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How to teach (and learn) surgery

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How to teach (and learn) surgery

W. Artibani

Surgical education in the last century was mainly based on the so-called Halstedian model.

William Stewart Halsted is one of the fathers of "modern" surgery. He became (at the age of 38) the first Chief of Surgery at Johns Hopkins Hospital after a training period in Europe. He was a visionary surgeon performing the first emergency blood transfusion, developing radical mastectomy for bladder cancer, and inventing surgical gloves. The 7 Halsted's principles in surgery are still valid today: handle tissue gently, control haemorrhage carefully, preserve blood supply, observe strict asepsis, minimize tissue tension, appose tissue accurately, and eliminate dead space. His main contribution was related to a model of surgical education which is the origin of the residency system and was not challenged for more than a century. Residents were expected to make a total commitment to hospital work and patient care, meaning no marriage, every other night call, no vacation, none or little pay, with graduated responsibility increasing from intern to junior resident to senior resident to chief resident. The Halsted's model was clearly based on volume and at the end only the "strong survivors" were selected.

This volume-based model has been progressively replaced by diverse ways of teaching of surgery, taking advantage of evolving technology, and taking into account changing regulations and patient expectations. At present, the aim of surgical education is unchanged (to obtain competent and safe surgeons), but the process is different, grounded upon simulation, structured focused and stepwise modular training, mentoring, and proctoring. The context is an important determinant, being in Europe residents work-hour restriction (2000/34/EC; 48 hours including overtime, minimum resting period per 24 hours of 11 hours and maximum working hours during the night of 8 hours), reduction in general surgery training, and resource reduction.

Surgical education and professional development should include technical skills (knowledge and competence on instruments, energies, basic maneuvers, procedure steps, management of complications, by means of computer simulators, virtual reality, wet and dry lab, fresh cadaver lab, animal lab, mannequins) and non-technical skills.

The Miller's pyramid of clinical competence (Fig. 1) resumes the various levels of progression.

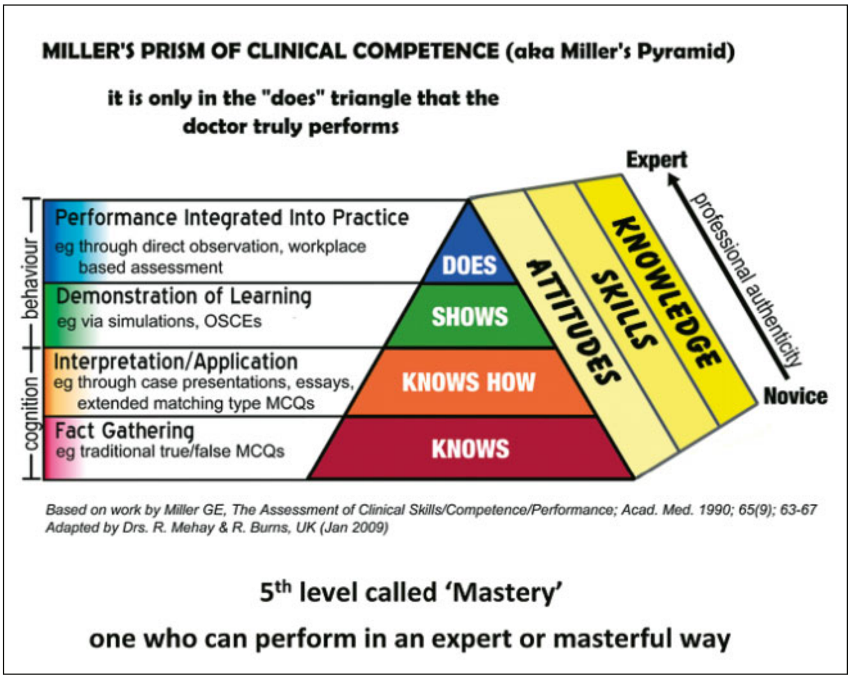

Figure 1: Miller's Pyramid/Prism of Clinical Competence (1990). Adapted from: Mehay R. Miller's Pyramid of Clinical Competence. Additional web resource to: The Essential Handbook for GP Training & Education. Chapter 29: Assessment and Competence (http://www.essentialgptrainingbook.com/chapter-29.php). Courtesy of Dr. Ramesh Mehay.

Modular training has been introduced in urology by Jens-Uwe Stolzenburg in endoscopic extraperitoneal radical prostatectomy, identifying different steps of the procedure with different degrees of difficulty. The trainee is supposed to achieve proficiency step-wise starting from the easy modules progressing to the difficult modules. Modular training has been shown to be an efficient and effective way of surgical training, without significant impact on duration of the procedure and patient safety.

Video and information technology provides today an endless opportunity of teaching through: e-learning and live surgery (youtube, websurgery, surgery in motion of scientific journals). On one side, to produce videos and disseminate them in the web is tremendously easy, on the other side, auto-recording and reviewing is an effective way to improve personal surgical performance.

EAU is particularly active in e-learning and for example EBLUS (European Training in Basic Laparoscopic Skills) and EBRUS (European Training in Robotic Urological Skills) are more and more popular and used.

Simulation is nowadays an integral part of surgical training and was introduced as mandatory in the UK in the surgical training programme of the Intercollegiate Curriculum. To be assessed on the basis of Fundamentals Laparoscopic Surgery, produced by the Society of American Gastrointestinal and Endoscopic Surgeons co-endorsed by the American College of Surgeons, is mandatory to get the US privileges in laparoscopic surgery. A similar programme of Fundamentals of Robotic Surgery is under validation, at present for basic skills, in the near future for procedure-specific advanced skills.

ERUS (the EAU Section of Robotic Urologic Surgery) has already conducted 2 pilot studies on the validity of a structured robotic training programme. Pilot study I was as follows:

- Day 1: simulation test (baseline), skills drills test, EBRUS.
- Week 1–3: bedside assistance, simulator and dry lab intensively, start on console.
- Week 4: theoretical exam plus simulator and skills exam; hand-on courses with simulator, dry and wet lab, cadaver training, and live surgery.
- Week 5–12: modular training on the console, lab training, or simulator.
- Day 91: handover of a DVD of a full unedited case of RARP which was blindly evaluated by external reviewers, final robotic skills evaluation (theoretical MCQ and practical-simulator and skills drills), evaluation by the mentor in a structured manner including depth perception, bimanual dexterity, efficiency, force sensitivity, autonomy, robotic control.

A second pilot study has recently been concluded, with the same concept although longer (6 months instead of 3).

A third pilot study is planned. The main goal is to validate the training programme and the assessment process and to explore a possible certification procedure.

Concepts deriving from civil aviation are very much transferable to surgery. Non-technical skills identify the cognitive and social skills which contribute to safe and efficient task performance. They are related to human factors, being well known that errors in aviation as well as surgical complications are mainly related to human errors. The University of Aberdeen pioneered the field providing specific taxonomy related to NOTSS for anaesthesiologists, surgeons, and scrub nurses. NOTSS includes: situation awareness, decision making, communication and teamwork, and leadership: they can be observed and rated. Together with cognitive training, they should be part of surgical professional development, and they start to become applied in several hospitals.

Many lessons can be learned from aviation. Some are commonsense rules difficult to disagree. Anticipate: "always fly ahead of your plane"; call for help early: "heroes are dangerous"; leadership: "what is right not who is right".

There is no doubt that in order to become a good surgeon, personal dedication and motivation are prerequisites which cannot be replaced by the efficiency of any teaching programme. Every great experienced surgeon says: "I am still in my learning curve, I continuously aim at improving my performance, outlining that surgical excellence is the outcome of a never ending dedication."

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