

University of Maribor  
Faculty of Medicine

# ERASMUS INTENSIVE PROGRAMME

Simulation in Clinical Practice: Virtual Medicine  
Abstract Book



Univerzitetni  
klinični center  
Maribor

UNIVERSITET MEDICINE  
OF BIRNBEI UNIVERSITY



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**Erasmus Intensive Programme: Simulation in Clinical Practice**

**ABSTRACT BOOK**

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## **SECTION 1: Simulation in Undergraduate Medical Education**

### **1.1 Percutaneous Tracheostomy as a Reward**

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*School of Medicine, University of Split, Croatia*

**Background:** European Resuscitation Council (ERC) Guidelines for resuscitation 2010 recommend performing cricothyroidotomy only by experienced rescuers, when every other procedure fails to ensure the patency of airway. Difficult airway algorithm advises that cricothyroidotomy should be used only in “can not intubate, can not ventilate” situations. However, according to the Croatian regulation, cricothyroidotomy kit is an essential part of reanimation bags in emergency medical services (EMS) vehicles. Both, the fact that kit is there to be used and malpractice anecdotes made us incorporate this advanced life support (ALS) procedure into undergraduate education of medical students at the School of Medicine, University of Split.

**Summary of work:** Second year medical students are thought principles of airway management, as a part of Clinical Skills II course and its module D, in accordance with current ERC Guidelines. At the same time, fifth year students, who take Anaesthesiology and intensive medicine course, are able to, among other things, practise on manikins and learn via simulation as well. However, this year we raised the bar higher in order to produce more interested and highly skilled future rescuers. A competition was established: commended students on their practical sessions and those with best results on their final exam were offered a special treat – they got the opportunity to assist on percutaneous tracheotomy in general intensive care unit (ICU) of the Split Clinical Hospital centre. Procedure itself was explained in detail to the chosen few and later on, when the situation for percutaneous tracheostomy arised, they were summoned up to the ICU.

**Conclusion:** Our experiences with Clinical skills and Anaesthesiology courses show it is possible to achieve outstanding results after intensive training on cardiopulmonary reanimation (CPR) over a short period of time. However, anaesthesiology, being a clinical course at the penultimate year of medical studies, should allow students to participate in more advanced procedures. If we want to raise properly trained rescuers familiar with the lifelong learning idea, we have to start early (hence the suggestion for implementation of those courses early into undergraduate education) and we have to encourage them to do so (hence the idea for assisting on tracheotomy as a reward).

## **1.2 The Present and the Near Future of Simulation in Undergraduate Medical Education at Medical School of Pécs, Hungary**

**Authors:** Balint Nagy, MD, Csaba Loibl, MD, Szilard Rendeki, MD

*Department of Anesthesiology and Intensive Therapy and*

*Department of Operational Medicine, Medical School of Pécs, Hungary*

Students really appreciate our enthusiasm on teaching up-to-date academic knowledge. However, to graduate as a fully trained doctor, plenty of opportunities are definitely needed to absorb practical skills as well. Therefore, we have to cope with increasing pressure regarding „hands on trainings”. It can be challenging to teach all the basic required procedures even if you work for a level one university hospital. Sometimes simply just the time schedule of the students does not fit to the opportunity. Learning on real patients are however also raise many ethical and practical questions. Medical simulation can solve many problems in this field. The main aim of this lecture is to present the development of simulation at our faculty.

Nowadays we use only basic simulators to teach airway support, resuscitation and minor procedures like urinary catheter and peripheral line insertions. We do our best to simulate complex real life scenarios. These simulators are however only available for students during anesthesiology, first aid and emergency medicine practices.

Graduates provided feedback results are disappointing regarding practical skill teaching. Local Council of Medical Students (CMS) - with strong lecturer support - therefore decided to start a new „Skill Lab” project to improve medical simulation possibilities at our faculty.

The project started in 2012 with planning and will be completed hopefully until the end of 2014. CMS dreamed a new 350 square meter sized complex within our central building involving simulators for almost all clinical specialty. The „Skill Lab” will be run as an independent institution by students under lecturers supervision. Lecturers will select skilled senior students for instructor program (IP). After successful IP completion, instructors can teach other students as a part of students to students education method (S2S). Therefore, it will be possible for students to use freely the facilities of the „Skill Lab” in their free time, which is -as far as we know- unique. The budget is approximately 420.000 EUR involving the grant of Foundation for Education Development. CMS strongly support the project not „just” with voluntary work, but also financially. CMS already ordered almost 100 simulator in the field of anesthesia & intensive care, surgery, internal medicine, cardiology, gynecology & obstetrics and ophthalmology. As a part of the „Skill Lab” two full operation theater will be set up with anesthesia simulators and real surgical devices (laparoscope).

„Skill Lab” project is a great leap forward in the field of undergraduate medical simulation with some unique solution which can be exemplary for other institutions. Importance of good cooperation between CMS and faculty leaders could not be over-emphasized.

### **1.3 Simulation in Undergraduate Medical Education at Uppsala University School of Medicine**

**Authors:** Sara Svensson, MD, Federico Centurion, MD

*Uppsala Akademiska University Hospital, Uppsala, Sweden*

**Background:** At Uppsala University School of Medicine there is a tradition of simulation training designed for medical students. All simulations are performed at Uppsala Akademiska University Hospital Clinical Training Center. It has been suggested that simulation can enhance team-work and thereby facilitate complex procedures, such as urgent medical interventions, and increase the efficacy and safety of these procedures.

**Summary of Work:** At Uppsala University, three different types of simulation with different scopes are part of the undergraduate medical education. For simple medical skills practice, there is the stand alone equipment for simulating e.g. laparoscopy, bronchoscopy, suturing, rectoscopy and intubation. For minor scenario simulation, less advanced, but life sized, models are used. A teacher/facilitator changes the vitals of the model via a SimPad and the clinical presentations of common urgent diagnoses are focused upon. Full-scale CRM (Crew Resource Management) simulations aimed at developing the students' team-work and communication skills and to a lesser extent focusing on medical skills are conducted by three facilitators and a more advanced Sim model. CRM simulations are performed as well intra- as interprofessionally together with nurse students.

**Discussion:** Swedish healthcare is dependent on its professionals to handle urgent and unforeseen events in an efficient and safe manner. Well-developed team-work between physicians and nurses are essential, but often deficient. We would like to argue that intra- and interprofessional CRM simulations (IPS) are possible ways for undergraduate medical students to develop safe and efficient communications skills adapted for the clinical environment.

**Conclusion:** More research is needed to evaluate the different kinds of simulation training used in undergraduate medical education in Uppsala and globally. More effort may be needed to provide both medical and nurse students with interprofessional team-work and communication skills, perhaps through simulation training.

**Take-home Message:** Simulation in undergraduate medical education has great potential to not only prepare the students for practical medical tasks, but also to provide them with clinical communication skills, facilitating clinical team-work.

## **1.4 Non-technical Skills Assessment Systems: a Critical Review**

**Authors:** Piotr Koleda MD, PhD<sup>1</sup>, Grzegorz Cebula MD, PhD<sup>2</sup>

<sup>1</sup>*Pathophysiology Department, Wroclaw Medical University, Poland*

<sup>2</sup>*Department of Anaesthesia and Intensive Care Medicine, Jagiellonian University Faculty of Medicine, Poland*

**Background:** Medical management errors are an important cause of in-hospital deaths. The human error is one of the greatest contributors of preventable adverse events. Even if the human error seems to be individual's fault, it is mainly induced by system failures.

Development of human factors, such as communication, leadership, knowledge of environment, anticipation and planning, obtaining timely assistance, attention allocation and workload distribution is now a core element of training and skills maintenance in high-risk areas. A good example of this may be Crisis Resource Management (CRM) training that addresses the non-technical skills necessary for effective teamwork. These skills, when practised in conjunction with medical and technical expertise, can reduce the incidence of clinical errors and contribute to effective teamwork. The simulation appears to be the most powerful tool in teaching and practicing non-technical skills but it has also many borders. Its low-fidelity, unknowledgeable and inexperienced faculty, and no standardized assessment systems may limit effectiveness of the simulation.

**Summary of work:** Authors reviewed the most popular assessment systems such as Anaesthetists' Non-Technical Skills (ANTS), Observational Teamwork Assessment for Surgery (OTAS), Observational Skill-based Clinical Assessment tool for Resuscitation (OSCAR), and Development of the Team Emergency Assessment Measure (TEAM) in the aspect of non-technical skills evaluation accuracy. Inter-rater agreement evaluation was based on a scale of 0.40–0.60 'fair', 0.61–0.75 'good' and >0.75 'excellent'.

**Summary of results and discussion:** The ANTS and the TEAM systems are characterized by 'fair' to 'good' inter-rater agreement (0.55–0.67; 0.55) and only single point differences in the rating occurs. The OTAS and the OSCAR systems have 'excellent' inter-rater agreement (0.83; 0.77–0.81) but both systems presents significant correlation with the assessors' clinical experience.

**Conclusions:** Non-technical skills reflect the interpersonal and cognitive skills that complement clinician's technical skills. Their teaching and evaluation are very important part of the medical education and have to be standardized by assessment systems usage.

## **1.5 Simulation in Medical Education in Undergraduate Studies in Rijeka, Croatia**

**Authors:** Darko Margeta, Klara Smolić, Dorotea Vukelić, Anja Wolfand, medical students

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The Skills Lab Simulation center in Rijeka is a part of the Department of Anesthesiology, Reanimatology and Intensive Care of our Faculty of Medicine. Assistants teaching in our Skills Lab Simulation Center are mostly licensed ERC's ALS instructors and the education of our students is largely based on ERC's principles of teaching.

The Skills Lab Simulation Center organizes undergraduate courses in First Aid for Medical students, Course of Emergency Medicine and First Aid for the students of Radiology, an Emergency Medicine course for Professional Nursing Studies and a Course of Anesthesiology with Reanimatology for undergraduate Dental medicine studies. The Medical and Dental study in Croatia are formed as integrated undergraduate and graduate programs that last for six years. The first three years are considered undergraduate.

The differences between approaches to various studies are in the depth and extent. Students are divided into work groups of a maximum of 5 students with one peer tutor and an assistant, for about an hour for each topic (sometime longer, depending on the topic). Class is conducted in four step approach (real time simulation, step by step explanation, student guided teacher simulation and student simulation). Everyone has the opportunity to practice each skill for several times. After completing the training, the students are able to apply the skills in real life situations.

The First Aid Course at the School of Medicine is the summation of procedures that are enabling a non-medical expert to help an ill or injured person. The aim of the course is to enable students to learn: BLS with and without an AED, airway (manual grips) and a recovery position, the basics of the ABCD approach, the AVPU scale, primary care of severe trauma injury.

The Emergency Medicine and First Aid course for the Study of Radiology is very similar to the course for Medical students, but it is simplified. It does not cover primary care of severe injuries, but they practice how to insert an IV cannula.

The Emergency Medicine class for the Professional Nursing Studies includes: BLS and AED, airway management (manual grips and aids) and the recovery position, IV cannula insertion and intraosseous access, monitoring and defibrillation and a teamwork practice of emergency scenarios.

The Anesthesiology and Reanimatology class for Dental medicine is equal to the Emergency Medicine course for nurses.

We keep track of progress of all of our students during simulation classes. At the end of the course all of the students take test paper with yes or no answers adapted to their level. Only medical students have to pass a practical knowledge exam in BLS on a ResusciAnne manikin.

Through annual evaluation surveys on faculty level we always get high ratings regarding our courses. Our former students are later in their education often chosen as instructor potentials on many courses they attend and many become licensed instructors.

Simulation medicine is an extraordinary way of preparing students for real life situations which cannot be learned in any other way and for which they have to be prepared for. Implementation of this kind of education has a huge benefit for future doctors.

## **1.6 Simulation in Undergraduate Medical Education in Maribor**

**Authors:** Sara Nikolić<sup>1</sup>, medical student, Tamara Serdinšek, MD<sup>1,2</sup>, Sebastjan Bevc, MD, PhD<sup>1,3</sup>

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**Background:** Clinical skills (CS) teaching and assessment by simulation plays an important part of modern medical education. In 2010, our faculty invested in building its' own Clinical Skills Laboratory (CSL) and Simulation Centre (SimCen). Both units now operate under the supervision of Centre for Medical Education (CME) established in 2012. Consequently, the concept of peer-teaching and system of objective structured clinical examination (OSCE) were introduced to our students through the activities of both CSL and SimCen.

### **Summary of Work**

- Elective course

Since academic year 2010/11, peer-tutors have been teaching a 3<sup>rd</sup> year elective course (EC) *Selected topics and novelties in propaedeutics*. The course curriculum was modified thorough the years, this year it included basic CS (venepuncture, bladder catheterization, intravenous cannulation, administration of intravenous solutions, rectal examination, basic abdominal ultrasound examination, etc.) as well as sophisticated simulations of Acute Coronary Syndrome and Heart Arrhythmia scenarios.

- Internal medicine

Last year cathedra for internal medicine incorporated us in history taking and clinical examination teaching by letting us train the 3<sup>rd</sup> year students for a month, before they start their rounds at Clinic for internal medicine.

- Introduction to 3-month clinical rotation

Year-6 students are obliged to spend a day in CSL training/repeating basic CS before their rotation starts. In addition, in this year we organized our second ECG interpretation workshop for them in cooperation with Clinic for internal medicine.

- Physiology

One of our goals is to make our curriculum as integrative as possible, thus, this year physiology department introduction application of subcutaneous injection, venepuncture and ultrasound of legs as part of their haemostasis seminar. They also use Human Patient Simulator as part of their physiology of shock seminar.

- Other

CSL and SimCen are also being used for clinical practice in courses such as first aid, family medicine, internal medicine, anaesthesiology, gynaecology, paediatrics and emergency medicine, however, not under the supervision of CME. On the other hand, CME supports student researchers in the field of medical education who present their findings at the eminent conferences on medical education.

**Summary of Results and Conclusions:** Our students are successful in passing the EC OSCEs and very keen on taking them. Throughout the years 2010 – 2014, number of students participating in EC increased (19, 40, 40, 63) and their mean score differences in e.g. venepuncture – 96.7%, 96.7%, 96.8%, 96.1%, respectively, are insignificant. Also, we tend to evaluate the long term retention of knowledge and the results of year 2011 have shown that in venepuncture the mean score after six months was 92.7%. We got the same results in all other CS as well as history and clinical examination OSCEs.

When it comes to internal medicine pre-ward training for 3<sup>rd</sup> graders, their mentors are much more comfortable and students are more confident in history taking and examination on real patients. Sixth graders made the same feedback.

Moreover, we constantly evaluate our peer tutor for the sake of the quality teaching and objective assessment. This year's results have shown that our peer tutors are as capable for objective assessment as our clinical mentors.

**Take-home Messages:**

Integrating clinical skills into curriculum as soon and as much as possible.

Maximizing quantity without losing quality.

Constant evaluation and feedback.

## **SECTION 2: Emergency Medicine Simulation in Undergraduate Medical Education**

### **2.1 Prehospital Trauma Management Simulation in Undergraduate Medical Education in Rijeka, Croatia**

**Authors:** Ivana Plavšić, MD, Erika Šuper-Kučina, MD

*School of Medicine, University of Rijeka, Croatia*

Prehospital emergency medical service (EMS) developed quite differently in different countries. Although the trend is to eliminate doctors from such service, in our country doctors are still employed in prehospital EMS, but great majority of those doctors are not specialists of emergency medicine, but those that have just finished their medical education. Considering statistical reports that trauma presents leading cause of early death and permanent disability for people up to 41 years of age, it's important to educate young medical staff in prehospital trauma management.<sup>1</sup>

During their First Aid classes, first year medical students are expected to master the skills needed for successful management of trauma patients. Our classes are held based on ITLS algorithm. Those cover the doctor – patient approach in out-of-the-hospital environment. We use their ITLS primary survey scheme principle. Our main goal is to teach medical students how to manage a trauma patient with minimum or without any professional equipment. One of the peer tutors is a model on which they practice the scenario. They are encouraged to improvise the needed equipment (such as using door panel instead of a spineboard for immobilization and using the standard car issue first aid kit). It consists of scene survey, initial assessment after which students decide whether to do a rapid trauma survey or focused exam. Rapid trauma exam is a whole body exam where students inspect and palpate the entire body, searching for any sort of injury or bleeding. In the focused exam, used when the force that lead to a certain trauma suggest only a part of the body has been injured, the same principles apply. After finishing the exam, they put a patient securely on a spineboard. One of the things they also have to learn is to apply the Maine protocol and how to safely remove a helmet, how to turn a traumatized patient lying on his stomach onto his back and how to urgently extract a patient from a vehicle.

The highest level of survive of trauma patients is accomplished in those who undergo surgical procedure during first hour post-trauma, so called „golden hour“.<sup>2</sup> Early recognition of critically ill patients requires systematized approach, team work and skilled professionals. We consider that pre-mentioned skills are achieved only through interactive education and constant practice. That's why we integrated those skills as a part of First Aid teaching program for medical students.

We believe that early involvement of medical students in trauma management can reduce fear and anxiety in medical worker confronted with a real life situation and enhance chance of survival for severely injured patient. ITLS systematized approach is the most effective way to familiarize students with the problem in such an early stage of their education.

There are many young doctors employed in the prehospital emergency service. In 2012. Croatian Ministry of the interior reports 19,8% of people aged 25 to 34 got killed in the car accident.<sup>3</sup> Only in the hands of well trained and skilled professionals those patients have a greater chance of survival.

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[http://www.mup.hr/UserDocImages/statistika/2013/bilten\\_2012.pdf](http://www.mup.hr/UserDocImages/statistika/2013/bilten_2012.pdf)

## **2.2 Apps and Basic Life Support**

**Authors:** Ana Šarić, MD, Filip Periš, medical student

*School of Medicine, University of Split, Croatia*

**Background:** Basic and advanced life support (BLS, ALS) knowledge and skills deteriorate in as little as 3 – 6 months. In order to provide refresher training to the students of School of Medicine, University of Split, and help them maintain their knowledge and skills on cardiopulmonary resuscitation (CPR), we decided to show them how to learn and revise on their own, in an easy and fun manner. European Resuscitation Council (ERC) and their 2012 Scientific Congress encouraged us to do so: a session ‘Your smartphone and CPR’ was held on the first day of Congress, just after the opening ceremony.

**Summary of work:** We implemented a few smartphone and tablet applications, all of which widely accessible through AppStore, into Clinical skills and Anaesthesiology and intensive medicine’s learning materials. The applications we use the most are CPR PRO, AED Trainer and AED Remote control iPhone app. CPR PRO (Version 3.0) includes educational videos, metronome to pace chest compressions and rate detection of actual compressions. It prompts rescuer to give rescue breaths and keeps the track of the time, while the stopwatch is running continuously. It also enables the rescuer to phone for help directly from the app. We use it with the CPR PRO cradle for iPhone. AED Trainer (Version 2.1) mimics all the features and prompts of real automated external defibrillator (AED). We use it together with adhesive, custom training pads that plugg into iPad and are usable with standard CPR manikins. When both iPhone and iPad devices are connected via Bluetooth and AED Remote control iPhone app is used, iPhone acts as a remote to the AED and different scenarios can be created.

**Conclusion:** First, second and fifth year medical students of School of Medicine, University of Split practise their BLS skills with the usage of their iPhones and iPads. For them it is a fun and unique way of learning that changed their attitudes towards resuscitation. Their grades show that we have every right to be content; hence the suggestion for implementing such a valuable training solution, that is in accordance with ERC Guidelines for Resuscitation 2010, into undergraduate education.

## **2.3 Educational Aspects of the Operational Medicine Concept**

**Authors:** Csaba Loibl, MD , Balint Nagy, MD , Szilard Rendeki, MD

*Department of Operational Medicine – Military Medicine, Disaster Medicine and Law Enforcement Medicine and*

*Department of Anesthesia and Intensive Therapy, Medical School, University of Pecs, Hungary*

**Background:** The Department of Operational Medicine was founded in March 2013, at the University of Pecs, Medical School in Hungary. After the review of our Department's system and goals, we open up the problems that we think are weighted in the education of Military and Disaster Medicine in Hungary. We also try to present a suggestion to their solution.

**Summary of work:** In our lecture we give a short brief of the education of Military, Disaster and Law Enforcement Medicine in Hungary, and their role in the gradual qualification in the armed forces', the academical, and the universal curriculum. Our educational concepts are based on the students' knowledge and experience achieved from the basic sciences like physiology or pharmacology etc. and from clinical practice like first aid or anesthesiology and intensive therapy. The members of The Department are involved not only in the post gradual medical education but in research and health care. Due to the co-operation with other Hungarian Services (Police, Fire Brigade etc.) The Department has started to play a role in their medical education and qualification. We have also started to teaching them the basic and advanced medical skills and methods can be used under harsh circumstances or action. As we mentioned above The Department's educational concepts based on the routine and the knowledge of the basic sciences. These concepts are concentrated on the research, the development, and the education of the separately, and individual specifics with difficulty to interpretate.

**Summary of results:** For a co-operation like this, no initiative had been made before among the Hungarian Medical Schools, which can warn only by involving experienced, and well-trained practioners of the associated professions. With this lecture our intention to the audience is to form a constructive connection.

**Discussion:** We demonstrate the results of our Department's first year, and ask the recipients to form a critic and to discuss about our activity.

## **2.4 Simulation in emergency medicine education & inter professional scenario training at Uppsala University Hospital**

**Author:** *Gustaf Hummel, MD*

*Uppsala University Hospital, Uppsala, Sweden*

**Background:** Simulation is introduced to the medical students from the third year (emergency medicine I) of the medical program at Uppsala University Hospital (UUH) and recur the sixth year (emergency medicine II) when also inter professional scenario training (IPS) is introduced. During inter professional scenario training both medical and nursing students participate in acute clinical scenarios. Both simulators and standardized patients are used during the course in emergency medicine whilst during IPS simulators are standard. Multi professional teams are simulated and students also have tasks as observers (using predefined categories and variables) and are encouraged to participate in the debriefing. Clinical scenarios with progressive degrees of complexity (regarding medical difficulty and setting) and length (5-15 min) are featured. Focus is on emergency care (including trauma), anaesthesiology and communication skills.

**Discussion:** Simulation drives the medical students to act the role as leading medical professional under controlled and safe conditions and allows the student to test his or her skills in handling an acute medical scenario. Direct feedback is given in formalised debriefings. Positive actions can be affirmed and reflections of actions can improve the handling of the patient in repeated similar scenarios. Simulations are also a learning platform for peer learning where students learn from each other.

**Conclusion:** A strong opinion amongst the medical and nursing students at UUH is that they wish even more simulation exercises during their studies. Simulations prepare and assure the students for their coming role as physicians.

**Take-home Message:** Both medical students, nursing students and teachers at UUH, request more simulation.

## **2.5 Education in Resuscitation: What We Need to Change?**

*Authors: Paulina Hącia, Anna Szczubelęk, Magdalena Florka, medical students*

*Wroclaw Medical University, Wroclaw, Poland*

**Background:** Unexpected cardiac arrest is a major cause of premature death in industrialized countries however defibrillation can be successful in cases of pulseless ventricular tachycardia and ventricular fibrillation. It is very important and urgent to promote CPR in community, change old training methods and with help of media inform about successful resuscitation and encouraged to act.

**Summary of work:** It's important that course participants after effective CPR training will be confident their abilities and should be able to recognize an emergency and summon help, demonstrate lifesaving CPR at the end of the training course, show the same skills 6 months after the training, express confidence in their ability to help in an emergency, perform satisfactory CPR.

Good organization of training is characterized by small-group, easy accessibility, comfortable environment, video-based techniques, television and video instruction, specific plans for refresher session, session duration -1-4 h.

**Discussion:** Most victims of cardiac arrest receive poor quality CPR or not bystander CPR even if the helpgiver underwent CPR course. The main reasons are instructor training are generally poorly adapted to the needs of course participants, there is not enough time for practicing on standard CPR course. Supervision and feedback are poor because of too many learners in one group.

On the other hand poor guidelines can affect even good CPR education, whereas a potential help-giver who is poorly trained may not be able to access effectively even a well-functioning emergency medical services system.

**Conclusion:** CPR training can be more effective but it has to be addressed directly to the needs of participants and practicing should be placed at the same level as theoretical part of course and be under trainer supervision. Video and new technologies should be more widely adopted as a useful assessment tool and be used with objective mechanical measurements. Training in small groups provides better results and allows trainer to focus on every participant.

With these changes The number of survival rates following cardiac arrest and number of resuscitation attempts will increase.

**Take-home Messages:** Promotion and conducting CPR training is a multidisciplinary issue. The aim must be to create a system comprehensible to all ages and professional society at a country.

## **2.6 E-FAST as Part of Emergency Medicine Simulation in Undergraduate Medical Education at Faculty of Medicine, University of Maribor**

**Author:** *Matevž Privšek, medical student*

*Faculty of Medicine, University of Maribor, Slovenia*

**Background:** Trauma is global leading cause of death and a major cause of disability. Besides measures to prevent and minimize consequences of trauma, proper and accurate management of trauma patients is also necessary. For this purpose, standardized protocol of managing trauma patients and stabilization of their vital signs (ABCDE principle) has been developed.

Haemorrhage is the main preventable cause of mortality from trauma. It can be obvious (external) or hidden (internal). External haemorrhage is easy to identify and treat while internal haemorrhage is more difficult to diagnose and usually demands focused treatment. To ease assessment of hemodynamically unstable and severely traumatized patients a screening ultrasound (US) examination for trauma, called FAST (*f*ocused *a*ssessment with *s*onography in *t*rauma) is becoming more and more of use. FAST should be performed during the secondary survey if the patient is stable; otherwise it can be performed at an earlier stage, usually during the primary assessment of circulation.

With FAST, it is quite simple to assess for possible free fluid in body cavities. Free fluid in trauma patients equals blood, until excluded by other methods. By using four ultrasound windows (subxyphoid, hepatorenal, perisplenic, suprapubic) we can easily and quickly evaluate spaces in pericardial sac and in thoraco-abdominal cavity where free fluid could collect.

Extended FAST (E-FAST) is an upgrade of FAST, where views are added to evaluate for pneumothorax.

**Discussion:** At our faculty, the basics of US examination are obtained in compulsory subject Internal medicine in the 3<sup>rd</sup> and 6<sup>th</sup> year of study, as well as in elective subject Selected topics and novelties in propaedeutics in 3<sup>rd</sup> year.

Theoretically, E-FAST is encountered during compulsory subject First aid in 1<sup>st</sup> year. Detailed knowledge and practical use of E-FAST are obtained in elective subject Emergency medicine in 4<sup>th</sup> or 5<sup>th</sup> year, where a 4 – 8 hour workshop is devoted solely to the use of E-FAST.

**Conclusion:** E-FAST is easy to use, quick, non-invasive, non-ionizing, portable and inexpensive examination method for trauma patients. Using five US windows, we can easily evaluate for free fluid. Examination can be repeated, thereby allowing serial reassessments of trauma patients.

Despite numerous advantages of US, its major disadvantage is examiners experience and sonography skills. Therefore, it is important to start learning US examination as soon as possible.

Learning of US examination is already a part of some subjects at our faculty. We are also planning to include the use of US at the very beginning of the study, as a part of Anatomy (1<sup>st</sup> year) and Physiology (2<sup>nd</sup> year).

**Take home messages:** US is extremely useful examination method for urgent and non-urgent conditions as well. Its usefulness is increasing with examiners experience, which is why it is important to start learning of its use as soon as possible.

E-FAST is a protocol of US examination of a trauma patient, by which we evaluate for haemorrhaging into thoraco-abdominal cavity and pericardial sac and by which we evaluate for pneumothorax.

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