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What is new in education and teaching in regional anaesthesia?

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INTRODUCTION

Training of some procedures on live patients is no longer ethically justified or acceptable to the patient. Patients expect that health professionals have fully mastered a procedure before using it on them. Procedures performed on a patient simulator can be interrupted, improved and repeated and, unlike in real life, no harm is done when a mistake is made *(1)*.

SIMULATION TEACHING AND LEARNING IN REGIONAL ANAESTHESIA

Various types of simulators are used to train and assess different levels of learners. These include human cadaver, mannequin simulators or animal models, computer-based simulation, haptic and or virtual simulation, as well as simulation using standardized patients (2). One of the prerequisites for physician, who wish to take the European Diploma in Regional Anaesthesia and Pain therapy (EDRA) Part I, is to attend a minimum of 1 ESRA workshop or CME/CDP approved workshop. The following are considered ESRA workshops: ESRA Congress WS, ESRA Cadaver WS in Innsbruck or Ljubljana, ESRA Winter Week in Grindelwald (http://esraeurope.org/education/esra-diploma/). Evaluation of cadaver workshops for education in regional anaesthesia demonstrated that the practice of peripheral nerve blocks on cadavers represents the most important part of the course *(3)*.

Although cadavers are used to teach anatomy and technical skills for regional anaesthesia, utilisation of ultrasound-guided simulator for technical skill training has become a trend in recent years. The observation of novice's behaviour, associated with learning ultrasound-guided peripheral regional anaesthesia, demonstrated that two main mistakes wre failure to visualize the needle before advancement and unintentional probe movement. They concluded that this technical part of block can be improved with preclinical simulation training *(4)*. Recent study also showed that simulation would still be applicable to all peripheral nerve blocks with respect to localization of target and placement of needle to the target *(5)*. There is commercially available ultrasound training block model for acquisition and interpretation of sonographic images of nerves and vessels and for developing the psychomotor skills of guiding needles to simulated nerves and vessels. Sonoanatomically based part-task simulators for learning ultrasound guided regional anaesthesia are also commercially available: an upper body torso manikin for learning interscalene and infraclavicular nerve blocks, a femoral model for learning femoral nerve blocks, and leg model for learning sciatic nerve blocks in the subgluteal and popliteal areas (Blue Phantom Ultrasound Training Models). These simulators were developed to anatomically mimic both surface anatomy and the sonoanatomy present on ultrasound visualization *(6).* Epidural and spinal anaesthesia simulators consist of a torso with synthetic spinal column that includes a ligamentum flavum and a spinal cord within a fluid-filled thecal sac. These trainers can reasonably recreate the touch, feel and consistency of a normal human back and the structures involved in neuroaxial regional techniques. Some models allow ultrasound imaging *(7).* Recommendations for education and training in ultrasound-guided regional anaesthesia by the American Society of Regional Anaesthesia and Pain Medicine as well as the European Society of Regional Anaesthesia and Pain Therapy suggest one method for education is to practice needle insertion techniques using simulators and phantoms *(8).* Increasingly sophisticated regional anaesthesia simulators continue to be developed although the contribution for such models to attainment regional anaesthesia skills remains to be seen *(7).*

For teaching and practicing how to manage critical events associated with peripheral neuroaxial and nerve blocks such as phrenic nerve paralysis with respiratory failure, stellate ganglion block with Horner' s syndrome, tension pneumothorax with cardiovascular collapse, recurrent laryngeal nerve block with hoarseness, central neuroaxial blockade with cardiovascular and respiratory collapse and intravascular injection of local anaesthetic, can be simulated with the high-tech computer controlled manikin. That manikin is specifically designed for training in anaesthesia, respiratory and critical care provides respiratory gas exchange, anaesthesia delivery and patient monitoring with real physiological clinical monitoring. The trainee can: "talk" to the mannequin and get answers from the operator through a speaker in the mannequin's head. The trainee can check the pupils, which react to light, feel arterial pulses, listen to cardiac and lung sounds, and collect information on heart rate, blood pressure, respiratory rate and oxygen saturation. Medications and fluids can be administered to the simulator, which responds appropriately based on an interaction between the mannequin's current underlying physiology and the dose, pharmacokinetics and pharmacodynamics of the medication. In addition, a number of procedures such as airway management, cricothyroideotomy and chest drain insertion can be performed on the mannequin (HPS Human Patient Simulator, CEA Healthcare).

Figure 1. *Trainee is performing spinal anaesthesia on the part-task trainer. Medical Simulation Unit, University Medical Center Ljubljana.*

Figure 2. *Operation theatre in Medical Simulation Unit, University Medical Center Ljubljana.*

In the University Medical Centre Ljubljana, Medical Simulation Unit was officially opened on 29th June 2011. It is multidisciplinary skills centre which can deliver a diverse number of training activities to national and international medical practitioners and healthcare workers. The centre has one operating theatre with associated control room, one intensive care unit with associated control room, two briefing – debriefing rooms with e-learning pods, storing space, wardrobe and external training area. Out trainees have the opportunity to train the regional anaesthesia using part-task trainers and management of critical events associated with regional anaesthesia with high-tech computer controlled manikin.

CONCLUSION

Simulation based clinical training is a supplement, not a replacement for traditional training and maintenance of competence. Learning on mistakes is done with no harm for the patients. It has been identified that simulation based clinical training can shorten the learning curve, permit manual skills development before patient exposure, improve performance under stress, improve team work and optimise communication. It is more than just a novel education strategy. Over the next decade it should mature into a key tool for error mitigation *(9).*

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