and completed his orthopedic residency at the University of Utah in Salt Lake City. Fellowship studies in Arthroscopy and Sports Medicine followed at The Hughston Clinic and American Sports Medicine Institute. He has served as a Clinical Professor in the Department of Orthopedics at the University of Washington, as one of the team physicians for the University of Washington Huskies, and as Chief of Surgery for Evergreen Hospital Medical Center. He participated on the American Academy of Orthopedic Surgeons Sports Medicine Subcommittee for Evaluations and as a Board of Specialties Education Subcommittee Member.

His involvement with the Arthroscopy Association of North America (AANA) has led to chairmanship of the Education Committee, participation as one of the Board of Directors, and teaching as a Master Instructor at the Orthopedic Learning Center in Chicago. Over the past decade, his passion for arthroscopic education has led to the institution of innovative new methods to assist surgeons in acquiring the knowledge base and mastering arthroscopic surgical skills. He recently instituted and chairs the AANA Magellan Project to explore a new paradigm in arthroscopic education by travelling outside of orthopedics to "sail around the world" across all disciplines, businesses and professions in search of the best and most effective methods available to educate and train surgeons in the discipline of arthroscopic surgery.

He has given over 160 national / international presentations, authored numerous scientific articles, and edited several textbooks, including co-editing of the Shoulder Volume in the AANA series on Advanced Arthroscopy for 2010. He served his term as the 31st President of AANA during 2011 – 2012.

The AANA Copernicus Initiative

Richard L. Angelo

In 2010, The Arthroscopy Association of North America began the Magellan Project to redefine its educational initiatives by searching across various disciplines, industries and professions to create a curriculum which harnesses the latest in educational theory and practice. Born of that effort is the Copernicus Initiative, a pilot project which seeks to study the impact of a proficiency based training methodology on the acquisition of arthroscopic surgical skills. The design has sought to employ "first principles" in conducting the investigation. An arthroscopic capsulolabral (Bankart) repair of the shoulder was chosen as the procedure which participants are trained to perform. Task deconstruction was performed by a core group of recognized experts to identify the individual steps which are involved in performing the procedure. Unambiguous operational definitions for each of the steps were then created so that a blinded rater was able to determine that the step was either completed or not with a high level of certainty. Similarly, common errors were identified and tightly defined for each of those steps. Those errors deemed serious, either due to jeopardizing the success of the procedure or potentially resulting in iatrogenic damage to the shoulder, were separately identified and termed "sentinel errors". After stress testing the definitions, a Delphi panel of shoulder experts was convened to review the established metrics and reached consensus that they accurately represented the essential aspects of the procedure. A group comprised of both novice and expert shoulder surgeons performed an arthroscopic Bankart procedure on a cadaver and the surgery videotaped. Independent, trained, blinded raters then scored the videos with an acceptable inter-relater reliability to confirm construct validity of the established metrics. An educational module was created to teach the steps and potential errors in performing an effective repair. Based on the scored video performance of the group of experienced operators, a level of proficiency was defined. Three matched groups of 4^{th} and 5^{th} year residents will be studied, all of whom are provided access to the orientation video: Group A – Training as currently exists at the Orthopedic Learning Center for orthopedic residents which includes shoulder arthroscopy; Group B (simulator) – residents who will also have an opportunity to practice arthroscopy using a shoulder simulator (dry shoulder model with instability pathology); and Group C (proficiency) - who must achieve an acceptable score confirming proficiency on each of the following components: a computer based test on the cognitive content of the orientation video, demonstrate the ability to tie arthroscopic knots to a pre-determined level of security; and the ability to perform a scored Bankart procedure to an acceptable level of proficiency on the simulator model. All registrants of groups A and B and those in group C who have reached proficiency of each component will perform an assisted, but unaided (no coaching) arthroscopic Bankart procedure on a cadaver shoulder which will be videotaped and scored in blinded fashion. The scores of the groups will be compared to determine the impact of proficiency based training on acquiring the skills necessary to performing the index procedure. The hypothesis is that the PBT group will perform significantly better that the traditionally trained residents (time and exposure). The results of this study will be utilized to restructure the curriculum for arthroscopic surgical skills training across the various joints treated in the discipline.

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Dr. Patricia J. Numann is a native New Yorker who was educated at the University of Rochester and obtained her medical degree and completed her general surgery residency at the State University of New York, Health Science Center at Syracuse. She holds Board Certification from the National Board of Medical Examiners and the American Board of Surgery. Dr. Numann is an active member of numerous professional societies such as the American College of Surgeons, the American Medical Association, the Association of Endocrine Surgeons, the International Society of Surgery, and the American Surgical Association. She has served as Vice-President of the American Association of Endocrine Surgeons and President of the Association for Surgical Education. She is past Second Vice-President of the American College of Surgeons and past Chair of the American Board of Surgery, the first woman in either position. She was one of the founding members of the Association for Surgical Education and founded the Association for Women Surgeons. She was the first woman elected to the American Medical Association Council on Scientific Affairs. Dr. Numann has received numerous honors and awards at the local, state and national level. She has received the Post Standard Woman of Achievement Award, the Onondaga County Physician Service to the Community Award, the New York State Woman of Accomplishment Award, and the Nina Starr Braunwald Award of the Association of Women Surgeons. She is listed in Best Doctors in America. She has been named, by the SUNY Board of Trustees, as a SUNY Distinguished Teaching Professor and a SUNY Distinguished Service Professor. She received the Upstate Medical University Distinguished Alumna Award and SUNY Alumna of Distinction Award. She served as Medical Director of University Hospital for 10 years. She was designated the Lloyd S. Rogers Professor of Surgery in 2000. She was inducted into the International Women Physicians' Hall of Fame and named "Local Legend" to The National Library of Medicine's "Changing Faces of Medicine" exhibit.

In 2006 Dr Numann received AMWA's highest award the Elizabeth Blackwell Medal for her contribution in the professional advancement and recognition of women. Dr. Numann was given The American College of Surgeon's Distinguished Award at the Clinical Congress in October of 2006. She was first woman to receive this prestigious award.

Dr. Numann is particularly interested in education and has been distinguished as a teacher, receiving the Clinical Teacher of the Year Award twice. She has been regularly asked by the graduating medical students to serve as the Faculty Marshall or to deliver the Oath of Hippocrates. Dr. Numann's scientific and clinical interests are in the area of thyroid and parathyroid disease and breast disease, founding The Breast and Endocrine Center which now bears her name. She was highly regarded as a clinical surgeon. She has published numerous articles, abstracts and book chapters. She is committed to equity for women.

Dr Numann serves on numerous community boards including the Everson Museum of Art, The Community Health Foundation of Western and Central New York, Vera House, Hospice of Central New York and the Greater Roxbury Learning Initiative Corporation.

In January of 2007 ,she retired from active clinical practice and as Lloyd S Rodgers Professor of Surgery but remains active in many teaching and organizational activities. She was awarded Emeritus status by SUNY. She was elected First Vice president of the American College of Surgeons in October 2010. In April 2011 she became President Elect of the American College of Surgeons and in October 2011 was installed as President of the American College of Surgeons. In August 2011 she was awarded the ISS Prize of the International Society of Surgeons. In October 2011, she received an Honorary Fellowship from the Royal College of Surgeons of Glasgow. May 2012 , she received an honorary Doctor of Science Degree from Upstate Medical University.

Teaching Clinical Judgement with Simulation

Patricia J Numann

Sound clinical judgment is an essential skill of a physician usually taught by a preceptor. This method is time and resource intense while not consistently exposing the learner to the needed spectrum of clinical material, nor establishing consistent patterns of decision making. On line interactive scenarios allow a more efficient consistent exposure to the defined curriculum. Sound educational principles which include immediate feedback and ready access to all necessary materials can be consistently applied. The patterning used in the scenarios creates implicit learning which then can be applied in other settings. The learner is taught to use evidence based decision making, to apply the six ACGME /ABMS competencies, and to use guidelines for best practice. Interactive learning leads to greater retention of information. The immediate feedback gives a rapid assessment of self efficacy. Classification of response which takes into consideration of some of the ambiguities of care and differences of opinion when evidence is not available teaches the resident to weigh evidence. The reality of the charts, data and decision making creates an enjoyable learning experience with direct applicability to daily patient care. The American College of Surgeons Fundamentals of the Surgery Curriculum [ACS FSC] is presented as an example of such an applied curriculum program. The program can help the learner achieve early competency in a safe environment.

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Sean Tierney trained as a Surgeon in Ireland, the USA and the UK and was appointed as a Consultant Vascular Surgeon in the Adelaide & Meath Hospital, Tallaght, Dublin in 2000. This is a teaching hospital of Trinity College Dublin medical school where he holds the position of honorary lecturer.

He has a long standing interest in surgical training and was chairman of the Irish Surgical Trainees Association in 1998. He was part of the editorial team for BeST (basic electronic surgical training) developed by RCSI in 1999. In 2003, the College established an internet based case based discussion forum for surgical trainees called "*School for Surgeons"* and Sean was recruited to run this programme which he continues to do.

Initially designed for trainees in Ireland, the *School for Surgeons* is was later extended to trainees in both the Middle East (Bahrain) and Africa in collaboration with the College of Surgeons of East, central and Southern Africa (COSECSA). Sean was appointed Professor of Surgical Informatics in RCSI in 2009. Sean has also served on he Consultant Committee and the national council of the representative body for Irish doctors (the Irish Medical Organisation) and was elected President in 2010.

He has research interests in both the clinical and surgical educational areas. He won the Silver Scalpel awarded by the Surgical Trainees representative committee in 2005.

Learning technology & surgical education - where do we go from here?

Sean Tierney

Advances in Information and Communications Technology (ICT) in the last twenty years have profoundly challenged traditional models of education, not least in the field of sugery. The embedding of communications technology in our daily lives has altered fundamentally how we communicate, learn and function on a daily basis. Almost every physician now has access continuous access to the internet (via smartphone or tablet) to clinical information at the bedside or in the operating theatre. Trainees can be brought to proficiency in a simulated environment, including the use of “e-” or “m-”(mobile) learning, before treating and operating on real patients. The challenge of data security, as it is transmitted across the internet and stored in the cloud, is an ongoing concern and there is likely to be an ongoing conflict between ease of access to data and its security. Effective use of e-learning shifts the focus of the trainers to becoming facilitators of learning, whereby they facilitate understanding and discussion of concepts, allowing the trainees to become active participants in their own learning. The application of this technology and m-learning, in particular, has huge potential in the developing world. The development and deployment of appropriate e-learning platforms and content could deliver significant financial savings due to the potential economies of scale, as well as providing a framework for establishing and disseminating a common curriculum efficiently.

Similar platforms (e-portfolios) can be used to help surgeons record their (life-long) education and accumulate evidence to demonstrate to regulators that they are maintaining their competence throughout their career. Ideally, these would be seamlessly integated into other records system to reduce the burden of compliance.
Such data might also be used to as evidence in a continuous quality assurance process for surgical training programmes. The aggregate data from individual trainee portfolios could potentially provide accurate, high quality structured information on which to base these decisions.

Effective use of modern communications technology can help ensure that trainees progress, surgeons are supported in providing this training and that surgical training systems deliver a quality-assured product in which both doctors and patients can have confidence.

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E-learning and learning technology in surgical education - where do they fit in into a sub-Saharan Africa curriculum?

Nyengo C. Mkandawire

Background
Surgical education in sub Saharan Africa (SSA) faces severe challenges due to shortages in faculty; an inadequate teaching, learning and research environment; and limited funding for health and education. E-learning presents a unique opportunity to address this situation. Postgraduate surgical education in sub Saharan Africa largely follows two paradigms: the traditional university postgraduate degree based at a university teaching hospital or the more recently introduced collegiate fellowship programmes of the College of Surgeons of East Central and Southern Africa (COSECSA) with decentralization of training to accredited regional and provincial hospitals. Both systems benefit from e-learning initiatives.

E-learning programmes
Due to major costs required to establish robust e-learning platforms, collaborating partners in high-income countries support most of the initiatives in SSA. Examples include:

- Royal College of Surgeons in Ireland School for Surgery programme: A unique, Africa-centric surgical training e-learning platform jointly developed with COSECSA with a mandatory online training programme.
- Ptolemy project: the University of Toronto and the Canadian Network for International Surgery supports the COSECSA with free access its vast electronic library.
- University of Edinburgh e-learning project: with support from the Scottish Government, Royal College of Surgeons of Edinburgh and Johnson & Johnson the project supports health education in Malawi through online postgraduate surgical education at Masters degree through the ESSQ; establishing local virtual patients; online lifelong learning in medical education; and e-learning in clinical education.
- HINARI: a WHO initiative offering free access to e-journals and e-books to educational institutions in LMIC

Varied formats of e-learning delivery are used:

- Blended format combining e-learning and face-to-face teaching
- Computer assisted learning
- Fully online learning with no face to face contact
- Web-based learning
- Use of e-tutor and e-mentors
- Access to digital libraries
- E-granaries using local area network (LAN)

Challenges to e-learning in surgical training in SSA include:

- Costs for IT hardware, soft ware and maintenance of the system.
- Poor connectivity and narrow bandwidth and expensive access costs
- Poor electricity supply
- Developing local relevant clinical e-learning materials.
- Shortage of well trained IT personnel
- Establishing clinical e-learning facilities in state controlled hospitals

Evaluation
No formal evaluation of the cost effectiveness and benefit of these e-learning programmes have been done. Both quantitative and qualitative research to assess the benefit of e-learning in surgical education are needed to justify continued investment in these programmes. Evidence is emerging that e-learning programmes enhance and improve the quality of medical education and research; provide an opportunity for continuing professional development; improve job satisfaction and might lead to the retention of health care workers in LIC.

Notes

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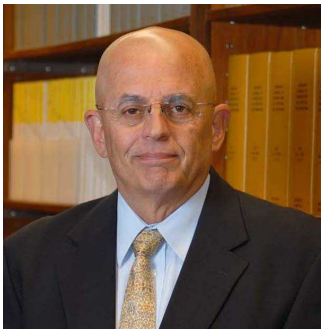

Dr. Barone graduated from Jefferson Medical College in Philadephia and trained in New York City at St. Vincent's Hospital. He served for two years in the US Navy and returned to St. Vincent's as chief of the surgical intensive care unit. He became chairman of surgery, residency program director and chief of trauma/SICU at St. Francis Medical Center in Trenton, NJ for 5 years and at Stamford Hospital in Connecticut for 14 years. He then was chairman of surgery at Lincoln Hospital in New York City for over 4 years.

He held clinical professorships at several medical schools including New York Medical College, Columbia College of Physicians & Surgeons and Weill-Cornell Medical College. His research interests focused on critical care, trauma and surgical education. He was a manuscript reviewer for several journals and an associate editor of the Journal of Parenteral and Enteral Nutrition.

Before retiring from a surgical hospitalist practice at the end of 2012, he had an urge to write. With the help of a mentor, he began blogging under the pseudonym "Skeptical Scalpel" about medicine, surgery, medical education and social issues. He also embarked on a career as a freelance reporter for Reuters Health and General Surgery News.

The blog has been successful, achieving 1000 page views per day recently. He also has a large following on Twitter.

Social Media and Surgical Education

James E. Barone, ***"The Skeptical Scalpel" Blog***

Twitter

Twitter is a service that allows one to post public messages of up to 140 characters. Many physicians use Twitter, but not that many on if you look at the big picture. A media research company did an exhaustive search and identified some 1400 physicians on twitter. This did not include those tweeting anonymously. Let's put it into perspective. A surgeon with a huge following is Atul Gawande. He has over 60,000 followers. There are about 314 million people in the United States and 750,000 physicians. One wonders how much impact Twitter really has. If you've searched Google for a specific topic, you know that there can be a lot of noise. Twitter is similar. For every pearl, you have to pick through a lot of distractions. But Twitter has alerted me to some interesting information that I probably would not have otherwise seen. Some residency programs are using Twitter to disseminate information to their trainees. The emergency medicine community on Twitter has set up a hashtag called #FOAMed (Free Open Access Medical education). They post a number of educational links with that hashtag. This link (http://conquestfrca. wordpress.com/2012/11/21/twitter-the-new-medical-symposium/) provides an example of "crowd-sourcing" a clinical question about whether cricoid pressure is worth doing during endotracheal intubation. One surgical educator has been using Twitter to pose a weekly board-type question which residents can ponder and discuss on a blog site. Twitter may yet have some value in medical education. Here are two links with information about Twitter and good tips on how to get started. (http://deevybee.blogspot.co.uk/ 2011/06/gentle-introduction-to-twitter-for.html and http://www.generalsurgerynews. com/ViewArtcle.aspx?d=In%2bthe%2bNews&d_id=69&i=March+2013&i_id=940&a_id=22685)

Blogging

My traditional bibliography consists of 95 papers, letters and book chapters. A blog that I wrote about statistical vs. clinical significance (http://skepticalscalpel.blogspot.com /2011/08/statistical-vs-clinical-significance.html) has had > 5000 page views. I estimate that is far more than the number of views of everything I previously published in print form combined. I believe that open access journals and blogs will eventually replace the time-honored print journal peer review process. Future peer review may take place after the paper is published and may consist of blogs such as the one I wrote in response to a PLoS ONE paper claiming that moderate drinking of alcohol during pregnancy caused a 1.8 point drop in children's IQs. (http://skepticalscalpel.blogspot.com/2012/11/ moderate-maternal-alcohol-use-lowers.html). Most people now get their news from the Internet. I think this will also be the case for medical education. Will blogging have an impact? I think it will.

YouTube

Videos found on line have been used to supplement textbooks in areas such as dynamic basic science concepts. Clips showing physical examination maneuvers and operations have aided students in preparing for clinical rotations. YouTube and other video repositories have many on line lectures and discussions that can be accessed at the student's convenience. One problem is that many hospitals block YouTube so that employees will not waste time or clutter bandwidth.

Conclusion

At this time, there is limited evidence that social media have any use in surgical education, but that may change.

Notes

Notes

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Since 1990 training in Atlanta, Chicago, Houston, Pittsburgh, San Francisco.
Scientific director of several meetings and workshops in Germany (12 seminars in Munich, Düsseldorf, Tegernsee, 11 work shops in Lübeck (saw-bones and wet lab).
Founding President of the Foot surgery foundation' in Germany 1996
Giving international lectures in the field of foot surgery in Atlanta/Georgia, Dallas/Texas, Sanibel Island/Florida, San Francisco/California, St.Petersburg/Russia, Mexico City, Helsinki/Finland, Wels/Austria, Doha/Qatar, Miami and Houston/USA, Beirut/Lebanon, Riyadh/Saudi Arabia, Skien/Norway, Budapest/Hungary, Honkong and Kanton/China, , Ho Chi Minh City and Hanoi/Vietnam.

Chairman of instructional wet labs in the USA, Mexico, Europe, Lebanon, China and Russia.
2002 Certified Foot and Ankle Surgeon , Association for Foot Surgery, Germany
2003 Honorary member in the American College of Foot and Ankle Surgeons (ACFAS)
Affiliate member of the Podiatry Institute Atlanta, Georgia

Publications:
Translation (English/German) - Comprehensive textbook of Hallux valgus surgery, Marcincko 1994
Update 2004, Podiatry Institute Atlanta
Several papers in scientific journals

Education costs money but then so does ignorance

Kai Olms

Education and practical training are the most critical parts of surgical education. Negligence will lead to low level qualifications, inappropriate surgical skills and above all to imperilment of the patients.

The surgical residency programs require much more efforts in practical training and simulation than what has been achieved today.

Attempts to improve the situation usually fail due to inadequate financial resources. It seems to be vital for the improvement of this situation to find a solution to incorporate the industry in these ambitious efforts much more effective than in the past.

The relationship between healthcare professionals and the industry is subject to national and international regulations. These rules have been established to create a culture of compliance and transparency among the companies involved.

Eucomed and AdvaMed and their branches as core representatives of all organizations dealing with ethics in business were able to establish very detailed rules of ethical cooperation, however, the interpretation of these regulations by their member seems to be very variable.

Among other topics, strict regulations refer to:

Member- sponsored Product training and Education
Supporting third party educational conferences
Sales and promotional meetings
Educational grants

There is a consensus about regulations regarding separation, transparency, equivalence and documentation.

All codes of conduct deal with education and the support of the trainees, however, it still seems to be too complicated to gain access to fundings of educational programs.

A global code of ethics regarding the specific relationship between HCP´s and industry in the field of education and training would not be possible to create in in the foreseeable future.Therefore, in close collaboration bewteen highly specialized lawyers at the Swedish national level as well as the European level and the Surgicon Foundation a new tool has been created, containing the basic content of existing codes of ethics, called: ***"Surgcon's Simple Guidelines for Surgeons***". The 5 basic principles on one page are easy to read, and intended as an 'every-day-help' not to exceed any legal limits. The principles do not replace existing laws and regulations, but explain the content of those.

Surgicon's 5 Principles for professional interactions between surgeons and industrial parties

Introduction

Surgeons and the surgical device industry are depending on each other, in many ways. In all interactions between industry and health care institutions, where the industry is financing costs related to the health care, the following basic principles should be respected. Following these principles of compliance will reduce the risk of violating applied regulations*. The regulations vary slightly between countries. The 5 principles described below should only be regarded as a tool to understand the content of existing regulations, and are not for legal use. In all situations only the original codes* could be legally applicable.

These 5 principles have been worked out in collaboration between Surgicon and legal experts specialized in the area of compliance, at the Swedish and European level:

***1 Principle of Transparency*:** Interaction between industry and health care, or medical staff, should be open and transparent and performed in compliance with applicable laws, regulations, business codes and codes of conduct.

2 Principle of Documentation: When a service is performed by the health care, or medical staff, for the industry the following data must be agreed in writing:

- the purpose of the interaction
- the service to be performed or
- what the contract would otherwise cover, and
- to what extent and
- how compensation should be made, and
- the compensation to be paid.

Likewise documentation should be made in case of industry funding of health care, or medical staff, or when other benefits are transferred from industry to health care, or medical staff. Adequate documentation such as the agreement, related reports, invoices, etc. must be retained by the parties to support the need for, and content of, the relevant relationship and to determine the reasonableness of compensation paid.

3 Principle of Proportionality: Agreements between industry and health care, or medical staff, about their respective commitment should be in good proportion to one another. In addition, compensation must be proportionate, reasonable, and correspond to the market value of the service rendered.

4 Principle of Moderation: Arrangements in any way supported by the industry should be permeated by moderation. The requirement for moderation means that the benefit may not seem to affect the behavior of the recipient. Interaction between industry and health care, or medical staff, should thereby not involve undue influence, and should not compromise, or perceive to compromise, the independence of health care professionals.

5 Principle of Mutual Benefit: Arrangements where the industry make any contribution to the participation by medical staff, the participation should be clearly linked to the company's normal activities, and equally of value to the healthcare provider.

Surgicon's 5 Principles for professional interactions between surgeons and industrial parties are based on:

Samverkansavtalet (SWE)
http://www.swedishmedtech.se

Eucomed Code of Ethical Business Practice (EU)
http://www.eucomed.org

Advamed Ethical Code (USA)
http://www.advamed.org

CMSS (USA)
http://www.cmss.org

EFPIA Code of Conduct
http://www.efpia.eu/code-conduct

IFPMA Code of Conduct
http://www.ifpma.org/ethics/ifpma-code-of-practice/ifpma-code-of-practice.html

FCPA
http://www.fcpa.us

OECD
http://www.oecd.org

UK Bribery Act
http://www.legislation.gov.uk/ukpga/2010/23/contents

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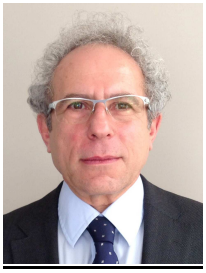

Ara Sarkissian is Regional Director of KARL STORZ Endoskope for the sub-Saharan and Maghreb region. Since his appointment in this position in year 2000, Ara Sarkissian has been covering the area to develop the company's activities. In this capacity, he was soon faced with the education and training challenges in endoscopic training needs of regional surgeons. The family-owned company KARL STORZ is committed and has a long experience in supporting training and education; these worldwide activities are part of its core competences. Over the years, Ara Sarkissian had to interact with different actors (surgeons, teaching hospitals, medical faculties and ministries of health) to suggest, build and coordinate training programs and activities to lift regional endoscopic surgical skills. In this quest, he relied on the company's large network of specialized surgical teams, led by eminent professors, willing to come and share their expertise with the regional faculties. Part of this mission was also to establish permanent regional training centers. This was executed in many venues: Accra, Dakar, Addis Ababa, Johannesburg, Cape Town…

Ara Sarkissian is Electrical Engineer and holds an MBA degree from the American University of Beirut - Lebanon. He also holds a Masters degree in International Relations from the Université Saint Joseph in Beirut.

Corporate Support in Training – Emphasis on sub-Saharan Africa

Ara Sarkissian

KARL STORZ GMBH & CO. KG is one of the world's leading suppliers of endoscopes, endoscopic instruments and devices for more than 15 surgical disciplines in human medicine. The company designs, engineers, manufactures and markets all its products with effectiveness. The family-owned company was founded in 1945 by Dr. med. h. c. Karl Storz in Tuttlingen, Germany and since 1996, the daughter of the company founder, Dr.
h. c. mult. Sybill Storz, took over the management of the KARL STORZ group. In 2013, KARL STORZ has about 2,000 employees in its German headquarters and throughout the world 5,800 employees are engaged.

On a world-wide level KARL STORZ is very involved and dedicated to support medical training institutions so that young physicians can receive endoscopic training in order that more patients can benefit from the great advantages of this surgical technique.

KARL STORZ and its management are of the firm opinion that the medical industry has to take its responsibility for education and training. Furthermore KARL STORZ believes that medical education and training have to remain in the hands of surgeons and therefore the company focuses on supporting education and training with high quality equipment and logistics. Medical content is exclusively provided by physicians.

In less developed countries, supporting training is not only a philanthropic activity but is part of the business model. This somehow modern approach for development aid put emphasis on building a sustainable and adapted business model and is not only about donating equipment. This was, for example, achieved with the Women Health Initiative in India - a PPP project that was conducted by KARL STORZ, the GIZ (German Association for International Cooperation) and academically evaluated by the United Nations University, Tokyo. Aim of this PPP project was to provide start-up aid to establish six gynecological training centers that will continue, after the project end, to offer sustainable training on a financially self-supporting manner.

Training needs are immense in sub-Saharan Africa. Over the years, links were established with a network of regional specialists, their needs in training discussed and training programs established and executed. This regional network was put in communication with the company’s international network of surgeons. Permanent training centers were put in place and supported in some major regional cities. The challenge is to make these centers sustainable with self-funding and operational capacity. KARL STORZ keeps on cooperating with local faculties in scheduling and supporting targeted training programs. The company continues its quest in enlarging
the access for training to other parts of the region.

There are numerous entities supporting surgical training and education activities in sub-Saharan Africa. Why not think of a more global and more standardized efforts to reach even more efficient results and sustainable activities?

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Hans Lönroth is professor of surgery and chief of Department of Surgery at Sahlgrenska University Hospital.

Hans Lönroth joined the upper GI-team at the Department of Surgery in the mid-eighties after getting his base training in surgery at a county hospital in Sweden. 1990 he started his training in laparoscopic surgery. He worked with the development of laparoscopic applications of different upper GI-procedures and among them laparoscopic techniques in obesity surgery. He presented his early experiences of laparoscopic vertical banded gastroplasty as well as laparoscopic gastric bypass at a meeting of the International Federation for Surgery of Obesity in Stockholm 1995. His first publication concerning laparoscopic techniques of VBG as well as gastric bypass were presented in 1996.

Hans Lönroth has continued his clinical research concerning obesity surgery with focus on hunger and satiety including the surgical procedures impact on gut hormones, cognitive restriction, eating patterns, clinical outcome and comorbidities. The goal has been searching for methods for prevention and treatment. He has among others, cooperated with professor Lars Sjöström concerning the Swedish Obese Subject Study, originally initiated by professor Sjöström in the 1980-ties. Hans Lönroth has also been working with research concerning acid related gastrointestinal diseases and motor function disturbances in the upper GI-tract.

Since 1996 Hans Lönroth has conducted workshops in the topics of obesity surgery and upper GI-laparoscopy. During the years the focus of yearly workshops has mainly been around technical aspects and skills training in laparoscopic gastric bypass.

Educating in Collaboration with the Industry

Hans Lönroth

The first surgical attempt to cure obesity took place in Sweden in 1952 when doctor Viktor Hendriksson performed an irreversible extensive small bowel resection on a morbidly obese female patient, which led to malabsorptive weight loss. Since then several surgical procedures aiming at long standing weight reduction have been presented. In the 1960-ties gastric bypass was presented by Mason and Griffen. Gastric bypass has since then become one of the most widely used techniques for surgical weight reduction.

For more than 15 years workshops about the topic obesity surgery have been conducted at the Department of Surgery in Sahlgrenska University Hospital. The workshops have been supported by Johnson & Johnson Sweden. This has developed to a mutual win win situation where the department has developed a worldwide network for surgeons and the industry has been able to offer costumers an opportunity to meet other surgeons and discuss topics related to surgical procedures.

During the years is became more and more obvious that it was necessary to limit the course program to only one procedure i.e. the laparoscopic gastric bypass.

The format of the workshop has been influenced by Rodney Peyton who wrote "Teaching and Learning in Medical Practice". Skills training as described by Tony Gallagher and multimodality teaching adapted from the Montessori philosophy have also been used in the teaching concept.

The main content of the workshop has been power point presentations, interactive live operations and the participants skills training in an animal lab. The main topic has been technical aspects of every step of the gastric bypass procedure, identification of adverse events and strategies to handle them. Presentation of outcomes and lessons learned are discussed. One of the main messages is "do not make mistakes already repeatedly done by others".

Until April 2013 more than 350 surgeons from over 20 countries have participated in the workshops given at Sahlgrenska University Hospital. The number of obesity surgical procedures in Sweden has during the past ten years increased from 800 to 10.000 patients per year in a population of 9 million people. More than 95% of all the procedures done in Sweden are made according the technique presented at the workshops at Sahlgrenska University Hospital.

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Dr Hyltander received his medical degree from the University of Gothenburg 1979 and became a board certified surgeon in 1985.
He became a member of the team at the Dept. of Surgery at Sahlgrenska University Hospital Gothenburg 1986 for completion of his surgical training and initiation of research projects where he was affiliated with the Surgical Metabolic Research Laboratory. He joined the team of Upper Gastrointestinal Surgery 1990, an area that since then has been the focus of his clinical interest especially cancer surgery. He became Ph.D. in 1992 and Associate Professor of Surgery 1995, the following year he was appointed Senior Consultant and Head of the Division of Upper Gastrointestinal Surgery. One of the major research topics has been treatment of pancreatic carcinoma.

Another research project during the following years focused on development and implementation of virtual reality technology in basic surgical training. In 1999 this project became the core in a new company, Surgical Science Ltd, one founder of which was Dr Hyltander. The company is established as one of the major players in this area of business and technical development. He held the position as CEO for several years after which he returned to the position as Head of the Division for Upper GI Surgery in 2005 but remained with the company as senior advisor.

In 2010 he received the position as head of the Dept. of Surgery at Sahlgrenska University Hospital campus Östra.

The surgical – industrial Interface. What are the issues?

Anders Hyltander

A continuous flow of new ideas eventually leading to refinement of existing products or brand new technologies that might cause paradigmatic shifts in clinical practise are examples of prerequisites for an improved surgical patient outcome. One perspective of which is an increased patient safety, another more cost-efficient use of resources spent on health care.

The innovative forces demand contribution from different players, the most important of which are briefly described here namely; academia and industry but also government, the three often referred to as the the Triple Helix.
Ideas and hypotheses are often created in the academic or clinical setting, or in R&D environment in commercial companies or in an often complex interplay between these. In the academia it is obvious that creativity and entrepreneurship are important and need to be identified and supported. However, not only clinicians and medical scientists are responsible in this context, there are often also an internal academic teamwork with contributions also from computer engineers, physicists and opticians just to mention some competences needed. Moreover, there is also a need for an academic infrastructure, a fertilizer, making it possible to grow and develop ideas with potential to become early start ups. Know-how regarding legal aspects, i.p. rights, funding are all examples of important competences. A potential pitfall in this context though is to have commercialisation as the primary goal in projects instead of sound scientific endpoints.

From an industrial perspective it is of absolutely of vital importance to have an ongoing product development which can be conducted or executed in-house or in close collaboration with prominent academic and clinical institutions or a combination of both. That collaboration can be organized in various ways from sole financial support, to include projects often connected to rights to get access of data, acquire i.p. rights or even employment of individuals judged as having vital knowledge and competence.
These two players are in various ways dependent on each other and the awareness of this interplay has been confirmed and appreciated since many years.

However, another central player in this context is the government. If academia might represent ideas and innovation, industry productification and commercialisation, the government represents regulation but also infrastructure and resources all of which important factors to facilitate these processes. Much attention has been paid from authorities with investments in infrastructures directly or via the universities. Examples of such investments are incubators and holding companies with all competence needed from financial, i.p. and juridical perspectives, that are nowadays present at most academic institutions.

However, the perhaps most important governmental task in this context is availability to financial resources. Access to grants even for early projects with a liberal and including attitude toward these allowing the strong ones to grow and mature are all essential factors in this context. Funding is thus a most vital issue, the importance of which cannot be overemphasized.

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Ms. Pedulla is a Principal of Berkeley Research Group's Boston, Massachusetts office and a member of the BRG – Health Analytics and Corporate Compliance and Regulatory Risk Management Practices. Prior to joining BRG, Ms. Pedulla served as Senior Vice President and Chief Compliance Officer at Orthofix International NV, an international orthopedic medical device company, where she was responsible for developing and managing Orthofix's domestic and international corporate compliance and ethics program and assisting the company in successfully resolving several federal health care fraud and anti-corruption investigations related to legacy business practices. Prior to Orthofix, Ms. Pedulla served as Vice President of Compliance, Regulatory and Government Affairs and Associate General Counsel for Fresenius Medical Care North America.

An attorney, Ms. Pedulla has more than 24 years of experience in health care regulatory compliance. She has extensive expertise in corporate compliance and has developed all aspects of compliance and ethics programs from their inception for hospitals, medical centers, physician group practices, durable medical equipment suppliers and medical technology companies. Ms. Pedulla is certified in health care compliance by the Health Care Compliance Association and holds a Bachelor of Science in Nursing from Boston College, a Juris Doctorate from Suffolk University and a Masters of Public Health in Health Policy and Management from Harvard University. Ms. Pedulla is a current member of the Health Care Compliance Association, the Health Law Sections of the American, Massachusetts and Florida Bar Associations and the American Health Lawyers Association.

Ms. Pedulla speaks frequently on health care compliance and best practices for healthcare professionals, institutions and industry. Ms. Pedulla also continues to collaborate with AdvaMed and Eucomed, the global medical technology industry trade associations, and has served previously on both trade associations' legal and compliance committees.

Ethical Interactions and Compliance Best Practices

Denise E. Pedulla

Ethical collaboration between healthcare professionals and the medical technology industry is necessary to advance medical technological innovation and promote the safe and effective use of medical technologies by healthcare professionals. Medical technology industry support of research and education also enhances healthcare professional standards, contributes to patient safety, and increases patient access to new medical technologies.

As healthcare professionals and medical technology companies are increasingly operating in a heightened enforcement environment globally, the need for compliance best practices on ethical collaboration between healthcare professionals and the medical technology industry has never been more important. Implementing and enforcing compliance best practices concerning such ethical collaboration preserves independent decision-making by healthcare professionals with regard to patient care, advances compliance with applicable laws, and reduces global compliance risk for all stakeholders.

Based on compliance guidance published to date in various industry codes of conduct, such as the *Eucomed Code of Ethical Business Practice – Guidelines on Interactions with Healthcare Professionals*, as well as related guidance documents, procedural frameworks and advisory opinions, compliance best practices on ethical collaboration between healthcare professionals and medical technology companies are discussed in the following contexts:

- Industry-Sponsored Product Training and Education
- Third Party Educational Conferences
- Sales and Promotional Meetings
- Arrangements with Consultants
- Gifts
- Provision of Reimbursement and Other Economic Information
- Donations for Charitable and Philanthropic Purposes
- Educational Grants

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Pr Barbara Lee Bass, M.D., FACS

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Barbara Lee Bass MD, FACS is the Chair of the Department of Surgery at the Methodist Hospital in Houston, Texas. She holds the Bookout Distinguished Endowed Chair and appointment as Professor of Surgery at Weill Cornell Medical College of Cornell University and is Executive Director of MITIE: the Methodist Institute for Technology, Innovation and Education.

Dr. Bass earned her MD at the University of Virginia School of Medicine and completed general surgery training at the George Washington University. She completed a research fellowship at the Walter Reed Army Institute of Research while serving as a Captain in the US Army Medical Corps. She previously served as Professor and Vice Chair of Surgery and Chief of Surgery of the VA Maryland Health Care System at the University of Maryland.

Dr. Bass has served as Chair of the American Board of Surgery and the Board of Governors of the American College of Surgeons as well as a Regent of the American College of Surgeons and President of the Society for Surgery of the Alimentary Tract. In addition to sitting on the editorial boards of the Annals of Surgery, SURGERY, the World Journal of Surgery, and the Journal of the American College of Surgeon, she is co-editor in chief of the Journal of Computational Surgery.
Her current research interests are in surgical education, surgical quality measurement and health services delivery, and application of mathematics to surgical problems – a new discipline known as computational surgery.

As executive director of the MITIE, Dr. Bass has formed the vision for a new platform for lifelong surgeon retraining. MITIE serves as a hands on training facility and educational research site for surgeons in practice to safely acquire new skills in new technologies and procedures in a non-patient based learning environment with the goal of improving patient safety and the quality of surgical practice.

Building the Infrastructure for Surgeon Retooling

Barbara L. Bass

Over the course of a forty year career, surgeons are faced with repeated demands to safely and efficiently incorporate new procedures and technologies into their surgical repertoires. Unlike the structured, supervised training that occurs during formal residency training, surgeons in practice are often faced with seeking opportunities to acquire these new skills in less structured programs, while maintaining their busy surgical practices. The rapid advances in new technologies, many of which offer greater patient safety and more rapid recovery when safely performed, and public demand for new procedures, currently outpaces the retooling and retraining capacity of our continuing education system. Examples over the last 20 years of revolutionary technologies with premature dissemination into the practicing surgical workforce without sufficient non-patient based or supervised training and consequent harm to patients during the surgical community's collective learning curve, include the introduction of laparoscopic surgery for abdominal surgery, endovascular procedures, advanced therapeutic endoscopic procedures, and robotic surgery, among others. Numerous international efforts have been proposed to ensure safe and efficient retooling for surgeons in practice, including the initiative of the American College of Surgeons Accredited Education Institutes program. However, the infrastructure to support the retooling surgical workforce remains in its infancy. The essential components of an effective infrastructure for retooling include structural components, program components and policy considerations, briefly articulated here.

An effective retooling facility will provide the physical space and equipment essential for non-patient based acquisition of new skills using relevant new technologies. The space must be of sufficient scale to accommodate necessary equipment to create a realistic, reproducible learning environment. Simulation models that mimic in a deconstructed or global fashion the essential skills required to perform a new procedure and to use new instrumentation and technologies are essential. The facility should be linked to a clinical facility to allow learners to observe, in real time, the procedures and technologies to further facilitate safe adoption. Post-training teleproctoring technologies are needed to safely supervise surgeons as they adopt new procedures into their practices back in their home facilities. Programmatic infrastructure includes the creation of curricula based on the new training needs. Curricula must include both didactic content to teach appropriate utilization of new technologies and procedures, and curricula for the skills and procedural training. Faculty, content experts and skilled educators, need to be trained to ensure that training is efficient and of high quality. Objective assessment tools, to measure the success of training and the readiness of a surgeon to incorporate the new procedures and technologies into their practice as needed. The development of a new retooling infrastructure also requires examination of relevant health care policy. A durable financial model to support the structural and programmatic needs of this new component of the medical education system must be developed. Responsibility for this expense must be borne in our health care budget and should be shared by the beneficiaries and stakeholders, including surgeons themselves, hospitals, purchasers of health care and insurance carriers, and the surgical technology industry, among others. The incorporation of retooling training and assessment into the surgical privileging landscape needs to be considered as a metric for ongoing competence through a long surgical career.

Several facilities are in development in the United States to meet this retooling and retraining infrastructure demand. One prototype facility, MITIE – the Methodist Institute for Technology Innovation and Education at the Methodist Hospital in Houston Texas will be discussed.

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James Garden is Regius Professor of Clinical Surgery and past Head of the School of Clinical Sciences and Community Health at the University of Edinburgh. He graduated from the University of Edinburgh (1977) and trained in Glasgow, Edinburgh and Paris in hepatobiliary, pancreatic and liver transplantation surgery. As a specialist hepatobiliary and pancreatic surgeon over the last 20 years at the Royal Infirmary Edinburgh, his clinical interests extend from laparoscopic cholecystectomy to liver transplantation. He has a particular interest in the management of both benign and malignant disease of the liver and bile ducts including the surgical treatment of complex injuries to the bile duct. He has led significant clinical, academic and service developments in Edinburgh and nationally. His academic surgical unit has an outstanding record of producing clinician scientists. He has published extensively in his field and is editor of thirteen books, over 70 chapters and 240 articles. He is past Associate Editor of the World Journal of Surgery and current Editor-in-Chief of HPB. He has strong interests in undergraduate and surgical education. He is Director of the MSc in Surgical Sciences (Edinburgh Surgical Sciences Qualification) that forms part of the collaborative venture with the Royal College of Surgeons of Edinburgh. This novel distance e-learning programme supports the surgical trainee through the early years of their postgraduate surgical training. The programme has been the fastest recruiting Masters programme in the history of the University and has some 250 matriculated students enrolled at any one time. He was awarded the Chancellor's Award for Teaching by the Duke of Edinburgh at Holyrood Palace in August 2010 for this work and the programme received the 2010 eLearning Award - Best Online or Distance Learning Programme Education in November 2010. He was a Travelling Fellow and is the Honorary Secretary of the James IV Association of Surgeons. He is a Past President of the Association of Upper GI Surgeons of Great Britain and Ireland. He is Chairman of the British Journal of Surgery Society Ltd. He was Chairman of the RCSEd Quincentenary Congress in 2005 and of the 7th World Congress of the IHPBA which met in Edinburgh in September 2006. He was appointed President of the IHPBA in July 2012. He is a Fellow of all the Royal Colleges in Scotland and serves on Council of the Royal College of Surgeons of Edinburgh. He is an honorary member of the Society for Clinical Surgery, the German Surgical Society, the New Zealand Association of Surgeons, the British Columbia Society of Surgeons, the Eastern Surgical Society, the American Surgical Association, the North Pacific Surgical Association and the Society for Surgery of the Alimentary Tract. He has honorary fellowships of the Royal Australasian College of Surgeons and the Royal College of Physicians and Surgeons of Canada. He was appointed Surgeon to the Queen in Scotland in 2004.

Retooling the surgeon in the UK - is it possible?

O James Garden

'To revise and reorganize, especially for the purpose of updating or improving'

Retooling in medicine is a term more often used to describe the reorganization of a facility or service rather than one that is directed at the surgeon. Health care is under considerable change in the United Kingdom and there are pressures on the individual surgeon brought about by increasing surgical specialisation, delivery of emergency surgical services, reduced working hours, increased expectation for quality outcomes for the patient and the introduction of revalidation. Undergraduate medical education and surgical training are also in the midst of considerable change. Modern communications technology provides unlimited possibilities for instruction, education, and learning and will require to be embraced in the future. In the United Kingdom, the surgeon is trained towards working as an independent surgical practitioner and yet service configuration and redesign often demands team working to deliver effective and safe patient care.

In this presentation, the topics that will be considered will include regulation and recertification of the surgeon in the United Kingdom. These will be illustrated based on experience and analysis of surgical health care delivery in Scotland. Analysis of outcomes for the most common abdominal operation, cholecystectomy will be used to consider the conflicts that often exist between service delivery and the surgeon. The issues around individual surgeon's performance and assessment will be highlighted and ways in which the continuing professional development of the surgeon can be supported will be considered. Finally, the question of whether the sub-optimally performing surgeon can be identified will be considered and possible solutions to corrective intervention will be proposed.

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Cem Terzi was borne in 1962 in Ankara, Turkey. He was graduated in 1984 from Ankara University Medical Faculty. He had his postgraduate training in Ankara Numune Training and Research Hospital between 1988-1992. He has worked in Southampton General Hospital in the UK as a research registrar as well as senior registrar between 1995-1997. Dr. Terzi had GMC full registration in the United Kingdom in 1997. He became Assistant Professor in 1999, Associate Professor in 2000, and Professor of Surgery in 2005 at the Dokuz Eylul University Medical Faculty, Izmir, Turkey. He is still working in this hospital in the Dept. of Surgery, Colorectal Surgery Unit. Prof. Terzi has two board certifications: Turkish Board of Surgery in 2002 and European Board of Surgery in 2011(honorary diploma). He was awarded with the International, Scholarship Award by the American Society of Colon and Rectal Surgeons in 2003 and he has been in the USA for four months as a visiting academician in several major colorectal clinics including the Cleveland Clinic Ohio and the Mayo Clinic. His academic interest areas are colorectal surgery, surgical infections, medical education, post-graduate training and E-learning. He is the writer of the book titled ''Medical Education: A Bridge to Public Health''. He is the founder of the Virtual Academy of Turkish Surgical Association and the founder and chief editor of E-Surgery Text Book of Turkish Surgical Association. He was one of the writers of the books titled ''Turkish Surgical Association Resident Committee Report on Surgical Education 2010'' and ''Turkish Surgical Society Report on General Surgery Manpower Workforce and Workload 2009''. Prof. Terzi was the member of Executive Committee of Turkish Medical Association (TMA) between1994-1995. He was the member of Turkish Medical Association Accreditation of Continuous Medical Education Committee between 1994-2000. He was the member of TMA Coordination Committee of Medical Specialty Societies between1999-2004, and the president of TMA Coordination Committee of Medical Specialty Societies between 2004-2006. Prof. Terzi was the member of Committee of Board of Turkish Surgery between 2000-2006, and General Secretary of Board of Turkish Surgery between 2000-2002. He was the National Delegate of The UEMS Section of Surgery between 2008 and 2012. He was the Member of Executive Committee of Turkish Society of Colon and Rectal Surgeons between 2008-2010. Prof. Terzi became the president of Turkish Surgical Association (2008- present) and the President of European Society of Surgery (2011- present). He was the associate editor of Journal of Turkish Colon and Rectal Disease betwwen 2008-

2012. Prof. Terzi is in the editorial boards of Journal of Dokuz Eylül Medical Faculty (2010-present). He is also works as the reviewer in some national and international medical journals. Prof. Terzi is the author and co-author of several national and international articles, author of several national textbook chapters, editor and co-editor of national medical textbooks. He is the president of XVI. Annual Meeting of the European Society of Surgery which will be held in 22-24 November 2012 in Istanbul, Turkey.

Surgical Education Websites: an example of the Turkish Surgical Association Virtual Academia

Cem Terzi

E-learning has great potential as a tool for educating healthcare professionals and the public. Several Surgical Associations have been involved in some form of distance learning programme over the last 15 years. Nowadays, web medium is an integral element in the delivery of surgical education.
We (Turkish Surgical Association–TSA) developed the first comprehensive e-learning programme of Turkey in terms of supporting continuing professional development (CPD)/continuing medical education (CME) of medical doctors especially for surgeons. The Virtual Academy, founded by TSA on 12 December 2009, offers e-learning tools to their members accredited by Turkish Medical Association Continuing Medical Education Accreditation Council in order to increase the accessibility of CME/CPD, to provide current and relevant information, and to ensure quality improvement of CME/CPD. It is a completely free of charge service and open to all healthcare professionals as well as to medical students.
The core curriculum consists of 5 main sections: General issues, main issues, basic surgical skills, advanced surgical skills and evidence-based surgery. The proposed approach is based on modular architecture; therefore the additional modules could be easily integrated. Each of these modules can be accessed separately, as they are independent of one another. This modular training system has 4 basic module types: e-articles, e-reviews/guidelines, e-cases and e-operations. Many of modules are formed by mix of basic module types. The architecture of the module includes aim(s) of the module and learning objectives. Didactic lessons are based on texts, images, presentation, audio and video data. All modules have multiple choice question test and a forum medium in order to the discuss the topic with trainers and other trainees.
As of October 2012 the number of users who start with modules was 39.968 (nonsingular), whereas the number of ones completing the modules was 14.034 (nonsingular), and the total number of modules reached to 100. We have 3.033 registered users (singular).
TSA Virtual Academy is met by tremendous interest by our country's surgeons and surgical residents. The users are existed in almost every province and district. The process of preparing the module and thus the completion of core curriculum takes longer than initially planned. The rate of users who complete the modules and gain CME credit score was lower than expected. It is possible that the long duration of modules could have played a part. In our experience the optimum time has been identified as 30 minutes.
TSA Virtual Academy can be an important complementary source in the training of surgical residents. TSA Virtual Academy can be used in recertification programme run by TSA Board.

Notes

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Dr. Dunkin is the Head of the Section of Endoscopic Surgery and Medical Director of the Methodist Institute for Technology, Innovation & Education (MITIE^{SM}) at the Methodist Hospital in Houston, Texas. He did his surgical residency training at the George Washington University in Washington, DC and a fellowship in advanced laparoscopy and surgical endoscopy at the Cleveland Clinic in Ohio. He has been an Assistant Professor of Surgery at the University of Maryland and an Associate Professor at the University of Miami in Florida. He joined the staff at the Methodist Hospital in January of 2007.

Dr. Dunkin's clinical practice is focused on advanced laparoscopic surgery and flexible GI endoscopy and he is the co-director of the Methodist minimally invasive surgery fellowship program. Dr. Dunkin is also the Medical Director of MITIE – a world class comprehensive education and research institute focused on helping practicing health care professionals learn new procedural skills and adopt new medical technology. Dr. Dunkin's research interests are in the development of novel methods and devices for endoscopic surgery, as well as the use of leading-edge technology in the development of improved training programs for surgeons. He is published in the areas of flexible endoscopy, minimally invasive surgery, surgical education, and gastrointestinal physiology. He is a Board member and 1st Vice President of the Society of American Gastrointestinal and Endoscopic Surgeons, Past President of the Texas Association of Surgical Skills Laboratories and serves in leadership roles in the American College of Surgeons, the Surgical Society of the Alimentary Tract, and the American Society of Gastrointestinal Endoscopy. He is also a member of the editorial boards for Surgical Endoscopy and the Journal of Laparoendoscopic and Advanced Surgical Techniques and in 2010 was appointed a Professor of Clinical Surgery at the Weill Cornell Medical College in New York – the academic affiliate of Methodist.

Optimizing training for procedural and technology adoption: the essential elements and process.

Brian J. Dunkin

The current pace of technological change in surgery is unparalleled. In less than three decades the profession has moved from open surgery to laparoscopic, endoscopic, and even image or robotically assisted surgery. No longer can one rely on the training he or she received during residency or fellowship to sustain them throughout a 40-year career. Unfortunately, the practicing surgeon faces incremental as well as disruptive innovation in surgical devices, tools, and technology without structured and safe non-patient-based opportunities to adopt those innovations. This has sometimes resulted in less than desirable outcomes for patients as was seen in the early days of laparoscopic cholecystectomy when the incidence of common bile duct injuries increased.
This need to create an "educational home" for practicing health care professionals has led to the development of a network of education institutes across North America through an accreditation process developed by the American College of Surgeons (ACS). Despite this growing infrastructure, many barriers exist that prevent successful procedural adoption. Among these are financial burdens currently born by the physicians or device manufacturers, legal concerns which prevent ready access to hands-on training in real clinical environments, lack of purpose-built facilities to meet the needs of practicing health care professionals, and variable paths to credentialing – a process determined by each individual hospital.
This presentation will explore the challenges of staying "up-to-date" in the current medical environment, describe the barriers to procedural adoption, explain the ACS Accredited Education Institute program, and show work that is being done to overcome obstacles to successful procedural adoption. Novel research in the areas of wearable technology for audio-video conferencing in the operating room, quantitative stress measurement as a surrogate for procedural competence, and proficiency-based training in robotic and flexible endoscopic surgery will also be described. At the end of this presentation, the learner will be able to:

- Discuss challenges to maintaining procedural competence throughout a 40-year career
- Describe current barriers to successful procedural adoption
- Identify key components of a purpose-built surgical training facility for practicing health care professionals
- Describe the American College of Surgeons Accredited Educational Institutes program and how it is being used to re-tool the surgical workforce
- Compare current measures of procedural competence to novel new measures

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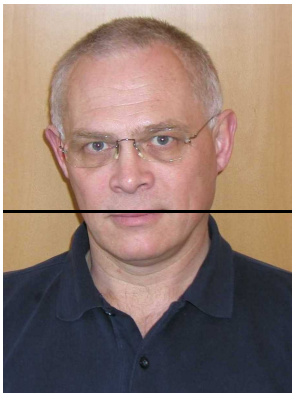

Karsten Offenbartl was born 1951 and received the degree of associate professor of Surgery at Lund University. Since 1989 he is working as consultant surgeon at Höglandssjukhuset, Eksjö, Sweden, with a main interest in trauma and upper gastrointestinal surgery. Since 2007 he is active in the educational committee of the Swedish Surgical Society and responsible for developing a Swedish training program for on-call surgeons in emergency surgery.

How to take on the ever-changing challenges of emergency surgery. The Swedish Society of Surgery example.

Karsten Offenbartl

Emergency surgical services pose a worldwide problem. The background is multifaceted and varies between countries. There are some common causes:

-Aging populations with higher demands for emergency surgery
-Financial constraints.
-Rising demands and attitudes regarding quality of care and patient safety.
-Workforce trends and changes as reduction of working hours and changing gender composition among doctors.
- A continuous sub-specialisation in surgery.
- A decrease of general surgery specialists.
- Increased time needed to train surgeons in dealing with emergencies.
- Questioning of the concept and future role of general surgery.

Emergency surgery is surgical management that cannot be delayed. It is therefore mandatory for a developed society to offer such services.
In Sweden emergency surgical care is mostly delivered in public hospitals under the control of around 20 county councils. There are 7 university hospitals/ tertiary referral centres. Each county council manages 2-3 hospitals. The catchment areas for these hospitals vary between 50000-200000 inhabitants, often in rural areas. Therefore surgical departments have to keep up high standards of emergency surgery including trauma. The on-going subspecialisation of surgery has been implemented in all hospitals in Sweden, regardless of hospital size. Surgeons prefer to work as subspecialists- and the departments are organized thereafter. However, emergency surgery in Sweden is mainly based upon using the same surgical work force.
Due to concerns for these problems the Swedish Surgical Society has taken the responsibility to build an educational system that could bridge the on-going changes. The work has resulted in a proposal of **new paradigm**:
The basis of action in emergency surgery is the"*damage control concept*" transferred from trauma surgery into the old concept of general surgery.

To achieve the paradigm change of emergency surgery, the Swedish Surgical Society has published guidelines and recommendations regarding standards for knowledge and skills development for Swedish surgeons taking calls in emergency surgery. The guidelines require knowledge and education in the expanded damage control concept, participation in national courses under the lead of the subsections of surgery and regional programs, continuous "re-education" at 3-5 years interval and finally, accreditation by the Swedish Surgical Society.
The guidelines from the Swedish Surgical Society are built on the structure and processes of Swedish surgery and cannot automatically be transferred into or adopted by other countries or health care systems. The ideas of the damage control concept expanded into the realms of general surgery may, however, be an answer to some of the problems of emergency surgery in the years to come!

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Richard Reznick is married to Cheryl, and they have three children -- Joanna, Josh and Gabe. Born in Montreal, he received his undergraduate university education and medical degree from McGill University, followed by a general surgical residency at the University of Toronto. He spent two years in fellowship training, first obtaining a Masters' degree in medical education from Southern Illinois University, followed by a fellowship in colorectal surgery at the University of Texas in Houston, Texas. Since his first faculty appointment at the University of Toronto in 1987, Dr. Reznick has been active in both colorectal surgery and research in medical education. He was instrumental in developing a performance-based examination, which is now used for medical licensure in Canada. He ran a research program on assessment of technical competence for surgeons and supervised a fellowship program in surgical education. At the University of Toronto Faculty of Medicine, he was the inaugural Director of the Faculty's Centre for Research in Education at University Health Network (The Wilson Centre) from 1997 to 2002. In 1999 he was appointed Vice President of Education at University Health Network. He served eight years as the R. S. McLaughlin Professor and Chairman of the Department of Surgery at the University of Toronto from 2002-2010. In July 2010, Dr. Reznick assumed the position of Dean, Faculty of Health Sciences at Queen's University and Chief Executive Officer of the Southeastern Ontario Academic Medical Organization (SEAMO). Dr. Reznick has received numerous awards for his work in education, including the Royal College of Physicians and Surgeons of Canada Medal in Surgery, the Association for Surgical Education Distinguished Educator Award, the National Board of Medical Examiners John P. Hubbard Award, the Daniel C. Tosteson Award for Leadership in Medical Education, the 2006 Inaugural University of Toronto President's Teaching Award and the Karolinska Institutet Prize for Research in Medical Education. In July of 2011 Dr. Reznick was awarded an honourary fellowship from the Royal College of Surgeons of Scotland, and in November of 2011, an honourary fellowship from the Royal College of Surgeons in Ireland. Dr. Reznick is the author of over 120 peer-reviewed publications and has given over 200 lectures to hospitals, universities and scientific organizations around the world.

The Next Step: Beyond Competency Based Education

Richard Reznick

The speaker will focus his comments on the evolution on competency-based programs for surgical training and conduct an analysis of the current status of the implementation of these programs and theoretical framework on which they are based. He will argue that we are at the cusp of extending beyond “simply deploying competency-based frameworks” and that we need to think more broadly, with regard to the systematic introduction of entrustable professional activities, the institution of curricular change in surgical residency programs, and broader thinking that would enable tearing down continental divides between conventional post-secondary education, medical school, residency, and fellowship.

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Javeria Qureshi is a post-graduate trainee in general surgery at the University of North Carolina. In 2010-2012, she worked in both a clinical and research capacity at Kamuzu Central Hospital in Lilongwe, Malawi. She helped develop the surgical training program at that hospital while also conducting research in trauma outcomes. Her research interests include strategies for sustainable surgical capacity building in the developing world, improving trauma outcomes in resource poor settings and the role of international collaboration in surgical training. She has both published and presented on these topics in a national and international setting.

Training the Global Surgeon

Javeria S. Qureshi

The imbalance of surgical capacity around the world has been well documented. Most resource-rich nations have a plethora of surgeons, particularly at urban tertiary care hospitals, while most resource poor nations have dearth of all medical personnel, particularly specialty-trained physicians such as surgeons. In resource rich nations, most surgeons train at tertiary care centers, where laparoscopic surgery is the norm and some may even be training in robotic and endoscopic procedures. However, the advancement of minimally invasive surgery has made some open procedures obsolete, and many surgeons-in-training are no longer comfortable with certain open procedures at the end of their training. Conversely, surgeons in resource poor nations have limited access to minimally invasive equipment or training, and are experts in traditional open procedures. Both these settings have much they can learn from each other. The ideal surgical training program would move beyond medical missions to have residents rotate in an international setting under an exchange program. The exchange would be preferably be between a resource rich and resource poor setting so that residents experience a different operating environment. This would facilitate both cultural exchange as well as sharing skill sets and techniques. Many surgeons from the U.S. and Europe would familiarize themselves with techniques they rare perform anymore such as open appendectomies, and open splenectomies. In addition, surgeons from resource poor settings such as sub Saharan Africa get an opportunity to learn laparoscopic and endoscopic techniques. The goal of such an exchange would be to foster relationships between surgical individuals and institutions that would perpetuate in both the clinical and research environments and encourage bilateral development.

Current discussions on the future of surgical training focus on the use of simulation and competency-based learning, but we ignore that many nations do not even have access to basic surgical equipment. In addition, an international exchange would not only teach technical skills but also professionalism and leadership, as trainees are challenged by working in an unfamiliar environment. While not all trainees would pursue these relationships if given a choice, each trainee would benefit from working outside his or her silo to recognize the huge diversity of surgical practice worldwide.

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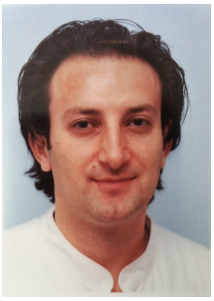

Matay Tunc is a Senior Attending Physician of the Hand Centre in the department of Orthopaedics and Traumatology of St. Bonifatius Hospital, affiliated with the Medical Faculties of the University of Hannover and the University of Münster. He has also trained and supervised residents of the hand surgery program as well as medical students in his department.
After completing medical school at the Free University of Amsterdam in the Netherlands,
he worked in different hospitals in the Netherlands and Germany to complete his residency in Orthopaedics and Traumatology. In 2010, he began his sub-specialization in Hand, Wrist and Upper Extremities.
His current focus is on the treatment of injuries, arthrosis and rheumatism in the hand, wrist and upper extremities. The Hand Centre in Lingen is among the few hand surgery clinics in Europe that perform wrist and finger joint replacements with innovative prosthetics.
Matay Tunc has participated at conferences and seminars in the field of Hand and Upper Extremities in different European countries, including the UK, Netherlands, Germany and Austria. This gave him the opportunity to exchange ideas and views on the many residency programs with colleagues of different disciplines who are now specialized in the field of hand surgery.

General surgery training vs sub-specialty training: The case of Hand Surgery

Matay Tunc

Sub-specializing in Hand Surgery, to some doctors, occurs as a result of the experiences and opportunities that arise during their training; to others, it is a decision made from the beginning of their training, where additional effort was needed to reach their goal. Furthermore, there are many similarities and differences in the training to become a certified hand surgeon in different countries, raising a diverse set of concerns for doctors who want to be in this sub-specialty.
Many disciplines can be observed in this presumably small domain of hand surgery. For instance, the neurosurgeons often operate the nerves in the hand and upper extremity, while the trauma surgeons deal with fractures of the hand. The orthopedic surgeons treat degenerative diseases of the joints of the wrist. The plastic surgeons claim that the tendons and muscles of the hand as one of the major aspects of their profession. We can continue by adding the vascular surgeons, who deal with the arteries and veins in the upper extremity and hand. When we list the difficulties that radiologists meet on how to deal with the complexity of diagnostic tests of the wrist bones and their diseases, or the neurologists who have to examine the nerves to locate nerve pathologies in the hand and wrist, as well as the physiotherapeutic training for the post-operative state of, for example, the flexor tendons or the small finger joint prostheses, we then realize that this small field of surgery becomes far too big for each of these respected colleagues if they are not trained well in how to deal with the complexity and wide range of pathologies in the field of hand surgery.

Since hand surgery has not yet been accepted globally as an independent specialty, how then can one become a specialized hand surgeon, when so many disciplines “fight over” each part of the hand and wrist? In most medically advanced countries, the certification for hand surgery can only be obtained after completing orthopedic surgery or neurosurgery, which will offer a track through a number of fellowships, rotations and comprehensive programs and exams to finally reach this qualification and accreditation. This eventually results in a prolonged training period, typically ranging from 7-9 years. In many major academic and non-academic hospitals, as is the case in Germany and the Netherlands, the chief surgeon that heads the department and who is often the one that received the certification for hand surgery, will not focus on hand pathology, due to the excessive work that is tied to his position. A high number of operations is necessary for a competent hand surgeon just as it is in the already well-accepted specialties. Hand surgery is then left as a minor field, even though the multitude of patients and complexity of this domain demand equal and focused attention as other disciplines receive.

Although both orthopedic and plastic surgery programs have attempted to strengthen the residents’ exposure to hand surgery education during their training, there is still a shortage of hand surgeons and this is possibly due to the abovementioned reasons. Therefore, a separate specialty program for hand surgery with its own residency program, distinct from orthopedic or plastic surgery, is required. We should aim to develop one uniform international residency program for hand surgery to avoid variable accreditation systems and to enable international exchange and collaborations.

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Dr Oussie went to the Faculty of Medicine at the Karolinska Institute, Stockholm 2001-2005, and was an ambassador for the Karolinska Institute during the same period. He made his internship at the Malar County Hospital, Eskilstuna 2006-2007, and is actually in his Residency in General Surgery and Urology, in Eskilstuna and Stockholm from 2007. He is an educated ATLS instructor since 2009, and elected President for KIRUB (The Association for Younger Surgeons in Sweden) for the period 2009-2011. He has also attended several leadership courses, and is the team physician for the football club Assyriska FF (second highest league) since 2006.

Future surgical education will still need mentors

Ninos S. Oussi

It is sometimes difficult to realize the importance of an event at the moment when it occurs, and often, it is not until later that it is seen as a pioneering change in history.

Consider the following scenario: "the Forrest Gump-syndrome", where a man gets involved in different revolutionary and historical events, like establishing a fruit company later named 'Apple', not understanding the importance of these events when they took place. This example can be applied to the on-going changes in surgical education.

Your presence here at the congress and the work each of you do is an acknowledgement of the importance of this development.

Well known idioms, such as "practice makes perfect", are applicable to surgical education, but there is more to it than just the practical training.

With a "state-of the-future" technology and new gained knowledge we like to reach utopia in surgical education – hence providing patients with the best available, safest and most beneficial treatments there are, performed by skilled and clinically trained surgeons.

It all sounds great, but how do we reach this goal? Several studies show that simulation training can be a benefit for surgeons. However, other studies also show that this may cause a blinding self-confidence, which could lead to unsafe surgeries. So what is the right path: Lectures? Video demonstrations? Fast-track training? Virtual simulation training? Globalized training for residents, with local and global rotation? These questions need to be subjected to scientific evaluation and studies – like all medical methods.

The imbalanced distribution of fully trained surgeons around the world is a consequence of a regional difference in surgical education. Accordingly, experienced mentors necessary for practical training are not evenly distributed, with consequences for young colleagues in training.

Like in the case of the Jedi's and their Master-Apprentice relationship, surgeons too need the comfort and guidance of more experienced surgeons, engaged in their progress. Even if we change the light sable to a scalpel, a laparoscopic arm or a robot, the training in general remains the same. Whether it is bed side clinical cases, simulator training or live operations, in a rich or poor setting, the need of an experienced and engaged mentor is of utmost importance.

No patient should be left alone in the hands of an untrained surgeon. One day, it could be one of us facing the sharp edge of a scalpel as it reaches our skin to make its first incision, in the shaking hand of a nervous young surgeon.

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Consistent standards across training boards and across countries

Spencer W Beasley

Surgical standards relate to: (1) the standards used internally for the assessment processes, such as examinations, and (2) standards across regions and countries, which ideally should be measureable and transferrable.

The pre-requisite of both is a training programme with a good governance structure that ensures consistent processes (including for selection onto the training scheme), defined learning objectives, a clear curriculum, measureable indicators of progression and high validity assessments (for both in-training formative assessments, and summative examinations). Good governance also requires a process of review and accreditation of training positions, ensuring all trainees have equal access to all learning materials, training of surgical supervisors and examiners, and policies around the management of: borderline or "struggling" trainees, dismissals and appeals.

Surgeons are employed within an international market. Their specialty training tends to be under the control of one educational body (University, Professional College etc), - even though some of their training may be elsewhere. Graduation from their training programme normally leads to automatic specialist recognition in that jurisdiction. The reality is that surgeons often choose to work in different jurisdictions (either elsewhere within the same country where there may be different regulatory bodies, or in other countries). The problem encountered by surgeons is that they have to demonstrate comparability with the recipient country's standards for specialist recognition, and the problem for the recipient country is having confidence that these IMGs (International Medical Graduates) have the training and skills required for specialist recognition. To do this they require certainty about the quality of their training programme, and the required level of expertise.

This presentation highlights the reasons that an internationally agreed system of objective measurement of surgical performance would facilitate the assessment of IMGs and surgeons moving between jurisdictions.

We are now getting to the point where metrics around performance in both technical and non-technical domains are of sufficient quality that they could be used to augment the other processes and tools that regulatory agencies use to assess the comparability of overseas surgeons, or any other surgeons not trained in their jurisdiction. It would make the surgical degree more transferrable.

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Governance Required to Provide Effective and Consistent Surgical Training Programs

Richard Reznick

The speaker will focus on “one world” and pose the rhetorical question as to could we consider a single certification standard for surgical training. Currently, virtually every jurisdiction runs its own surgical training programs and certification process. The speaker will analyze successes of where countries have banded together for joint certification. He will propose a system wherein future certification efforts will be much more coordinated between countries, ultimately evolving towards one (or possibly several) global standards. He will explore the development of new trends in testing and simulation that will enable this progress.

Notes

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Dr Crebbin completed her undergraduate degree in Physical Education at Melbourne University and a second degree in sociology and psychology at the University of Ballarat. Her career includes over 25 years as a senior lecturer in teaching and learning including gaining two highly competitive grants from the Australian National Committee for the Advancement of University Teaching.

Wendy worked as a National Education Advisor in Namibia, working with her Namibian counterparts, to develop the policy and curriculum for the (then) new National Teacher Education programs (1997-8). She was invited back to Namibia in 2008 as a consultant to lead the review of that program.

Since joining the Royal Australasian College of Surgeons (RACS) almost ten years ago Wendy has overseen significant development in all of the surgical training programs. A major focus of her work has been to guide curriculum development and improved assessment processes within the framework of the nine RACS competencies.

Two recent projects in which she has worked with surgical colleagues have been to define progressive training standards for each competency, and to develop models describing the way that clinicians think and make decisions. In this latter project she has drawn on her research passion of how the brain processes learning, thinking and remembering.

Wendy divides most of her free time between her family (four children and four grandchildren) and running. Having recently taken up running again after a very long break she has enjoyed the opportunity to participate in longer events wherever she goes.

Progressive training standards as a safety net for supervisors and trainees

Dr. Wendy Crebbin

For the purposes of this presentation governance is defined as: 'a transparent and fair process which provides common guidelines and protocols for those who are doing the training and those who are being trained'.

The process of becoming a surgeon is a complex combination of personal attributes and trained capabilities. In the last two decades most, if not all, training organisations have developed statements that define the characteristics their graduating trainees and Fellows need to be able to demonstrate in order to provide optimal patient care. In turn these statements, whether they define roles, competencies, values, professional standards, or skills and behaviours, ensure surgical training covers non-techinical competencies as well as those that relate to clinical or technical expertise, and in so doing have augmented both curriculum and assessment.
What is less well defined is the definition and assessment of progression between what is an acceptable level of performance for a novice or early trainee, and the stages through which competency and observable performance progresses throughout training. This applies equally to technical and non-techical competences, the latter being traditionally acquired through apprentices observing and role modelling their masters whilst taking on greater responsibilities in their workplace.

In the current clinical environment of increasing pressure on time and resources for training, the lack of common progression guidelines leaves both supervisors and trainees at risk: Supervisors because they are unsure if their expectations and standards are the same as their peers; Trainees because they know what the end-goals are, but have no clear guidance of how to get there, or what is expected along the way.

To address this issue the Royal Australasian College of Surgeons established a working party to define a framework of progressive development for each of their nine competencies:

- Medical Expertise
- Judgement – Clinical Decision Making
- Technical Expertise
- Professionalism and Ethics
- Health Advocacy
- Communication
- Collaboration and Teamwork
- Management and Leadership
- Scholarship and Teaching

The resultant document, approved by the College Council early in 2012, has been integrated into the training programs in a variety of ways. In this presentation I will provide examples of some of the ways in which Training Boards, Supervisors and Trainees have used these generic standards across all specialities, particularly to demonstrate increasing acquisition of skills for each competency.

Notes

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Göran Stiernstedt has previously been the CEO of Uppsala University Hospital and Deputy Director of Stockholm County Council. He is also Associate Professor of Infectious Diseases at the Karolinska Institute.

Surgical training in a national patient safety perspective

Göran Stiernstedt

Several studies have shown a rate of avoidable patient injuries of 10-15% in Sweden, which is in accordance with most other comparable countries. The Swedish government and the 21 county councils (responsible for organizing health care) in collaboration have focused on patient safety since six years.

The tool has been a national program and agreement between the councils and the government. Councils which have reached certain goals are reimbursed. In this national program main focus has been on hospital acquired infections being evaluated as point prevalence studies twice a year since 2007. The main strategy to reduce the number of infections has so far been on hygiene and standardized procedures. Initially the prevalence decreased from 12% to 9% on a national level.

However, since at least 3 years the prevalence seems to have stabilized on the latter level, which is a matter of concern and has caused frustration. Consequently, we now need to discuss new strategies to further reduce the number of avoidable infections and other injuries.

Should we focus more upon the skilled and competent physician? In order to reach a high level of competence and capacity you certainly need training. The subject which needs to be evaluated is if Sweden should include a national surgical training program in our future national strategy on patient safety.

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Free papers:

1. Awad, Zaid et al.,"The value of Procedure Based Assessments in otolaryngology training."
2. Green Carlsen, Charlotte et al., "Fast-track training reduces operative time in Lichtenstein hernia repair."
3. Hopmans, C J et al., "Current status of training in general surgery in Europe: A review of the literature."

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1. Depypere, Lieven et al., " Does the implementation of European working time directive (EWTD) have an effect on surgical training in a Flemish teaching hospital network?"
2. Crebbin, Wendy et al., " Progression through surgical training: Competencies, Standards and Measurement."
3. Crebbin, Wendy et al., " Quality and Safety in Surgical Training: Improving teaching of clinical decision making"
4. Bjerrum, Flemming et al., "Impact of instructor feedback on retention after laparoscopic simulator training – six-month follow-up of a randomised trial."
5. Geissler, Norman et al., "Development and evaluation of a scenario based simulation training for spinal surgery."
6. Hopmans, C J et al., "Surgeons' attitude towards a competency-based training and assessment programme: Results from a multicentre survey in the Netherlands."
7. Awad, Zaid et al., "Validating the assessment of otolaryngology trainees using Clinical Evaluation Exercise."
8. Awad, Zaid et al., "Does Direct Observation of Procedural Skills reflect trainee's progress in Otolaryngology?"
9. Awad, Zaid et al., "Are Case Based Discussions valid for assessing otolaryngology trainees?"
10. Shedda, Susan et al., "Concept Maps aid teaching Decision Making and Surgical Strategy."
11. Chi-Chuan Yeh et al., "The effect of a new operative team training incorporated in a structured surgical skill training model for cultivating surgical competency."
12. Chi-Chuan Yeh et al., "The retention effect of learning suturing and knot tying during clerkships and internship."
13. Sengpiel, Verena et al., "Passing on the knife."
14. Nickel, Felix et al., "Virtual Reality Training versus Blended Learning for Laparoscopic Cholecystectomy in a Randomized Controlled Trial."

Free papers

1. "The value of Procedure Based Assessments in otolaryngology training"

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Hypothesis
Procedure Based Assessment (PBA) is a valid tool for assessing trainee's progress in otolaryngology at all levels.

Methods:
We analysed the outcomes of 1488 PBAs submitted by all 27 trainees in the North London otolaryngology training program from 2008 to 2012. PBAs are one of four work-based assessment (WBA) tools tabulated by the Intercollegiate Surgical Curriculum Project and is compulsory to assess competence throughout surgical training in the UK. The assessments start from core training (CT) level 1-3 in the generalities of surgery (junior residents) and are carried out through higher specialty training (ST) level 3-8.
The procedure list is wide but must reflect a real operation, carried out totally or partially by the trainee and observed by the assessor. The assessment tool is made of 6 domains: consent, planning, preparation, exposure/closure, technique and post-operative care. Each domain contains 10-25 procedure-specific questions rated by: NA: not assessed, D: development required and S: satisfactory. The trainee is then given an overall performance (oP) score by the assessor where 1: Unable to perform the procedure, 2: Able under supervision, 3: Able with minimum supervision and 4: Competent to perform the procedure unsupervised.
We calculated a score for each domain: (dS) and an overall score (*oS)*. The results were compared across trainees' grade (CT vs ST) and level within the grade (CT 1-3 and ST 3-7) using SPSS 20.

Results:
156 different raters assessed the 27 trainees in over 50 different procedures. The average number of PBAs for each trainee was 55, ranging from 19-105. The oS correlation with the oP was (R^2=0.23). Trainees in ST grade had higher oS and oP than those in CT, 93% and 77% versus 63% and 58% respectively (both significant with P<0.001) showing construct validity. All dS, oS and oP increased throughout training years from CT1-ST7 (P<0.001) and all dS correlated better with oS than oP. The technical skill domain was the best predictor of oS and oP (R^2=0.87 and 0.3 respectively). Furthermore, trainees' oS increased individually and collectively with each PBA but OP was not as sensitive to show progress.

Conclusion:
PBA is the most popular and practical WBA tool. It is valid for assessing otolaryngology trainees at all levels by differentiating between different grades and levels within the grade. A calculated score should replace overall performance rating, as it is less subjective, more accurate in showing progress and highlighting weaknesses. The Technical skill domain is the best predictor and should be paid the most attention.
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2. "Fast-track training reduces operative time in Lichtenstein hernia repair"

Charlotte Green Carlsen*, Karen Lindorff-Larsen**, Peter Funch-Jensen***, Lars Lund****, and Peder Charles*.

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Hypothesis:
Lichtenstein hernia repair is a common surgical procedure that all surgical trainees need to learn. Programs must therefore include training in this procedure. Evidence of usefulness of different training models is sparse. Operative time impacts on hospital costs and patient safety.

Methods:
We conducted a randomized study of a fast-track training model in Lichtenstein hernia repair among 17 Danish surgical trainees. In the intervention group we offered trainees formal course and the opportunity to perform 20 supervised standard Lichtenstein hernia repairs in the OR within a 4 to 8-week period in the first three months of specialty training. The first and last of the procedures in the sequence were videotaped and by the end of their first year a similar procedure was videotaped. The control group was videotaped at the beginning and end of their first training year. Operative time was measured from skin incision to wound closure.

Results:
Time to complete the procedures was reduced significantly through the fast-track training program. At study entry operative time was identical in the two groups, and the two groups performed a similar number of Lichtenstein hernia repairs throughout their first year. The operative time remained lower in the intervention group compared to the controls at end of the first training year.

Conclusions:
Operative time in Lichtenstein hernia repair was significantly reduced by deliberate training in a fast-track model. Implementation of a fast-track training model in this standard surgical procedure enhances training and may lower hospital costs in the future. The model may apply to other standard procedures as well.

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3. "Current status of training in general surgery in Europe: A review of the literature"

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Introduction:
The competence of a certified surgeon is to a large extent dependent on the quality of the preceding training. Within Europe, training in general surgery is not uniform and there is no central control body. At the same time, an increasing number of healthcare professionals are crossing national borders. An upward trend that is caused by the increasing globalisation and implementation of European legislation that warrants equivalence and mutual recognition of medical diplomas and qualifications awarded in any country of the European Union. The aim of this study was to compare the structure and content of training in general surgery across Europe.

Methods:
A literature review was conducted using the MEDLINE database and the internet to search for the most recently published literature that reported on training in general surgery in European countries that were located in either Western or Southern Europe, or Scandinavia. From these articles and information on websites data was extracted on four themes: training methodology, length of training, certification requirements and duration of a trainees' working week.

Results:
Although there are still countries in Europe that have no formal training programme for example Greece[1], most countries have replaced the traditional master-apprentice model by a structured competency-based training programme[2-4]. In general, a 2-3 year during common trunk has to be completed by trainees who pursue a career as a surgeon followed by a additional training period of (sub)specialist training. The duration of training varies per country, ranging from 5 years in Spain to as long as 8-9 years in Ireland, the UK, and the Scandinavian countries.[5-7] In addition, the qualifications required for certification as a surgeon are not uniform, with national standards that vary from oral and/or written examinations to attendance at postgraduate training courses. However, usually the focus is on the number of operations performed as first surgeon, ranging from 164 operations in Italy to 780 operations in Norway.[8, 9] As a result of the implementation of the European Working Time Directive, a trainees' working week is reduced to an average of 48 hours. An exception is Scandinavia where a working week of ≤ 40 is the standard for many years.

Conclusion:
In most European countries, competency-based training programmes are used to direct training in general surgery. Nevertheless, major differences exist between individual countries with respect to the length of training and the applicable certification requirements. These differences, in combination with the free cross-boarder exchange of surgical trainees and surgeons, stress the importance of comparable training standards and requirements in order to achieve a common background for surgeons in Europe. The initiative should be taken by the responsible national authorities together with the various surgical associations in Europe.

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Posters

1. Does the implementation of European working time directive (EWTD) have an effect on surgical training in a Flemish teaching hospital network?

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Hypothesis:
Flemish surgical residents used to work many hours in the past. The European working time directive (EWTD) 2003/88/EG was created to protect young doctors for working too many hours and to improve medical education. The EWTD was implemented in Belgian law on February 1st 2011. Our expectations were a decrease in working hours and an improvement of surgical education in some way.

Methods:
Every resident in a medical or surgical specialism is requested by the Faculty of Medicine to answer an ACC (Activities Coaching Context) questionnaire about his or her teaching hospital. This questionnaire was validated (1) and the content hardly changed over the last years. It was designed for all residents, not only for surgical residents, but relevant questions were filtered. We used the answers of surgical residents in all teaching hospitals affiliated to our university, including the university hospitals during the academic years before, during and after the implementation of the EWTD in Belgium. Statistical analysis was performed with SPSS 20 (IBM) using ANOVA.

Results:
Response rates before, during and after the implementation of the EWTD were respectively 24, 57 and 76 percent. Since implementation of EWTD we note a significant decrease in mean daily working time ($p = 0{,}000468$). However, this mean daily working time stays significantly longer in university hospitals, even after implementation of EWTD ($p= 0{,}0243$). Non-medical administrative workload did not change significantly ($p= 0{,}5311$), but medical administrative workload increased significantly after implementation ($p= 0{,}0497$). Non-medical as well as medical administrative workload are significantly higher in university hospitals after implementation ($p= 0{,}0021$ and $p= 0{,}000036$). The opportunity to practice skills and also the perception of a good balance between working and learning did not change significantly after implementation ($p= 0{,}1995$ and $p= 0{,}819$), but both were scored significantly better in non-university hospitals ($p= 0{,}000008$ and $p= 0{,}0521$) regardless implementation of EWTD.

Conclusions:
Since implementation of EWTD there is a significant decrease in mean daily working time, which was the main goal. However despite a decrease in working time, administrative workload has not decreased and is much higher in university hospitals. The main challenge for surgical education in the future will be to reduce administrative workload in order to give surgical residents enough opportunities to practice their surgical skills without prolonging the training time with several years.

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2. Progression through surgical training: Competencies, Standards and Measurement

Wendy Crebbin*, Spencer Beasley*, David Watters*
* *Royal Australasian College of Surgeons*

Hypothesis
Surgical training involves a progression in levels of competency from being a doctor to becoming a specialist capable of unsupervised practice. However, demonstration of acquisition of expertise in each of the competencies has not been easy to measure or well defined.
On the assumption that a framework of standards would enhance the monitoring of trainees' progression with their clinical work, the Royal Australasian College of Surgeons (RACS) set out to define such a framework for supervisors and trainees.

Method
RACS chose to identify progressive development through five stages of increasing complexity (pre-vocational, novice, intermediate, competent and proficient). For each of the nine RACS competencies there are three major patterns of behaviour, each with a small number of key behavioural markers. Using language that is familiar to surgeons in describing how any trainee is progressing, the resultant document 'Becoming a competent and proficient surgeon: Training Standards for the Nine RACS Competencies' includes descriptions of characteristic behaviours which are both observable and assessable.
This framework is currently being evaluated through surveys and focus groups.

Results
Preliminary feedback suggests that the progressive training standards have been well received by Australasian surgeons and the training boards, and will increasingly become a valuable tool to measure trainees' performance and progression.

Conclusion
The RACS training standards framework aligned to the nine RACS competencies has been found to assist supervisors and trainees to be more confident in making judgements about the level of a trainee's performance and what they need to do to demonstrate improvement.
Because the RACS competencies are closely aligned to the original seven CanMEDs roles it is hoped that these competency standards might be able to be adapted by other surgical training programmes, and by other medical disciplines, beyond surgery.

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3. Quality and Safety in Surgical Training: Improving teaching of clinical decision making

Wendy Crebbin*, Spencer Beasley*, David Watters*,
* *Royal Australasian College of Surgeons*

Hypothesis
Clinical decision making (CDM) can be defined as a fundamental competency which underpins the effective clinical performance of trainees and Fellows across all medical disciplines and geographic areas. However, despite extensive literature on clinical decision making – including how experts think, and the differences between the thinking of novices and experts - the high level cognitive skills of CDM are frequently not well taught.
It was proposed that a course to teach CDM be developed and trialled to gauge its impact.

Method
During 2011 representatives of the Royal Australasian College of Surgeons (RACS), the Royal Australasian College of Physicians (RACP); and the Royal College of Physicians and Surgeons of Canada (CPSC), worked together to develop a model exemplifying the complexity of CDM through four phases (1) initial encounter with a patient, (2) preparing for the procedure, (3) monitoring operative progress, and (4) after the procedure. The resultant model identifies both the key elements, and the continuous iterative thinking processes involved.
Based on this model RACS developed and piloted a three hour course designed to make explicit some of the dynamic, and often unconscious, thinking processes that enable an expert to be so efficient and effective. During 2012-13 the course was made available to supervisors, trainees and international medical graduates.
Participants in the pilot courses were surveyed before, immediately after, and then 3 months after participating in the course.

Results
Participants' responses were collected on a Likert scale and analysed to ascertain the extent to which they felt that they had improved in (a) their own CDM; (b) their ability to teach CDM; and (c) their ability to assess their own and other's CDM. All of the participants indicated that they felt that they had improved in each of these three areas, with more than half indicating that they had made a moderate to significant improvement in each area.

Conclusion
The course appears to offer a framework for improved teaching and learning in CDM, and a mechanism to identify problems in the decision making processes.
More work is being carried out in non-surgical disciplines to assess whether the model has the potential to be used across a wide range of clinical environments.

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4. "Impact of instructor feedback on retention after laparoscopic simulator training – six-month follow-up of a randomised trial"

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Hypothesis:
Laparoscopic simulators can improve technical skills, which leads to improved performance in the operating room [1-3].
Feedback is an essential component of surgical education, but has also been shown to have significant impact on simulator training, by increasing efficiency, reducing errors and reducing the required time to reach a predefined proficiency level[4-7]. However the impact of instructor feedback on the retention of the skills needs to be determined.
The objective of this study was to investigate the impact of instructor feedback on long-term retention after proficiency-based training of a procedural task on a laparoscopic virtual reality simulator.

Methods:
6-month follow-up study of a randomised trial.[7] The participants were 4th to 6th year medical students without prior laparoscopic experience.
All participants initially trained a procedural task (laparoscopic removal of an ectopic pregnancy) to a predefined proficiency level on a virtual reality simulator (LapSim® Surgical Science).[8]
During the initial study the intervention group had received standardized instructor feedback, whereas the control group (n=50) did not receive instructor feedback. All participants received the automated feedback generated by the simulator.
Participants who reached the proficiency level during the intervention period (n=91) were invited back after six months and were asked to practice the same simulated operation and reach the same proficiency level (n=65). None of the participants received additional simulator training or performed laparoscopic procedures between the intervention and follow-up period.

Results:
During the initial study the intervention group used an average of 162 minutes and 29 repetitions to reach the proficiency level, where as the control group in average used 342 minutes and 65 repetitions. A significant difference ($p<0,0005$) was found regarding both repetitions and time spent.
At six-month follow-up (n=65) the intervention group used an average of 83 (95%CI: 64-102) minutes and 21 (95%CI: 26-16) repetitions to reach the same proficiency level, and the control group in average used 73 (95%CI: 52-93) minutes and 20 (95%CI: 15-25) repetitions.
Both the intervention and the control group showed a significant reduction in time ($p<0,0001$) and repetitions ($p<0,0001$) compared to their initial training period, showing retention of skills.

The reduction in time and repetitions were larger for the control group compared with the intervention group resulting in that the initial difference between the two groups had disappeared at six-month follow-up. There was no significant difference for time (p=0,542) and number of repetitions to reach proficiency (p=0,864) between the intervention and the control group.

Conclusion:
Retention is the same, with or without instructor feedback, after training a procedural task on a laparoscopic simulator using proficiency-based training. Since instructor feedback increases efficiency of simulator training, we recommend using this in combination with the automated feedback provided by the simulator.

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5. "Development and evaluation of a scenario based simulation training for spinal surgery"

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Hypothesis
Realistic haptic simulators with an adapted training concept are needed to enhance the training for spinal surgery.

Methods
A Cognitive Task Analysis (CTA) [1] was performed to define the relevant details for the simulator and the specific training concept. The CTA included i.e. literature research, observations in the operating room and interviews [2]. The simulator was validated through 12 experienced

spinal surgeons in a multicentre iterative development process. The training concept was developed and evaluated in an interdisciplinary cooperation of surgeons, psychologists and educationalists. For the evaluation a one-day training with 1 surgical expert, 2 surgical trainers, 3 educational trainers and 4 participating surgeons was completed. The training was conducted in a realistic training operating room. The training included a professional briefing and debriefing of the participants.

Results
The simulator was validated as visually and haptically realistic. Especially the integrated bleeding was evaluated as very relevant. The evaluation of the participants through the surgical trainers, based on the OSATS approach [3], was rated as very helpful by the participants. In a pre-post test all participants improved their self-assessed surgical competence and reached their pre-defined learning goals, i.e. improvement of orientation in the situs. The 4 participants of the training course validated the training concept, especially the briefing and feedback through the surgical and educational trainer, as very good.

Conclusions
The CTA and the first training course showed the need for a simulator with a realistic visual and haptical anatomy including soft tissue and bleeding. Nevertheless a specific training concept is necessary to give the surgeons a professional feedback, which will help them to analyse their progressions and challenges. Based on this analysis a specific training plan can be created. The next steps will be the coaching of surgical trainers in educational and technological competence on the simulator. Because non-technical skills, as postulated in the NOTSS approach [4], are relevant for surgical training scenarios to improve patient safety.

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6. "Surgeons' attitude towards a competency-based training and assessment programme: Results from a multicentre survey in the Netherlands"

Authors:

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Introduction:
Over the past decade, renewed educational insights have led to radical changes in the way surgical trainees are trained nowadays. Responsible surgical authorities in the Netherlands[1], as well as in many other Western countries[2-4], have embraced structured training programmes that are focused on the development of professional competencies. Most of these programmes are based on the CanMEDS framework[5-7] and use standardised tools to assess competence attainment. However, despite the worldwide implementation of these modernised training programmes, little is known on the appraisal of such programmes by its users. The aim of this study was to examine the attitude of surgical trainees and consultant surgeons towards a competency-based training and assessment programme used to reform surgical training in the Netherlands.

Methods:
In 2011, two years after the implementation of a new surgical training programme, a cross-sectional survey was conducted in a particular training region of the Netherlands, consisting of one university hospital and six affiliated district general training hospitals. All trainees (n=51) and consultants (n=108) from this training region were asked to rate the importance of each of the CanMEDS competencies *(Medical Expert, Communicator, Collaborator, Scholar, Health Advocate, Manager, and Professional)* for their value to the competency profile of a surgeon. Subsequently, the suitability of the adopted assessment tools *(In-Training Evaluation Report, 360-degree assessment, Critical Appraised Topic, Case-based Discussion, mini-Clinical Evaluation Exercise, Assessment of an Operation Report, Report of a Complicated Hospitalisation, and Objective Structured Assessment of Technical Skills)* to assess trainees' competence attainment was surveyed. Items were rated on a 5-point Likert scale and considered relevant when $\geq$ 80% of the respondents rated an item with a score of 4 or 5 (indicating a positive attitude). Cronbach's alpha was calculated to determine reliability. The Mann-Whitney test was applied to analyse differences between different groups of respondents.

Results:
The response rate was 88% (n=140). The CanMEDS framework demonstrated good reliability (Cronbach's alpha 0.87). However, the importance of the competencies 'Manager' (78%) and 'Health Advocate' (70%) was undervalued. The assessment tools jointly failed to achieve an acceptable reliability (Cronbach's alpha 0.55) and individual tools were predominantly considered unsuitable for competence evaluation. Exceptions were the tools 'In-training Evaluation Report' (91%) and 'Objective Structured Assessment of Technical Skill' (82%). No significant differences were found between the trainees and the consultants.
Conclusion: Two years after the implementation of a competency-based training and assessment programme, surgical trainees and consultant surgeons in a large training region of the Netherlands do not acknowledge the importance of all CanMEDS competencies and consider almost all assessment tools unsuitable for trainee assessment. In order to meet challenging future healthcare demands, continuous evaluation of training programmes is essential to ensure trainees receive tailored high-quality surgical education.

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7. "Validating the assessment of otolaryngology trainees using Clinical Evaluation Exercise"

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Hypothesis
Clinical Evaluation Exercise (CEX) is a validated tool for assessing otolaryngology trainees

Methods:
All 27 Otolaryngology trainees at Specialty Training Registrar (STR) level (senior residents) in North London were assessed by their trainers (consultants or attending otolaryngologists) using CEX tabulated by the Intercollegiate Surgical Curriculum Project throughout their training. The assessments started at Core Training level (CT) in the generalities of surgery (junior residents) and was carried out through STR years (Range: 3-7 years). The topics of assessment varied but the format remained the same. The assessment tool is made of 7-8 domains and the trainees were initially given a score out of 6, where U/C: unable to comment, 1-2: below expectations, 3: borderline, 4: meets expectations, 5-6: above expectations and an overall performance rating out of 6, from February 2008 to October 2010. The rating from October 2010 to August 2012 was done using a different system where NA: not assessed, 1: development required, S: satisfactory and O: Outstanding with an overall performance rate out of 4
An analysis of all ratings was done by standardising the scores using percentage of the overall performance and by calculating a score based on the individual ratings of each domain. The overall performance and the calculated scores were compared to the trainees' grade and their level within the grade to investigate difference and progression.

Result:
The average number of assessments for each trainee was 25, range 10-57. The calculated scores for individual questions correlated well with the overall performance rate given by the assessors when the 6-point rating system was used (R2=0.8). The correlation was weaker when the 4-point system was used (R2=0.049). Both overall performance and calculated scores increased with experience. Trainees in STR grade scored higher than those in CT grade, 75% and 93% versus 67% and 85% respectively ($P<0.001$). The higher the trainee level within the grade; from CT1 to CT3 and from ST3 to ST7, the higher their assessment scores ($P<0.001$). Predictably, at individual level, the calculated scores were more reflective of progress than the overall performance rate. This is explained by the better details given when looking at all domains within the assessment rather than a final independent single score.

Conclusion:
The CEX is a valid tool for assessing trainees' progress and can be applied for periodic assessment and selection into higher training. The wider the score selection, the more likely that it is to show progress. There is probably no need for an overall performance rate as this is better calculated automatically.

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8. "Does Direct Observation of Procedural Skills reflect trainee's progress in Otolaryngology?"

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Hypothesis
Direct Observation of Procedural Skills (DOPS) can reflect trainee's progress in Otolaryngology at all levels.

Methods:
19 trainees in the North London otolaryngology training program were assessed periodically by their trainers using DOPS. The tool is tabulated by the Intercollegiate Surgical Curriculum Project and is used throughout all surgical training. The assessments started from core training (CT) level 1-3 in the generalities of surgery (junior residents) and carried out through higher specialty training (ST) level 3-7.
37 different basic yet common procedures were used and most were purely otolaryngological. Examples include; reduction of fractured nose, removal of foreign bodies, drainage of abscess, flexible and rigid nasendoscopy…etc. The assessment tool is made of 10 domains and the trainee is given a rate D: development required or S: satisfactory, NA: not assessed and an overall performance (OP) out of 4.
Analysis of ratings was done by calculating a score (*cS = (S / (S + D)) %*) and comparing it to overall performance (*((OP / 4)%*). The results were compared across trainees' grade and level within the grade (CT 1-3 and ST 3-7) using SPSS statistical package 20.

Result:
The average number of assessments for each trainee was 18, ranging from 9-53. The cS correlated well with the OP rate (R2=0.4) at CT level but not at ST level (R2=0.15). Trainees in ST grade had higher cS and OP than those in CT, 98.3% and 95.2% versus 79.8% and 80.6% respectively ($P<0.001$) showing construct validity. Both cS and OP increased from CT1 to CT3 but not further on from ST3-ST7. See attached pairwise comparison and p values in tables1 and 2.

Conclusion:
Assessment using DOPS is a useful tool and can show progress at junior (CT) level. It can also differentiate between junior and senior trainees making it useful in selecting trainees for higher specialty training. The tool was not able to demonstrate progress at higher (ST) level most likely due to the simplicity of the procedures included which otolaryngology trainees tend to master in

early years. Automatically calculated scores should replace overall performance rating and can be more structurally powerful in showing progress and highlighting weaknesses.

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9. "Are Case Based Discussions valid for assessing otolaryngology trainees?"

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Hypothesis
Case based discussion (CBD) is a useful tool when assessing trainee's progress in otolaryngology at all levels.

Methods:
We analysed the outcomes of 908 CBDs submitted by 26 trainees in the North London otolaryngology training program from 2008 to 2012. CBDs are one of the work-based assessment tools tabulated by the Intercollegiate Surgical Curriculum Project and is used throughout surgical training in the UK. The assessments started from core training (CT) level 1-3 in the generalities of surgery (junior residents) and carried out through higher specialty training (ST) level 3-7.
The case choice is open and is decided by the trainee and trainer to reflect on real life scenarios. The assessment tool is made of 7 domains and the trainee is given a rate in each domain. From 2008 to 2010 the domains had a score of 1-6 where 1-2: below expectations, 3: borderline, 4: meets expectations, 5-6: above expectations. Since 2010 a new system was used where D: development required, S: satisfactory and O: Outstanding. The trainee is then given an overall performance (OP) score by the assessor.
Analysis of ratings was done by calculating a standardised score:
cS =(S+O/(D+S+O) or *cS=sum of domain scores/number of domains*, depending on the system used and comparing it to OP. The results were compared across trainees' grade (CT vs ST) and level within the grade (CT 1-3 and ST 3-7) using SPSS statistical package 20.

Results:
The average number of CBDs for each trainee was 35, ranging from 14-71. The cS correlation with the OP was very good (R^2=0.78) when using the old (6-point) system but not with the new (S,D,O system) (R^2=0.04). Trainees in ST grade had higher cS and OP than those in CT, 93% and 76% versus 83% and 68% respectively (both significant with P<0.001) showing construct validity. Both cS and OP increased throughout higher training years from ST3-ST7 (P<0.001). At CT level, only cS showed progress from CT 1-3 but the OP dropped and dissociated form the cS. Furthermore, trainees' cS increased individually and collectively with each CBD but OP was not sensitive enough to show progress.

Conclusion:
CBD is a popular and practical tool. It is valid for assessing otolaryngology trainees at all levels by differentiating between different grades and levels within the grade. The 6-point system is favourable to the 3-point system in showing detailed scores and progress. Automatically calculated scores should replace overall performance rating irrespective of how individual domains are rated. They are less objective can be more powerful in showing progress and highlighting weaknesses. A

5-point Likert scale can be a good alternative that is previously tested and can allow for freedom in rating.

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10. "Concept Maps aid teaching Decision Making and Surgical Strategy"

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Introduction
Decision Making and surgical strategy is one of the nine competencies for a surgeon. However, as a non technical skill there are few strategies to teach this skill other than the apprenticeship model. Concept maps have been used to assess decision making and the higher order Bloom classification skills.
This pilot study was aimed at determining the acceptance of concept maps to surgical trainees and to trial assessments of marking concept maps.

Method
Participant surveys were distributed prior to the first and after the completion of 3 sessions. A scale of 1 to 5 was used at both occasions. The first session started with training in Concept maps with two subsequent sessions using increasingly complex scenarios. Concept maps were marked according to the Novak guidelines [1] and the Holistic Critical Thinking Rubric. STATA v.11 was used for Kruskal-Wallis, linear regression and Fischer's exact test analysis.

Results
37 questionnaires and 64 concept maps were analyzed. Usefulness increased significantly (P=0.006) from the first to last session. This was independent of SET level, previous exposure to concept maps, sex, or age of the trainee.
Concept maps were marked independently by two authors and then a consensus was reached between the two. There was no correlation between session and rubric but a relationship was found between session and total Novak score or number of links (p=0.005, p=0.009 respectively)

Conclusion
Concept maps are useful for developing an awareness of the formal process of decision making though assessment requires further validation.

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11. "The effect of a new operative team training incorporated in a structured surgical skill training model for cultivating surgical competency"

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Aims:

How to train and enhance the performance of an operative team in the early stage of their career needs to be explored. The aim of this study is to explore the effect of a new operative team training programme incorporated in a structured surgical skill training model from novices and trainers.

Methods:
We have set up a well-designed structured surgical skill training model which combined basic surgical skills training workshop and animal lab training with diagnostic laparoscopy and open subtotal gastrectomy for the 1st and 2nd year surgical trainees. Since March 2011, we created a new operative team training programme which included a pre-training online course and invited a novice nurse to join the animal lab training as a scrub nurse. Pre- and post- self-evaluation questionnaire, skills and non-skills assessments, and interviews were used to explore the effect of this new training. We used paired-t test for analyzing self-evaluation questionnaire, t test for analyzing assessments, and thematic analysis method combined with Grounded theory data analysis method for analyzing the qualitative data. .

Results:
From March 2011 to January 2012, 10 teams included 20 surgical trainees and 19 novice nurses were interviewed. The results of the self-evaluation questionnaires for cultivating surgeons' and scrub nurses' competencies showed significantly increasing after training except setting up aseptic working area and using surgical instruments in nursing competencies. Trainees thought this training could increase their team work (after the first time operation 9±1.40, after the second time operation 9±0.83). The assessments of teamwork between and after the training revealed improving significantly in team function (7.17±0.88, 7.43±0.49), communication (7.28±0.83, 7.93±1.13), sharing responsibilities(7.28±0.67, 8.07±0.84), trust (7.11±0.74, 8.07±0.73), and support (7.33±0.70, 7.86±0.80). Five domains including personal, team member, the training course, instructor, and outcome were defined. Characters of team members had some impacts on building the team, surgical outcome, and learning. This new team training programme provided young surgical trainees and novice nurses the chances to have many hand-on experiences of practicing basic and advanced skills, to conduct interdisciplinary communications for discussing surgical procedures, and to build up their competences in a safe simulated environment which mistakes can be happened.

Conclusions:
The effect of a new operative team training programme were providing hand-on experiences, cultivating competences, and enhancing interdisciplinary communication for novice operative teams.

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12. "The retention effect of learning suturing and knot tying during clerkships and internship"

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Hypothesis:
Suturing and knot tying are basic and most important surgical skills. The retention effect of learning these skills during clerkship and internship is unknown. The aim of this study is to explore its retention effect after teaching medical students when they started their clinical clerkship.

Methods:
We set up a new "Structured Clinical Skills Training Model" implemented in National Taiwan University Hospital (NTUH) for pre-clerk medical students since 2008. This new model included two and a half days training for eight clinical skills, practice sections, and assessment before clerkship. Suturing and knot tying is one of these skills. We evaluated suturing and knot tying skills of each cohort after the training, junior clerkship, senior clerkship and internship by using the same assessment tool which is modified OSATS form. We used paired t- test for analyzing assessment results.

Results:
In the cohort of 2009, 111 medical students attended pre-clerk training courses and learned how to perform suturing and knot tying. After two year clerkship and one year Internship, only 22 students had complete follow up data. The overall performance of suturing at pre-clerk training, senior clerkship (two years after the training) and internship were 3.62±0.86, 3.95±0.38, and 3.95±0.92. No significant statistical difference was found. The overall performance of knot tying after training and at senior clerkship showed significant improvement (3.38±0.66, 3.76±0.43, p=0.017).

Conclusions:
Although the overall performance of suturing did not improve significantly after training, the performance of knot tying during senior clerkship was better than the stage after training. Our results showed the retention effect of learning suturing and knot tying was good.

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13. "Ge kniven vidare – Pass on the knife"

Background:
Structured surgical training is essential to turn residents into good surgeons [1]. The basis of surgical training is workplace-based education in the operating room. In surveys, both medical students as well as residents identified the surgical training as shortage of their education [2, 3]. The Swedish National Board of Health and Welfare (Socialstyrelsen) warned in the "National Report - Planning Support 2013" that the lack of consultants will further aggravate according to the age distribution of medical doctors [4], increasing the need for organized knowledge-transfer to the next generation.

Following a Danish example [5], six Swedish resident organizations initiated the campaign "pass on the knife" focusing on surgical education in routine clinical care [5]. Hypothesis is that the campaign will improve surgical competence, patient safety and happiness at work, reduce costs and lead to development of the surgical disciplines [6, 7].

Methods:
The resident organizations have prepared campaign material by collecting good praxis from clinics all over the country as well as assessment of the needs of both junior doctors and supervisors [8]. During spring 2013, all colleagues have been informed about the campaign by publications in national media [9, 10] and information on the specialist organizations' homepages, newspapers and conferences.
In order to evaluate the effects of the campaign, questionnaires were sent out and follow-up questionnaires are planned for autumn 2014.
As conditions vary between different hospitals, local representatives have been recruited to implement "pass on the knife" at their sites.
The residents' homepages will be used to get into contact and exchange ideas.

Results:
Possible interventions in three areas - organization of the educational environment, preparation and attitude of both residents as well as their supervisors [11] – have been summarized in form of a power point presentation with an accompanying manuscript. As communication was identified as a major area for improvement, checklists for the clinical supervision setting have been prepared as part of the campaign material [12].
As OGU started the campaign, so far obgyn is the only discipline that has completed recruitment and 39 of 43 sites (including all major centers) chose to participate [12].
In the obgyn questionnaires, only half of the supervisors and 1/3 of the residents considered that the surgical training at their sites meet their expectations with continuity being one of the main deficiencies. There is no established culture in planning or evaluating the clinical education situation:

	Do you plan who will perform which part of the operation?		Do you discuss what the resident is supposed to learn before operating?		Does the resident get feedback after the operation?	
	Resident	Supervisor	Resident	Supervisor	Resident	Supervisor
always	4	23	1	10	3	23
often	32	62	10	50	24	62
seldom	51	14	59	37	62	15
never	13	1	30	3	11	0

Conclusion:
There is a big need for the improvement of surgical training and especially communication in clinical supervision. "Pass on the knife" has been received with great interest and the majority of sites intend to participate. Local projects have been started and are collected on the resident's homepages.

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OGU (obstetriker och gynekologer under utbildningen: the Swedish obgyn resident's organization [12]): Elisabeth Vock, Emilia Rotstein, Ida Gideonsson, Jonas Eklund, Josefin Kataoka, Karin Hallstedt, Malin Sunder, Olof Alexandersson, Peter Anfelter, Verena Sengpiel
KIRUB (kirurger under utbildning: Swedish society of young surgeons [13]): Elin Ericsson, Fredrik Jonsson, Jenny Granström, Jessica Frisk, Hanna Nyström, Martin Skogar, Patrik Larsson, Pernilla Benjaminsson, Sofia Westermark
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15.**Yngre Läkarförening inom Svensk Ortopedisk Förening** [http://www.ortopedi.se/index1.asp?siteid=2&pageid=21&s1id=7]
16.**Underläkarsektionen Otoliten** [http://www.orlforum.se/index.php?option=com_content&view=article&id=152&Itemid=133]

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14. "**Virtual Reality Training versus Blended Learning for Laparoscopic Cholecystectomy in a Randomized Controlled Trial**

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Introduction:
Training of laparoscopic skills and operations outside of the operating room is mandatory to reduce operative times and risks. The aim of this study was to compare Virtual Reality (VR)-

Training with low cost Blended Learning (BL) (combination of standard Video Training (VT) and Elearning) in a standardized and structured training.

Methods:
Laparoscopy naive medical students were randomized in two groups stratified for sex (m=42, w=42). Each trainee had three training sessions of four hours. The BL group (n=42) used Elearning for laparoscopic Cholecystectomy (LC) and practised basic skills with VT. The VR group (n=42) did the basic skill modules and procedural training for LC on the VR Trainer (Simbionix LapMentor). Operative performance of a cadaveric porcine LC was measured with the validated Objective Structured Assessment of Technical Skills (OSATS) tool with a global operative score (Minimum 7 Maximum 35) and a procedure specific score (Minimum 14 Maximum 70). The maximum time for finisching the operation was 80 minutes. The raters were blinded to the trainees groups. The trainees evaluated their training modality with questionnaires (grade 1 (excellent) – 5 (not good)).

Results:
There were no significant differences between the groups for the global operative score (VR:16.7 vs. BL:16.2 p=0.66), for the procedure specific score (VR:33.9 vs. BL:33.7 p=0.89) and for the total OSATS score (VR:50.7 vs. BL:49.9 p=0.79). There were no significant differences between the sexes for the OSATS scores. However, the trainees in the VR group completed the LC significantly more often than the BL group (p=0.02) as was the case for men vs. women (p=0.02). Trainees found the training fun in both groups (VR:1.3 vs. BL:1.5 p=0.21). The efficiency of the training was found higher in the VR than in the BL group (1.8 vs. 2.1 p=0.048). The medical students felt well prepared for assisting in laparoscopic operations in both groups (VR:2.3 vs. BL:2.5 p=0.37).

Discussion:
Both training modalities were effective for the training of LC. In the validated OSATS score there were no differences between groups and sexes, however VR seems more fun and male students as well as the trainees in the VR group were more likely to finish the operation. VR and BL can be applied for training novices the basics of LC.

Expressions of gratitude

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In case you find any errors we do apologize.

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