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## EXTENSION OF THE ABILITIES OF THE MEDICAL OFFICERS, SUB-OFFICERS OF THE CARE OF THE SERIOUSLY INJURED PERSONS IN THE MILITARY HOSPITAL-EMERGENCY CENTER

### *Absztrakt/Abstract*

*A súlyos sérültek és kritikus állapotú betegek ellátási folyamatának kulcsponja a korai vénás út létesítése után a mielőbb elkezdett folyadékpótlás és gyógyszeradagolás. A gyors perifériás vénabiztosítás ennél a betegcsoportnál igen nehéz, így időigényes lehet, ami az ellátás sikerét veszélyeztetheti. Ezért egy új technika az intraosseális kanülálás képességének kialakítása szükséges az ellátó állomány részére megfelelő oktatási tematikával.*

*The key point of the process of the care of the seriously injured persons and those of critical conditions is replacing fluids lost and the drug ingestion as soon as possible after the early catheterisation. The fast establishment of the peripheral catheterisation by this group of patients is very difficult and it takes much time that can endanger the success of the care. That is the reason why a new technology, the development of the intraosseous catheter is needed for the members of the care team in the frame of a suitable education programme.*

**Kulcsszavak/Keywords:** *egészségügyi tiszt, tiszthelyettes, súlyos sérült ellátás, vénabiztosítás, intraosseális kanülálás, kompetencia, képesség, oktatás ~ medical officer, sub-officer, care of seriously injured persons, peripheral catheterisation, establishment of intraosseous catheter, competence, ability, education*

The Military Hospital- Emergency Center of the Hungarian Army represents the level of the emergency care system with the highest progression. Beside the complex system of the provision and the management of the continuous emergency care, the Centrum also functions as the area of the theoretical and practical education of the knowledge and the scientific research of the emergency care. As a certified place of the national education system, we are performing the education of emergency care that is determined to the training of the doctors, medical specialists, special medical workers of university level (MSc nurse), university college level (BSc nurse, ambulance officer) and of medium level (nurse, ambulance nurse, emergency nurse) and the leading of the practices. The Emergency Centrum is the basis institute of the training of emergency nurses that was launched in 2008. We regularly receive soldiers from the Hungarian Army who perform special exercises and need a medical education of different levels in order to make the practices needed to their training. We regularly organise different further educations for all members of our own team to develop and preserve the abilities in which the development of the practical abilities is especially emphasized. The changes of the past years and the regulations introduced that resulted in the transformation and shifting of the levels of the competences and that of the duties also affected the emergency care that is the reason why it is very important to develop and preserve the abilities beside introducing the competences continuously and making them clear.

As an emergency specialist, I consider as important that all members of the team have the emergency attitude and ability of high level that is needed to the competence in their position. We do our best to provide for the theoretical and practical education of the team members, so that they could meet the requirements to provide the care of suitable level after the unified principles of care, alone or in team-work, also in extraordinary situations less alike to the everyday routine working conditions and situations.

## **DIFFICULTIES OF THE CARE OF THE SERIOUSLY INJURED PERSONS**

In the system of duties of the emergency departments, the care of the seriously injured person/persons means the biggest challenge because of the conditions of the patient, the severity of the clinical picture and the complexity of the strategy of care. That is the reason why the development of the abilities of all members of the care team is emphasized priority.

The care of the seriously injured persons is a process with extraordinary narrow time-window because of the early death. The main reason of the early death can be the injury of the nervous system (head injury) and the serious exsanguination because of the injury of the chest, abdomen, pelvis and femur. The professional emergency interventions as soon as possible, just as ensuring the breath passage, checking bleeding, care of the injuries of the chest, replacing fluids lost and de-shocking ensure the decrease of this early death. That is why, the exact ingestion of the drugs, fluid, blood and blood-preparations into the veins, if needed, and the emergency laboratory examinations at the same time with the life-saving therapies and diagnostics performed in time represent the main point of the care algorithm. The early peripheral catheterisation is traditionally of big importance but it is well-known that the peripheral catheterisation is very difficult in case of the patients who are seriously drained of blood, even in the case of the persons with big routine it can take much time and remain without success in spite of several efforts. Because of the several or unsuccessful peripheral catheterisation, the injured person can run out of the time-window and the „golden-hour” that was planned for the care can decrease to „platinum-tenminutes”. Because of these facts, if, the third unsuccessful attempt is over when caring a seriously injured person or who is in critical condition or we could not perform the useful peripheral catheterisation with suitable lumen

within 90 seconds, it is recommended to choose the intraosseous ingestion that can be effective both by children and adults.

## THE METHOD OF INTRAOSSEOUS CATHETERISATION

The main point of the intraosseous catheterisation is that we place in a venous catheter with a special instrument, the most often into the medulla hole of a long bone (humerus, femora, shin-bone) making use of the rich venous system and the one important character of these veins that they do not collapse. [1] This method of ingestion is not a new one. It was discovered by the doctor of the Harvard University, Dr. Drinker in 1916 that the fluid ingested into the intraosseous area absorbs very fast and gets into the circulation, so, if it is impossible to provide a blood system access with the traditional methods, this method can also be used. In the II. World War, it was successfully used in more than 4,000 cases for replacing fluids lost by the seriously injured soldiers, so, this method is used on the operational area by the life-saving soldiers, if needed, in our days too. [1] In the civil emergency care, this method of ingestion was only used, mainly in case of children, until they year of 1984, for reasons unknown. However, until the recent past this reliable, safe and easy method fell into the background but thanks to the medication and nurse based on evidences, it became the essential method of the emergency care for today. This easy and fast method is recommended, in all ages and situations, when the urgent venous catheterisation is needed but the peripheral venous catheterisation takes much time or it is unsuccessful, just as the stop of the circulation, serious injury, serious burn. To sum it up, one can tell that by the patients with critical conditions the intraosseous catheterisation provides a faster and safer venous access than the venous catheterisation that is the reason why this access was declared to be the safe and effective way of access of the central blood-system on all areas of the emergency care.

When choosing the place of the insert, one has to choose an unhurt limb. If we do not find any suitable limb or the injured person is extremely obese, then, in case of adults the pin can be inserted into the breastbone too. With the development of the technology, the means that are suitable for the intraosseous catheterisation have also developed much. Several types of the first-generation manual drills of “Cook” type are not used any more today. From the second-generation instruments that we usually use in the care of injured persons on the spot and on the front, I would like to emphasize two types. The first is the F.A.S.T.1 (First Access for Shock and Trauma) that we call “hedghog” because of its form. This instrument can only be used by adults for the venous catheterisation of the breastbone.

The other instrument is the B.I.G. (Bone Infusion Gun), it is an automata instrument that is called pistol on which the length of the pin 0,5-2,5 cm) can be easily set in accordance with the age. [2]

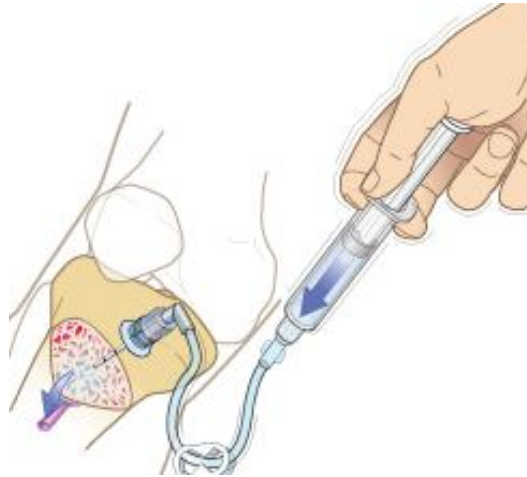


1. figure. F.A.S.T.<sup>1</sup>, B.I.G.<sup>2</sup>, EZ-IO<sup>3</sup>

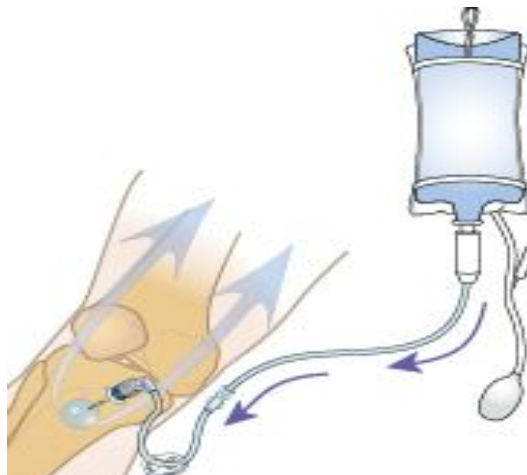
<sup>1</sup> <http://www.pyng.com/products/fast1/>

<sup>2</sup> <http://www.waismed.com/Documents>

The third-generation instrument that is spreading in our days is the EZ-IO drill that can be used just on all areas of the emergency care, however, we mostly use it in the care in the institutions, probably for the reason that it is some bigger than the B.I.G., so, it needs much more place in the emergency bag. The advantage of the use of the instrument is that it is faster and more reliable than the former ones. The venous catheterisation can be performed within max. 10 seconds, the intervention is in 95-97% successful. [3] We can use pins of two different sizes.



**2. figure.** ingestion of the drugs through the catheter [2]



**3. figure.** ingestion of the infusion through the catheter [2]

After the successful catheterisation, we can immediately ingest the drugs, infusion preparations, blood preparations that can also be ingested in the vein too. The dosing and the concentration is the same as in the case of the intra-venous ingestion. The cannula can be used for 24 hours, then, after 24 hours it can be pulled out very easily and the pinhole has to be covered.

## THE COMPETENCES OF THE INTRAOSSEOUS CATHETERISATION

After the national legal regulations, on the field of the emergency care the competences of the special emergency nurses and ambulance nurses were only limited to the assistance functions. In the care on the front, in qualified situations, the medical intervention is assigned to the position and not to the medical qualification (e.g. Combat medic). With respect to the

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<sup>3</sup> <http://www.vidacare.com/EZ-IO>

indication of the IO cannulation and the minimum possibility of the complications, it became important to reassess the competences in connection with the intervention. As a result of this, the application of the intervention on ability level is possible with the ambulance and emergency nurse qualification. The specialist who takes care of the seriously injured person can be expected to know and apply the medical intervention. The intraosseous catheterisation that is used during the care on the front is as important as the tourniquet that is used to stop bleeding. Therefore and because of the easiness of the intervention and the minimum risks, it is worth considering that not only the medical officers and sub-officers who serve in the emergency care and ambulance care but those on all fields of the Hungarian Army do have the ability after having the suitable training and passed the relevant examination. After the successful examination, the instrument that is needed to the intervention shall be the part of their first aid package.

### **THE METHOD THAT IS USED TO THE DEVELOPMENT OF THE ABILITY**

For the use of the determined competence on the ability level, all members of the care team have to go through a development process that is built up and controlled pedagogically and didactically very well. To reach the abilities and expectations that are set as a target, we provided for the necessary material and personal conditions. We have the suitable cubature to the practical exercises. Our Clinical Demonstration Unit that is the most alike to the real clinical situations, provided with the modern instruments for the education (moulages, phantoms, simulation phantoms and tools) and the fleet of the instruments that is necessary to the care are of expressed importance.

When choosing the trainers, beside the theoretical and practical knowledge of the current international and national principles, professional recommendations and their backgrounds it is also important to have the suitable professional experience and the tutorial skills. From the viewpoint of the quality education and the leading of the practices one has to emphasize the development, preservation of the knowledge of the trainers and the transfer of the new, both professional and methodological conceptions and skills as soon as possible. The fact is welcome that already today, our several colleagues with medical and health qualification of high degree are able to meet these requirements.

We determined the learning of the ability of the intraosseous catheterisation in the following steps of education methodology.

1. acquiring the theoretical knowledge – the subject-matter of instruction in connection with the practice will be delivered to the colleagues 2 weeks before the start of the practice. The fact that the students have already acquired the theoretical knowledge and the less complicated practical competences on the suitable level assist the success and the suitable efficiency of the leading of the practices and the progress in learning of suitable dynamics.
2. after the practical activity introduced by the trainer and the controlled practising, our target is to achieve the abilities (skills) on the possible highest level, with performing the activity alone.
3. after having acquired the skills suitably, building them into the sufficient scenarios, the student adapts them to the specific conditions with real instruments.
4. the practical examination – situations under lifelike circumstances, with a unified assessment system passed - did not pass.
5. the colleague who passed the exam performs the intervention after the written instruction of his direct boss, the head surgeon of the department. We make sure about the preservation of the acquired competence ability with a similar examination every two years.

## SUMMARY

One can state that during the care of the seriously injured persons, the fastest and safest alternative of the stop of bleeding and replacing fluids lost is the ingestion of drugs and fluids through an intraosseous catheter. Because of the simplicity, quickness of the life-saving method and the minimum possibility of the complications, it is needed to educate this method in even wider range for the force of the Hungarian Army who is dealing with seriously injured persons both in qualified situations and in peacetime.

## References

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