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Editorial

Simulation; usefulness in medical and surgical training

Simulación, utilidad en la formación médica y quirúrgica

Medicine is changing its paradigms, that is, its manner to be learned, exercised, and evaluated. Clinical practice reflects the knowledge, technology, and culture of the moment; when this changes, it has repercussions in medicine, and when these changes are radical, they promote the renovation of the established paradigms. Minimally invasive surgery (MIS) has become the motor of the renovation[1] of this medical discipline, by changing the skills that surgical acts had required until the end of the eighties; thanks to a spectacular technological change, large surgical incisions have disappeared, surgical aggression has been reduced, and the discomforts and risks for the patient have decreased. The technological innovation has brought with it changes in the skills that are required from a surgeon, as well as in the ergonomics of the surgical procedure, in such a way that the current classical surgery learning model, learning at the patient's bedside, is now limited and insufficient. Confronting this change in the surgical paradigm requires the redesigning of diverse aspects of surgical activities, including the learning process.

Medical simulation is a training method that reproduces reality in a controlled atmosphere. Its purpose is acquiring and/or improving professional competencies.[2] This type of training based on simulation allows for an adequate learning curve, without putting patients at risk, at the same time that the skills acquired can be transferred to real practice.[3] Simulation in surgery is focused on acquiring psychomotor surgical techniques, and also communication, coordination and leadership skills.[4,5] The equipment that is used in training based on simulation can be simple equipment that allows for the learning of basic initial skills or even minimally invasive surgery equipment, that are sometimes used with virtual reality screens, and in other cases, with biological tissues, isolated organs, human corpses, or laboratory animals.[6] The transversal skills require actors that simulate patients or interactive human mannequins that make it possible to reproduce critical situation in the operating theatre.

Training based on simulation of surgical skills should be framed by a theory that allows for the progressive control of the simulation means. Three training levels have been proposed[7]; the first level corresponds to the elementary psychomotor skills that are done automatically; basic, Pelvi-Trainer type simulators are used at this level along with certain virtual reality models. The second step is complete surgical procedure learning; this objective is reached with virtual reality equipment or with real surgical techniques used in human corpses donated for this activity; the third step requires a new dimension: critical thinking and decision taking based on it; this dimension represents the ability to react to unexpected conditions, such as intraoperative complications; the animal models allow surgeons to train in many of these situations and they are an appropriate tool for this level. Watching surgical interventions by means of e.Operating theatres connection[8] especially reinforces the last two steps. Parallel to practicing surgical skills, communication skills, leadership, coordination and team work should also be practiced, given that different medical specialists with different responsibilities work together in the operating theatre.[9,10] Simulation with actors allows for the practice of surgeon and anaesthesiologist communicating with the patient and his/her family regarding topics such as informed consent, giving bad news or conflicts resolution. Team work can be practiced with interactive human mannequins that enable the reproduction of critical situations (for example: severe bleeding or intraoperative heart attack) that makes it necessary for the team members to lead, coordinate and mobilize resources.

Training in MIC based on simulation obtains maximum performances if certain conditions are taken into account. Firstly, the scenarios should be as real as possible, that is, they should be well contextualised, while the training scripts should be focused on pre-selected competencies. The tutors that will be supervising the simulation activity should understand their role as facilitators, develop an adequate feedback and promote a reflexive and critical analysis at the end of the training session. Finally, evaluation tools are required[11]; some of these will be based on quantitative data, such as time spent, errors made, number of movements made…while other will be based on lists of tasks to be performed.

These tools should be calibrated and validated. The simulation and its evaluation can be used as an educational activity, or as a credential activity as an objective structured clinical examination (OSCE).[12]

Teaching based on simulation has its own needs. The basic simulation needs can be acquired at a reasonable price, and they can be easily installed in hospitals; however, the highly complex equipment should be centralised, not only because of its elevated cost, but also to ensure that the volume of activities makes them worth their price; the highly interactive mannequins and the real surgical techniques including robotic surgery equipment are included in this last category. Another need would be an adequate physical and administrative infrastructure.[13] The first requires, together with the training scenarios, workshops, classrooms, animal cages, equipment to preserve human corpses, etc. The management of the training activities should be complemented by a "virtual campus."

Finally, it must be kept in mind that these training centres have different functioning dynamics than classrooms and than those for activities carried out in operating theatres, and that they do not require their own teaching staff, but that they should be open to practicing professionals, for them to design training activities according to appropriate methodologies that must always be likely to be evaluated.

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