First Things to Be Done in Emergencies – Providing First Aid for Health Professionals

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by József Betlehem

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Authors:
József Betlehem Ph.D.
Krisztina Deutsch M.Ed.
Nikolett Gál M.Sc in PT.
Tamás Kócse M.Ed.
József Marton-Simora M.NS.
András Oláh Ph.D.
Gábor Nagy M.D.

Proofread by
Zsigmond Göndöcs M.D
James Garvey Ph.D.

Medicina

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'Anyone can have an accident
anywhere any time.'

Dr. Bán S. István

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The social i.e. legal and moral requirements for rendering assistance

Administering first aid and being prepared to do so and consequently its quality is an organic part of every nation's health culture. The international epidemiological data show that the most common situations that require first aid, namely accidents, in the world appear as the third most common reason for death after vascular and tumorous diseases. That is why the fast recognition of the given actualities and performing the first basic life saving primary activities get a special emphasis since they fundementally define the further life of the person in trouble by decreasing the chances for premature death on one hand and improving the quality of life after survival on the other hand.

Teaching the basic phases of first aid is not only important for professionals in the developed countries of west Europe but it acquires a significant role in the education of non-professionals and it is attached to the shaping of a helpful attitude from a very young age on. This bears a special significance because the first witnesses of accidents or sudden health impairments are usually members of the family, friends, acquaintances or co-workers. Consequently the responsibility is theirs to try to help the one in trouble as best as they can. The knowledge of the basic principles of first aid is indispensable for administering proper help and it ought to be continuously updated.

Consequently during the education of the health care professional staff the practical knowledge of basic life support interventions require special attention irrespective of their specialist areas or disciplines. The legal and moral obligation to be able to perform life saving interventions in case of emergencies can be expected from professionals graduating at degree level in health science education in disciplines such as education in the area of nursing, medical attendance, health care, prevention, management, medical laboratory and visual diagnostical analyst and also on some other majors resulting in a Bachelor's degree.

During the last decades the techniques that can be applied in such situations have been simplified a great deal on the basis of the newer scientific achievements on one hand and for the sake of easier acquirement and implementation on the other. Besides the technical simplification there has been another very important point of view, namely taking into consideration the degree of scientific data that underpins the interventions that we perform in case of emergencies. With the flare of professional medical knowledge more and more scientifically based practical knowledge evolves, a substantial amount of which can be used in non-professional education as well. A good example to the latter is the application of the automatic external defibrillator (AED).

(Illustration 1: Most common accident locations)

Before the exposition of the chain of survival and the factors influencing the first aid process it is subservient to **define what first aid application is.**

In a complex interpretation first aid application expresses all the primary activities around the person in trouble that are aimed at the elimination of the dangers that people might find

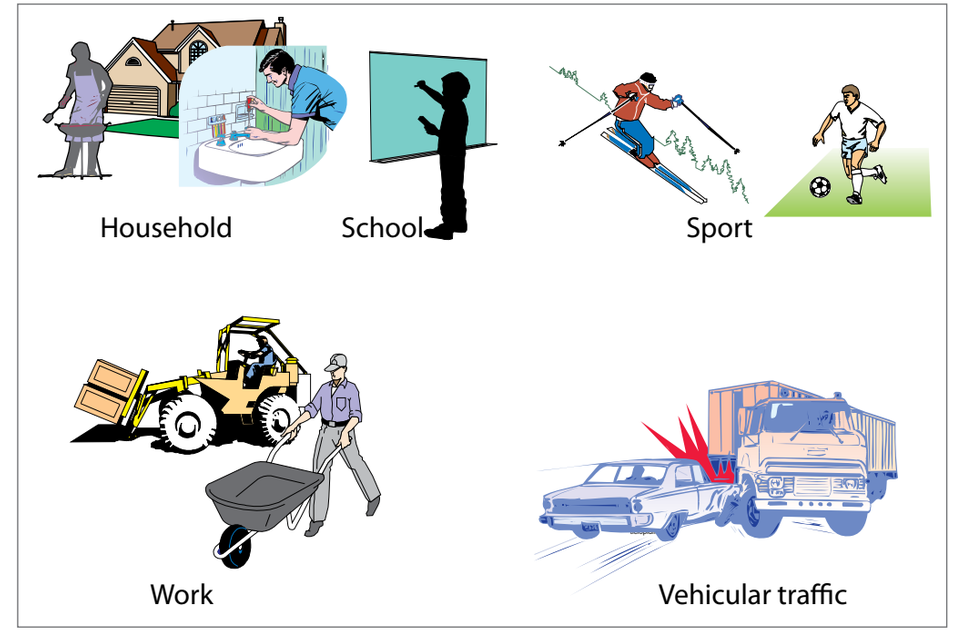

Illustration 1/1 The most common accident locations

themselves in and the objective environment in question and to prevent the development of further damages.

Out of these the most important point of view has to be to save the human life and to stop or delay the damage to health.

In a narrower sense first aid can be defined as the application and treatment of the injured person within the context of first aid knowledge.

The basic book noted by the St. John (the Johannitas) Ambulance Service and the British Red Cross says *' first aid means the first help or medical attendance given to the injured or people who became suddenly ill'.*

According to Aurél Gábor *'We call first aid the health attendance that is performed either by a medical professional or a non-professional before starting the final medical attendance in order to delay the direct consequencies of an accident or of some sudden health damage and also to keep off further decline of health and eliminate newer or secondary damage.*

Róbert Almási says that *'administering first aid is not only a skill or ability but it is also the unity and harmony of intention, knowledge and action.'*

Two new concepts have been introduced in the last decades which interpret first aid in a less wide sense. They characterize those situations from the point of view of health care when immediate help really might be necessary.

Urgent need is *'a change in the state of health as a result of which the patient's life would either be directly threatened or badly or permanently damaged in lack of immediate medical attendance.'*

Endangering state is '*the state when the lack of immediate arrangements would either result in a situation that would endanger the patient's or another person's life, body integrity or health or would mean direct danger to the surroundings. '*

In Hungary **helping a person in trouble is a citizen's obligation even at a non-professional level and it is** specified in Act CLIV of 1997 on Health. *'It is everyone's obligation to help in a way which can be expected from him/her and notify the authorized health care server in case an urgent need or an endangering state is noticed or heard about.*

The above statement is even better understandable if we put ourselves into the position of someone who is in trouble, who expects help, since according to the previously mentioned law ***'Every patient is entitled*** *to get life saving medical attendance or attendance that ensures the prevention of bad or permanent health damage and also his pain to be soothed and his suffering to be lessened.'*

People working in the health care system are especially **obliged** in this respect to administer help in an urgent need. *'In case of urgent need people working in the health care system provide first aid to the person in need of it among the given circumstances as it can be expected of them and depending on the equipments available. They are to take the proper action. In case of doubt the occurence of urgent need has to be opinionated.*

If the expected first aid is cancelled then, according to the law, '*The person who does not help an injured one or someone whose life or body integrity is directly endangered in a way he can be expected to do, commits a misdemeanor and can be inprisoned for two years.'* [1] (Illustration 2., 3.)

Illustration 1/2 A non-professional is helping the person in trouble

Illustration 1/3 A healthcare worker is helping the person in trouble

The relationship between the health care system and first aid

The injured or health damaged patient gets medical assistance within the frames of **the chain of survival** from the first level of non-professional first aid to the highest level of hospital treatment while each medical level is built on each other, being connected as chain links. Consequently the efficiency of each medical assistance level fully depends on the efficiency of the previous medical assistance level, thus determining the further outcome of the patient. (Illustration 4: The units of the saving chain in Hungary

The chain of survival includes the following medical assistance levels and activities:

1. non-professional first aid
2. notification of professional aid providers
3. ambulance assistance
4. hospital treatment

The non-professional first aid provider usually does not possess professional health care knowledge and reliable practical experience consequently a difficult job awaits him at the location of the accident.[2] Naturally, depending on the situation, first aid can be given by a **qualified first aid provider** who bears the knowledge of first aid and specific professional medical assistance. Other than this first aid without appliances and medication can also be applied by a doctor.

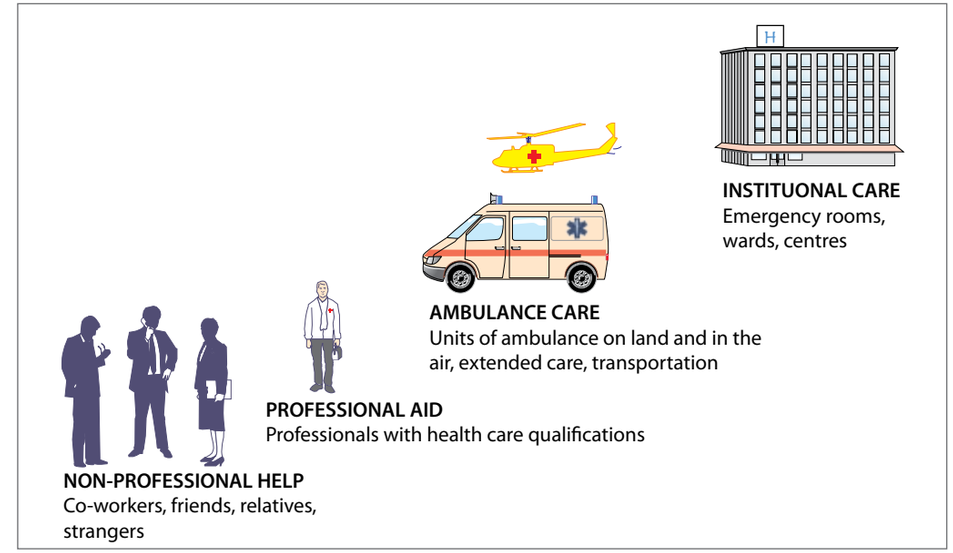

Illustration 1/4 The units of the saving chain in Hungary

The first thing to be done after having noticed the incident is to **request professional help** by calling an ambulance (see in more details in a later chapter). The f**urther first aid assistance** carries out the necessary immediate actions and stabilizes the patient's status until the professional health care givers get there. Then the professional staff and appliances of the ambulance allow the **professional specialist's higher level assistance on the spot.** During transportation the medical staff of the ambulance (the ambulance driver, ambulance nurse, ambulance officer or an oxyologist - emergency medical doctor) monitors the status of the patient and performs the proper medical applications according to the changes in status. This is the **control during transportation. The receiving institutions** are health care institutions that are apt for some level of emergency assistance (emergency room, emergency ward) where the patient's status is tested based on newer and wider scaled diagnostic opportunities first and the patient is either given final assistance or the required further specialized treatment is taken care of afterwards.

All in all **the first aid provider plays a key role** in emergency care since the first minutes following an accident are critical from the point of view of the further chances for survival. His ability to recognize the given situation, his actions and calling for help are of crucial importance in terms of the further process of the subject needing help. His psychological support can have a calming and reassuring effect.

Taking the directives of the European Resuscitation Council into consideration the **graduates of health sciences education, as qualified first aid providers, have to be competent** in performing the following activities no matter what area they had specialized in:

- recognition of the situation in case of an emergency
- fast patient's examination and decision making
- calling for help (ambulance)
- immediate interventions for supporting life functions
- resuscitation without appliances
- primary care of unconscious patients
- further care of conscious patients
- further care of choking patients
- the application of an Automated External Defibrillator (AED)

Employers are required to employ a qualified first aid provider whose job is to recognize sudden health damages related to work and to perform primary care using the first aid kit supplied by the workplaces.

The psychological effects, motivation or apathy towards first aid assistance

Providing first aid, as an activity, is built up of several psychological and physiological elements. Action happens only after perceiving the stimuli of the environment which are structured into meaningful units i.e. they are sensed and recognized. The extraordinary circumstances, the recognition of a situation that demands an immediate intervention evoke strong pressure and a heightened emotional state in the first aid provider. Experiencing the given stressful situation and then the alarm reaction that appears as the response of the human body evoke an increased activity of the sympathetic nervous system. All of this result in the rise of the pulse, the number of breaths and a higher blood pressure besides the increased functioning of the digestive system.

Numerous, psychologically and sociologically based, explanations exist about why we should help or why we do not help our injured fellow-men or women in trouble.

Psychology assumes **altruism** i.e. the kind of unselfish behaviour in the background of administering help in case of emergencies that does not serve one's own interests but that of his fellow-man or woman. In other words, empathy is emphasized. Consequently the higher the empathic skill, the higher the drive to be helpful. It has been observed that altruistic behaviour is more common with acquaintances, friends than with strangers or less carismatic individuals. Since this behaviour goes with advantages both for the helper and for the helped person, it is called reciprocal altruism by psychology.

Prosocial behaviour is a sort of behaviour that is aimed at helping others and it always goes with social rewards. This is mostly a demeanour that appears in the family among relatives. Consequently the stranger the person who needs help is, the smaller the chances are for the help that the helped one would benefit more from than the helper.

According to the **exchange theory model** the person giving help receives symbolic resources in return. This model claims that the person undergoing trouble, being in an emergency situation experiences a feeling of pressure which is based on the grounds of empathy. The more we are capable of empathizing with the position of the other one, the stronger the feeling of pressure and also the desire to act are. In pursuance of the altruistic model our self-confidence grows by providing help. Giving help can also be the consequence of embroilment when assisting with help means a smaller loss than its omission and then the subsequent negative condemnation from the society's part. It is put into words by György Csepeli the following way:

'The motif of providing help derives from the negative feelings originating from the violation of norms, the **avoidance** of a sense of guilt and a twinge of conscience.'[3] There have also been research done concerning how the mood of people, the type of settlement, the differences in gender and the relationship factors influence help providing attitudes. John Darley and Bibb Latané reported the following results:

The **momentary positive mood** increases the inclination to give help in several ways but the **negative mood** is not necessarily a decreasing factor since giving help can improve negative mood and sadness. This was named a negative state relief hypothesis (*Cialdini and co-workers*, *negatív - state reliefe hypothesis, 1987)*.

In relation to the type of settlement several case studies and experiments have proved that the more people are present at the spot of the accident or the emergency, the smaller the chances are for giving help.

We have already known for a long time from socio-psychological research that people tend to wait for each other in first aid assistance. Sándor Márai, the Hungarian writer, also recorded an incident of the sort: *'In a New York district a young woman was stabbed to death in the early morning hours. Hearing the screaming of the victim the neighbours hurried to the windows but nobody called the police. The police questioned the tenants of the area who confessed that thirty-seven! of them were watching from their windows as the murderer killed the screaming victim but they did not make telephone calls because they were afraid of getting involved.'* It is known as 'by-stander apathy'. According to what they said each eyewitness thought that somebody else would notify the police. Then a hypothesis was created in pursuance of which paradoxically giving help is obstructed by a lot of people present.

According to a sociological explanation belonging together is less characteristic of big cities and this situation alienates the individual from the group. Withdrawal from the accident and the need to satisfy potential unconscious sadistic instincts were traced as possible reasons by psychologists.

Concerning relationships the seemingly almost evident thought was confirmed that the closer a relationship is, the higher the probability rate of giving help is. In this case the nature of the relationship is also a determining factor (Illustration 5.)

Illustration 1/5 The ones who provide help sometimes work in the presence of a large group of people

In every culture people are more likely to help a member of their own group than a stranger in the group. 80% of all heart attacks occur in the home, hence the casualty is going to be a loved one, a relative, a person for whom we care about.

In the context of **differences in gender and providing first aid** it turned out that women help more often and more in simple routine situations than in real emergencies whereas in trems of strangers men tend to be more helpful. In cases when the person who needs help is female or if others are also present at the location of the emergency the differences between the genders is even more obvious.

The ensurance or rejection of **giving help** is the **result of human decisions** in which the personal value system and habits, family or institutional upbringing, moral points of view, the knowledge and skills at hand, further more, the state of mind and the social expectations are tightly connected. Lendvai (1986) sums up the **the motivating and inhibiting psychological, cognitive and social factors** as they are listed below.

According to this the **driving factors of providing first aid** are as follow:

- wanting to help
- being sorry for the person in need of help
- proving worthiness to oneself and to others
- pressure of conscience
- sympathy towards the patient
- being related to or acquainted to the patient
- helpful mentality
- family and/or school example
- highly developed emphatic skills
- acceptance of life
- being against death
- searching for new things, curiousity
- interest in extraordinary things
- prior practical exercises done during education
- success or failure during earlier first aid assistance
- the request and encouragement of the people present
- feeling of dutifulness

The **obstructive factors of providing first aid** are listed as follow:

- feeling of fear and uncertainty
- lack of professional knowledge and practice
- sensing blood, smells, seeing vomiting
- passivity as a habitual factor
- family relationships
- lack of earlier positive examples

- pitifulness
- repulsion of death
- inability to make decisions
- the effect of the atmosphere of panic
- lack of confidence and/or faith in success
- lack of initiative skills and perseverance
- fear of difficulties and/or infection[4]

In Hungary *'barely 10 % of road accidents are accompanied by any kind of first aid assistance not to mention their poor quality. However the 60 % rate of the same kind of activity in Germany evoke a high degree of dissatisfaction there.' (Árki, 2002)*[5]

Therefore there is much **to be done** in the area of first aid in Hungary both in the **establishment of the first aid providing attitude** and in the **transmission of theoretical and practical knowledge about first aid.** Families, educational institutions, workplaces, professional and civil organizations have emphasised tasks to be done in this area.as well as health science educational institutions

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2. Recognition of Status in Case of Emergencies

by József Betlehem Ph.D. and Krisztina Deutsch

The content of chapter

Situations demanding others' help (health damaging accident mechanisms)

The intensified life in developed societies is accompanied by a lot of dangers. On one side the spread of inappropriate health damaging individual behavioural patterns and on the other side the surrounding technical achievements create more and more the option that our health can get endangered not only in the long run but it can also be damaged suddenly. In every day life (at home, at workplaces, school, public places and during free time activities) accidents can occur, numerous of which may become so intense that we need the help of others in their elimination. The outcome of sudden occurances can oftentimes, if not always, result in non-fatal but permanent damages that puts a serious burden on a nation.

A significant proportion of accidents can be avoided so that is why their prevention needs to be seriously emphasized. The purpose of accident prevention is to obviate the occurances of injuries or to decrease their number. One of the elements of safety is accident prevention that is capable of improving the life quality of the population. The non-intentional accidents i.e. the ones which are independent of our will, can be prevented. The approach of strategic prevention of accidents is denoted with three 'E'-s in English. They are as follow:

- Engineering – alterations due to engineers' designs e.g. children's safety car-seats, airbags
- Education – training, instructions e.g. teaching how to use safety belts, teaching the Highway Code
- Enforcement/ enactment – legal administrative regulations e.g. speed limits, compulsory usage of childern's car-seats (Illustration 2/1)

Illustration 2/1 Within the frame of accident prevention an ambulance EMT worker is giving a presentation to non-professionals

The epidemiology of immediate health damages

If we analyse the most common situations that make first aid necessary i.e. if we analize accidents then it can be stated that they constitute the third most common reason for diseases and death in the world after cardiovascular and tumourous illnesses. Accidents happen to roughly 5 million people a year that cause the death of 10 000 people a day (WHO 2000). In the European region 790 000 people die yearly and accidents also appear as the third most common reason for death in the European Union. In Hungary it can be stated that examining the places of occurences of accidents the household accidents stand in the first place that happen at home which are followed by work-related accidents, traffic, sports and other accidents, the majority of which originate from free time activities. The related data referring to the population in Hungary come from a survey done by OLEF according to which 9.1 % of the adult population suffer from an accident that demand some medical attendance, which meant 750 000 people in 2003. The number of household accidents significantly exceed the total number of accidents (Chart 1).

According to tha data given by the Central Statistics Office 1104 people lost their lives in traffic accidents in Hungary in 2008. In the background of the lethal cases speeding stands as the most common reason though in some form DWD (driving while intoxicated) i.e. alcohol also plays an important role in this respect in 14 % of the cases. It is sad that in 75 % of the lethal accidents the safety belt was not in use thus drivers do not even give themselves a chance for survival.

We should not forget about the fact that among the sicknesses belonging to internal medicine the cardiovascular diseases which also require medical attendance appear in an outstanding proportion. The sudden heart attack refers to 700 000 people in Europe a year, 40 % of which could result in a 60 % positive outcome if the non-professional person who notices the incident for the first time could use an automatic external defibrillator. All of these unfavourable situations create an opportunity for people with a higher health care qualification to efficiently intervene. At present

Chart 1. The known places of accidents according to genders in 2003 *by OLEF*

Places of Occurences at accidents	*Genders*		*Total*	
	Male (person)	*Female (person)*	*(person)*	*(%)*
Household	132650	145239	277889	40,3
Work related	123414	43571	166985	24,2
Traffic	65456	86486	151942	22
Sport	63319	29723	93042	13,5
Total known injuries	**384839**	**305019**	**689858**	**100**

the education of the above mentioned elements of modern first aid need to be made much more efficient and up-to-date.

The basic recognition of the incident, a simple patient's examination, the statement of life or death and the most necessary first things to be done are taught about at every level of education within the frame of first aid. Other than this the CLIV. Law of 1993 gives the details of the situations when a health care professional is required to provide first aid. Besides primary prevention secondary prevention needs to be given an important role that health care employees can put into practice based on their professional qualifications.

Judging from the epidemiological parameters of Europe and Hungary, the most determining health damages are related to internal medicine or accidents. These also have an effect on the whole of society and economy as well. The first non-professional perception of an incident can influence the patient's chances for survival significantly. In case of sudden health damages (accidents, sickness) even non-professionals are expected to have these skills which supports the idea that attention has to be paid to this question in health care education as well.[6]

During the training of both adults and children first of all the recognition of an incident, the primary examination of the patient or the injured one, resuscitation without instruments, the attendance of an unconscious patient, the removal of a foreign-body from the airways and the use of an automatic external defibrillator are aimed to be taught.

The environment of the person in need of help, as a source of danger

The sources of accidents

Considering the typical accident locations the most important sources of danger are worth being emphasized. Naturally they are many and can appear in many combinations.

Household accidents include falling off, scalding, electric shock due to the malfunction of electric appliances, injuries caused by household appliances, explosion induced by natural gas or propane butane, carbon monoxide toxication.

Out of the work related accidents the most dangerous ones are the injuries caused by different chemicals, production machines, electric shocks and fire.

In traffic accidents the injured person is usually a passenger in the vehicle involved in the accident. Due to this the mechanical injuries of various degrees will mostly be present. Further injuries must not be forgotten about either.

In mapping **the environmental sources of danger**, especially in case of children, the mental and psycho-motor stages originating from the children's age and the natural and material environment derived from their developmental level should be considered practically as starting points. The ter-

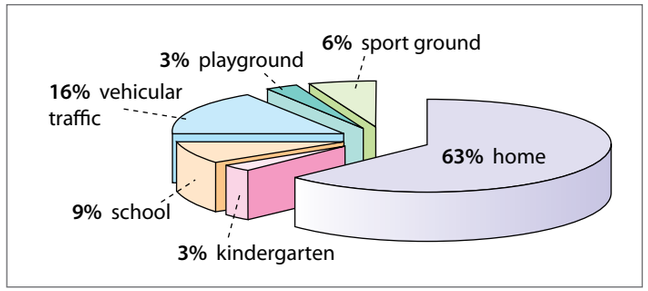


Illustration 2/2 The locations of children's accidents based on the experiences of district nurses in the years 2002 and 2003. Source: Mária Bényi, The Conformation of Children's Accidents Project

ritory of a child, the home, the kindergarten, the school, the playground and the street become the potential risk factors from the point of view of children's accidents. If we project the data of the accident statistics and research to this matter then the questions will gain clarity in their context.

The features of **childhood accidents** were mapped based on the given data by district nurses in different counties in 2002 and 2003. According to the results of the survey out of 1222 chidren's accidents 363 happened to boys, 278 to girls and the gender of 581 chidren remained unknown. The proportion of the accidents in relation to age groups was as follows: infants of 0 to 1 had aciddents in 15 %, children aged 2 to 3 in 36 %, aged 4 to 6 in 21 %, aged 7 to 14 in 26 % and the ones over the age of 14 in 2 %. Nearly two third of the accidents happened at home, the location of the next highest rate (16 %) occured in vehicular traffic and 9 % happened at school. (Chart 1. The locations of children's accidents based on the experiences of district nurses in the years 2002 and 2003).

As infants develop and grow turning to their side, then to their belly, later spinning, crawling and climbing mean situations of danger sources when the baby is left alone on a bed or on the diaper table by a parent or an adult even if only for a few seconds. Falling down is the most common form of accident mechanism during this time.

In the survey the total number of **falls** was 139 which came to 11% of all accidents. With smaller children a frequent occurence of falls can be expected at almost any age because mobility and curiousity represent a strong moving force in their case. Falls took place dominantly under the age of 1. At this age accidents of this sort reached 27 % which happened mainly from a big bed, a diaper table or a high chair.

New sources of dangerous situations come about in children's lives when they start walking, climbing up on stairs and furniture and having access to the pots and pans in the kitchen. Due to their mobility and curiousity babies can easily pull pots full of hot liquid (water, tea, oil, soup) on themselves. The highest number of **scalding** incidents occured between the ages of 2 to 3 when it reached 19 %. In the age group of 0 to 1 it was 13 % and between 4 and 6 this rate dropped to 11 %.

Burn injuries occurred to 99 children which comes to 8 % of the total number of accidents. This type of accidents happened in the biggest proportion to children aged 0 to 1 and the occurence rate showed gradual decrease with their growing age.

Research was also done about burn injuries among children at the Bethesda Children's Hospital between 2002 and 2006 in relation to 534 injured children. According to the analyses the cases came about in high numbers mostly in the first 4 years of age. The accidents were caused by scalding in 72 %, by getting in contact with hot surfaces in 13 %, by usage of open fire in 10 %, by electricity in 2 %, by sun radiation also in 2% and by explosion in 1 %.

The inexperience of children and the associated unattentiveness of adults bears several dangers in the households. In the research by Bényi children were **bitten by dogs** in 50 cases. This makes up 4 % of the total number of accidents so this is not a dominant injury type among children but the question of parental carelessness comes up as an issue since in 56 % of the cases it was the family's dog that caused the injuries. The majority of dogbite injuries occured among children aged 2 to 4.

The district nurses found **poisoning** in 83 children's cases which were the most common in the age group 1.5 to 3. Poisoning was caused by cleaning supplies and chemicals in 50 %, by medicine in 34 % and by consuming mushrooms or other parts of plants in 16 % of the cases. [1]

At the age of 4 to 5 children begin to ride a bycicle and along with this vehicular roads become new endangering factors in their lives. **Bycicle accidents** constitute 8.6 % of the total number of children's accidents. Injuries of children's legs having got tangled in the spokes of the bicycle that happened while the children were being transported by bicycle occured in 42 cases that can refer to the carelessness of the parents. Based on the experiences of district nurses the 41 bycicle accidents that occured at the age of 5 to 6 can be accounted for learning how to ride a bicycle whereas the 23 crashing accidents in the age group 7 to 14 can be attributed to the faster and more courageous bicycle riding. Girls tend to have more leg injuries related to the spokes of the bicycles while ~~while~~ falls and crashes occur more frequently to boys.

A further important question is whether we dedicate enough time and energy to **accident prevention** in our own and in our children's lives. Pursuant to several studies in Hungary 8 % of the regular bicycle rider children wear a protective helmet while riding whereas in the neighbouring Austria this rate is 42 %. The attitude related to this is shown by the fact that 93 % of the Austrian bike rider children find it important to wear a helmet, while only 41 % of Hungarian children think of it as a necessity. The rate of severe head injuries during bicycle riding is 64 % in Hungary and this proportion is 32 % in Austria.

At the Children's Clinic of the University of Pécs 767 children participated in a research project that was performed in association with in Pécs, Hungary and in Graz, Austria. It turned out from the Hungarian data that the rate of wearing a helmet decreases with age i.e. schoolchildren aged 7 to 8 wear helmets while riding a bicycle in 17 % while 14-year-olds wear it only in 3 %. Only 41 % of children consider it important to wear a helmet regularly. Twice as many boys were injured than

girls. It is shocking that 79.5 % of the injured children ride a bicycle on the roads alone without the supervision of an adult.

The practice of car safety appliances application belongs significantly to the prevention of vehicular road accidents. In 2007 the research team of the Canadian University of Windsor examined what kind of safety appliances were used in the car by parents in order to protect their children, what sort of preliminary information they possess about the security systems used in cars and what can influence the appropriate or inappropriate usage of security car seats for children. They evaluated the answers referring to 2199 children given by 1262 parents.

According to the statistical analysis the majority i.e. 95.7 % of parents who have children aged 6 months or younger act appropriately from a safety perspective. The most significant deficiencies were found within the circle of parents raising children aged 7 to 12 months and 5 to 8 years of age. All in all 79.2 % of parents apply the car security systems properly for their children. The gender, the qualifications of the parents and the difficulty in gaining information influence the appropriate usage of the security appliances a great deal. Analyzing the incorrect answers of parents raising infants aged 7 to 12 months and 5 to 8 years of age, it was stated that parents with an infant decided on the car seat facing the engine too early and parents raising kindergarten and young schoolchildren used seat raisers and safety belts prematurely with their children (Illustration 2/3).

While examining the risk factors related to the location of the accidents it is a crucial question whether the school or locations outside the school mean a larger risk factor from the point of view of cases that require emergency attendance.

Incidents demanding an emergency attendance in relation to locations were analyzed among children and adolescents aged 5 to 18 in the State of South Dakota, in the mid-west of the USA, between 1994 and 1996. In the given period the ambulance had to be called in relation to children aged 5 to 18 in 12603 cases. Out of these places, areas outside the school, like streets, apartments, holiday resorts, were the locations of accidents during 11848 occasions and they were the schools in 755 cases. The number of emergency calls were higher in the schools mainly at the beginning of the school year and during the summer months it was higher at the outside school locations. The accidents or sicknesses were experienced mostly around the noon hours at schools while the cases needing emergency attend-

Illustration 2/3 A child has been injured

ance at other locations occured mainly in the afternoon hours after school. The three most common reasons for ambulance alerts to schools were falls (36.2 %), other traumas (27 %) and diseases of internistic nature (24.5 %). The ambulance was called to take care of children or teenagers outside the school primarily to motorcycle vehicular accidents (30.8 %), to internistic diseases (26.2 %) and other injuries. In the street life elder children were brought to danger mainly by consumption of alcohol and usage of drugs.

Since the emergency cases experienced at school differ from the ones outside schools, the analysis of ambulance alerts can provide help for the ambulance directory operators, the EMTs i.e. the emergency medical teams and the school staff and this way they can become acquainted with the necessary appliances and theoretical to aid prevention.

The Transportation of Dangerous Substances

Warning signs have to be provided for railway and road vehicles transporting dangerous substances. The colour of the warning signs is orange with a black frame at the edges. Their size is 30 by 40 cms.

The sign has numbers on it and it is divided into two parts with a horizontal line. The top part shows the danger code number, this is the so-called Kemler number, the bottom part gives the substance code number, the so-called UN number HOMMEL. The numbers are black on the sign, they are 10 cms in height and 15 mms in line thickness. (Illustration 2/4 General notation of vehicles transporting dangerous substances)

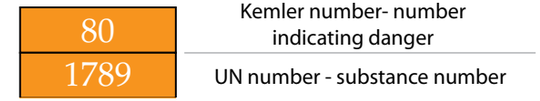


Illustration 2/4 General notations of vehicles transporting dangerous substances

The meanings of the first digits are:

2. gas
3. flammable liquid or self-heating liquid
4. flammable solid substance or self-heating liquid
5. oxidizing substance or organic peroxide
6. toxic substance
7. radioactivity
8. corrosive effect
9. other dangerous substance

The subsidiary danger is expressed by the 2nd or 3rd digits.

The substance numbers consist of four digits that mark a given substance or substance group. A few examples to the substance numbers: 1035 ethane, 1789 hydrochloric acid, 2790 vinegar acid, 2796 vitriol, 2055 styrol, 2312 phenol (melted), 2448 sulphur (melted), 2591 xenon (frozen). (Illustration 2/5 The marking of vehicles transporting diesel oil)

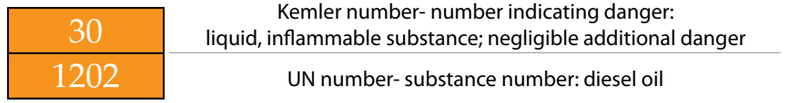
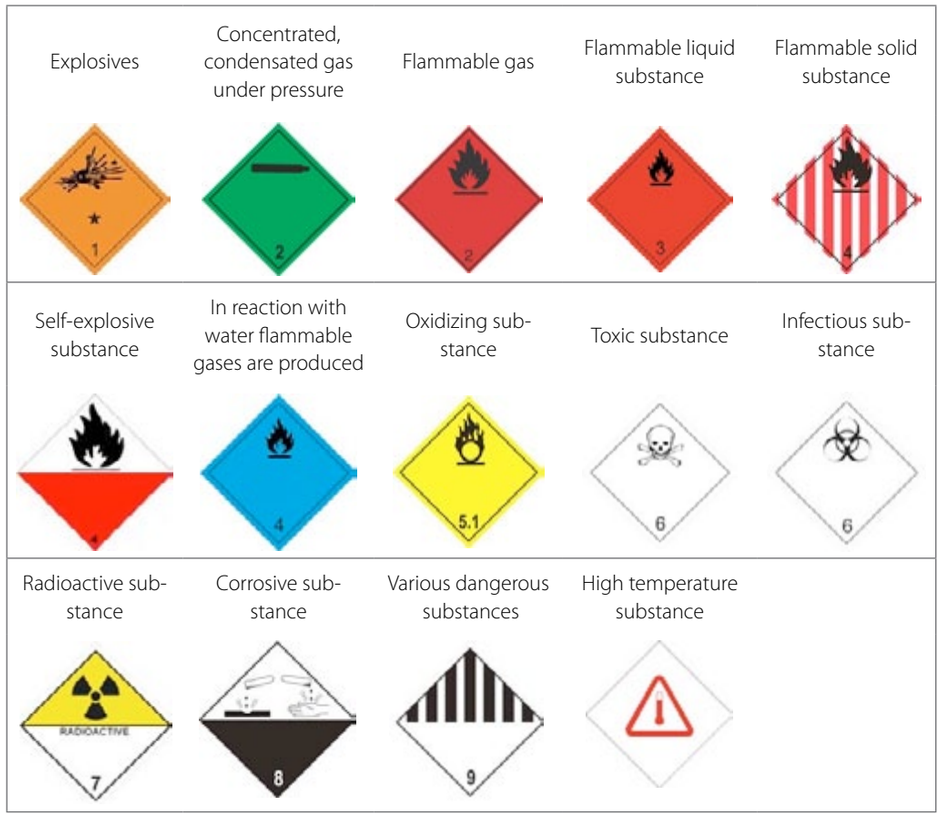


Illustration 2/5 The marking of vehicles transporting diesel oil

Chart 2. Main pictograms for carriage of dangerous goods by road (according to ADR)



To facilitate easier recognition and differentiation of the attributes of dangerous substances, internationally accepted conventional pictograms are also used. The major notations are shown in Chart 2. (Chart 2. Main pictograms for carriage of dangerous goods by road (according to ADR))

More information can be attained from the Catastrophy and Emergency Information Service (http://www.edis.hu) ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road) (Illustration 2/6).

Illustration 2/6 An accident of a vehicle transporting dangerous substances

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3. Patients' Examinations and Making Decisions

by Gábor Nagy

The content of chapter

Primary survey of health status

During the inspection of the health status of the injured persons numerous factors need to be taken into consideration. The first one, and perhaps the most important one, is the question of the first aider's own safety and that of the patient. All the possible sources of dangers that may have a harmful effect on the first aid provider have to be examined.

They can be:

- danger of accident (e.g. on a highway)
- danger of radiation, chemical or physical harm (electricity, toxic gas, acid, alkali)
- danger of injury (e.g. due to an agressive patient or dangerous animals)
- danger of infection (this generally needs to be presumed with all of the injured)

As long as the first aider feels that the potential or real source of danger can harm his/her health the immediate survey of status and attendance does not have to be started or it can be postponed until the elimination of the given danger.

In cases like this the first aid provider's job is to notify the employees of the assigned organizations (police, fire fighters, catastrophy protection), to warn the people in present and the prevention of their potential health damage.

If there is an option to extinguish any further source of danger on the spot, then it has to be attempted if the appropriate conditions are given (e.g. in case of an accident we should turn off the ignition, we can remove the clams from its battery, we should remove flammable substances etc.).

Since the sources of danger can be numerous it is difficult to give specific knowledge about their recognition and elimination. At the location of accidents it is the first aid provider's duty to estimate the danger and this job depends a great deal on his or her qualifications and earlier experiences.

Besides the determination of the sources of danger it is crucial to survey where to place the patient in case of unforeseeable danger (e.g. fire or accident). A relatively safe but easily approachable place has to be found where further attendance can be safely provided during the survey of status, primary care and later upon the arrival of professional help.

Partially taking the above aspects into consideration it is important to think the following things over before we approach the casualty.

- Based on what we are able to see may have happened to the injured person. (especially if the health damage did not happen in front of our eyes).
- Is there a chance or danger of damage to the patient's spine? (If yes, this fundementally determines our further actions.)
- What possible sources of danger or difficulties can we expect? (This determines the further notice of the assigned authorities.)
- Where can the patient be relocated i.e. transported from the spot in case of a further emergency?

- What do I have to do if the patient does not breathe or bleeds etc.? (Immediate implementation of life saving skills.)
- What kind of easily available help can be attained until the arrival of the ambulance (bystanders, professional first aid provider, mobile security guards etc.)?

The First Aider will already be aware and know the answers to the above questions but fast and thorough survey of the environment is definitely crucial.

Unfortunately the deficient answers to the above mentioned questions (especially the one that says 'What do I have to do if …') contributes largely to the low inclination to give help in Hungary.

The Determination of Consciousness (Awakeness)

Our first job upon stepping to the injured is to determine his consciousness. Several methods are available to be able to ascertain this. It is important and can easily be seen if the patient's eyes are open. It counts as a good sign (but not sufficient) if his eyes are open. We can definitely consider it as a clear sign of consciousness if the patient surely looks at us or follows us with his eyes either spontaneously or upon addressing him.

Making the first contact

The best method for the determination of consciousness is to address and at the same time to shake the patient and then we watch his responses to this.

Numerous factors can influence the strength we use to shake the patient i.e. during this physical contact. They can be listed as follows:

- the patient's potential visible injury, the chance for spine injury
- the age of the injured (the elderly and children should be shaken gentlier!)
- the probability of potential usage of mind-altering substances (alcohol, medicine, drugs)

If we do not see or assume any severe injuries on the patient, then the strength of the shaking should be as intensive as we would use to wake up a sound asleep person with success.

If the patient is visibly injured or we consider him to have a spinal injury instead of shaking him we should use another method for establishing his state of consciousness. These can be as follows:

- applying a painful stimulus on the patient (a stronger pinch on the skin)
- the patient's eyelashes could be blown onto or stroked with our fingers

Addressing the patient should be decisive and loud enough so that the casualty who may be sleeping or is deaf would be able to respond.

During addressing patients it is to the purpose to greet them formally and wait for them to respond or we can ask them some kind of sensible question. Saying *'Hello'* or *'Sir/Madam'* may be useful

but they cannot examine the patients' responsiveness and their orientation since these are not questions so the majority of people would not try to give an answer but just answer by saying *'yes'* as best.

It is better to ask questions like *'What has happened to you? Do you feel any pain? Are you injured anywhere?'* because we can measure the patients' adequate responsiveness with them (the specific, understandable answer is always better than mumbling or fragmented speech). Besides the given answers help us to make a diagnosis.

Movements

Eventually we should observe the patients' movements that are either spontaneous or can be responses to shaking, having addressed them, or maybe to pain. Spontaneous movements or spontaneous or purposeful movements deriving from being addressed can be considered as positive signs. It is important to state that conscious, voluntary movements are meant by these and spasms, referring to breathing do not belong to these movements.

Other than movements the spontaneous position and the position of the limbs can also help in diagnosing the patient. This will be discussed further in the GCS (Glasgow Coma Scale) motoric responses part.

The Glasgow Coma Scale

The GCS also includes the triple signs of opening the eyes, speech and movement in a standard form. These are used for determining the depth of consciousness disturbance The patients' nervous system status can be stated objectively with this and due to its comparability the change in the patients' status can also be updated. For the implementation of the later things to be done it is important to mention that the coughing reflex can be absent or decreased to such an extent with patients who score less than 8 that the danger of aspiration can occur. That is why steps need to be made to ensure stable airways for patients in this state. (Chart 1. Glasgow Coma Scale after Teasdale and Janett)

Chart 1. Glasgow Coma Scale after Teasdale and Janett

The patients reactions	**1**	**2**	**3**	**4**	**5**	**6**
Opening the eyes	none	to a stimulus of pain	to instruction	spontaneous	X	X
Verbal response	none	unrecognizable vocal sounds	wrong words	confused, disoriented	oriented	X
Motoric response	none	extension to pain (decerebration)	abnormal flexion to pain (decortication)	flexion / pulling away to pain	Localization of pain	Follows instructions

1. We score the opening of the eyes, the movements (motoric response) and the verbal response according to the listed issues. The first scored point of view is the OPENING OF THE EYES i.e. the question is, upon what kind of stimulus the patient opens his eyes. If he opens them spontaneously, he scores 4. If he opens them only if we tell him to, he scores 3. In case we have to cause a painful stimulus for him to open his eyes, he scores 2 and he scores 1 if there is no opening of the eyes at all.
2. The second point of view is related to movements and muscular tone i.e. to MOTORIC responses. If the patient acts upon the instructions (for example lifts his arm upon request), he scores 6. He scores 5 if he localizes pain that is, if he makes purposeful movements towards the direction of the pain. We can cause pain for example by rubbing the area on the chest over the breastbone, although in the UK for example, it is considered assault and the Trapezius Pinch or supra-orbital push is used. In case of flexional pulling away, he scores 4. In this case this response is about the patient clearing away some kind of stimulus of pain with flexional (bending) movements. For example he pulls away his arm if we prick him with a needle or pulls away his finger if we press his nail-bed. It is called a flexional position when the upper limbs are in flexion (continually bent) and the lower limbs are in extension (continuously stretched). In this case the patient scores 3. It is called an extensional position when all the limbs are continuously stretched, they are in a tightened state. The patient scores 2 for this response and he scores 1 if we do not peceive any sort of muscular tone or movement.
3. The third point of view is the verbal answer. The patient giving an adequate verbal answer scores 5. He scores 4 if his wording is confused i.e. it is understandable what he says but he is not completely aware of himself and the environment around him so the contents of his communication is inadequate. The patient scores 3 if he uses words in the wrong way, he speaks incoherently. If he gives unrecognizable vocal sounds, he scores 2. This can for example be groaning. If he does not give any sound i.e. there is no verbal answer, he scores 1. If the total GCS score is 8 or less, a severe brain damage can be suspected. If it is between 9-12, the probable brain damage is mediocre and it is slight if the total score is 13 or over.

The disadvantage of the GCS score system is that generally only experienced people can determine the patient's status with it fast. However we can remember that a patient who does not open his eyes upon a strong stimulus and does not give a verbal response can score moximum 8 independent of the motoric responses so ensuring the airways in their case is crucial which will be discussed later.

AVPU scale

The so-called AVPU system is more easily practicable in determining the degree of seriousness in case of disturbed consciousness. Using the AVPU system we observe the patient's responses to different stimuli. If the patient is alert i.e. he is not unconscious, he gets an 'A' notation according to the English word 'ALERT'. If he is not alert but responds to a voice, the marking of his state will be

'V' according to the word 'VOICE'. In case he responds only to pain, we assess him to be of 'P' status based on the word 'PAIN'. If he does not respond at all, he is UNRESPONSIVE (unable to respond) and his marking will be 'U'.

- **A**(lert) – alert / awake
- **V**(erbal) - responds to instructions
- **P**(ain) - responds to pain
- **U**(nresponsive) - does not respond to any stimuli

The levels of consciousness disturbances

Independent of the different evaluation scales we know 3 degrees of depth in terms of consciousness disturbance. They are as follow:

- *Somnolence:* in this case the patient is comatose, opens his eyes to light or medium strength stimuli and usually keeps his eyes open for a short time and then closes them.
- *Sopor:* the patient is in the state of deep stupor, opens his eyes to strong painful stimuli but closes them very fast. In the meantime he either hardly answers any questions or answers with great difficulties.
- *Coma:* the patient does not respond, does not open his eyes to any stimuli, not even to painful ones, does not speak but his breathing and circulation is maintained.

Some consider **sopor** the first stage followed by somnolence and the other above mentioned phases.

Without attendance the different degree consciousness disturbances can become worse and worse depending on the state of health. The airway blockage, the danger of aspiration may occur even in the state of somnolence and it is even more probable in more serious stages. That is why these patients should never be left alone. It is best to check their status frequently and in order to avoid complications maintaining a stable airway is recommended. Therefore, in a certain sense, the AVPU scale and the somnolence, sopor, coma distribution correspond with one another.

If the casualty or the injured does not show responses to attempts of contacting him and we are alone with him we need to shout for help in order to have someone to assist us during a potential intervention.

The presence of consciousness in the given case presumes the proper cerebral circulation, heart functions and more or less the sufficient existence of breathing. *3.1. video:* First contact with the patient – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Elso_kontaktus_felvetele_eng.wmv

The determination of breathing

The other important element of the primary survey of status is the determination of the patient's breathing.

It needs to be emphasized that with a non-responsive unconscious patient the determination of breathing bears an outstanding significance in relation to the patient's further attendance.

Before the determination of breathing it is a crucial thing to be done to ensure patent airways to the patient because this condition enables us to safely announce the existence and the given characteristics of breathing. The simplest way to do it is to tilt the head back (see illustration). With the head being leaned back the tongue that fell back due to the loss of consciousness moves away from the pharynx wall freeing the upper airways this way. The patient's existing breathing or breathing sounds may change or improve due to this.

In case of an unconscious lying patient the determination of breathing goes as follows:

- we kneel next to the patient's ear
- we lean his head back (see illustration)

If the injury of the jugular spine is suspected, leaning the head back must not be done but another form of free airway ensuring method has to be chosen (e.g. the Esmarch-Heiberg manoeuvre - see chapter 8).

If we do not suspect the patient having a foreign-body in his mouth, looking into the mouth as a routine examination is not necessary. If there are food leftovers, or in case of children maybe toys, around the patient then the mouth needs to be looked into.

- Holding the patient's head leaned back we bend over his face in a way that the first aid provider's ear should be towards the patient's mouth and nose and the raising of the chest needs to be observed in this position.
- The rising and falling of the chest has to be watched for 10 seconds, the flux of air leaving the patient's body has to be listened to and felt on our face. Shortly the triad of the **'Look, Listen and Feel'** sensing needs to be applied.
- During a 10-second long examination an average living adult inhales at least twice which is quiet and goes with visible chest deflection. *(video about an average patient's inhalations examined for 10 seconds)*

The number of normal, sedent inhalations in different age groups are as follow: (Chart 2. Children's breathing count and respiratory volume in different age groups). *3.1. sound file: normal breathing sound* – http://tamop.etk.pte.hu/elsosegelynyujtas/hangok/3_1_Normal_legzes_hang-normal_breathing_tone.wav

If the number of inhalations is less than 2 in 10 seconds or the breathing is loud, groaning, snoring etc., then the patient's breathing is *not normal*. We evaluate the abnormal breathing of an unconscious patient as a sign of circulation stoppage and after calling the ambulance we begin resuscitation. (see the process of BLS)

Chart 2. Children's breathing count and respiratory volume in different age groups:

Age	*breathing count*	*respiratory volume*
Under the age of 1	30-40/min	3,4-4,7 ml
From 2 to 5 years	24-30/min	30-90 ml
From 5 to 12 years	20-24/min	90-400 ml
Over 12 years	12-20/min	400-600 ml

Since the normal presence of breathing is one of the most important factors from the point of view of starting resuscitation, the clearance of the airways and the judgement of breathing has to be done with thorough circumspection.

The breathing of a conscious patient and its evaluation will be dealt with in the next chapter in details.

In rare occasions without the examination of other signs of life visible arterial spurting out bleeding is the sign of circulation (not necessarily of normal breathing). After or besides quickly caring for the bleeding, the patient's survey of status needs to be done from the beginning to the end as described above. *3.2. video:* Quick examination of breathing – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Legzes_megitelese_eng.wmv

Secondary survey of status

History taking

If the patient shows signs of life phenomena and has no significant outer bleeding it is important to take a history to decide what kind of illness underpins the symptoms.

As it has already been mentioned at the contacting the patient chapter, the clarification of the problem or complaint needs to be started as soon as possible either based on the information from the patient (autoanamnesis) or the people present in the given environment (Illustration 3/1).

Autoanamnesis

During the history taking it is worth asking the questions below early:

- What has happened?
- Are you in pain? Where exactly does it hurt?
- Has anything like this happened to you before?
- What sort of diseases do you have?
- What kind of medicine do you take? Have you taken them?
- When and what did you eat and drink for the last time?

The answers given to the above listed questions provide great help to the further history taking. The main questions worth clarifying during the anamnesis aquisition process are listed below according to the different areas of the body.

Illustration 3/1 A help provider is speaking to the person in trouble

Head, neck

In case of the head's injury or complaints located on the head the following questions are worth asking:

- Has any trauma occured to your head? If so, where exactly?
- Where do you feel pain?
- Have you got a headache? If so, let us specify:
  - Where do you feel pain (symmetric or unilateral)
  - How strong is the pain? (on a 1 to 10 scale where 1 is the slightest and 10 is the strongest)
  - Does the pain radiate to other areas of the body?
  - How fast did the pain begin?
- Do you have any other symptoms that appeared simultaneously with the pain? (vision disorder, nausea, vomiting, pain in the chest)
- Do you have any other pain on your face, in your nose, eyes, mouth or ears?
- Are you dizzy? What kind of dizziness is it?
- Do you have any vision problems or double vision?
- In case of suddenly occurring, even painless, one-sided blindness or peripheral vision loss, seeing a doctor immediately is necessary in order to prevent lasting damages.
- Is there a weakness of muscles or decrease of chewing power on the face?
- Do you have any swallowing problems?
- Do you have any suddenly occurring hearing deficiency?
- Do you have any history of runny nose or flow from the ears? If so is it bloody or watery?
- Have you ever lost your consciousness? Have you ever had amnesia?
- The most common reasons for the above complaints are summarized in Chart 3.

Chest

One of the most alarming complaints is the pain in the chest. Chest pain can be caused by numerous diseases, so questioning the patient about the genre of the pain can help in making a diagnosis. It is important to note that chest pain is the sign of several life threatening causes, so the patient should not be left alone until his status improves and professional help arrives, since his condition can worsen at any moment, the patient may need immediate intervention.

In case of a chest complaint ask about its:

- Character (pressing, stabbing, blunt, squeezing etc.).
- Strength (even 1 – 10 on a Visual Analogue Scale).
- Radiation (the typical radiation area of the acute miocardial heart attack can be the left arm on the little finger's side, left shoulder, chin. This state can also stand behind complaints of the stomach area though it is rare.).
- Is it accompanied by vegetative symptoms? (sweating, blushing, redness of the skin, quick pulse sensing)

Chart 3. The anamnesial defficiencies and reasons of the head and the neck that call for attention

Complaint	Most common reasons
Headache	cerebral blood supply disorder (e.g. stroke, bleeding between brain membranes, metabolism deficiency (e.g. blood sugar), shortage of liquid, deprivation (of tobacco, coffee, medicine), high blood pressure, status after a head trauma, side-effects, without a known reason, primer headache
Dizziness	disease of the inner ear, nervous system defficiency, the calcification of the cervical spine
Vision problems	diseases of the eye: trauma, cataract, glaucoma, blood supply disorder of the eye, nervous system defficiency
Double vision	disease of the eye muscles, central nervous system deficiency
Facial muscle tone deficiency	VIIth cranial nerve drop-out, central nervous system deficiency
Chewing muscle decrease	Vth cranial nerve drop-out
Swallowing disorder	functional disorder of the IXth and Xth cranial nerves
Sudden loss of hearing	diseases of the ear, central nervous system defficiency
Flow from the ear	skull trauma, diseases of the ear
Runny nose	skull trauma, diseases of the nose and nasal cavity (allergy, inflammation)
Loss of consciousness	skull trauma, cerebral blood supply disorder, epilepsy

In respect to the development of chest pain we specify the so-called *ischemic pain* during which the blood supply gets worse and this causes the pain

The following diseases can cause ischemic type pain:

- angina pectoris – acute miocardial heart attack
- pulmonary embolysm

Chest pain can come about due to the deficiencies of the chest wall. The most common cause for this is the injury of the intercostal nerves or their getting under pressure. This sort of pain can be detected in some of the chest troubles.

The third cause of chest pain occurs due to the *pleura getting involved* if inflammation or built up peccant substances irritate the wall disc of the pleura. Pneumonia, emphysema or pleurisy go with this type of pain.

The differentiation between the various types of pain can be done on the basis of the symptoms as well.

Contrary to the pain caused by the intercostal nerves the ischemic type pain usually cannot be precisely located. Pain originating from the pleura is related to breathing, whereas ischaemic pain is not.

The dieases of the heart can often appear in the form of the following complaints:

- irregular pulse
- feeling of the heart beat
- syncope – temporary cerebral circulation problems
- feeling of weakness, tiredness
- symmetrically swollen oedematous legs (anasarca)
- frequent night time urination, exceeding daytime urination with a large quantity of urine (nocturia)

Another alarming symptom is hampered respiration i.e. dyspnoea. Hampered respiration is a subjective symptom that the patient experiences as an unpleasant feeling related to breathing, the nature and intensity of which can be manyfold (hard breathing, choking, precipitative breathing, tightened chest).

The reasons for hampered respiration can be divided into 2 large groups. On one hand they can be caused by problems of circulatory origins or they can accompany the diseases of the respiratory system, on the other hand it is oftentimes difficult to determine dyspnoea. However surveying the parametres listed below can be of help:

- the number of breaths (quick inhalations per minute i.e. tachypnoea often goes with dyspnoea, too but it can mostly be considered pathologic if the patien's quick inbreaths are not accompanied by some sort of physiological action or status but they evolve without these.
- depth of breathing
- Breathing work (maybe one of the most objective sign indicating dyspnoe). The increased withdrawal of the intercostals, wing of the nose-type breathing and the usage of the other supplementary respiratory muscles refer to increased breathing work.
- It is crucial to clarify early whether hampered respiration occurs during inhalation, exhalation or both
- The following diagnoses are characterized by obstructed inhalation:
  - upper airway stricture (glottal stricture, enlarged formulas of the pharynx and larynx, airway foreign-body etc.)
  - stricture of the trachea and/or the main bronchia (due to earlier inflammation, tumour, foreign-body)
- Obstructive exhalation rather refers to the strictures of the lower airways like bronchial asthma, chronic obstructive pulmonary disease (COPD) etc.

The determination of the sound of breathing is also of outstanding importance. The following pathological, easily audible breathing sounds can be differentiated:

- Hissing, loud, 'pulling', forced breathing, obstructive exhalation characterize the asthma bronchiale and COPD attacks.
- Slurping breathing can indicate bronchial inflammation or oedema of the lungs
- Snoring breathing may refer to backfallen tongue or obstruction caused by a soft uvula
- Groaning breathing with obstructive inhalation may indicate stricture of the upper airways.

3.2. sound file: whooping sound – http://tamop.etk.pte.hu/elsosegelynyujtas/hangok/3_2_sipolo_legzes-whooping_sound.wav

3.3. sound file: stridorous breathing – http://tamop.etk.pte.hu/elsosegelynyujtas/hangok/3_3_Stridoros_legzes-stridorous_breathing.wav

3.4. sound file: crepitation noise – http://tamop.etk.pte.hu/elsosegelynyujtas/hangok/3_4_Crepitalo_legzesi_hang-Crepitation_noise.wav

3.5. sound file: pleural friction rub – http://tamop.etk.pte.hu/elsosegelynyujtas/hangok/3_5_pleuralis_dorzs_zorej-pleural_friction_rub.wav

3.6. sound file: agonal breathing sounds – http://tamop.etk.pte.hu/elsosegelynyujtas/hangok/3_6_terminalis_legzes-agonal_breathing_sounds.wav

3.7. sound file: sound of oedema – http://tamop.etk.pte.hu/elsosegelynyujtas/hangok/3_7_oedema_hangja-sound_of_oedema.wav

Coughing and spitting is also a frequent complaint related to breathing. Coughing, as a protective reflex, is attached to numerous banal diseases or states of health. From the point of view of first aid those longlasting coughing spasms can be more of a problem that can obstruct inhalation by occurring in attacks.

In the less serious coughing states the nature of the consequential spit can help in setting the diagnosis. If the patient does not cough or spit in our presence, asking about their charactersitics is recommended. Out of the typical spittles, blood stained sputum (hemoptoe) needs to be put an emphasis on because it can indicate a trauma, a tumour or TB. Sputum with pus or reddish-brownish sputum can refer to bronchial inflammation (pneumonia). Typical white foamy sputum can be seen in oedema of the lungs.

Former respiratory diseases, allergies and asthma should also be inquired about.

It is important to emphasize that hampering respiration can easily be simulated so certain individuals often use it to attract attention or to simulate. If we make the patient talk for a longer period of time, it helps to distinguish between simulated and real obstructive breathing.. The seriously choking patient if able to communicate can do so only in short sentences or specific words at a time. The simulating patient 'will forget about choking' when he lists his complaints with an emotional input.

Abdomen

In case of abdominal diseases making the diagnosis on the spot is many time more difficult since several abdominal pathological processes show similar symptoms. Among the first questions it needs to be asked if the abdomen has been subjected to any trauma lately.

The most common complaint is abdominal pain. The following questions are worth asking in this situation:

- Where exactly do you feel the pain?
- Does it radiate to anywhere?
- How strong is the pain? What sort of pain is it; cramps, blunt, sharp, belt-like pain etc.)?
- Have you ever had a similar pain?
- What evoked it? What soothes the pain? Does eating improve it?

- What kind of stooling habits have you had since the beginning of the pain?
- When did you have your last stool and urine? What were they like?
- Have you vomited? How much did you vomit?
- In case of ladies their cycle of periods or potential pregnancy ought to be asked about.

Out of the above mentioned questions the ones about stooling and urinating habits and their nature can also be asked without the patient having abdominal pain. Surveying appetite and change of weight are less informative from the point of view of setting a diagnosis on the spot.

Limbs

The symptoms appearing on the limbs can vary a great deal but from the aspect of first aid only a few of them bear heightened relevance. First the possibility of a potential trauma, which is one of the most frequent cause of young patient's complaints concerning limbs, has to be excluded.

Several diseases can be in the background of non-traumatic pain of the limbs, especially in case of the lower limbs which is a frequent complaint.

The following disorders can accompany the pain in the lower limbs:

- ischemic pain that developed on the grounds of blood supply disorder (vasoconstriction)
  - this pain can evolve acutely also without any previous complaints
  - Or on the basis of the already known vasoconstriction. In this case movements provoke the pain that ceases upon rest.
- a feeling of tightening (deep vein thrombosis (DVT) due to the decreased flow of the deep vein system
- pain originating from cerebrospinal or nerve disorders (spinal hernia, nerve disorders of diabetic patients etc.)
- locomotor complaints (of muscular origin, arthritis, caused by abrasion etc.)
- pain due to skin diseases (erysipelas, ulcer etc.)
- due to cardiac reasons the stasis of the vein system of the lower limbs can lead to their swelling and tightening which may become painful in the long term

Based on this inquiring about the patient's traumatic injuries, earlier vascular system diseases, locomotor or neurological diseases are recommended. It is important to isolate whether the pain or the complaints about the limbs refer to symmetrically both limbs (in this case a systemic disease needs to be primarily considered) or is it a unilateral process (in this case the reason of the problem has to be sought on or in the given limb).

We always need to take into consideration the possibility that due to old age osteoporosis fractures i.e. so-called pathologic fractures can occur often as a result of a slight impact (that the patients do not find strong).

Other

We classified those symptoms to this group that cannot especially be connected to any of the specific areas of the body. These are complaints like weakness, trembling, sweating, faint, raised or high temperature.

It is important to notice that most of the suddenly occurring health damages lead to the activation of the sympathetic nervous system, the symptoms of which are as follow: fast pulse, sweating, trembling, paleness. However upon the existence of these symptoms anamnesis and examination concerning the whole body are necessary in order to find the triggering cause. Strong, sudden pain can also be accompanied by similar complaints.

The differences in body temperature, like raised or high temperature and also sweating related to the latter can also be caused by the illness of several organs. These symptoms by themselves require calling an ambulance only in extreme cases. However the reasons need to be searched for but many times this is not the job of the first aid provider.

The disease of numerous organs can be accompanied by weakness. Since one of the most common non-tumourous illness is the cerebral circulatory disorder i.e. stroke and one of its symptoms is the sudden feeling of weakness, this complaint ought to be taken seriously.

Naturally a multitude of diseases like the banal flu for example can go with weakness so the diseases of most body parts need to be considered and then the most probable one has to be chosen.

Medical history

The information given by others is called heteroanamnesis. Getting the heteroanamneses is significant in case of unconscious or consciously disturbed patients or infants or small children. In cases like this we can gain information as follows:

- from the people at the location of sickness or injury
- from the friends and family members of the patient
- from health care professionals
- or we can get informed from previous health care documentation (e.g. final medical report or documents found with the patient)

If we were not present at the location of sickness or injury and/or we did not see what had happened to the patient we quickly need to get information from the people who presumably saw the incident. Enquire as to what exactly happened and how much time passed since the beginning of sickness, consciousness disturbance or other alerting symptoms.

Heteroanamnesis is also worth getting if we can communicate with the patient properly but we are searching for signs or symptoms that can be noticed by an external observer earlier than the patient would realize them or would cause subjective complaints. cyanosis, paleness, slight tremble of the limbs can be symptoms like that.

Illustration 3/2 A help provider is speaking to the relatives

These signs can bear special significance if the patient suffers from some sort of disorder related to the sensory organs or mental disorders.

During the heteroanamnesis acquisition the sequence of asking about the complaints based on the questions do not need to be altered.

Upon the acquisition of every anamnesis it is important to ask the patient whether he has any known sensitivity or allergy to any medicine or any other substance. Sensitivity to iodine for example can influence the way of disinfection before bandaging a wound or the choice of medication in further care.

Detailed examination of the patient

After the primary survey of status and the acquisiton of the anamnesis making the diagnosis can be conduced by the physical non-instrumental and the instrumental examination of the patient.

A few important basic principles have to be mentioned before we give the sequence of the examinations in details. They are as follow:

- If the patient's complaints are localized to one area of the body then it is best to examine the given part of the body first after having eliminated and cared for the life threatening status.
- If we do not know which part of the body is injured the patient has to be examined head to toe.
- If the patient complains about one or more areas of the body then we need to have a look at those parts, at all times maintaining the patient's dignity.
- If the environment allows it the separation of the patient is recommended for the examination and care. We should possibly find a place that can be easily found and reached by the ambulance or other attendance providers.
- The patient's physical examination practically begins, especially if an experienced helper is present, as soon as the helper steps to the patient and contacts him. At this phase viewing and touching bear heightened significance.
- Signs of traumatic injuries ought to be searched for even if the injury evoking causes were not traumatic but due to e.g. sickness or faint, the patient may suffer from secondary injuries. It can happen that the secondary injury is worse than the evoking cause.
- In case of an unconscious or consciously disturbed patient the position of the patient, as he was found on the spot, can be of special significance. Other than all of these we can find positions that confirm our hypothetical diagnosis based on the complaints and examinations in case of conscious patients as well.
- During the physical and instrumental examination, the usage of protective accessories (e.g. rubber gloves) is highly recomended if possible.
- Besides all these, maybe the most important is to perform only the examinations that we are famliar with, so that we can implement and evalute them and they take us closer to the diagnosis and are preferably not painful. An examination done in the wrong manner can cause pain and further worsening of state of health to the patient. *3.3. video:* General patient examination – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Altalanos_beteg-vizsgalat_eng.wmv

Head, and neck region

Viewing. In case of traumatic injuries we search for wounds of the head, bleeding of the nose, ears or mouth. Damage or bleeding within the skull has to be assumed even without any traces of outside injuries on the head if the head might have been injured as a result of the accident mechanism or if the patient is disturbed consciously even if seemingly without reason.

The traumatic injuries of the head need to be emphasized at a young age or in childhood since this is when the size of the head is relatively big compared to the proportions of the body and consequently it gets injured more often.

The change in the contours of the brain or facial skull indicate its injury even without wounds.

Eyes. Viewing the eyes can refer to several parts of it, though in respect to first aid they rarely provide sure information for non-professionals. A few details are given below in terms of the potential divergencies.

Pupill disorders. Among regular circumstances pupils constrict according to the strength of light going through them. If a lot of light gets in touch with the eyes they grow wider, if they are subjucted to little light they become narrower. The first thing to consider is whether the pupils are of proper breadth in relation to the given circumstances concerning the amount of light. Secondly it needs to be observed whether the pupils are of the same size i.e. if they are symmetrical. The assymetry of the pupills in size is called anisocory. Pupil responses are examined with the help of a pupil-lamp during which healthy pupills grow narrow upon interaction with light.

On the whole pupils are pathological if

- they do not show the expected breadth within the given circumstances of light
  - dilated pupils can refer to the effect of increased sympathetic nervous system functioning or to the usage of medicine or drugs or to a neurological problem
  - narrow pupils on the other hand can indicate a parasympathetic influence, neurological disease or the intake of medicine
- the pupills are not symmetrical
  - numerous mainly neurological diseases are in the background (in emergency situations they rarely reflect ophthalmological problems)
- the pupils do not respond
  - in a similar way they can be caused by harmful influences or by medicine

The earlier trauma, surgery or disease of the eyes can influence the functioning of the pupils. If the patient's major complaint is of ophtalmological nature this has to be inquired about.

Conjunctiva divergencies. The venous drainage of the eyes is worth observing. If it is increased, congested, it can refer to several diseases and factors (e.g. conjunctivitis, allergy, exertion, smoky environment, the effect of drugs or medication).

Pathological positions and movements of the eyes. The movements of the eyes are the result of complicated neurological functioning so the underlying disease can rarely be diagnosed immedi-

ately. The purpose of the first aid provider is generally to observe the noticable changes. In cases like this the following phenomena are worth being focused on while observing the eyes:

- Do the two eyes move together upon instructions?
- Can nystagmus be seen on the eyes?(see video)
- Are the eyes (or is just one of them) fixated to a pathological direction (e.g. sideway upwards)?
- Is cross-eyedness noticable?
- Can the eyes move in every direction? While examining all of these the patient has to be asked to look in every direction.

The patient needs to be asked about the visible pathological divergencies (e.g. if cross-eyedness or nystagmus has been known to exist for a long time). The divergences that we consider pathological should be remembered and told to the further health care staff.

The changes in the eyes can also be inspected in case of unconscious patients by opening the eyes. What we see gives important information in unconscious states of mind as well

Face. Changes in the face that relate to colour and muscle tone are important for us.

The face is well supplied by blood so the signs of systemic states like paleness, cyanosis, redness can be noticed early. The change of colour on the lips can be observed even much earlier and better. Increased sweating can also be detected early. The state of the face has been considered a pathological disorder indicator in serious cases for a long time. One of its best-known form is the Hyppocrates face i.e. pale face with sunken cheeks and a drowsy glance.

The determination of the state of the facial muscles and the strength of chewing: the most common serious divergence related to the facial muscles is their lateral weakness or palsy.

Its signs are:

- baggy eyelids
- flattened nasolabial wrinkle
- dropped edge of mouth (maybe flowing saliva)
- unexpressive, smooth half of the face
- The drop-out of the unilateral chewing muscles can be indicated by slant jaws or sideways ponting chin.

The above indicated changes on the face can be symptoms of neurological diseases so they have to be considered as serious signs that demand further examination.
N.B. If the weakness or the palsy of the lateral face developed suddenly, the ability to raise one's brows has to be checked if possible. In case the raising of the brows is kept on the given side of the face in spite of its omission on one side while the patients is moving the different facial muscles upon request, the symptoms are presumably caused by stroke so the patient needs to be hospitalized urgently.

Mouth. At present under the entry-word 'mouth' the oral cavity with its parts and the pharynx that functionally belongs to it are discussed.

First it should be mentioned that for looking into the patient's eyes sometimes we need to open it with our hands. In this case we must be very careful because a patient suffering from disturbed consciousness can bite on our fingers being in his mouth as a reflexive response. This means that in case of a patient who does not fully cooperate with us we should be careful that our fingers getting in between his teeth.

Upon assuming a foreign-body in the mouth, naturally the first thing to do is looking into the mouth and getting the foreign-body out (in a way discussed later).

When we look into the mouth it might be necessary to clear away false teeth in order to be able to examine the mouth more easily.

The lips, just as the face, reflect several systemic states as well, e.g. cyanosis, shortage of liquid.

When we look at the tongue we should examine if its furred or coated first. A coated tongue can refer to the shortage of liquid in the body but it can be influenced by numerous diseases and nutrition intake through the mouth.

Let us ask the patient to stick his tongue out and also observe its motions and pathological position. It is easy to recognize the sideway pointedness of the tip of the tongue. This indicates a neurological disease.

We inspect the mucous membrane of the mouth and the teeth, too. These can refer partly to the fluid balance (dry mucous membrane) and also the patient's health and social state.

Examining the pharynx and the tonsils is usually a more difficult job because it requires a spatula or another tool to press the tongue down. The enlargement of these organs can be important from a first aid point of view because they can make breathing more difficult.

It is also important to evaluate the patient's breath. Breaths smelling of alcohol, (after alcohol consumption), acetone (in case of diabetic patients), urine (kidney patients), medicine or chemicals (in case of suicide attempts) can be sensed best upon observation or looking into the mouth and they can be of indispensable signicance in diagnosing the patient.

Nose, ears. The diseases of the nose and ears rarely cause such an emergency disorder that requires the first aid provider to seriously take action in this respect. In case of injuries of these organs some discharge or blood can leave the nose or ears. Bleeding or fluid flowing from the nose or ears can also be expected in case of different forms of cranial fracture.

Upon injuries or diseases of the nose respiratory problems may occur, especially in case of children. Lateral surface of the external nose breathing can be the sign of hampered breathing. In case of sudden loss of hearing we can rarely make a diagnosis while observation is restricted to the external parts of these organs but this is unlikely to explain the loss of hearing.

Neck. A lot of signs can be found on the neck upon the injury or disease of which a life threatening state can occur. In case of traumatic injuries of the neck, primarily the injuries of the veins of the neck, the larynx, trachea, or in rare situations that of the oesophagus, go with life threatening consequences if there is no fast intervention available. Due to these dangers the attendance of the injuries of the neck have to be started as soon as possible during performing first aid. Due to the potential inner bleeding upon the blunt injuries of the neck, fast diagnosis and institutional treatment can provide improvement.

The observation of the neck in case of non-tarumatic injury provides less information. In case of change of colour and haemorrhage of the skin inner injury has to be assumed. Specific neck (collar) cyanosis presumes cardio-pulmonary origin. The larynx, as an organ not being tightly fixed to its environment, is often laterally dislocated due to the fast change of pressure within the chest e.g. in case of pneumothorax i.e. PTX. In this case chest complaints need to be investigated and the chest also has to be examined because a life threatening state might stand in the background.

The illnesses of the other organs of the neck rarely cause serious larynx dislocation from the point of view of first aid.

The vessels of the neck, especially discerning the jugular vein system can be of informative value. The pressure in the vein system, particularly in the neck veins close to the right half of the heart, reflect the pressure conditions in the right half of the heart and the fluid balance of the organism. The protrusion of the veins in the neck go together with the increase of pressure in the right half of the heart (thorax) which may indicate heart problems or fluid overload.
The neck veins being sunken can refer to fluid shortage.

Touch. Touching the head and neck region bears a significance primarily upon searching for traumatic injuries that originate from external impacts. The traumas potentially not causing wounds can be detected with the help of touching e.g. pathological contour, mobility or subcutaneous emphysema. Gently pressing the bones of the skull lets us touch them all the way through and then do the same with the bony edges of the facial skull (the zygomatic arch, the ledges of the eye socket, the bridge of the nose, the mandible and the parts of the maxilla that are near the upper teeth). Then the tone of the muscles of the face should be palpated. The decrease of the tone of the facial muscles and their atrophy can indicate the loss of the VIIth cranial nerve while the loss of the Vth cranial nerve can be indicated by the atrophy of the chewing muscles.

Touching through the cervical part of the spine should be emphasized though the patient has to be considered spine injured even without its change if it could have been injured as a result of. trauma.

Though the other organs of the neck, like the thyroid and the lymph nodes may be touched through, but their examination is of less importance in an emergency case.

We rarely, only in arrest or periarrest status, touch the carotid pulse of a patient so information about this is given in other parts of the textbook.

Auscultation, percussion. Auscultation and percussion on the head and neck have no relevance before the patient is hospitalized. N.B. professional health care workers apply carotis massage to treat certain rhythm disorders but before doing that the carotid should be listened to.

Chest

Viewing. Viewing the chest bears a lot of important information so in case of complaints it needs to be examined.

Viewing the *shape of the chest* can be done the fastest. On the other hand in the evaluation of the form numerous earlier surveyed factors have to be considered.

They are as follow:

- the chest having been subjected to trauma
- the existence of earlier respiratory diseases
- the existence of a prior state that was accompanied by spinal or chest deformation

The shape of the chest may change in case of long-term respiratory diseases, especially concerning smokers. In such cases typically it takes the shape of a barrel with the help of which the body tries to compensate for the respiratory surface that decreased during the years.

The orthopaedic deformities of the spine and chest influence the implementation of the respiratory movements so they are best to be taken into account. In practice we can rarely come across chest and spine deformities.

In case of the traumatic injuries of the chest we obseve the signs below:

- unmoving half of the thorax or part of it (serious injuries have to be presumed in the background)
- minor wounds or haemorrhages of the chest wall (the danger of internal bleeding to the thoracic cavity or mediastinum is present in every case)
- the change of the rib positions (caused by the fracture of the ribs)
- paradoxical movements of the chest (upon sequential rib fracture the fractured parts move counter-wise to the movements of the whole of the chest)
- dislocated position of the larynx (refers to pneumothorax distention)
- opened thoracic cavity (further serious injuries need to be assumed)
- change in the number and quality of breathing

We have already written about the evaluation of the patient's breathing in the chapter covering the primary survey. During the secondary survey we observe further characteristics of breathing.

- According to given age groups, amidst resting circumstances the *number* of breaths deviating from normal can appear in an increased (tachypnoe) or decreased (bradypnoe) form. The complete disappearance of breathing is called apnoe but that is already a status that requires immediate intervention.
- It is difficult to evaluate the deviations in terms of the *depth* of breathing because it is not determined how much the normal depth of breathing is. Consequently the evaluation of the

breathing deviations is slightly subjective but they can be increased with strong chest amplitude or they can be weakened. The latter is also called surface breathing and in that case the chest hardly deviates.

- The lateral nature of the depth of breathing can also be pathological. In this case usually the part breathing more superficially is damaged so it is best to keep on examining that part thoroughly.
- The *normality and rhytmicality* of breathing is also an important factor. Normal breathing is regular while in a pathological case its regularity alters. A few typical breathing pattern pictures are shown on the Xth chart. From the observer's point of view breathing seems irregular even if *the time period of inhalation or exhalation is expanded i.e. it becomes forced.* These need to be observed as well since they can refer to the status described earlier.
- The *sound phenomena during breathing* should also be paid attention to. Among normal circumstances breathing is almost soundless, we can sense slight sounds to be evident when close to the patient. We can find pathological sounds in the following cases:
  - upper airway stricture
  - asthmatic patient
  - the stridor breathing of a patient in a terminal status
  - COPD patient
- Lastly let us observe the *functioning of the additional respiratory muscles,* the increased usage of which can indicate dyspnoea.

N.B. The reason for cyanosis visible on the skin is often, but not exclusively, of respiratory origin so in case of complaints like this numerous other factors need to be examined (heart disease, environmental factors, hypothermia, poisoning).

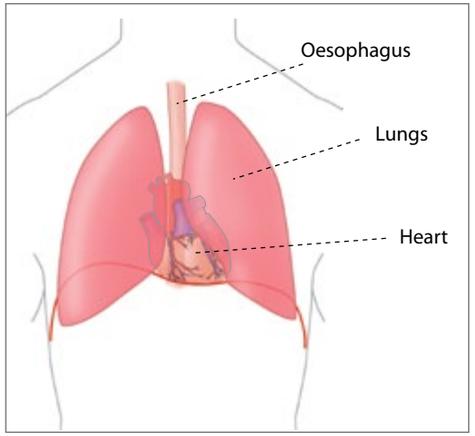

Illustration 3/3 The position of the lungs in the chest

Touch. The purpose of palpating the chest is generally to search for traumatic injuries and determining the instable parts of the thorax. For this reason we press the patient's chest from both sides and from above to find deviations, signs of fracture and instability.

While doing this, especially in case of women in a public place, always remember to maintain the dignity of the patient. The touch of the breast covered parts of the chest should

happen subsequent to the patient's prior informing about it, preferably with decisive and quick movements.

With our hands put on the chest the assymetrically moving chest parts can be more easily detected.

Auscultation, percussion. Listening to the lungs demands instruments (phonendoscope, which is a stethoscope that intensifies auscultatory sounds) and its findings are hard to evaluate for non-professionals so while discussing instrumental examinations touching upon this topic will be omitted. Thus the evaluation of breathing and listening to the breathing sounds are restricted only to the sounds that have already been mentioned in the observation chapter and that are of practical value bearing important information in case of a seriously ill patient.

Under the present circumstances the percussion of the lungs is narrowed down to the examination of the traumatic chest injured since the evaluation of these sounds demands complex and deeper knowledge. Within the framework of first aid, percussing the patient. can provide important information only to the qualified ones who are experienced in its completion.

In case of traumatic injuries percussion helps to distinguish the nature of foreign substances accumulated in the chest or more precisely in the space between the discs of the pleura. It is worth knowing because the accumulated increasingly pressured air between the discs of the pleura can cause life dangering complications. Naturally the agglomeration of blood can also cause serios respiratory problems but primarily the threat of circulation stoppage is smaller in this case.

The lungs are located in the chest, their apex part expands even beyond the clavicles. Their bottom border is the 5-6th intercostal and laterally the 8th intercost in the median line of the armpits while they can be found in the height of the 10th intercost on the back. (Illustration 1. The position of the lungs in the chest).

During percussion we gently put the middle finger of one of our hands, usually not that of our dominant one, to the chest area (intercost) that we wish to percuss. Then we hit the middle phalanx of our middle finger which is positioned on the patient several times with the end phalanx of the middle finger of our other hand. See chart X.

Since the sound of percussion is influenced by numerous factors (the amount of air under the percussed parts, the strength of percussion etc.) we do the percussion not on the bony surface but in the intercosts in order to gain information about the lungs and its surroundings.

In case of the traumatic injuries of the chest we can percuss on the chest in the front or on the back depending on the position of the body.

Percussing the front part of the chest is best in the medioclavicular line (in the middle of the clavicle, a line drawn parallel to the spine) from top downwards as long as we reach the border of the lungs (5th intercost). We also go from top downwards while percussing the back, with the intermission of the shoulder blade, until the percussing sound becomes blunt. The border in between the two indicates the lower border of the lungs for us.

We can also complete comparative percussion in order to get easily evaluable information so that we can decide with certainty if the received sounds are pathological or not. During this we percuss over the identical points of the chest or of the two lungs and then we compare the received sounds.

With percussion the vibrations evoked on the surface of the body go towards the deeper layers of the body and then they are reflected back from the various borderlines (from the border of the organs and inner spaces of different density). These reflected frequencies are sensed as different sounds for us to evaluate them.

During the percussion of the chest we distinguish three different sounds. They are:

- blunt (if liquid or blood accumulated in the thoracic cavity – haemothorax)
- tympanic (if too much air is agglomerated in the thoracic cavity – pneumothorax (PTX))
- sharp (the percussive sound of normal lungs) (Illustration 3/3)

Abdomen

Viewing. In case of abdominal complaints the basic examination of the abdomen is of heightened significance. We search for the signs of traumatic discrepancies in the form of different skin haemorrhages and wounds.

Upon the injuries or diseases of the abdomen the location is relevant i.e. we need to keep in mind which area of the abdomen the complaints refer to, since usually that part of the abdomen becomes sensitive which is above the organ in question. (Illustration 3/4 The topography of the abdominal organs).

We generally view the abdomen while the patient is lying on his back.

We request the patient to make his abdomen visible, bend his legs and relax his abdominal muscles in a way that the whole of the abdomen and also the inguinal region can be easily examined. Other than the injuries caused by the trauma we seldom see any discrepancies upon viewing the abdomen which could help in making the diagnosis.

The following signs are worth paying attention to on the abdomen:

- The intensified turgidity of the abdomen (at the whole abdominal area or only at some of its parts).
  - This can refer to the accumulation of ascites on one hand or there could be some kind of space occupying process in the peritoneal cavity in the background.
- The changes on the skin of the abdomen (here the strongly visible vascular tree (caput medusae) due to the cirrhosis of the liver or scars from earlier surgeries can indicate earlier illnesses)

N.B. It is important to note that in case of the presence of a scar from appendicitis the effective complaints of the patient cannot be caused by appendicitis again since that is always cut out in such cases. Consequently we should consider a different disease as the causer of the complaints.

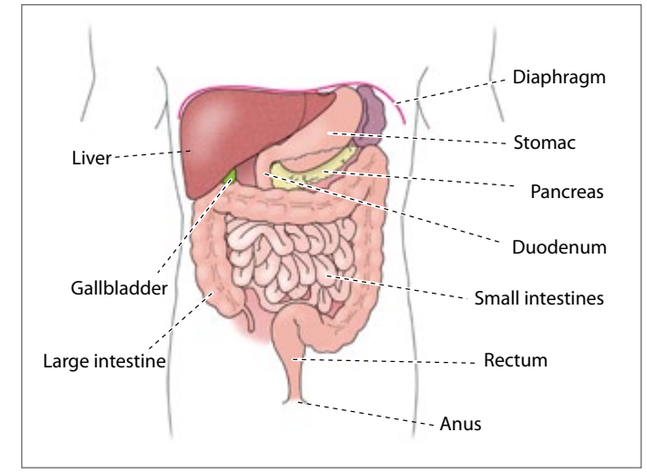

Illustration 3/4 The topography of the abdominal organs

- The bulging out of the navel or of another part of the abdominal wall (it can refer to hernia).
- Is there an abdominal region that does not participate in the abdominal breathing? (Certain parts of the abdomen are seen in a motionless position in spite of the breathing movements in case of circumscript peritonitis.)
- Is the abdomen assymetrical? (A protruding, immobile part of the abdominal wall can indicate certain areas to be concerned about even if they are not specific.)

Touch. Out of the examinations to be done by the first aid provider maybe the touch of the abdomen provides the most information in critical situations. If, on the other hand, we would like to listen to the abdomen, then viewing has to be followed by touch because the intestines moved by touching can refer to a false presence of intestinal functioning.

Upon touching the abdomen we can sense sensitivity to touch and defence musculaire on one hand and in rarer cases different out of place abdominal formations, occupying space on the other hand. A healthy individual's belly is usually soft and touchable.

In case the patient can be moved and no mobility excluding factors are present either, we ask the patient lying on his back to lie with his legs raised in the knees, to relax his abdominal muscles and to position his arms next to his trunk. In this position the abdominal muscles are in a relaxed enough state so that we can touch the abdomen easily.

If the patient had a complaint at a certain area of the abdomen, then that part should be touched. at the end of the examination. With this we avoid the further painful muscular defense of the patient.

The examiner may complete the abdominal touch with either one or two hands. In case of a two-hand examination he should hold his hands next to or on one another.

In most cases we touch all the quadrants of the abdomen generally starting from the left lower region since this is the place where the patient is most unlikely to complain about the painfulness of the area.

During abdominal muscular defense it is important to distinguish between the patient's voluntary or involuntary muscular contractions since the latter abdominal pathological processes are more of a pathognomonic value.

It is important to determine the exact location.

We can perform the abdominal touch superficially or more thoroughly as well so that we can determine better how close the sensed deviation to the abdominal wall is. In case we find a pathological formation during the abdominal touch the following features have to be determined:

- location (exact place)
- size, shape (exact size)
- consistency
- surface
- demarcation from the environment
- sensitivity, painfulness

It is worth noting that the organs of the abdominal cavity, especially the liver and the spleen, are proportionately bigger than with adults, so these organs can be touched even among normal circumstances. Since these organs are easily subjected to injuries, in case of infants the abdominal touch should be done carefully and preferably by a professional.

Auscultation, percussion. The percussion of the abdomen bears little significance from the first aid provider's point of view. Alhough the solid abdominal organs like the liver and the spleen can be percussed but it is rarely done in emergencies. One point needs to be made: if upon percussing the liver of a patient who is lying on his back we hear a tympanic sound over the normal blunt sound, it can indicate the presence of free air in the abdominal cavity.

Upon abdominal auscultation, that we can complete either with our ears laid on the abdomen or with a phonendoscope, we can primarily determine the sound effects originating from the intestinal movements.

Intestinal motions largely depend on the quality of the contents of the intestines, the status of the vegetative nervous system and numerous other factors so the evaluation of the deviations should be done accordingly.

If we want to percuss the abdomen it should be done right after viewing it due to the reasons mentioned above.

Since the above mentioned factors can significantly influence intestinal functioning, in a doubtful situation we should listen to it for at least as long as 1 minute before we make the diagnosis for a mute abdomen.

The intestinal sounds can be divided into 2 groups in a largely simplified manner:

- normal or increased intestinal sounds
- mute abdomen, ceased intestinal functioning

Most frequently we sense a mute abdomen in case of some kind of ileus (intestinal passage disorder) and it should be considered a life threatening diagnosis in case of a patient with abdominal complaints.

Though there could be several pathological processes behind normal or increased intestinal activity but their determination demands complex knowledge and adeption, thus it overexceeds the limits of this textbook.

Limbs

Numerous things are worth observing on the limbs. In case of injuries of the limbs, clothes from the injured or suspected to be injured limbs should be preferably removed so that we can perform their examination as thoroughly as possible. They are discussed in details below.

Skin

Viewing. As a result of external effects different wounds and injuries of the epithelium may come into being on the patient.

We can determine the colour of the limbs, the presence of oedema and their perspiration simply.

The circulation of the skin fundementally influences its colour and it is especially true in case of limbs. The contraction of the vessels of the skin generally happens as a result of increased sympathetic nervous system influence which can be caused by sudden excitement, pain, a decreased amount of circulating blood and low blood sugar. Consequently the skin will become pale, slightly sweating and of cool touch which is, as we have seen, not a specific but a general response to numerous changes of status.

The redness of the skin can refer to inflammation, raise of temperature and metabolic discrepancies (status that is accompanied by high blood sugar) of the given area.

Naturally these kinds of changes of the skin are not exclusively localized on the limbs but they are easily observable there.

The accumulation of carbon-dioxide in the body (in the blood) causes purplish discolouration (cyanosis) on the skin. Several reasons for this are known starting from the respiratory disturbances to the decay of the circulation in the limbs. Cyanosis can be first seen on the nails and lips (around the lips).

It rarely happens that the skin becomes yellowish due to the agglomeration of the bile (bilirubin). In cases like this liver, bile or blood forming organs' diseases can be suspected.

Sometimes we can meet patients with a cherry-red colour skin. In this case carbonmonoxide poisoning has to be considered.

Besides all of these the other discolourations of the skin can be caused by countless factors.

It is important to mention that in states of poisoning or in case of illnesses of uncertain origin besides viewing the discolouration of the skin let us not touch the patient without protective accessories since we ourselves might get infected.

Touch. Among other things touching the skin reinforces and supplements the determined status based on viewing. The temperature of the skin is higher in case of redness and it is lower in case of a pale limb. *3.4. video:* Examining capillary Refill Time – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/A_Kapillaris_ujratelodes_vizsgalata_eng.wmv

The coldness of the skin without sweating naturally refers to a cooled down status.

N.B. In case of infants or old people an inflammatory process (sepsis) may also stand in the background since they often respond to a status like this with decreased temperature instead of high temperature.

The presence of oedema, which typically means a swelling holding a fingerprint and it appears on the limbs, can be determined with more certainty by touching. The appearance of oedema accompanies most inflammations but change in the circulation of the limbs (cardiogenic circulatory deficiency, deep vein thrombosis, lymph efference disorder) and change in the composition of blood (decreased protein and albumin content of the blood) can also lead to the development of oedema. The formation of oedema of the limbs is facilitated by not moving but dangling the given limb for a longer period of time.

Among the appendices of the skin the blood supply of the nails is very good, too so in case of a decay of circulation they become pale early or they might gain a purplish colour. Due to its good blood supply it also gives information concerning the whole body. If we press the nail bed for a short period of time then it becomes white and then in healthy people it regains its original colour in a few moments. This is called the examination of the capillary reimpregnation. If the capillary reimpregnation lasts longer (over 2 seconds), it can refer to circulation disorders. (Video 2: The examination of capillary reimpregnation).

Bones and joints

Viewing. In case of traumatic injuries the examination of bones and joints is exteremely important since the injuries of long tubular bones mean a serious status. Consequently it is relevant to notice and attend them early. The most significant bones of the limbs are shorter or longer tubular bones that may get injured in various ways. The most easily noticable injury is the one that goes with deformity, maybe an open fracture. In cases like this the given fracture has definitely happened so its further examination is not necessary other than searching for the locations of bleeding.

The examination of the joints and the end of the bones near the joints is complex and it is more difficult to evaluate. Joints swell soon after their traumatic injuries so in many cases their injury can be suspected only based on this symptom.

Palpation. Upon the examination of the injured limb we should strive for proceeding as gently as possible since it can happen that an examination done with improper professionalism causes secondary injuries (vascular and nerval injuries). According to the general principle, we leave the injured limb in the position found and stabilize it that way. If moving the injured limb is necessary afterall, eg. if further dangers can be expected, in this case every tubular bone should be pulled in the direction

of its axis with medium strength. This way we can avoid secondary injuries due to moving a limb. It might be practical to maintain the traction for the time of stabilization and mobilization.

Since the joints are stabilized by numerous ligaments, their examination means to evaluate the integrity or intactness of these ligaments. The position of the ligaments stabilizing the joints varies according to the given joint. Thus, under the present circumstances, we can discuss them only in general terms.

During the examination of the joints let us try to estimate whether the size and direction of the movements related to the given joint is within normal range of movements. In case the functioning of a joint differs from this upon its motion, passively generated by us, it can be seriously suspected that it has been injured (e.g. if the knee can be laterally bent while the lower limb is stretched).

Pulse

Touch. The evaluation of the pulse palpated on the artery has been used as a method to survey the patient's status for centuries. A pulse can be palpated at any point where a surface running artery can be pressed to a bony base. The most commonly used points of such are:

- on the wrist on the side of the thumb (artery, radial)
- on the inner surface of the upper arm (artery, brachial)
- in the curve of the groin (artery. femoral)
- in the curve of the knee (artery, popliteal)
- in the middle of the back of the foot (artery, dorsalis pedis)
- behind the inner ankle (artery, posterior tibialis)
- in the neck next to the thyroid cartilage (artery, common carotid)
- on the temple (artery, temporal)

These pulses can be divided into two groups depending on their location related to their distance from the heart. They are central i.e. near the heart or peripheral i.e. far from the heart. The radial artery is most commonly used to evaluate the pulse of a conscious patient.

As an average, a healthy adult's pulse number in rest is 60 – 80 heartbeats/minute.

If the pulse rate exceeds 100/minute in less than a minute we speak of a fast pulse (tachycardia) if it is below 60/minute it is a slow pulse (bradycardia).

The pulse rate in rest varies according to age. The normal pulse rates in rest are summarized below:

- with newborn babies 150-160/min
- at the age of 1 month 130/min
- at the age of 1 120/min
- at the age of 2 to 5 100/min
- at the age of 5 to 12 80-90/min
- over the age of 12 60-80/min

We come across tachycardia in case of fever, pain, loss of liquid, heart disease, physical activity, poisoning and in every status where the sympathetic nervous system activity is increased due to some kind of reason.

Slow pulse occurs upon the decrease (cooling down) of the body temperature, heart disease and also in certain cases of poisoning.

Since the rate of the normal pulse in rest changes fast in childhood, determining the fast or slow pulse rates in relation to this, is more difficult. The pulse rate below 60/min calls for special attention though, in any case.

Other than determining the pulse rate, its supressability also carries important information for the first aid provider. In case the pulse is suppressable, it may refer to a decreased amount of blood circulation (indirectly for example it can enable us to estimate the loss of blood and fluid in the body). In case of a full, tight pulse a large amount of loss of blood is less probable. Naturally suppressability can be significantly influenced by the general state of the heart and vessels.

It is worth noting that in case of an adult the peripheral pulse can be felt either with uncertainty or not at all under 60 Hgmm of systolic blood pressure findings in general, so by touching the peripheral pulse and judging from its nature we can draw conclusions also about the blood pressuere.

Other than the general survey of health status the examination of the pulse also informs us about the circulatory status of the organs in question. If an artery of the limbs is blocked and a pulse cannot be palpated distally from it (towards the end parts) we might be able to still feel a normal pulse examining the other areas. This example clearly reflects that in case of injuries of the limbs or a painful limb it is compulsory to examine the pulse on the given limb. In case the pain in the limbs or injuries of the limbs are accompanied by a missing pulse, we definitely need to assume a status demanding fast medical care.

The most common reasons for suddenly evolving painful limbs can be as follows:

- sudden cease of arterial blood supply
- deep vein trombosis (especially on lower limbs)
- injury of limbs (of bone, muscle or joint origin)
- nervous system disorder (hernia of the spine)

In each case the pulse must be evaluated on the given limbs.

Non-professionals have not been taught the palpation of the central pulse lately since its presence is often evaluated in an incorrect way even besides bad (but existing) general circulation. Besides observing breathing experienced persons though may also examine the pulsation of the carotid which, unlike breathing, directly indicates the functioning of the heart i.e. the existence of circulation. *3.5. video:* Examining central pulse – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Centralis_pulzus_tapintasa_eng.wmv

Neural functions, muscles. We put a special emphasis on the examination of neural functions because the occurence of cerebral circulation disorders is outstanding in Hungary and recognizing the status plays an important role in making the diagnosis fast. In every suspicious case the patient has to be transported to the hospital as soon as possible because this is the way to avoid permanent nervous system damage like paralysis, limited mobility, speech impediments and other serious consequences.

Viewing. In case the patient was mobile, well-motioning earlier, the change of mobility and the decrease of muscular strength are always important symptoms. Some of these changes can manifest in the change of walking, lateral weakness, visible decrease of muscular strength or in muscular palsy which is similar to the one mentioned in the chapter about the face. The suddenly evolving speech impediment, that can occur in various forms, can also be an important sign of cerebral blood circulation problems.

These pronounced and conspicuous signs should always be taken seriously since prompt further examinations and hospitalization might be required.

Palpation. We try to determine the muscle tone by palpating the muscles. Lax, hardly movable muscles and involuntary tightening in the patient's muscles can refer to important nervous system damages.

It is worth checking if the patient feels our touch (stroking) on every limb of his. It should preferably be done with the patient's eyes closed so that we can get prompt information about the functioning of the sensing system.

Other examinations. Recognizing the decrease of muscular strength is a task of heightened significance in case we suspect cerebral circulatory problems. Primarily the active muscular strength needs to be determined preferably by comparing it to that of the opposite side. The so-called hidden paresis (weakness) test is best done with individuals who seemingly move well but while holding a limb counter gravitation-wise (e.g. with held out upper limbs) they cannot hold the limb on the side of the hidden paresis and the given limb starts to sink.

While doing a latent upper limb paresis test, the sitting or standing patient stretches his arms horizontally forward with palms positioned upwards and fingers slightly apart from one another. In case of paresis the stretched out arm begins to sink and the palm turns downwards (pronates) on the side in question.

In case of a lower limb the patient is lying on his back, bends both legs in a 90° angle at the hips and knees and holds them in this position. In case of paresis the lower leg sinks more, the thigh slightly on the weakened side.

A simple way of recognizing a speech impediment is to tell the patient a simple sentence and request him to repeat it. If the patient makes a mistake or cannot repeat the sentence after several attempts, we can strongly suspect a speech impediment.

Instrumental examinations

Measuring blood pressure

The determination of blood pressure, just like the determination of pulse, supplies important information about the current status of the heart and the circulatory system. Since a blood pressure gauge can be found in more and more households, its significance in the survey of the patient's status is more and more emphasized.

Measuring blood pressure is based on the principle that the vascular wall is flexible so it can be constricted by proper external strength so at a given short section of a vessel the stream of blood can be stopped and then by gradually decreasing the outer constriction the pulse wave is able to pass through the stricture. The pressure is decreased until the normal flow returns.

Accordingly, if we start decreasing the pressure on a completely pressed down vessel, we reach a pressure finding when the strength of the heart can already press the blood through the constricted vascular section. This can be heard as a tiny knock (Korotkoff sound) if it is listened to above the vessel. The pressure count that appears upon hearing the first sound is the systolic blood pressure. Then we decrease the pressure further on until the knock sounds disappear. The blood pressure count belonging to the sound that we hear last, is the diastolic blood pressure.

A healthy adult's systolic blood pressure is 100 – 140 Hgmms while the diastolic blood pressure is 60 – 90 Hgmms.

If the measured blood pressure counts are higher than this, we speak about high blood pressure (hypertension) and if they are lower, it is low blood pressure (hypotension).

Regarding the factors influencing the blood pressure figures we refer to the physiological studies.

Several types of blood pressure gauges exist already, from the traditional manually pumping ones to the completely automatic ones. The arm cuff is a basic part of every blood pressure gauge. It can usually be fixed on the upper arm with velcro. Attention should be paid to the proper size of the arm cuff and its proper positioning on the upper arm in relation to the height of the heart. The pressure of the air pumped into the arm cuff constricts the artery to the bone of the upper arm. *3.6. video:* Measuring blood pressure with aneroid equipment – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Felkari_vernyomasmeres_eng.wmv

The remaining parts of the equipment depend on its type. They can be completely manual when the blowing up and the deflation of the arm cuff are done manually with the help of a pump supplied with valves. With this we can determine blood pressure by listening to the

Illustration 3/5 Traditional and automatic blood pressure gauges

Korotkoff sounds with a phonendoscope. It is important to let the arm cuff down preferably slowly (2-3 Hgmms/sec).

The half-automatic (manual pumping, automated deflation and measuring) and automatic (every phase is automated) blood pressure gauges measure blood pressure electronically and at the end of measuring we can read the blood pressure finding and the pulse rate on the display. (Illustration 3/5 Traditional and automatic blood pressure gauges; *3.7. video:* Measuring blood sugar – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Vercukormeres_technikaja_eng.wmv

For a more precise blood pressure finding no exhausting physical work or movements should be done immediately before measurement for 5 minutes.

Measuring blood sugar

More and more people suffer from diabetes in Hungary so the self-measurement of the blood sugar count is also done by more and more people at home.

The deviations of blood sugar from normal (3.5 – 5.5 mmol/l) can produce numerous serious symptoms, consequently the first aid provider can be expected to know these signs (see another chapter) and the techniques of blood pressure measurement.

The scale of blood sugar measuring devices is also wide but in relation to their forms there are only a few differences. It could be important to check before measurement whether the code on the display of the blood sugar measuring device and the code of the testing dip coincide. This can influence the precision of the measuring.

After preparing the equipment we prick the previously disinfected finger tip either with a needle or with a special finger tip pricker and we allocate a drop of blood to the indicated part of the test dip. After a little while we read the measured finding.

It can happen that the gauge does not write the finding. In this case it is possible that the drop of blood was too small or the measured finding is outside the limits of the device, though it is often indicated by the gauge.

The findings received during instrumental examinations always must be related to the current status and symptoms of the patient. Their significance is due to the general approach that we should never try to influence or treat the received data but the patient as a whole and his parametres should be evaluated in a complex manner. Illustration: Blood sugar measuring device (Illustration 3/6).

Illustration 3/6 Blood sugar measuring devices

Continuous observation

After having performed the detailed secondary examination the patient's vital signs and respiration have to be kept under continuous observation and the patient must not be left alone for a longer period of time.

Naturally it is hard to judge when a re-evaluation of the patient's status is necessary. A summary can be found below which shows the factors that necessitate re-evaluation:

- the patient's consciousness changes
- the patient's respiration changes
- the patient's skin colour changes (mainly paleness, cyanosis)
- a new complaint or pain appears with the patient
- we would like to check the efficiency of the applied therapy with the patient
- a new circumstance rises (e.g. poisoning) that can cause further changes of status
- if we got a doubtful result during the completion of some examinational method (blunt abdominal trauma, somewhat harder abdomen)
- if giving first aid takes longer, helpers are or the ambulance is late

In case of unconscious patients it is fundamentally important to often check the patency of airways and breathing (every few minutes if there are no further changes).

Our job is somewhat easier in case of a conscious patient since his complaints and state of mind can be easily checked by verbal questions. In lack of the above factors we do not need to do re-evaluation but doing it afterall is naturally not a mistake.

During re-evaluation we apply the same techniques that were mentioned in the chapter about primary and detailed survey of status.

Transmission of the patient

The transmission of the patient to the health care staff is an important momentum since every piece of information that may influence the patient's further care has to be told to the care givers promptly and concisely. It is worth sharing the acquired knowledge with the emts according to the scheme below:

- greeting, introduction (potentially experiemce in first aid, health care profession highlighted)
- the patient's age, previous basic diseases
- the circumstances of the evolvement of the present disease or status
- the patient's status upon primary survey highlighting the main alterations during examination
- the applied interventions, therapy

Illustration 3/7 Patient transfer at an emergency ward

- if there was an intervention, its efficiency
- the patient's other changes in status (deviations noticed during re-evaluation) until the arrival of the ambulace
- answering the emt's questions (sometimes they can be asked during the presentation of the case)

After transmission it is purposeful to take notes of what happened and of the care given which can be done based on the accident report (Illustration 3/7).

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4. Asking for Help, Calling an Ambulance

by József Betlehem and József Marton-Szimora

The content of chapter

Communication has changed a great deal in our modern world by numerous modern computer science and communication technology devices helping our everday lives. We can hardly imagine our lives without them. The usage of appliances significantly increased the survival options of patients and the injured since asking for help properly can save lives. At the same time we must not forget about the fact that the system does not always work perfectly and the first aid provider is oftentimes left alone and may feel helpless together with the casualty. Consequently it is important to know that help can be asked for not only by mobile phone but by every possible means of communication. Moreover, the first aid provider himself might have no other choice but going to get help himself. Getting the patient or the injured to the location of preferably his final care in the fastest and most approriate way is a serious organizational question in which every participant is equally responsible, even if they do not meet the patient at all. The notion of the survival chain is used to demonstrate the patient's path where every participant struggles for the survival of the patient.

The survival chain

With his notification the first aid provider starts the cascade that puts a mechanism into action with several participants (ambulance, fire fighters, police, catastrophy defence etc.) In case there is a necessity for a life saving intervention it should be kept in mind that by interrupting the survival chain the chances of the patient's survival are significantly diminished. The elements of the survival chain are: early recognition, early call for an ambulance, early resuscitation, early defibrillation and early instrumental resuscitation. In the top part of the chain links on the illustration the activities are shown whereas in the bottom the purpose is given.[7] The attitude, the responses and the knowledge of the first aid provider contributes a great deal to the success of saving the one in trouble. The omission of any single chain link in the survival chain or its delay might cost the patient's life. Therefore calling for professional help (ambulance) properly and in time is very important. Illustration 1. The survival chain

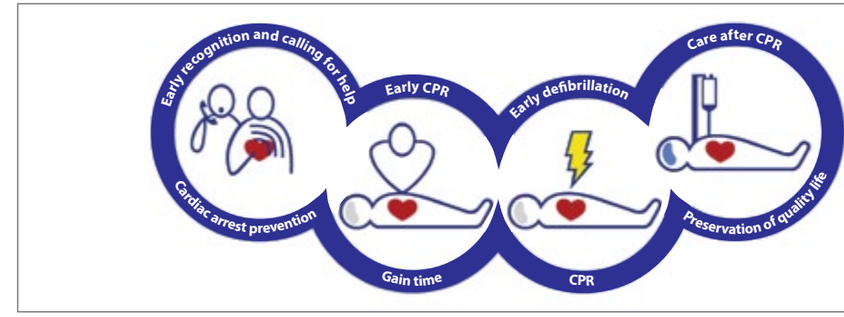


Illustration 4/1 The elements of the survival chain

The reason for asking help

In a given situation it must be decided whether help is really needed. It is not every case that requires health care professional help. It can be decided after getting thorough information on the spot if any health damage happened that justifies calling an ambulance or alerting the stand-by medical team. Question the patient in the way you have learnt from the chapter on the patient's examination. Maybe the patient's status does not justify calling for help but based on the circumstances you assume occurences that make you decide on asking for help. For example you find traces indicating poisoning or an accident. In some cases the one in trouble does not need a health care provider. Consider calling the family, acquaintances, friends, co-workers or other people based on the antecedents, the status of the patient and what he told you.

Shout for help. In case you decide that the one in trouble is in danger of life, lose no time and shout for help. This mainly plays a role in your not being alone on the spot but with a helper. In cases when you are not alone you do not need to shout. Even then get others who are present to get involved in the care of the patient.

Calling an ambulance. The ambulance should only be called when the caller already possesses the most basic information needed. This can be done after your own orientation (having promptly surveyed the environment and the status of the patient or the injured) or getting the needed data preferably directly from the person who has taken care of orientation but cannot go to call an ambulance. Direct and precise information is fundamental to report a case since infomation can very easily get distorted through several people and misleads the operator in judging the situation. In Hungary most of the health related rescue tasks are done by the Country-wise Ambulance Service (OMSZ) although other organizations can also collaborate in rescue jobs. They can do rescue jobs under the direction of OMSZ. The County-wise Ambulance Service (OMSZ) is available through the telephone number 104. There is also a general emergency telephone number (112) that rings at the stand-by duty police stations. If the distress call demands health care attendance the person on duty will immediately forward the call to the ambulance service. Distress calls are taken by the nearest ambulance station of the OMSZ that has a rescue operator and a qualified rescue team on duty. The caller is expected to give the most basic information but their work is also aided by a questioning scheme in order not to lose any fundamental information. The calls are digitally recorded so that they can be re-listened to later as well.

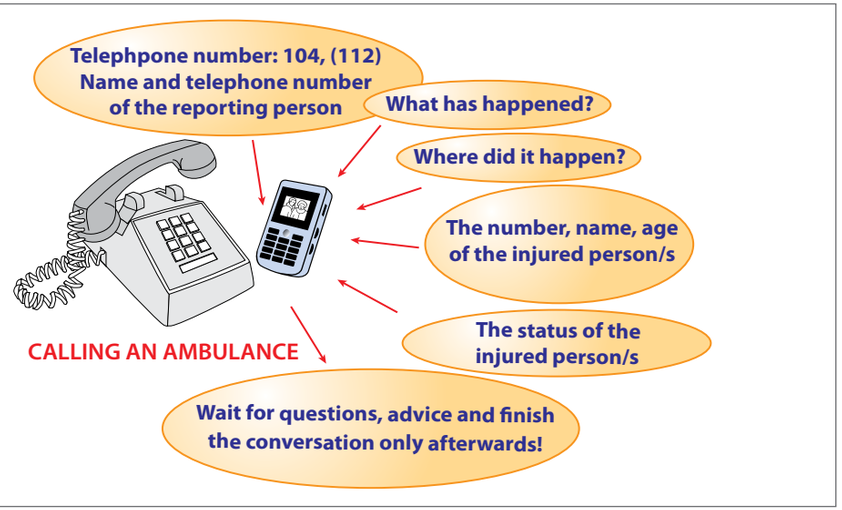
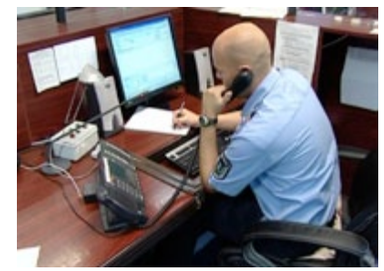


Illustration 4/2 The contextual elements of calling an ambulance



Identify yourself. Introduce yourself by your own name and give the telephone number of the phone you are calling from or where you can be reached later. This is not necessarily the same number.

Briefly tell them what happened. Do not go to the details of the events just name them. For example: two cars crashed, somebody fell down from a height, there was an explosion etc.

Give the number, sex and age of the injured (patients). Even if you do not know exactly give a probable estimate.

Tell them about the status of the injured (patients), what their injuries are like, what characterizes them. For example tell them if he is unconscious, if his breathing is normal, if he has any pain or bleeds etc.

Tell them also what kind of interventions have happened and who has done them. Give the exact location. Tell them if you think that there is further danger and call their attention to a potential demand for technical rescue if that is what you think.

If you do not say something important they will ask you about it. Remember not to hang up until they hang up.

(Illustration 2. The contextual elements of calling an ambulance); *4.1. sound file:* ambulance call – www.tamop.etk.pte.hu/elsosegelynyujtas/hangok

Illustration 4/3 Rescue management at a county ambulance station

The rescue operation management makes a decision about the deployment of the care units or the notification of the partner authorities, institutions or organizations based on the received information. In Hungary several types of different care units are known beginning from the rescue motor scooters all the way through to the units that are able to ensure specialized care e.g. ambulance car with operating facilities for newborns, rescue helicopters. The functioning of the Country-wise Ambulance Service (OMSZ) spreads over the whole area of the country which, unlike in a lot of European countries, ensures being identically equipped with resources and the interventions that can be profesionally expected from these units all over the country.

The most basic, also historically determinative ambulance units are:

- ambulance (emt and driver)
- prominent ambulance (further trained emt and driver)
- case ambulance (ambulance officer, emt and driver)
- ambulance car with operating facilities (oxyologist, emt and driver)

(Illustration Rescue units of the Hungarian National Ambulance Service i.e. OMSZ)

Illustration 4/4 Rescue units of the Hungarian National Ambulance Service

Salvage

The injured can often be found among circumstances where the dangerous environment itself can quickly worsen their status or it can mean further danger to him and/or the first aid providers. This situation often makes primary care impossible, too. In such cases mobilizing the injured i.e. transporting him to a safer environment might become necessary. Sometimes the strength of the first aid provider is enough but in certain cases more rescuers' joint activity e.g. with a jammed patient

Illustration 4/5 Rescue from a height

Illustration 4/6 Special rescue from a mountain

or the intervention of a technical rescue team can be necessitated e.g. lifting the cargo if the injured is seized under it.

Salvage must always be considered in case of presumed further dangers. Otherwise let us wait for the arrival of professional help. Unqualified salvage endangers the status of the injured and the rescuers' state of help. If it is impossible to salvage the injured relying on our own facilities let us try to protect the patient's integrity and ensure his comfort as best as we can with clothes, blankets etc. Talking to the injured or just keeping his mind busy by attracting his attention can have a calming effect on the one in trouble so he should never be left alone if possible (Illustration 5, 6).

Self-rescue

Upon the occasion of sudden health damages if the one in trouble does not lose his consciousness he himself can do a lot of things to turn things for the better but at least to delay the worsening of his status and to call for help. The most important thing to be done is to assess his state objectively among the given circumstances and to realize the potential further sources of danger. It is especially difficult when everybody wants to escape from the stressful siuation reflexively and initiates irresponsible actions that can potentially harm himself. If he is able to, he should try to cease the evoking causes with the available means with no delay. Pain is a defining factor in the intention of taking action but sometimes it has to be overcome to take steps. The stoppage of significant bleeding is possible and it is an important step that can be done with one's own clothes or even by putting one's hands onto his own wounds. Ensuring the immobility and comfort of the fractured bones can bring relief to the complaints. Escaping from a tight spot oftentimes cannot be imagined without external

help so the most important step is to attract attention if nobody is present near us. Any possible way of doing this is worth trying like crying out loud, making a noise, maybe using appliances like a lamp or the flashlights of the car etc. Remaining calm is important for the one who got in trouble and who might have to take action in a situation seemingly without a perspective.

Mass accidents, rating

It can happen that damaging events caused by the same reason generate health damages not just for one person but for more at the same time. Based on the definition of the Country-wise Ambulance Servive in Hungary damaging events that result in 5 or more injured people are classified as mass accidents. They require a different way of thinking. Finding 20 to 200 injured people at an accident location is considered mass disaster while an accident location with even more people involved is reckoned a catastrophe. On the other hand caring for two seriously injured people may engender strong worries for a first aid provider.

The basic principle of care is that it can be done by compromising, during which the injured have to be prioritised.

During rating the degree of health damage seriousness the experts label the injured with a colour code and a brief written description (usually with 'X'-es) so that they could be transported to a care facility faster. For labelling they use a so-called rating card.

Illustration Country-wise Ambulance Service rating card

At mass disaster locations it is to the purpose to be familiar with the above grouping categories since in case the first aid provider has to collaborate with the experts, then it is useful to be able to recognise the patients based on the colours and degrees. The first job of the primary care givers is to explore the damage location, to count the injured and evaluate the degree of their injuries, to clarify if there is anything that would obstruct special rescue and to forward the collected information as soon as possible. At the mass disaster location the health care damage location commander is responsible for health care but he does not participate in the effective health care of the patients but leads the sanitary operations of the location. His most important tasks are as listed below:

- assigning the place for the relocation of the injured
- organizing how to gather the injured
- organizing the rating and care
- keeping continuous contact with the rescue crew, institutions and partner organizations
- assigning a place where the dead can be gathered
- documentation
- organizing evacuation

Chart 3. Rating degrees, characteristics and their consequences in case of a mass damage location (Ahrweiler)

Rating Degrees	*Characteristics*	*Consequences*
I. (T1)	Acute, vital threat	Immediate care
II. (T2)	Seriously injured/patient	Postponed caring emergency rate
III. (T3)	Patients with light injuries	Later out-patient care
IV. (T4)	The ones with no chance for survival	Life maintaining treatment

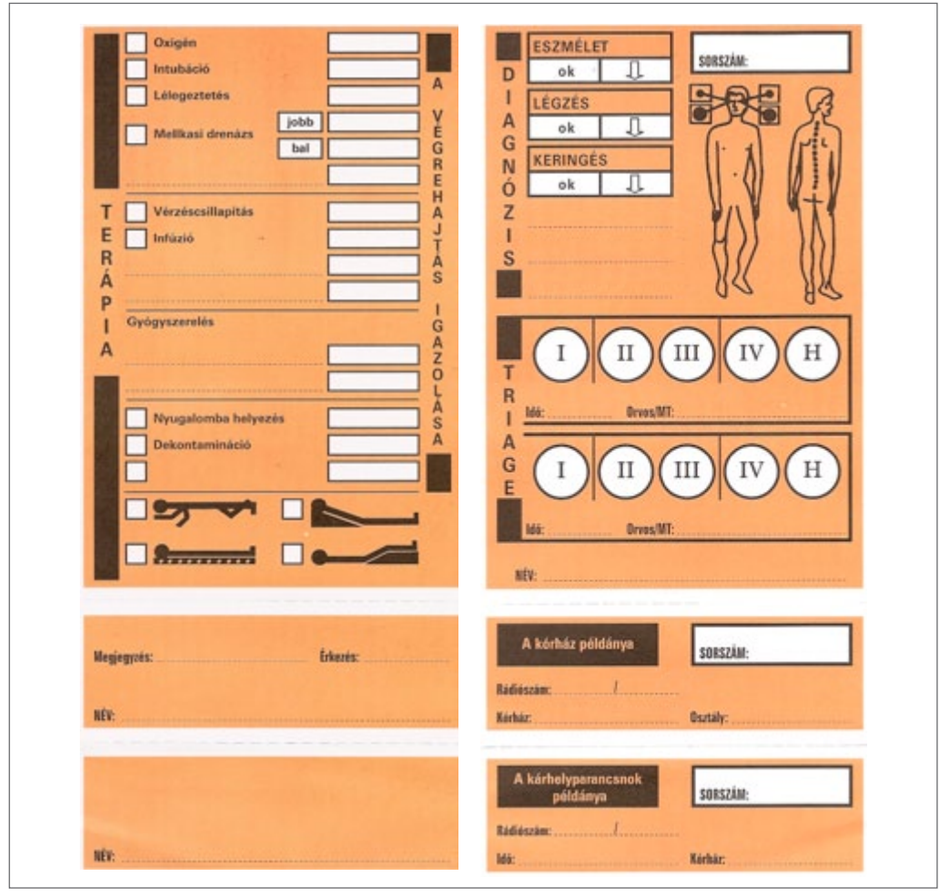


Illustration 4/7 (OMSZ) Rating card for the injured persons of mass accidents (Hungarian National Ambulance Service)

Illustration 4/8 First aid provision at the site of a mass accident

Based on the occurences that evoked the accident we can speak of a dynamic damage location or a static one. The reason for causing the accident is more or less constantly present at a dynamic accident location which continuously produces newer patients (e.g. epidemic). At the static damage locations a single damaging occurence happened so the majority of the injuries come to being in the first minutes (e.g. traffic accidents) (Illustration 4/8, 4/9, 4/10).

Illustration 4/9 A mass accident unit's tent for laying the injured persons down

Illustration 4/10 The coordinated work of the rescuers

Institutionalized care

After stabilizing the status of the injured the ambulance transports the patient to the most appropriate emergency care unit, to an emergency ward or to an emergency centre. Unfortunately the emergency care organizational units have not yet been established in a unified way in the whole country so sometimes the patient is purposefully transported directly to the proper hospital ward where he can be taken care of.

Most smaller health care institutions are equipped with an emergency care providing place where a room for taking emergency patients and the most basic conditions for his necessary care

Illustration 4/11 The entrance of the emergency care unit

are provided. Emergency wards are specifically organized to suit their purpose and their professional and objective conditions are given in a larger range. Other than the wider diagnostic options, patients can also be laid down there, intensive care is ensured and emergency specialists are on duty round the clock to be up and doing. Either after the final care of the patient or after eliminating danger to his life he is relocated to the proper hospital ward according to his injuries or disease. In the emergency centres care is specialised at several areas e.g. thoracic surgery, neurosurgery, haemodynamic laboratory, perinatal intensive centre (Illustration 4/11).

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5. Basic Life Functions and their Physiological Basis

by András Oláh and Nikolett Gál

The content of chapter

In the human body there are physiological processes happening that maintain the inner functioning balance (homeostasis) so that the body is able to adapt to the changes of the internal and external environment. From the point of view of the basic life functions the most determining physiological processes are breathing and circulation.

Breathing

Breathing means taking oxygen (O_2) in and giving carbon dioxide (CO_2) off. Physiologically an average adult takes in 250 mls of oxygen in a rest position and composes 200 mls of carbon dioxide a minute. A breathing cycle consists of a breathing in and a breathing out phase. During a breathing cycle 500 mls of air flow into and out of the lungs. In a rest position the number of breaths is 14–16. The product of the latter two gives the respirational minute output which consequently comes to 7–8 l/min as an average.

Upon breathing in, the thoracic cavity expands in all 3 directions of space due to the active functioning of the muscles so the pressure measured inside of it decreases below the atmospheric pressure and the air flows into the lungs. During breathing out in a rest position the air streams out of the lungs due to the relaxation of the muscles. The lungs follow the movements of the chest by the transmission of the pleura which consists of two discs, the ecternal disc attached to the thoracic wall (pleura parietal) and the inner disc adhered to the surface of the lungs (pleura visceral). A thin layer of fluid can be found between the two pleura discs. In the wall of the alveoli surfactant is produced, a reduced amount of which can cause the alveoli to collapse. During the flow of air through the airways the inhaled air is warmed up, cleaned and made wet.

The exchange of air between the external air and the alveoli of the lungs and the exchange of gas between the alveoli of the lungs and the blood is called external breathing. The exchange of gas between the blood and the cells and cellular breathing is considered internal breathing. The exchange of gas occurs by diffusion which is based on the partial differences of the gas pressure. The transportation of gases can happen through their being dissolved in the blood plasma or in the form of being bonded to haemoglobin. It can also be found in the form of carbon dioxide bicarbonate in the blood plasma.

The regulation of breathing means the regulation of ventilation. The most dominant stimulus of the respiration centre, located in the myelencephalon, is the CO_2 level of the blood. The H^+ ion, which is formed from carbon dioxide and its decomposition, increases respiration. The peripheral receptors, that can be found in the main cervical pulse (carotid gland) and sense the partial pressure of the oxygen being dissolved in the bood plasma, also take part in the regulation of respiration.

Heart functioning

Four cavities can be found in the heart, two atrials and two chambers i.e. ventricles, the total weight of which is almost 300 gramms in an adult who is not involved in regular physical fitness activities. The wall of the heart is made up of three layers, out of which the pericardium is located outside. It has two discs, the external and internal serous membranes, with a few drops of fluid in between them that ensure friction free motions. The median layer is the heart muscle i.e. the myocardium which is built up of heart muscle cells. The inner layer is the endocardium. Rhythmicalitycharacterizes the heart functioning i.e. the single heart cycles follow one another approximately within identical time intervals. Heart functioning is also characterized by automation i.e. the heart is capable of independent functioning even if the nerves leading to it are cut through. The cells of the heart muscle contract and relax upon stimuli of appropriate force. The smallest stimulus that evokes the contraction of the heart is called threshold stimulus, as a response to which the whole of the heart muscle contracts (all-or-none law). In an absolute refractor period, which is about 200 ms long, the heart muscle cells cannot be stimulated. The heart muscle cells cannot be tetanized due to their relatively long absolute refractor period. The heart's own blood supply is supplied by the coronary vessels which start from the intial section of the aorta and run around to the right and to the left in the height of the pocket valves. The coronary vessel on the right side goes to the right in the sulcus coronarius and then continues downwards to the heart apex on the posterior wall in the pit between the ventricles. The left coronary vessel divides into two parts after a short, 1-cm-long run and goes to the left as ramus circumflexus, whereas the descending branch (ramus descendent anterior) goes downwards to the heart apex in the anterior pit between the ventricles.

The heart has its own excitation producing system. A primal excitation place is the sinus node which can be found in the wall of the right atrial and it produces excitation with a 70±10/min frequency. This.rhythm is called sinus rhythm (SR). The secondary excitation place is atrioventricular node which produces excitation with a 50/min frequency. This is called nodal rhythm. The tertiary excitation place is the His's bundle which produces excitation with a 30/min frequency, it is called the idioventricular rhythm. Physiologically the secondary and tertiary excitation places produce excitation only if the excitation place superior to them is omitted. The excitation that came into being in the sinus node is led by the specific conduction system of the heart and by the membrane of the heart muscle cells. From the sinus node the excitation gets to the atrioventricular node by the three bundles that can be found in the wall of the atrials (internodal tract anteror/medial/posterior). From the atrioventricular node the excitation spreads to the bundle of His, then to the Tawara stalks and finally to the Purkinje fibres and then to the heart muscle cells.

The amount of blood thrusted by the ventricles during each contraction (systole) is called stroke volume. In case of a not trained adult it comes to 80 mls. The amount of blood pumped by one ventricle in one minute is called cardiac minute output or minute volume. The cardiac minute output is the product of the stroke volume and the pulse number. In case of a healthy adult the cardiac minute output is 5 – 6 l/min.

Circulation

The blood flow in the vessels. The blood flow is determined by the perfusion pressure (the difference in pressure measured at the two ends of a given part of a vessel), the preipheral resistance and the amount of blood flowing through the vessel. The degree of peripheral resistance is mainly influenced by the characteristics of the vascular wall and the viscosity of blood.

Bood pressure. The pressure exposed to the flexible vascular wall by the blood flow is called blood pressure. The blood pressure rate changes during the heart cycle i.e. during the systole and dyastole, it varies at different parts of the circulatory system, it shows fluctuation according to the different times of the day and can be influenced by several other factors.

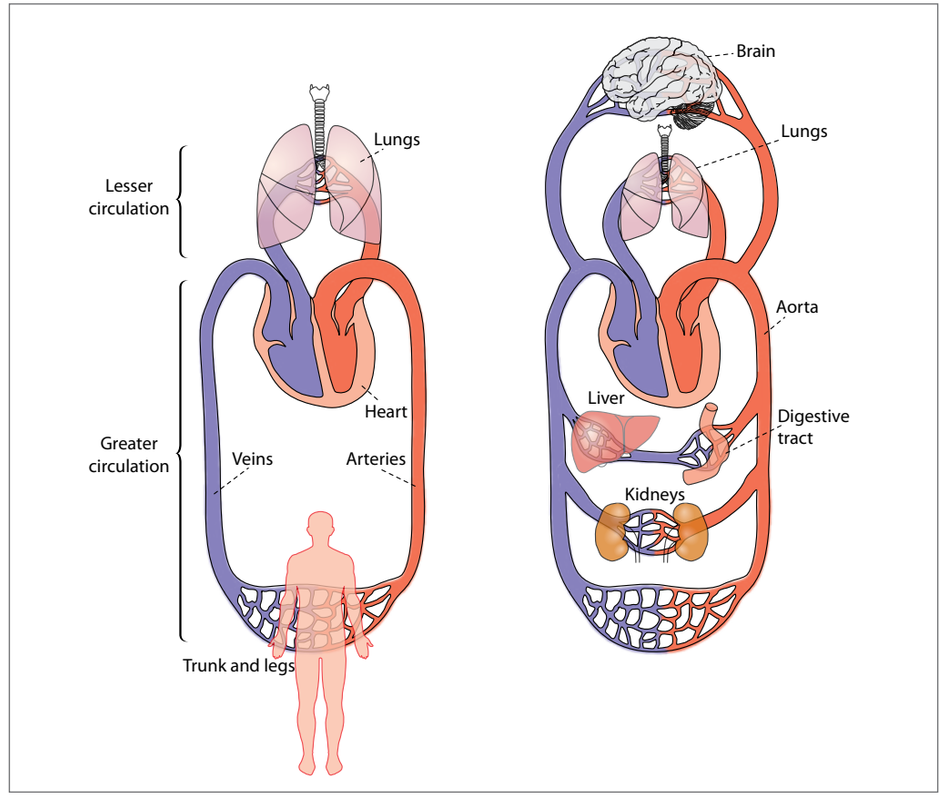

Illustration 5/1 The lesser and greater circulation in the human body

The blood pressure reaches its highest degree upon the contraction of the left ventricle that we call systolic blood pressure and physiologically it measures 120±20 Hgmms. Then the lowest degree is reached upon the relaxation of the ventricle, which is called dyastolic blood pressure and physiologically it measures 80±10 Hgmms. The difference between the systolic and dyastolic blood pressure finding is called pulse pressure.

Blood pressure influencing factors. When the blood pressure rate sinks below the phyiological level we speak of hypotonia whereas when it raises above it, we call it hypertonia. Blood pressure is defined by the amount of the blood flow and the peripheral resistance and it is influenced by numerous factors like age, muscular work, position of the body, pregnancy, sleeping, gender and emotions. From birth to adolescence blood pressure rises and then it is set in at the physiological rate of 120/80 Hgmms. During muscular work the systolic degree can reach 200 Hgmms while the dyastolic blood pressure rate physiologically must not raise over 100 Hgmms even while muscular work is being done. Based on the position of the body, while there is a movement from a lying position to a standing one, the blood pressure increases by 10 -15 Hgmms physiologically. Blood pressure may rise a little during pregnancy. The blood pressure alteration during sleep are in accordance with the periods of sleeping i.e. during a slow wave SWS-sleep it decreases, while upon the influence of the dreams that appear in the rapid eye movement phase, it increases. Until menopause women's blood pressure might be 10 Hgmms lower than that of men. An individual's emotional state may affect his blood pressure a great deal e.g. blood pressure is significantly higher in a stressful situation. Since blood pressure is partly influenced by the peripheral resistance and partly by the amount of the blood flow, that is why the neural, reflective and humoral regulation appear as significant factors in the regulation of blood pressure.

Pulse. The pressure and volume changes that emerge at a given point of the arteries is called pulse. The thrust wave running through the arterial section is called pulse wave, the speed of which depends on the tightness and flexibility of the vascular walls.

Lesser circulation. Lesser circulation is characterized by low perfusional pressure. Its main physiological function is to ensure gas exchange. The capillary pressure is physiologically smaller in the lesser circulation than the colloid osmotic pressure of the plasma proteins. That is why there is no filtration towards the direction of the alveoli of the lungs, thus there is no interstitial fluid between the alveoli and the capillary wall. The development of interstitial fluid is the result of a pathological process when due to the pressure increase in the lesser circulation, filtration begins towards the direction of the alveoluses and oedema of the lungs may develop which obstructs gas exchange.

Organ circulation. The functioning of the different organs changes continuously. Parallel to this their metabolism processes alter as well which results in the change of the blood flow amount. The

distribution of blood among the different organs in the body changes accordingly. This blood distribution in the body, that changes in space and time, is called the re-distribution of circulation. The blood flow of our organs participate in this re-distributional process in a varying degree. The blood flow of some organs, like that of the brain and the heart do not participate at all in re-distribution, whereas the blood flow of the intestines (viscera) and the skin take a significant part in it. Striated musculature is a determining factor in re-distribution.

The regulation of circulation. In terms of the regulation of circulation we differentiate between short term and long term regulation while according to its mechanism we distinguish between neural, humoral and local regulation. Neural mechanisms take part in the short term regulation which is mainly manifested in changing the resistance, whereas hormonal factors participate in the long term regulation, which appears in the change of volume.

The neural regulation of vessels. Sympathetical and parasympathetical efferent fibres take part in the neural regulation of vessels. Due to being effected by sympathetical efferents, vasoconstriction evolves, with the exception of coronary vessels and the vessels of striated muscles, which are smaller in diameter, where vasodilation is developed, which results in increased blood pressure. The sympathetic innervation of the pre-capillary resistance is the most significant. Upon the increase of the sympathetic tone, which exists in rest too, under the effect of norepinephrine, vasoconstriction evolves through the α_1 receptors. Vasodilation accompanied by decresed blood pressure may develop in the vessels in case of the blockage of the sympathetic tone. Under the influence of the parasympathetical efferent fibres, which can be found primarily in the vessels of the salivary glands, vasodilation is developed. In the vasodilator parasympathetical fibres nitrogen monoxide and vasoactive intestinal peptid may also be released as co-transmitters, which also have a vasodilatory effect, which effect is mainly featured in the vessels of the stomach and intestinal tracts and the vessels of the sexual organs. Under the effect of NO, vasodilation is also developed in the cerebral vessels.
Illustration 1. The lesser and greater circulation in the human body

The temperature of the human body

Regarding the physiological functions, it is necessary to maintain an approximately permanent temperature in the human body. Body temperature varies between 36.5 °C and 37.2 °C during the day. The lowest temperature is measured in the morning hours (6 a.m.) and the highest is in the evening (6 p.m.).

The deviation of body temperature from the normal range is usually a pathological sign either in case of decrease or increase.

Chart 1. The degrees of the basic life functions' parametres

Pararmeter	*Degree (adult)*		
	normal	*tolerable*	*intolerable*
Breathing	14-16/min	25-40/min 10-15/min	> 40/min < 10/min
Pulse	70-80/min	100-150/min 40-60/min	> 150/min < 40/min
Blood pressure	120/80 Hgmm	120-250/80-110 Hgmm 60-80/55-60 Hgmm	> 250/110 Hgmm < 60/55 Hgmm
Body temperature	36,5-37,2 C°	38-40 C° 32-36 C°	> 40 C° < 32 C°

If the body temperature exceeds the normal range we speak of a raised temperature first and over 38 °C, a fever. Fever can be caused by several factors e.g. infections, autoimmune diseases, malignant processes etc. From the point of view of assessing fever as a symptom, it can be important when it occurs, how long it lasts and how high it elevates.

We can measure body temperature at various places (armpit, mouth, anus, ears, skin).

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6. Immediate Interventions Supporting Life Functions with or without Appliances (BLS)

by József Betlehem and József Marton-Simora

The content of chapter

Sudden circulation stoppage, the process of death

Basic life functions

Basic life functions (circulation, breathing) are inseparable parts of the existence and functioning of the human body. If we examine the origins of human life in the dimension of time, it can be stated that existence can have several reference points e.g. conception or birth to a human being's independent life in the physical reality. During birth the human organism adapts to the extrnal environment within a short time (1–2 minutes) upon which process circulation and breathing fulfills the function that subsequently becomes a determining basis for all of our body functions. If this adaptation does not happen without problems following birth, then external help might be needed. It is not only our being born but also our death that constitutes our life. About 150 000 people die on earth on a daily basis, due to some kind of reason.

During our lifetime the basic life functions are subjected to numerous influences, both from our inner environment (physiological effects) and our outer environment (environmental risk factors, physical, biological, chemical reasons). The external and internal influences often have the ability to cause harm in the systems that take part in the complicated realization and regulation of circulation and breathing. If some damaging effect is present excessively it can lead to functional disorders or eventually to the deficiency of circulation or breathing. There are influences that come into being suddenly and may lead to the immediate stoppage of one of the basic life functions. The cessation of circulation and/or breathing in the body starts serious functional disorders, the damages of organs, tissues and cells. In this case the heart can neither ensure the continuous oxygen and nutritive supply of the cells nor the delivery of the accumulated metabolites.

Anoxemia in the body

The body is able to endure temporary relative shortage of oxygen (hypoxial state) without irreversible cellular damages for a few minutes but subsequently irreversible damages occur in some of the organs in case of a longer lasting lack of oxygen. Certain tissues and cells of the human body possess a varying degree of oxygen shortage tolerance so the damages also appear in different rates. Our most sensitive cells that are incapable of regeneration are the neurons, consequently the cerebral tissue is the one that can sustain its life without oxygen and nutrients (glucose) for the shortest time (4–5 minutes) at regular temperature. Compared to this, the other cells are able to compensate relatively for a longer period of time but this can only mean a limited number of extra minutes, maximum 30 mins (heart, lungs, kidney, liver etc.) (Chart 1.).

Chart 1. The disribution of gases relevant to the body

Gas	*In atmospheric air (%)*	*In the alveoluses of the lungs (%)*	*In arterial blood (%)*	*In venous blood (%)*
Oxygen	21	13,5	12,5	5,3
Nitrogen	78%	76,2	76,2	76,2
Carbon dioxide	0,04	5,3	5,3	6,1
Water vapor	0,7	6,3		

Brain death

The distinguished role of the brain is more and more often spoken about these days. This is important because we know that the brain is capable of functioning without oxygen for the shortest possible time and this is the place where irreversible damages develop fastest if the oxygenization of the brain does not happen in time. **Brain death** is the complete and irreversible cease of the functioning of the brain including the brain stem as well. The occurence of brain death can never be stated among environments on the spot in case someone has maintained circulation and breathing but does not show any sort of responses. The cessation of cerebral functions in case of patients who are in a long term coma can be determined exclusively within institutionalized circumstances under legally regulated conditions. (Illustration 1. The life and death process from a biomedical point of view).

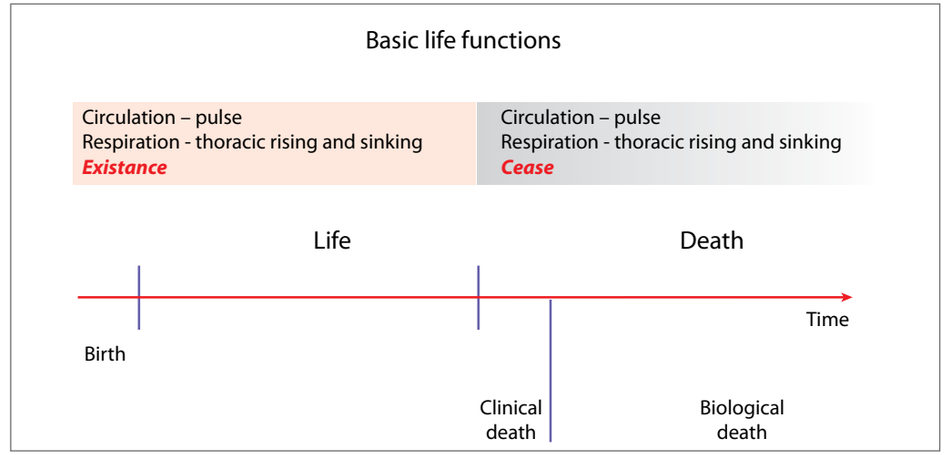


Illustration 6/1 The life and death process from a biomedical point of view

Clinical death

Based on all of this, it is understandable that it was necessary to denote a state of being beginning from which on someone can be considered dead. In case of death we also speak of a process where the distinguished starting point of time is connected to the perceptible cease of circulation and breathing. If we consider the physiological events occuring in time as a basic factor, we speak of ***clinical death*** when no circulation and breathing can be found upon the examination of the patient or we perceive the temporary cessation of the functioning of the brain which does not mean the occurence of death or brain death. In cases like this we can reasonably hope that the patient's life functions can still be restored i.e. starting resuscitation with no delay may hold out a favourable outcome. This can mainly be done by people who are near the patient, independently of their being non-professionals or experts. It is exclusively beginning resuscitation as soon as possible that can ensure the avoidance of long-lasting damages subsequent to the successful resuscitation from a durable oxygen lacking state. The more the substitution of circulation and breathing is delayed, the more the degree of irreversible cellular damage increases, which undermines the justification of resuscitation.

In certain situations the human body is capable of regenerating without significant neurological damages even after a longer period of time. Based on the most outstanding professionally proved cases, successful resuscitation can be expected even over an hour-long delay after being cooled down to a -20 °C body temperature.

Biological death

We speak of **biological death** in case of cellular death that spread over the whole body. In this case neither the basic life functions nor the other physiological functions of the body can be restored. According to the Hungarian laws death can be identified when the irreversible disintegration of the body begins, due to the complete cessation of breathing, circulation and brain functions.

The term biological death is used when the basic life phenomena cease to exist and there is no biologically determined hope to restore them. It is not always obvious but in many cases it has unambiguous signs. The unambiguous signs of biological death are as follow:

- ***Paleness of the body*** (pallor mortis) begins to develop on the body within 15 – 20 minutes under the effect of the gravitational force, as a result of which the skin and the mucous membranes become pale.
- ***Postmortem lividity*** (livor mortis) appear. The postmortem lividity appearing in case of death are of imbibitional nature, while sinking postmortem lividity may also develop on a living patient.
- ***Cadaveric rigidity*** (rigor mortis) It develops gradually in all the muscular tissues of the body. It begins within 30 minutes in the heart muscle whereas it starts within 2–4 hours in the skeletal muscles where it develops fully in 5–8 hours and then it resolves within 24–48 hours.

- The ***cooling down of the body*** (algor mortis) to the temperature of the environment always depends on the weather and environmental conditions.
- ***Putrefaction*** (putrefactio), ***autodigestion*** (autolysis) begins under the effect of the bacteria that can be found in the environment.
- ***Mummification*** (mumificatio) develops in case of extremely dry environment by ***exsiccation*** (exsicatio).
- ***Injuries incompatible to life*** often happen as a consequence of serious accidents (e.g. head separated from the body).

From the point of view of the functioning of the body, in case of non-professionals, their most important task has been defined as to recognize the threatening stoppage of circulation and/or breathing or the recognition of the patient's already developed circulatory or respiratory deficiencies during the assessment of the patient's primary status.

Patient in a critical state

Judging from certain signs we can draw the conclusion in case of a patient in a critical state that he may die within a short period of time. The following warning signs of clinical death are as listed below:

- Prolapse
- Worsening of breathing, change in the type of breathing
- Increased sweating, the skin quickly becoming pale, grey, cyanotic and suddenly cool
- Weakening of the pulse, its becoming irregular and hardly palpable
- Suddenly occurening chest pain or headache
- Convulsive attacks appear on the whole body
- The patient complains about fear of death

On the spot activities to support basic life functions

Basic life support (BLS), resuscitation

Basic Life Support (hereafter as BLS) includes things that are necessary to be done in case of unconsciousness or suddenly occuring death so that there is a higher chance for saving the patient or the injured until the arrival of professional help (ambulance). In Hungary BLS is called basic resuscitation (without appliances), though this term does not only involve the tasks related to resuscitation.

Basic resuscitation (BLS) is done mostly without appliances and it is taught to non-professionals. On the other hand it has to be noted that a professional 'in plain clothes' without appliances can begin resuscitation also with this method. Consequently it is crucial for both non-professionals and professionals to be aware of this method and to be able to realize it as an aquired skill. Advanced Life Support (ALS) can be manifested with appliances (medicine, defibrillator, E.C.G. monitor, airway ensuring appliances) that are also done by professionals e.g. the ambulance staff. The artificial substitution and restoration of suddenly occuring ceased life phenomena are part of both basic and advanced resuscitation (ALS).

Resuscitation in Hungary is taught and done according to the prevailing recommendations of the European Resuscitation Council (ERC) and the Hungarian Resuscitation Society Company (MRT).

The process of BLS in case of adults

BLS can be applied to anyone of any age in trouble although there are age related differences concerning the various steps of the process. First the adult algorhytm is reviewed and then the method for children and newborn babies will be discussed.

Security. Before you would do anything, make sure that you yourself are not in danger. Do not enter any location which is obviously dangerous! If you are not sure about your security be circumspect! In case you are in danger afterall, leave the spot immediately and request help. A separate chapter deals with the dangers of locations.

Making contact. If you are safe step to the one in trouble and make sure that he can be contacted. Address him loudly by saying 'Good morning. What has happened? What is the matter? Can you hear me?' If you know the person address him by his name. Simultaneously with the greeting, carefully but decisively grip both of his shoulders and shake them. Do not lift the one in trouble from the ground and spare his neck and head while shaking his shoulders. In a certain sense any movement or sound given by the injured can be considered a response. However his life can still be endangered even if he responds. Consequently take a sensible verbal answer as a response. Do not take

Illustration 6/2 Contacting the patient

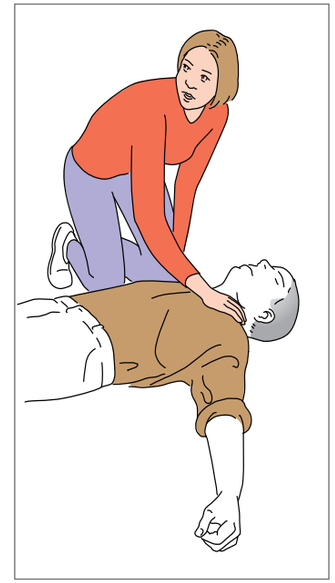


Illustration 6/3 Shouting for help

it as a response if the one in trouble groans, gives confused or incomprehensible answers, jerks or is seized with cramps. (Illustration 2. Contacting the patient)

If you get a sensible verbal response try to question the patient. Proceed as you read it in the chapter about patients' examinations. If there is no response shout for help. (Illustration 3. Shouting for help)

Shout for help. If the patient does not respond to the attempt of being contacted, yell for help. Yell even if you do not know where you can expect help from for example if you are in a room, basement or an empty corridor. **SHOUT!** The role of yelling is to attract attention to trouble. With this you can get help. If you are not alone you naturally do not need to yell but make the people present know that they will be needed. It is recommended to select a specific person from the crowd and ask him to stay near you. Remember that you cannot save the patient alone!

Clearing airways. If an airway obstruction is suspected look into the patient's mouth. An airway obstruction can be suspected if something is flowing from the patient's mouth, if he got sick while eating, if he was saved from water or if drowning preceeded prolapse. If you find some foreign-body, you should put your bare hand into the patient's mouth only in case you are sure that you can remove it. If you think you can remove the foreign-body with bare hands, you can put your hand into the patient's mouth.

With the exception of the above mentioned cases you do not need to routinely look into an adult's mouth.

The most common airway obstruction is the patient's own tongue. The muscles of an unconscious patient are relaxed and atonic. This is the reason why the tongue freely slips back, towards the pharyngeal wall and creates an airway obstruction. This can be eliminated with a simple movement, by reclining the skull. Recline the patient's head back carefully. This movement happens with both hands. One of your hands is on the patient's chin, the other one is on his forehead. Be careful not to press his neck. (Illustratino 4. Head tilt / chin lift method to free the airways) In many cases this single movement saves lives since if the tongue has blocked the way of the air, then by tilting the head, this health status is stopped and the airways become free.

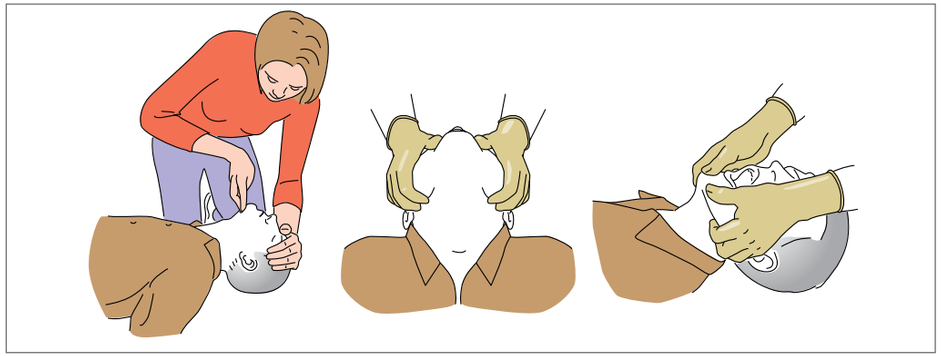
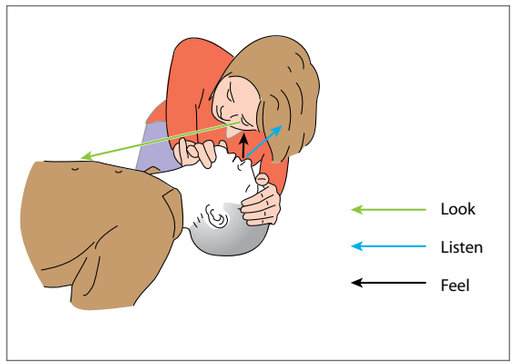


Illustration 6/4 Head tilit / chin lift method to free the airways

The examination of breathing. During the examination of breathing hold the skull in the above described reclined position. The examination of breathing happens with the so-called triple perception for 10 seconds. Bend your head to the patient's face and watch if you hear any breathing. In the meantime notice whether you can sense the air exhaled by the patient on the skin of your face and also observe the movements of the patient's chest. LOOK, LISTEN and FEEL. (Illustration 5. The examination of breathing.) *6.1. video:* Observing vital signs – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Vitalis_parameterek_eszlelese_eng.wmv

The question is whether there is normal breathing. We consider breathing to be normal if there are at least two inbreaths within 10 seconds that are accompanied by chest amplitude, are not forced and no pathological sound is formed (e.g. hissing).



Illlustration 6/5 The examination of breathing

Illustration 6/6 Only trained professionals are allowed to carry out the simultaneous examination of circulation and respiration

A professional should also examine central circulation simultaneously with the examination of breathing. A non-professional helper does not have to examine circulation. Consequently in deciding whether a person is alive or dead, the examination of breathing has to be relied on. Not having to examine circulation has several reasons; in case of adults respiration stoppage is the consequence of circulation standstill in the majority of cases. That is to say that if someone has no respiration, he has no circulation either. It is also worth noting that a non-professional (and part of the medical professionals who do not work at emergency facilities also belong here) examines circulation with great uncertainty. Thus valuable seconds can be lost that can influence the patient's further process in a negative way.

Task if there is normal breathing: ensuring free airways. Even if you assess the patient's breathing as normal, it does not mean that everything is all right since he did not respond to the attempt of being contacted. In this case the patient's status is called unconsciousness i.e. he has respiration (and consequently circulation, too) but he does not respond to the stimuli coming from his environment. Uncountable diseases or states can be the reason for this but it is not the first aid provider's job to find the causes.

If you found normal breathing based on the description above your most important job will be to continuously ensure free airways for the patient. The breathing of the patient can be endangered if the free flow of air is not guaranteed between the outer world and the lungs. Consequently the most important task is the assurance of free airways in case of unconsciousness. Several methods are known to implement this. If it is not contraindicated then lay the patient on his side stably. A separate chapter is about unconsciousness and ensuring free airways.

After having assured free airways call an ambulance if it has not happened yet. Stay near the patient and keep observing his breathing. If some change occurs in the patient's status, then proceed accordingly.

Calling an ambulance. If the patient has no normal breathing it means that he is dead. If the coming about of biological death is not obvious, the patient must be resuscitated. The role of the non-professional level resuscitation is to be a bridging solution until the arrival of the ambulance. The patient is very likely to need a defibrillator but one of the prerequisites of successful defibrillation (electrical restart of the heart) is that it should happen as soon as possible and that the most important organs should be oxygenized. Consequently, when we know that the person in question is in need of resuscitation we must not be late starting it and beginning defibrillation as well. You can start resuscitation but you have no defibrillator. That is why calling an ambulance has to be done at this point. If you are not alone, then the person who came to help you, should be the one to call the ambulance. By all means ask him to say on the telephone that the ambulance is requested for a resuscitation attempt.. If you are alone you should call the ambulance. If you have no mobile phone, leave the patient alone and find an option for making a phone call, a phone booth, a house, a car etc.

If you presume that there is an automatic external defibrillator (AED) on the spot (e.g. at a shopping centre or airport) that can be used by a non-professional, ask your helper to fetch it. A separate chapter will deal with AED in details.

If death is of respiratory origin (e.g. a person saved from water, a case of aspiration) and you are alone on the spot then call the ambulance only after a 1-minute-long.period of resiscitation.

Chest compression. After you had found out that there was no normal breathing and an ambulance was called resuscitation needs to be started. The sooner we begin this, the better the chance is, that the body's own oxygen supply is appropriate which is indispensable for a successful defibrillation.

The patient should be lying on a solid foundation! If it is not that way then try to lay him on solid ground. Position yourself next to the patient in a way that allows you free access to his chest and his face from the same posture so that you do not have to change position.

Put your hands on top of one another in the middle of the patient's chest above the bottom third of the breastbone. Be watchful of having your hands over one another as much as possible. Resuscitation can be more efficient this way because the exposed strength does not spread at too large of an area. Be careful of not putting your hands too deep on the chest since you might break the cartilaginous part of the sternum, the xiphoid process, and/or the compression will not be effective. (Illustration 6. Chest compression during BLS)

The arms should be straight during compression, do not bend your elbows. Try to press the chest with the mass of your upper body, do not work from the upper arm. Your body should be moving back and forth starting from the waist.

Press the chest in a 4-5 cm-depth 30 times after one another. It is important that every compression should be of the same depth. After each compression release the chest completely. This ensures that blood is not just thrusted from the heart but it can get saturated from the direction of the great veins, too. The time rate of the compressions and decompressions should be 1:1. The frequency of the chest compressions is 100/minute. This means that the time frame for the 30 compressions is about 20 – 25 seconds.

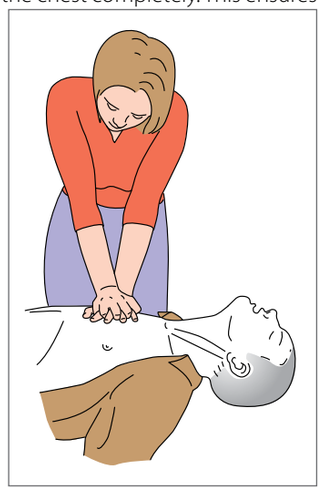


Illustration 6/7 Chest compressions on an adult

Ventilation. After the 30 chest compressions have been administered, air must be blown into the mouth or the nose of the adult patient. The air you blow out contains enough oxygen to ventilate with it (its oxygen content is 16%.). You can

decide where to blow the air. Pay attention to hold the patient's mouth shut if you blow into his nose and hold his nose if you blow into his mouth. The skull should be reclined while you are blowing into the mouth or the nose. Your mouth has to be completely air tight with the mouth or the nose of the patient to make the ventilation effective. One ventilation should last 1 second. For an adult an average of 500–800 mls of air has to be blown in during one blow which comes to 7-8 millilitres for each body mass kilogram. This corresponds to a normal breathing amount of air. If you blow in too much air and/or blow it in too fast, the air gets into the oesophagus instead of the trachea and consequently the stomach gets puffed. Thus there will be no proper gas exchange on one hand and there is the danger on the other hand that the gastric contents refluxing to the pharynx through the oesophagus and as a result of your in-blows they get to the airways.

It is important that after ventilation you turn your head sideways towards the patient's chest and observe his exhalations exactly as you were doing it when you examined his breathing. This way you will feel the expired air the air and you will see the sinking of the chest. From these signs you will know if the ventilation was effective i.e. you blew in the approriate way to the proper place.

If you cannot ventilate then look into the patient's mouth. If you see an object there (a foreign-body) that you think you can remove with bare hands (e.g. slipped off false teeth, piece of food) then try to take it out and then, if it is still necessary, keep on ventilating. If you do not think you can take the foreign-body out or you do not see anything in the patient's mouth, then do not put your hand in there. Maybe reclining the head was not correct. After five unsuccessful attempts do not experiment any longer but do the chest compression continuously.

You can also decide on not ventilating the patient at all. For example because you are afraid of infections or you do not find it hygienic or for some other reason you are incapable of doing it. In

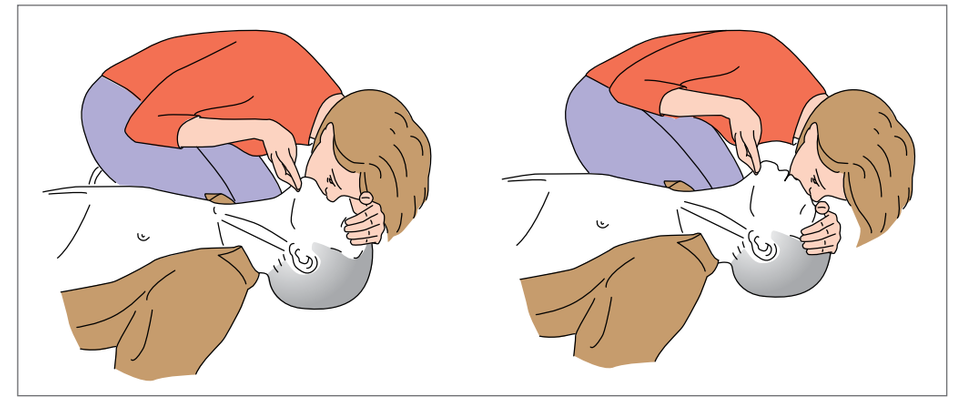


Illustration 6/8 Ventilation during BLS on an adult (into the mouth or the nose)

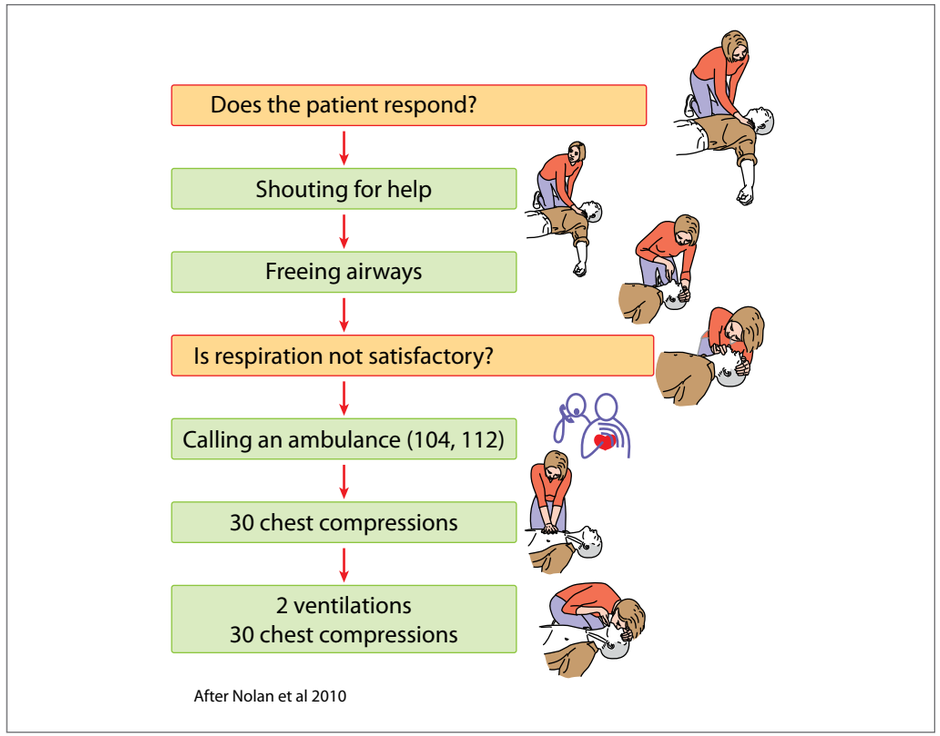


Illustration 6/9 The process of basic level adult resuscitation based on ERC

this case compress the chest continually with 100/minute frequency. Illustration 9. Ventilation during BLS; Illustration 10. The process of basic level resuscitation for adults. *6.2. video:* Adult Basic Life Support – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Felnott_alapszintu_ujraelesztes_eng.wmv

Cardiopulmonary resuscitation (CPR)

The most important steps of resuscitation are also called cardiopulmonary reanimation since the substitution of respiration and circulation happens with the help of these two organs. The main purpose of CPR is to reverse circulation and breathing in a way which is close to the physiological manner after a cardiac arrest. Obviously this can never succeed as perfectly as it is done by the body itself. However this is still the best method according to our present knowledge. During a

Illustration 6/10 Complex resuscitation in real life

properly implemented chest compression blood pressure remains low and the heart's own blood supply is not going to be perfect but it can remain sufficient enough to delay cellular damage within the process of death or it might be able to reverse the death process.

In the last few years continuous research was being done about how to increase the efficiency of reanimation taking the body's physiological and pathological processes into consideration. The newest and most crucial statement of this research is that the continuity of chest compression must be ensured as much as possible. (According to certain theories continuous chest compression (CCC) would exclusively be sufficient in the first minutes of resuscitation but the ERC did not yet introduce the general justification of this concept in 2010.

Children's BLS

BLS itself means the same in childhood as in adulthood i.e. it is basic life saving without appliances. In a narrower sense we mean children's resuscitation by it but in fact, the care of unconscious children and the removal of childhood foreign-body airway obstruction also belong here. The process of BLS applied in childhood differs from that of in adulthood. However, if you are not certain about how to use the childhood protocol then use the adult algorhytm.

Who do we consider a child? It is unambiguous in most cases who to consider a child or an adult. The rule is rather simple: consider a patient a child if he has not yet reached adolescence in your opininon.

A The peculiarities of children's BLS

Main differences compared to the adult BLS algorhytm. The differences can basically be categorized into two groups. The deviations that are differences of the BLS process or algorhythm belong to one of the groups. The reason for this is that in case of grown-ups the cause of circulatory standstill is mainly of cardiac origin and its consequence is breathing stoppage. In case of children it is the other way around i.e. the respiratory or airway problem is primal and circulatory standstill will be the result of that. The discrepancies in children's reanimational algorhythm compared to that of adults are derived from this crucial difference.

The differences in the techniques of implementation are included in the other group that originate from the anatomic divergencies. These are the sizes and proportions of the body or that the narrowest part of the larynx is in the height of the cricoic cartilage and that the larynx is positioned higher.

The alphabet of reanimation. In childhood the care sequence according to ABCDE (as listed below) must be insisted on in the BLS care as well. (Illustration 11. The algorhythm of resuscitation in childhood)

- AIRWAY-A: clearing the airways
- BREATHING-B: checking and if necessary, substituting respiration
- CIRCULATION-C checking and if necessary, substituting circulation

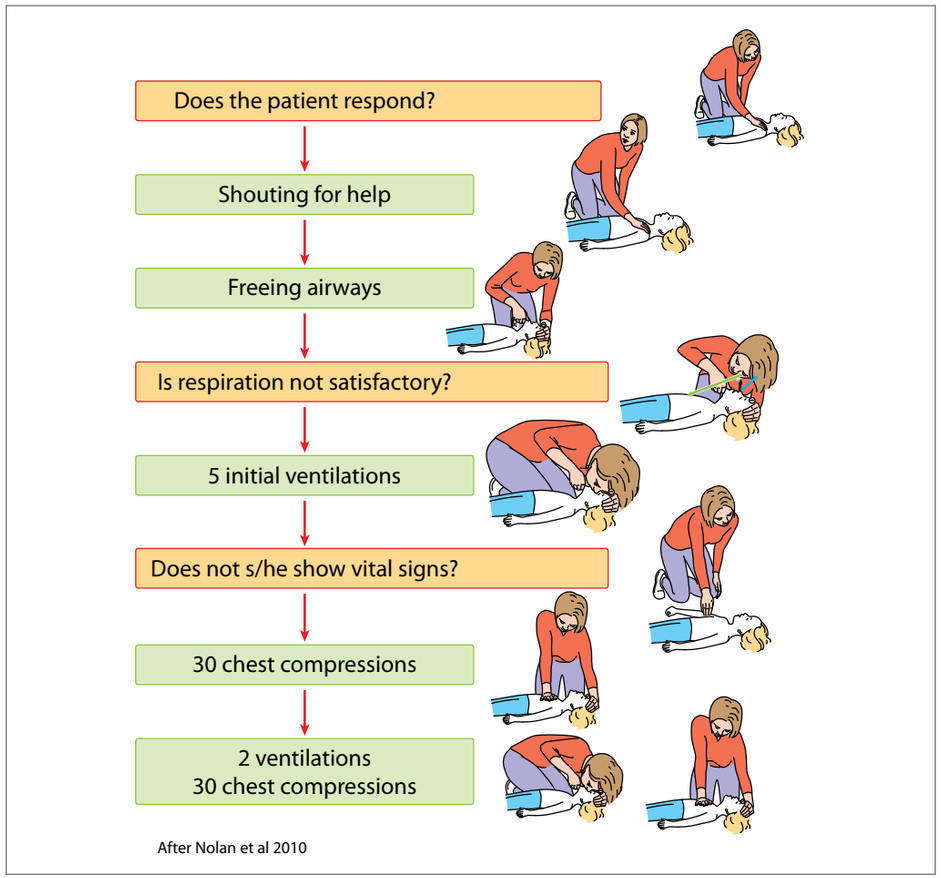


Illustration 6/11 The algorithm of resuscitation in childhood

- DISABILITY-D: the assessment of mental state
- EXPOSURE-E: considering the environment

Reassessment. A child's state must be regularly reassessed during a BLS level resuscitation, too. The child's breathing and circulation has to be checked if there is a change in his status or if we performed an intervention that can significantly influence his status e.g the initial 5 in-blows. Irrespectively of all, the recommendations concerning this procedure advise frequent checking. We suggest a reassessment every minute.

The process of cildren's BLS

Security. Before you would do anything, make sure that you yourself are not in danger. Do not enter any location which is obviously dangerous! If you are not sure about your security be circumspect! In case you are in danger afterall, leave the spot immediately and request help. A separate chapter deals with the dangers of locations.

Making contact. If you are safe, step to the child and make sure that he can be contacted. Address him understandably but not too loudly by saying 'Hello. What has happened? What is the matter? Can you hear me?' If you know him, address him by his name. Simultaneously with the greeting put one of your hands onto his forehead and with your other hand try to stimulate one of the limbs. Do not shake the child in any case! This can be dangerous for him and if he is unconscious he might also be frightened. If the child is not unconscious, the role of having your hand on his forehead is to make sure that he is not frightened so that he does not jump up. (Illustration 12. Contacting a child during BLS)

In a certain sense any movement or sound given by the child can be considered a response. However, even if a child responds, his life can still be in danger. Consequently, take a sensible verbal answer as a response. Do not take it as a response if the one in trouble groans, gives confused or incomprehensible answers, jerks or is seized with cramps. If the child responds then he is obviously not dead but naturally further examinations, questioning and care are needed. If the child does not respond shout for help!

In a child's case his age must be considered. Do not expect a verbal answer at every age. The child might not be able to speak yet.

Illustration 6/12 Contacting a child during BLS

Crying out for help. If the child does not respond to the attempt of being contacted, shout for help. Yell, even if you do not know where you can expect help from. For instance if you are in a room, basement or an empty corridor. **SHOUT!** The role of shouting is to attract attention to trouble and to get help with it. If you are not alone, you naturally do not need to yell but make the people present know that they will be needed. It is recommended to select a specific person from the crowd and ask him to stay near you. Do not forget that you cannot save the child alone! (Illustration 13. Shouting for help during children's BLS)

Illustration 6/13 Shouting for help during children's BLS

Clearing the airways. Irrespectively of the antecedents, look into a child's mouth in every case. This is important because the probability of a foreign-body being there is high. Similarly to adults, of course, there are circumstances that indicate the presence of foreign-bodies more than average situations i.e. eating or if the child got sick while playing or if he was saved from water, was drowning, coughing etc.

If you find some foreign-body in the child's mouth, you should put your bare hand into his mouth only in case you are sure that you can remove it. If you think you can remove the foreign-body with bare hands, try it. Putting a bare hand into a child's mouth is dangerous because the helper himself can very easily push the foreign-body lower in the airways and can make the prior partial obstruction a complete one causing the child's death by this.

In case of children their own tongue is also a common airway obstruction. If the muscles of the body are relaxed and atonic, the tongue freely slips back, towards the wall of the pharynx and creates an airway obstruction. Similarly to adults' cases this needs to be prevented. In case of a child under the age of 3, recline his head carefully but only to a neutral position (the longitudinal axis of the ears and chest should coincide) and lift his chin with one finger. Watch out for not shutting his mouth and do not lean on soft body parts like the neck for instance. Over the age of 3 you can recline the skull carefully. (Illustration 14. Head tilt / chin lift for a child to ensure free airways)

Illustration 6/14 Head tilt /chin lift for a child to ensure free airways

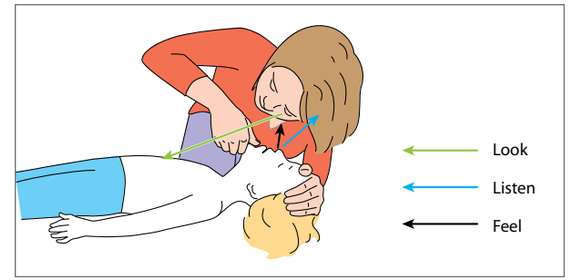


Illustration 6/15 The examination of a child's breathing during BLS

The examination of respiration. During the examination of breathing hold the skull in the above described way. Similarly to that of adults the examination of respiration happens with the so-called triple perception for 10 seconds. Bend your head to the child's face and observe if you hear any breathing. In the meantime watch if you can sense the air exhaled on the skin of your face and also observe the movements of the child's chest. This is how the triple perception is manifested: LOOK, LISTEN and FEEL. (Illustration 15. The examination of a child's breathing during BLS)

The question is if there is normal breathing. We consider breathing to be normal if it is of the appropriate frequency i.e. if it corresponds with the child's age, it is accompanied by visible chest amplitude and it does not give any pathological sounds (e.g. stridulous breathing).

Task if there is normal breathing: ensuring free airways. If you assess that the child's breathing is normal, then continually take care of keeping the airways free and notifying the ambulance. If it is not contraindicant then lay the child on his side stably. The way to do it does not differ from that of in an adult's case. Substitute an infant's laying on his side by holding him in your arm sideways.

If you are alone on the spot then call the ambulance only after having assured free airways. Stay near the child and keep observing his breathing and circulation. If some change occurs in his status, proceed according to the status of the child.

Five initial inspirations. If the child has no normal breathing (irregular, forced, superficial, none) then immediately attempt to ensure oxygen for him by 5 quick in-blows. (If you have a helper and calling an ambulance has not happened yet, then ask him to do that with no delay. Say on the phone that you are asking for help for a child's resuscitation that has been started.)

If you have not done it yet, it is still not too late to look into the child's mouth. Search for an airway obstruction foreign-body and proceed as it is written above.

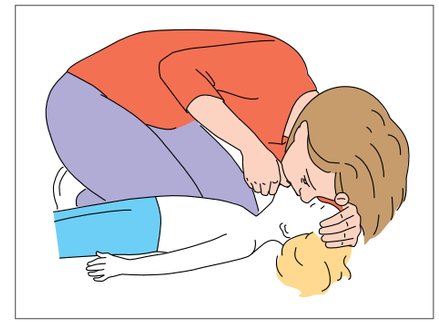


Illustration 6/16 The ventilation of a child during BLS

Ventilate the child's mouth 5 times after each other while keeping the airways free (and having the skull properly positioned). His nose should be held, the chin raised. In case of an infant blow into the nose and the mouth simultaneously. (Illustration 16. The ventilation of a child during BLS) 7-8 mls of air has to be blown in by body mass kilograms. In case of an infant it can be as little that the amount of air in the helper's mouth might be sufficient.

You have to check the efficiency of the in-blows as in case of adults i.e. after an in-blow hold your head sideways and watch if the chest is sinking and if the air is flowing out of the airways.

We can get to know more information during the 5 initial ventilations. We can find out if the airways are free on one hand and whether the child responds to being given oxygen on the other hand. If the airways are not free, look into the child's mouth again but attempt the in-blows maximum 5 times after each other. If it is not effective, go on by checking circulation and substituting it if necessary.

Checking circulation. After the 5 initial in-blows check if the child has circulation and if it is sufficient. You will have to decide whether chest compression is necessary based on this. (Illustration 17. Checking a child's circulation during BLS)

The way to assess circulation:

- The child moves, gives sounds, coughs, has the hiccups after the 5 initial in-blows
- Checking pulse by touching (maximum 10 seconds)
  - In case of infants brachial artery (upper arm) or femoral artery (thigh)
  - Over the age of 1 common carotid artery (neck)

If you are certain that the child has satisfactory circulation re-examine breathing and ventilate for another minute if necessary i.e. until the next checking. If you are alone on the spot, call for an

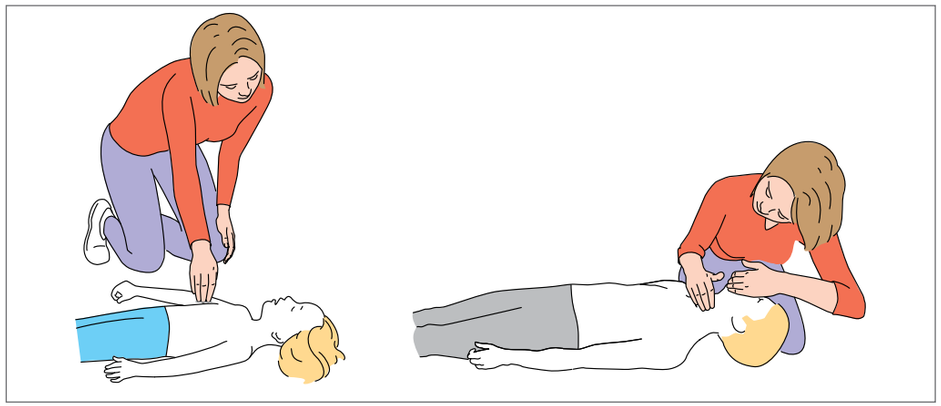


Illustration 6/17 Checking a child's circulation during BLS (upper arm brachial artery, common carotid artery of the neck)

ambulance after one minute of resuscitation. Subsequent to this re-evaluate the child's status and proceed accordingly.

Chest compression. Consider the child not having circulation if:

- you do not notice the obvious signs of circulation
- at the same time the pulse number is less than 60/minute and the pulse is irregular and easily suppressable
- the signs of bad perfusion can be seen i.e. the child is pale or cyanotic
- if the child does not show signs of life and you are not sure whether the child has a pulse, consider his status to be a circulatory standstill. *6.3. video:* Child Basic life support – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/GyermekAlapszintuUjraelesztesMenete_eng.wmv

If you assess lack of circulation start chest compression and do it alternately with ventillation. The proportion is 15 chest compressions followed by 2 in-blows. If you are alone you can also apply the 30:2 proportion that you learnt in relation to adults

The place of the chest compression is the lower tertiary of the breastbone, 1 transverse finger over the xiphoid process (Illustration 18. Chest compression in case of children)

The characteristics of chest compression are:

- Keep your other hand on the child's forehead
- Press the chest down in one third depth
- The compression-decompression rate should be 1:1
- The frequency of compression should be 100/min
- In case of an infant press the chest with 2 fingers, in case of a bigger child with one hand

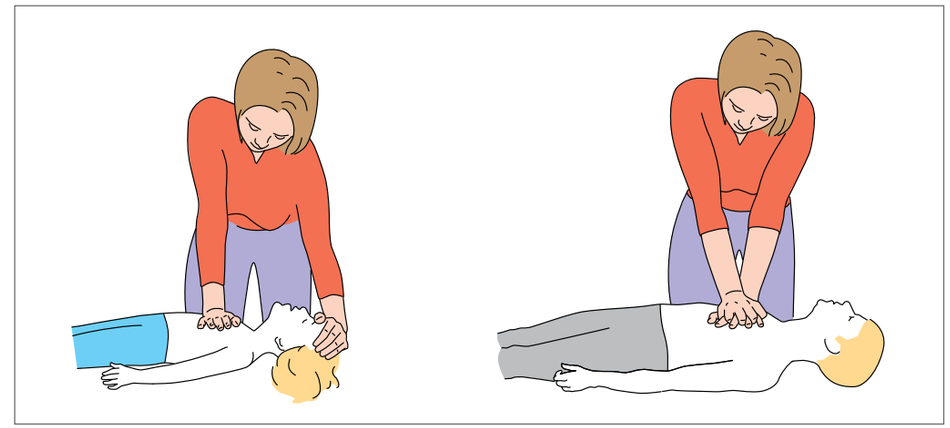


Illustration 6/18 Chest compressions in case of children's BLS

Reassessment. During a child's BLS level reanimation, reassess his status every minute. Check if he shows signs of life, if he breathes and examine his pulse. The things to be done in the following minute are determined by what you have noticed. It is possible that in spite of an earlier observation the child has already got satisfactory circulation but his breathing still requires support. In a case like that he needs to be only ventilated for a minute.

Calling an ambulance during a child's BLS. If you have a helper call an ambulance right at the beginning of care.

If you do not have a helper then you need to call an ambulance after one minute of resuscitation. This is a major difference compared to the adult BLS algorhytm. The reason for this difference is that in an adult's case a defibrillator is very likely to be needed (so one needs to be fetched as soon as possible i.e. an ambulance has to be called), whereas children almost always need oxygen primarily which can be provided with the 5 initial ventilations and the 1-minute long CPR.

Exception: if something suggests that the circulatory standstill of the child is of cardiac origin afterall (if it happened suddenly without any antecedants and/or he is a child known to be suffering from heart disease), then you have to call an ambulance right after stating circulatory standstill just as in case of adults.

If you have no mobile phone with you, find a phone booth, a house, a car but take the child with you, too. In the meantime stop frequently and keep on doing resuscitation. An infant's reanimation can also be done while walking. (Video 2. The process of a child's basic level reanimation)

Stopping Resuscitation

Chest compressions and in-blows have to be performed continuously in a 30:2 ratio with adults, 15:2 ratio with children and 3:1 ratio with newborn babies as long as one of the conditions for stopping resuscitation does not occur. Resuscitation can be stopped if the patient shows signs of life i.e. he moves or gives out some sound.

In this case start the complete care process from the beginning. Try to contact the patient again then go on with the appropriate steps of BLS. You do not have to keep doing reanimation neither in case you are alone and have nobody to pass the job to but you are exhausted. You must stop resuscitation when professional rescue arrives (e.g. the ambulance) and they take the job over from you.

Assessing the outcome of resuscitation

Here you need to get acquainted with three concepts i.e. effect, result and success. Efficiency is the mecahnical result of chest compression and in-blows. That is it only means that what you have done, functions in a mechanical sense. You will see the sinking of the chest and you will hear air streaming

out. If the chest does not sink after ventilations and the air does not stream out, then you have not performed the process properly.

Chest compression is effective if, while doing it, as a result central pulse (common carotid artery or femoral artery is palpable. If you are alone you will not know if chest compression is efficient since you do not have a chance to examine pulse and this is not your job either.

The result is a biological consequence that indicates improving oxygen supply. The patient's skin losing cyanosis and his pupills getting narrower indicate result.

Success means the return of life functions. Great vessel pulsation can be considered success by itself even without the return of spontaneous respiration. You will notice this only if the patient shows life signs since you do not need to examine circulation.

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7. Automated External Defibrillator (AED)

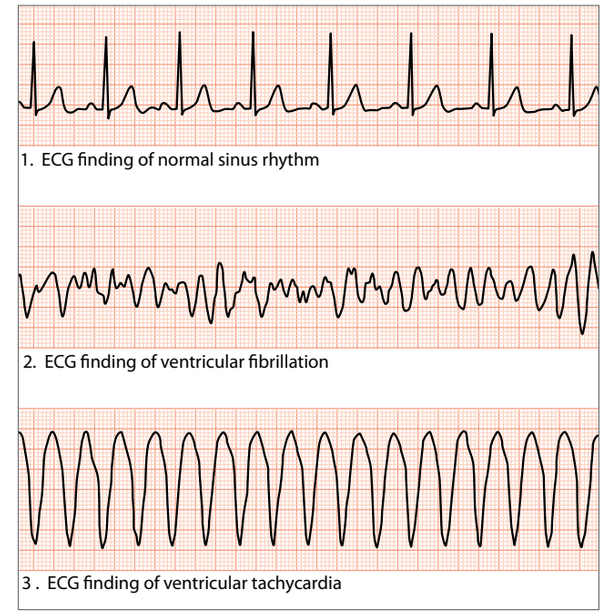
by Gábor Nagy

Definition. Automated external defibrillators are portable appliances that are able to automatically recognize life dangering heart rhythym disturbances (ventricular fibrillation and ventricular tachycardia) and can cease them by defibrillation i.e. by transmitting external electric energy. Thus the applied defibrillation can cease dangerous rhythm disturbances while making room for normal stimuli in the heart.

Ventricular fibrillation and ventricular tachycardia are two so-called *to-be-shocked rhythm disorders* upon the occurence of which the heart is theoretically capable of functioning but the pathological stimuli controlling it are partly too fast (tachycardia) and partly disorganized (ventricular fibrillation) for the heart to be able to pump blood out efficiently. (Illustration 1. E.C.G. findings of normal sinus rhytm, ventricular tachycardia and ventricular fibrillation)

This status leads to brain damage in the acute phase and then to the biological death of the patient. AEDs recognize this rhytm disorder with great efficiency.

In the majority of cases, in the background of sudden circulation standstill these rhythm disorders stand as causes. The recognition of this already happened decades ago and early defibrillation with the help of the easily applicable AED has already been built into the non-professional resuscitation process as part of the survival chain by now. It is important to note that in case of a sudden cardiac arrest every minute of delay without proper therapy (chest compression, defibrillation) decreases the patient's chance for survival by 10 %.



The application of AED tightly fits into the algorhythm of BLS.

Illustration 7/1 ECG findings of normal sinus rhythm, ventricular tachycardia and ventricular fibrillation

Consequently in case of every started resuscitation (chest compression) information whether there is available AED in the neighbourhood needs to be attained fast and if there is one, it has to be taken to the location as soon as possible.

Several programs, AED programs, have been developed also in Hungary to diminish the elapsing time until defibrillation. Since a significant proportion of the sudden circulation standstill cases happen at public areas, the outplacement of these appliances to public places seems promising. Naturally numerous studies of expense efficiency have already been done in western countries. Based on these studies it seems that the placement of AEDs at areas with heavy traffic (casinos, airports, shopping centres, railway stations, sports stadiums) goes with positive consequences in the long term.

The structure of the appliance. The presently used AEDs were developed in a way that their application and applying surface is so simple that even an unqualified non-professional can use it. Naturally most professional organizations that deal with and instruct resuscitation already teach reanimation and the usage of an AED jointly as part of their BLS courses.

The equipment consists of two parts: The **central unit,** where the on button switches the machine on and a separate button is available for administering the shock, usually orange with a lightening bolt graphic on it. Depending on the type of the equipment a readout display and a speaker on the front panel of the equipment jointly help to facilitate an easy application by transmitting visual and audible instructions.

The central unit senses and analyzes the rhythm of the patient and makes a decision about transmitting a shock.

The battery is also part of the unit which provides the energy needed for the shock. On most equipments you can find a readout display that shows the battery's degree of charge.

Most appliances automatically check the state and charge of the electrodes and battery with a pre-determined frequency. In case of a damaged AED equipment or electrode, do not use the appliance due to the potential danger of an unwanted electric shock.

Illustration 7/2 The parts of an Automated External Defibrillators (AED) in different gauges

The 2 **electrodes** are either fixed to the equipment by the manufacturer or the user has to connect them to the appliance manually. The sizes of the electrodes are usually designed for adults because they are generally used for them and they have to be placed on specific points of the chest. The electrodes are self-adhesive, they are supplied with some gel that transmits electricity well, thus making the precise sensing of the cardiac rhytm more efficient and making energy transmission easy in case of a shock. (Illustration 2. The parts of AED)

Implementation. Make sure that both the injured and both the rescuer are safe.

If the injured does not respond to being spoken to and does not have normal breathing, send someone immediately to fetch an AED if it is available and tell him to call an ambulance.

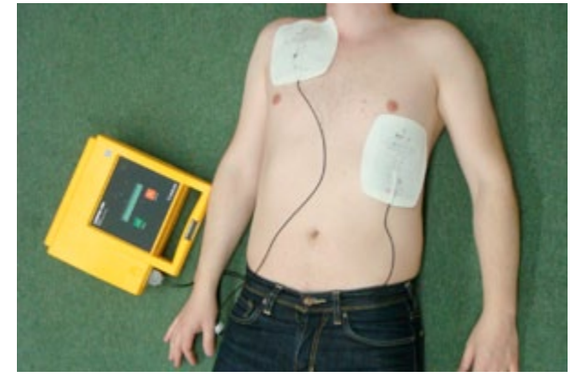
Begin resuscitation as described in the previous chapter; in a chest compression- ventilation ratio of 30:2.

As soon as the AED is brought to the spot, turn on the equipment and place the adhesive chest electrodes onto the patient. If there are more rescuers present, one of them should be doing resuscitation continuously while this is being performed.

The placement of electrodes. Place the self-adhesive electrodes with their gelled parts pointing towards the patient's chest after having taken the protective foil off. Make sure that the electrodes cling to the body surface well since in case of a poor connection hold the amount of the transmitted energy may decrease.

Out of the two electrodes one of them has to be placed onto the left part of the body to the area of the apex of the heart while the other one needs to be put onder the right clavicle. The illustration on the electrodes usually shows where to place them (polarized electrodes) so that the placement can happen faster. (Illustration 3. The placement of AED electrodes onto an adult)

There are also non-polarized electrodes which we can place either towards the heart or under the right clavicle. It does not matter which one we put where, it does not influence the direction of the energy transmission.



Based on these, the positions of the electrodes are such that they leave the sternum free so that it does not disturb the process of resuscitation.

In most cases the sizing of the electrodes is in accordance with the chest size of an average adult. These

Illustration 7/3 The placement of AED electrodes onto an adult

electrodes can generally be used over the age of 8 (or over 25 kgs of body mass). For special cases children's electrodes also exist which are smaller in size. (Illustration 4. The placement of AED electrodes in case of children)

If we put adult sized electrodes onto a young individual with a smaller chest we need to pay extra attention to position them in a way that they do not touch one another. In special cases the electrodes can be placed in a different way unlike usually e.g. onto the chest over the heart in the front and on the back.

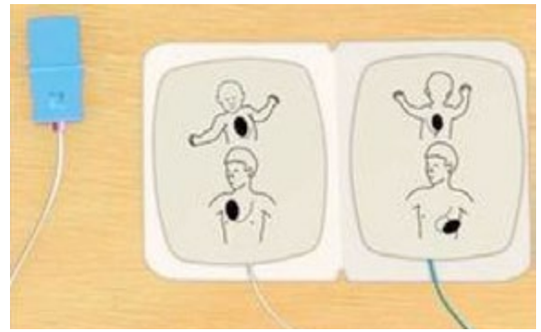


Illustration 7/4 The placement of AED electrodes onto a child

Do not take the electrodes off the patient until the ambulance arrives, not even if resuscitation has been successful in the meantime. The patient will surely be transported to a hospital by the ambulance in this case too and his status can change suddenly any time and transmitting another shock might become necessary.

If we forget what we need to do, how we have to perform the next steps, most AEDs give visual or audible instructions that have to be followed.

After the electrodes have been positioned the appliance is ready to analyze the patient's heart rhythm. At this time resuscitation has to be stopped and the AED operator has to make sure that during analysis (and the subsequent transmission of the shock) nobody touches the patient (Illustration 5.).

Rhythm to-be-shocked. If the equipment senses a rhythm to-be-shocked it signals loudly that a shock needs to be transmitted which the machine either does automatically (in case of a completely automated defibrillator) or it calls upon us to push the 'shock' button (automated external defibrillator). In both cases still nobody is allowed to touch the patient (at this point mainly due to the danger of an unwanted electric shock).

Rhythm not-to-be-shocked. If the appliance senses a not-to-be-shocked rhythm it calls upon the ones present to keep on resuscitating for 2 more minutes as soon as possible.

After the transmission of shock has happened, 2 more minutes of resuscitation comes again.

As far as the next steps are concerned the equipment keeps on warning the rescuers and counting the 2 minutes. After the 2 minutes have passed, an analysis is needed again and if necessary, a shock transmission as well. These rounds with the 2-minute rhythm control are continued as long as:

- the ambulance arrives and takes the care over
- the patient does not begin to breathe normally
- the rescuers do not get tired. *7.1. video:* Applying AED in adult – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/GyermekAlapszintuUjraelesztesMenete_eng.wmv

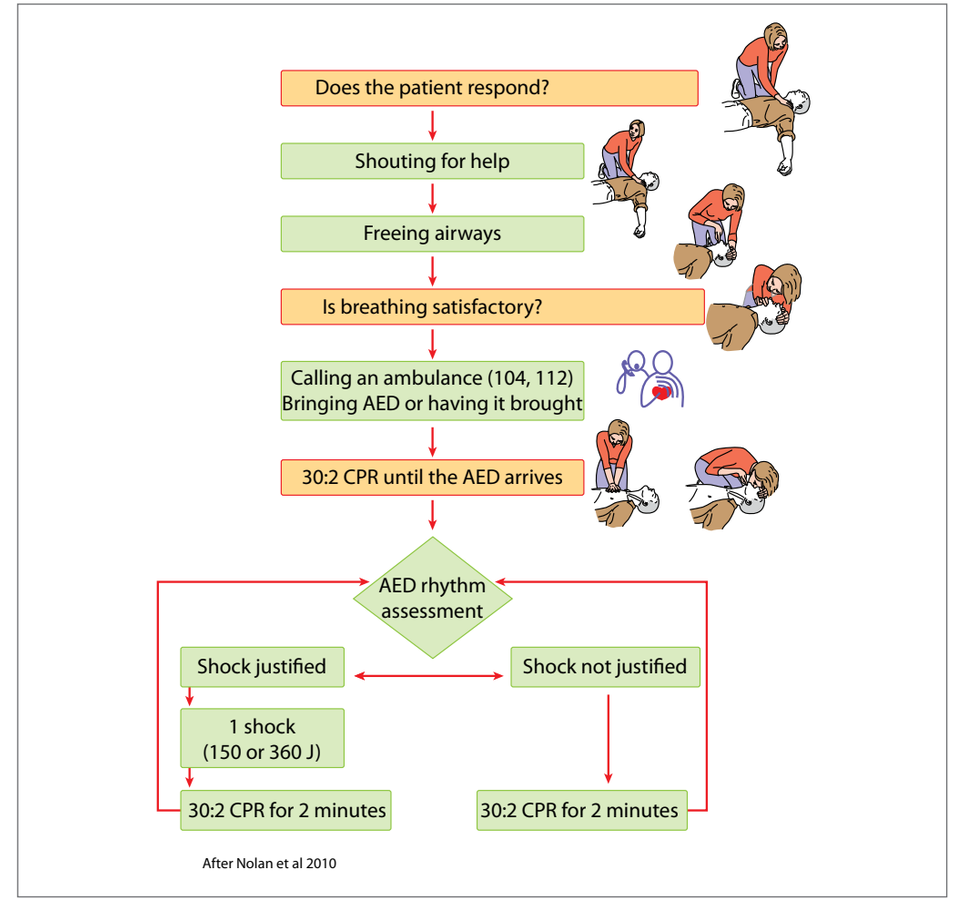


Illustration 7/5 The algorithm of AED application during BLS

Fortunately more and more public institutions possess an automated external defibrillator equipment. The places where these appliances can be found are endowed with an agreed upon sign where further first aid kit appliances are provided. (Illustration 6. A first aid spot endowed with an AED)

Illustration 7/6 A first aid location endowed with AED (based on ILCOR)

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8. Primary Care of Unconscious Patients

by József Marton-Simora

The content of chapter

Consciousness and impaired consciousness

Specialists have been preoccupied by the precise but simply understandable definitions of awareness and consciousness for a long time.

According to Kornél Lukács's phrasing consciousness is 'the inner state of the brain mantle in which the conditions are given to process the outer and innner stimuli at an intellectual and cognitive level through which both the objective reality and the human behaviour organized at will are psychologically reflected.' If normal self consciousness and environment consciousness are missing then impaired consciousness occurs (clear versus impaired consciousness).

By awareness the physiological and energetic conditions of consciousness functions are meant which are necessary for the realization and sustenance for some cortical functions besides the integrity of the given area. (Kornél Lukács). The level of awareness can spread from sustained consciousness to coma. Consequently if the patient's awareness is missing then, as a result of this, impaired consciousness occurs.

From the point of view of emergency care impaired consciousness is mostly grouped based on the time frame of occurence. Proper oxygen and nutrition (primarily glucose) supply and the intactness of anatomic structures are needed for the undisturbed functioning of the central nervous system. On the basis of these we distinguish:

- short-term impaired consciousnessness
- long-term (lasting) impaired consciousness
- impaired consciousness accompanied by convulsive attacks

Short-term impaired consciousness generally ceases to exist within a few minutes while long-term impaired consciousness may be sustained for several hours or maybe even days after their occurence. In the background of cases of impaired consciousness accompanied by convulsive attacks we can usually find some type of convulsive attack spreading in the body which maintains this status for a shorter or longer period of time.

A simple faint

Faint or collapse is losing consciousness for a short time (5-10 minutes) due to the temporary oxygen shortage of the brain. A simple faint is, in fact, a benign process which occurs as a result of peripheral circulation deficiency. Its reason is generally complex. It occurs during standing or waiting for a longer period of time. This is usually supplemented by the person in question not having had a sufficient amount of fluid. It may be caused by heat also supplemented by insufficient fluid-intake. A suddenly occuring emotional shock can also evoke collapse. Monotonous work, standing, exhaustion may also lead to fainting. In most cases the functional disorder is regulated by the person collapsing and getting into a horizontal position. Circulation is able to recover in this posture faster which can improve cerebral circulation as well.

Prior to fainting certain symptoms appear and if we notice them we can expect collapse. These are: paleness, concentration disturbance, dizziness, impaired eye-sight, tinnitus and increased sweating. Nausea or possibly vomiting may also accompany the symptoms. People who fainted also give account of a black-out among the phenomena that preceed collapse.

Care. Upon the appearance of the symptoms it is best to lay the person in question down, to take him to a cool, shady, airy place in summer. If it cannot be done and the person has already fainted then the methods applicable in a status accompanied by collapse may be used. After having made sure that the environment is safe he should be addressed and carefully touched. Even if he responds he has to be left in a lying position for 10-15 minutes also in case he was found lying on the ground. The first aid provider may ask one of the people present to raise both of his lower limbs high. With this the venous back-flow improves from the legs i.e. the circulation towards the vital organs gets better and the circulation of the brain is also regulated more easily. (Illustration 1. Autotransfusional position)

If there is a crowd around the patient ask the people to step back. If the patient's status improves ask him about his potential diseases and medication. Inquire about his further complaints. Ask him how much fluid he has had and when he ate for the last time. You can also ask if he has had an accident. Since you cannot decide whether there is a serious disease in the background of fainting, calling an ambulance is suggested in every case.

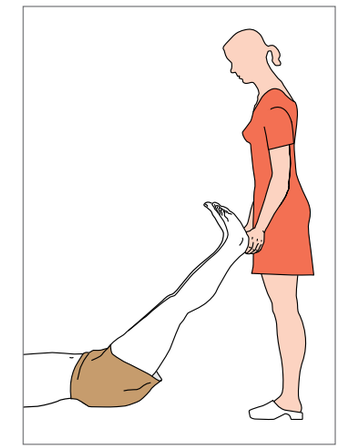

Illustration 8/1 Autotransfusional position

Diagnoses with long-term impaired consciousness

The causes of long-lasting impaired consciousness can be diversified but the given pathological processes may be accompanied by some level of impaired consciousness that can last for hours or days. The most common reasons are related to the processes of the central nervous system e.g. cerebral circulation disturbances, serious skull injuries, central nervous system infections. In the development of long-lasting unconsciousness the different metabolic diseases are also significant e.g. the pathological changes of the blood sugar level, the disorders of the salt and water equilibrium. Sometimes there might be some kind of poisoning in the background of unconsciousness. Besides all of these, naturally a lot of other occurences can lead to unconsciousness like e.g. electric shock, cooling down, heart rhytm disorders, drowning etc. (Chart 1. Potential causes of long-lasting impaired consciousness)

Chart 1. Potential causes of long-lasting impaired consciousness

The main reasons of long-term impaired consciousness	
Central nervous system processes	- serious skull injuries - infections of the nervous system - circulatory disorders
Metabolic disorders	- the change of blood sugar level - disorders of the salt and water - equilibrium
Poisoning	- drugs (LSD, cocaine) - medicine
Accidents	- drowning - electric shock - heat damages
Circulatory and respiratory deficiency	- heart rhythm disorders - pulmonary embolism

Loss of consciousness accompanied by convulsive attacks

In some cases loss of consciousness appears together with convulsive attacks. By convulsive attacks the involuntary tightening and/or the jerking of the body muscles is meant. The patient loses consciousness, he is not in control of his body and as a result of this he may be doubly incontinent of both urine and stools and might suffer from injuries.

Convulsive attacks can have numerous causes e.g. circulatory disorders, nervous system diseases (epilepsy, tumour, injury), poisoning (alcohol, cyanide, lead), metabolic disorders (liver deficiency, kidney deficiency, diabetes), high fever, pregnancy toxaemia.

Epilepsy. A convulsive attack caused by epilepsy and accompanied by loss of consciousness can be recognized by its typical phases; the patient suddenly cries out loud in an unarticulated manner, he collapses and his body tightens. This lasts for about half a minute during which there is apnoea (breathing break). After this his body jerks, his mouth is aerated and he still has apnoea. His face is already cyanotic due to oygen shortage. Then his muscles relax and become atonic. The patient is lying unconsciously but his breathing starts to return. He gets into a sleep-like state and then while regaining consciousness he is in a strange, foggy state of mind. He does not remember what happened. These patients may be incontinent during a convulsive attack.

Care. At the beginning of a convulsive attack your most important job is to protect the patient from injuries. Try to hold the patient's head laid in your two palms and do not let it bang to the

ground or floor. Shout for help. Ask your helpers to also protect the limbs held in their hands. Ask one of your helpers to call an ambulance. If you do not have a helper you will have a chance to call an ambulance only after the attack. (see Chapter 4.)

Do not hold down the patient in any case and do not put anything into his mouth. He might bite on his tongue during the attack but you will not be able to prevent that. Do not put your hand into the patient's mouth!

When the convulsive attack is over assess the patient's status. Address him, shake his shoulders and examine his breathing. Continue with caring based on what you have experienced. Do not be frightened if the patient inhales less frequently than normal. The most important thing will be to ensure free airways. Lay him into a stable sideway position or recline his skull. Stay with him and wait for the ambulance.

Fever spasm. As a result of high fever it can happen that the patient starts to have spasms amidst the general prostration especially in childhood, known as infantile convulsions.

The depth of unconsciousness

Unconsciousness by itself is assessed as a symptom so it is not a disease but a state. It signals a danger to life in every case! The examination of consciousness happens with an attempt of contacting the patient by addressing him loudly and carefully but decisively shaking his shoulders. There are several methods for evaluating the patient's degree of unconsciousness. The basis of each method is to determine what stimuli the patient responds to and how.

The degree of impaired consciousness (vigility). With this easily applicable method that assesses the depth degree of unconsciousness we examine to what extent the person can be contacted. The degrees of unconsciousness were discussed in detail in chapter 3.

The assessment of the depth of unconsciousness (AVPU, GCS). The most commonly used methods to determine the depth of unconsciousness are the assessing scales. The AVPU scale and GCS are used most frequently in Hungary, too. (see chapter 3.

The reasons of unconsciousness

Almost any health damage can be of such degree (can be accompanied by such consequencies) that it leads to unconsciousness. The diseases of the nervous system (epilepsy, skull injuries, infections, cerebral circulatory disorders etc), circulatory problems (loss of blood, fainting etc.), metabolic disorders (diabetes, kidney disorders etc), respiratory disorders, airway obstruction, poisoning (drugs,

chemicals, gases etc.), high fever and uncountable other diseases and pathological states can lead to unconsciousness. Naturally in the patient's care, causal treatment will be crucial. At the same time it is not the first aid provider's job to explore what the cause of unconsciousness is.

The care of unconscious patients

The process starts as it was already discussed at the beginning of the chapter on BLS. When somebody collapses in our presence or we find him lying on the ground, we cannot know yet what state he is in. We are descrbing the steps of the process here again.

Step over to the patient only if the environment is safe. Loudly address address and carefully but decisively shake his shoulders. In case the person did not respond to the attempt of being contacted, shout for help and then clear the airway by head tilt chin lift. Examine if his breathing is normal with the triple sensing method. If you find normal breathing then the person can be assessed as unconscious. (If his breathing is not normal then it can be assumed that he is dead so you need to begin resuscitation according to the guidelines described earlier.)

In the care of an unconscious person the most important thing to-be-done is ensuring an open airway. The most common method for this is laying the patient down in a stable sideway position. If it is contraindicated (due to some circumstance it must not be done) you have to chose another method. Ensuring pervious airways is extremely important because depending on the degree of unconsciousness certain reflexes drop out, that otherwise in a normal case, also provide even a security function e.g. pharyngeal reflex. In lack of these, the patient might aspirate, suffocate from his own secretions. Asphyxia often has mechanical reasons which can be made redundant by performing certain manoeuvres. (Illustration 2. The potential mechanism of an unconscious person's asphyxia)

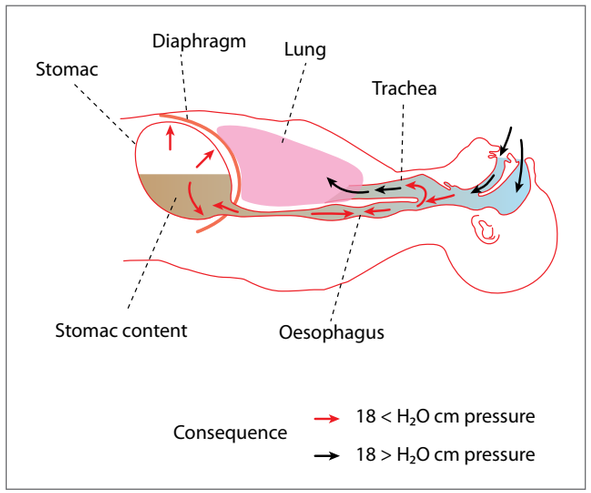

Illustration 8/2 The potential mechanisms of an unconscious person's asphyxia

If you have a helper ask him as soon as possible to call an ambulance to the unconscious patient. If you are alone, call an ambulance after having ensured free airways (e.g. by laying the patient down in

a stable sideway position i.e. in a recovery position.) Stay next to the patient until the ambulance arrives and watch his breathing. If there is a change in his status then continue his care according to that. You MUST NOT give anything through the mouth to an unconscious patient.

Recovery position

Recovery position is the applied body position according to the recommendation of ERC. Its purpose is to keep the airways free. That is to say it is not a purpose by itself but a tool. In this position the tongue does not block the airways, the potential discharge (saliva, blood, stomach content) can flow out of the patient's mouth. The patient lies without support and does not move so breathing stays examinable. It is also characterized by enabling rescuers to easily replace the casualty back in the spine position if needed. The ERC recommend that a casualty should not stay in the recovery position for more than 10 minutes without alternating the position to the other side where possible.

The recovery position is contraindicant i.e. not allowed in situations when its implementation would mean danger to the patient. The biggest danger is to move a patient with spine injuries and as a result of moving him the spinal cord gets injured. This might even cause the death of the patient. So the first reason against using the recovery position is where we suspect spinal injury. It is important to emphasize that it is about suspicion since spine injury cannot be diagnosed with complete certainty on the spot. The suspicion has to be based on the mechanism of the accident. The suspicion of spine injury emerges in case of falling from high above, being hit by a car, jumping into shallow water and in every case when the spine having been injured cannot be excluded from the trauma that caused the injury.

There are injuries that are by themselves contraindicated to moving the patient and consequently to implement the recovery position. These are such serious open chest and/or abdominal injuries where due to moving the wounded, internal organs can be exposed externally and also pelvic fractures, thigh bone fractures or suspecting them.

To exclude contraindications, the patient has to be definitely examined before he is moved. Check if you see injuries or if there are signs indicating them. There might be some contraindications even if the accident mechanism (or presumed mechanism) does not suggest it. In this respect the circumstances, the indicative signs and the location are of great significance. For example if you fnd somebody in a room lying on the carpet and nothing suggests a trauma, even then you need to assume it and the patient has to be examined.

Begin searching for injuries on the skull. Carefully touch it all the way through. Look if you see injuries on the chest or the abdomen. Search for injuries by touching, too. Limbs should be palpated through carefully, search for signs of fracture.

If you do not find any contraindications you can arrange the recovery position. The steps to do it are as follow:

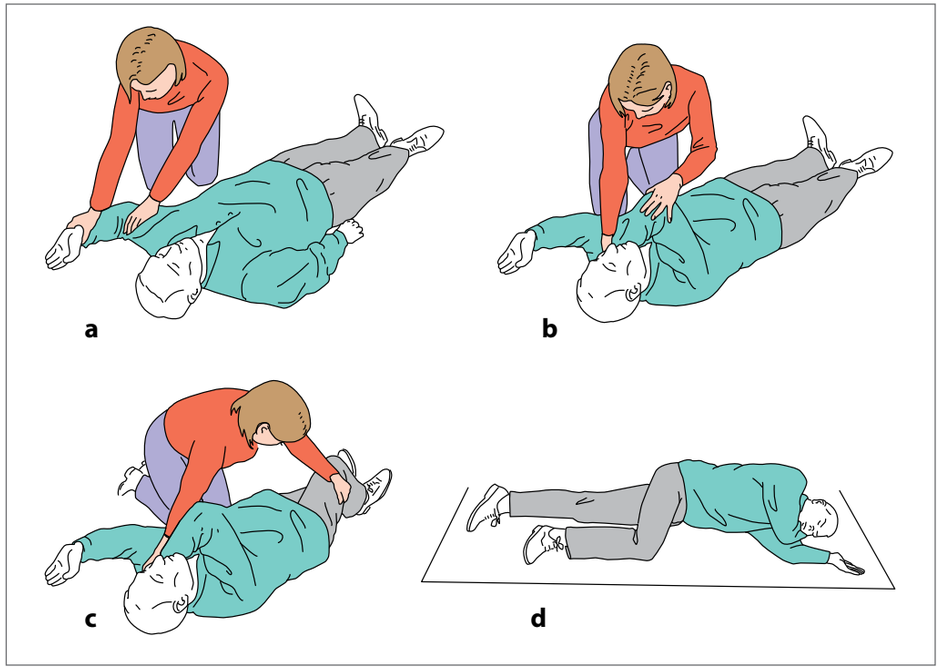

Illustration 8/3 The process of arranging a recovery position

Raise the upper limb closer to you next to the patient's head. At this time the patient's palm points upwards as if he were waving. After this bend the lower limb further from you at the knee and pull upwards. Pull the upper limb further from you over to the side near you and then turn the patient towards you while holding his shoulders and knee. The bent knee should remain in a bent position. Strive for a rectangular-like position. Place the patient's face on the back of that hand of his which was further from you at the beginning. Open the patient's mouth. Make sure that the patient is lying in a stable position. Stay next to him and watch his breathing and changes of status. If the ambulance has not been called yet make a telephone call at this point.

If a recovery position is contraindicated in your opinion chose another method for ensuring a clear airway. (Illustration 3. Arranging a recovery position.) *8.1. video:* Making recovery position – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/StabilOldalfekves_eng.wmv

Other methods to ensure free airways without appliances

In cases when moving the patient is contraindicated or obstructed, the recovery position cannot be implemented either. In a case like this free airways can be ensured by the methods below:

Cleaning and drying the mouth and the pharyngeal cavity, pulling the tongue forward. These are all methods that require putting you hand into the patient's mouth. Be careful! In fact it is not recommended to put your hand into an unconscious patient's mouth. It can happen that the airway will be blocked exactly due to this in one respect and the patient might bite you in the other. Put your hand into his mouth only if you can see a foreign-body and you are certain that you can remove it with maximum a few movements. (Illustration 4. Opening and cleaning the mouth cavity)

Head tilt and chin lift. This is nothing else but reclining the skull. Kneel next to the patient and put one of your hands onto his forehead and hold the jaw with your other hand. Tilt the patient's head with a decisive movement. This is usually applied together with the chin lift manoeuvre. Its disadvantage is that it does not spare the cervical spine so it cannot be applied in case a spinal injury is suspected. The chin lift manoeuvre means lifting the chin, pulling it forward. Hold the tip of the patient's chin with two fingers in a way that you keep his mouth open. Try to pull his jaw in a vertical direction. It can be achieved with this movement that the atonic, slipped back tongue root cannot block the airways. If you put your other hand on the patient's forehead you can prevent the skull from moving. With this method the neck remains motionless i.e. you spare the cervical spine. (Illustration 5. Head tilt / chin lift)

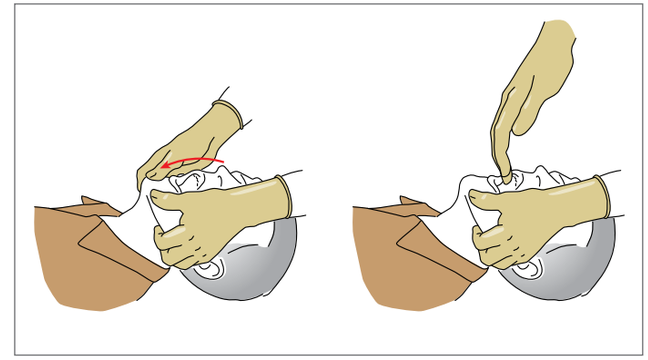

Illustration 8/4 Opening and cleaning the mouth cavity

Illustration 8/5 Head tilt, chin lift

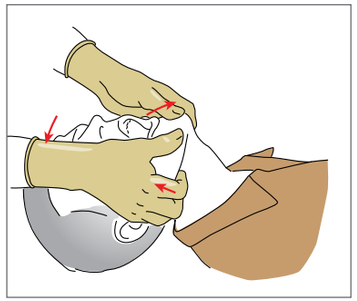

Illustration 8/6 The Eschmarch-Heiberg manoeuvre

The Eschmarch-Heiberg manoeuvre (jaw thrust). This method is recommended to health care professionals. The jaw is thrusted in this case. It is applied when reclination is not enough, contraindicated (a spine injury is suspected) or maybe impossible.

Kneel behind the patient's head. Place your 3rd and 4th fingers to the stems of the patient's jaw while you are leaning on the zygoma (near the bridge of the nose) with your thumbs. Then try to lift the patient's jaw forward with your 3rd and 4th fingers in a way that his skull does not move in the meantime. (Illustration 6. Eschmarch-Heiberg manoeuvre)

An unconscious patient must never be left alone since his life is in danger. The first aid provider's jobs are to quickly gather the most information available on the spot, related to the potential causes of unconsciousness and to continuously observe the patient's status and arranging N/A for him to get professional help as soon as possible.

Methods for ensuring free airways with medical equipments

The sustenance of pervious airways developed artificially by hands (e.g. Eschmarch-Heiberg manoeuvre) can keep a first aid provider busy for a longer period of time. If certain medical equipments that are used for maintaining free airways are available for the first aid provider as part of the first aid kit, then it serves the purpose to apply them. These tubes are distinguished depending on their positioning and placement. They are as follow:

- pharyngeal tubes
  - oropharyngeal
  - nasopharyngeal
- laryngeal mask
- tracheal tubes
  - orally inserted tubes
  - nasally inserted tubes
  - special combined types of tubes (for the trachea and oesophagus)

Only the pharyngeal tubes will be discussed below since tubes inserted to the trachea require further tools and more serious professional knowledge.

Oropharyngeal tube. A lasting patent airway is created between the mouth cavity and the pharynx with the help of the Guedel-tube. Upon placement we should watch out for the bent, stiff tube to

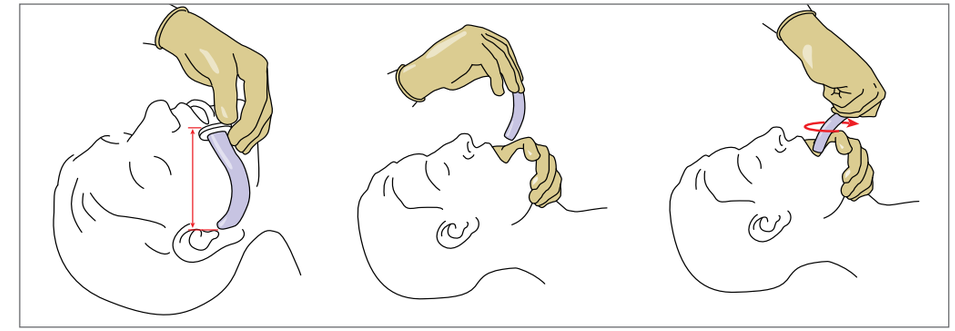

Illustration 8/7 Selecting the right size Guedel tube and its insertion

be inserted to the mouth with its upward pointing end and pressing the tongue down, it needs to be turned around in a 180 degree. It gets to its place in the pharynx with this turning around. They are distributed with the following marks: 00, 0, 1, 2, 3, 4, 5. It is important for us to chose the tube with the appropriate size since it does not give 100% protection against aspiration but it can lead to injuries in case the tube is too big while it will be ineffective if it is too small. For selecting the proper size fast, it helps if we take the distance between the patient's corner of his mouth and his earlobes as basis. (Illustration 7. Selecting the right sized Guedel tube and inserting it). *8.2. video:* Introduction of a Guedel-tube – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Guedel_tubus_beheelyezes_eng.wmv

Nasopharyngeal tube. The Wendl tube is a rubber pipe that connects the nose and the pharynx. It is best to spread gel on the rubber tube before insertion. The tube must be carefully led off through one of the nasal passages with its cut longer part downwards as far as the pharynx in a way that during insertion it has to be turned in 90 degrees. You have to be watchful because it can be applied only in a limited way in case of a nose injury. Its usage is relatively less common in Hungary. (Illustration 8. The canalization of the Wendl tube)

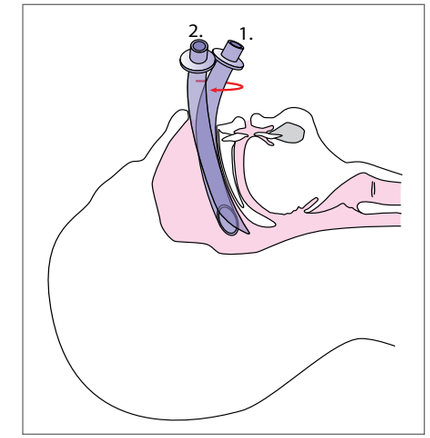

Illustration 8/8 The canalization of the Wendl tube

The most important goal during the care of an unconscious patient is the maintenance of pervious airways until appropriate help arrives to the given location. Unconsciousness is dangerous to life with a high time factor, so the patient has have professional help or be transported to an institution as soon as possible.

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9. Care of Sickness Caused by Airway Foreign-body Obstruction

by József Marton-Simora and Gábor Nagy

The content of chapter

The concept of airway foreign-body

Part of the airway obstruction cases are caused by foreign-body aspirations. The foreign-body is generally a piece of food, chewing gum, a toy etc. It is not just an external foreign-body that can create an airway obstruction. An unconscious patient's retroverted tongue that blocks the pharynx, oedema narrowing the transection of the airway, especially in the larynx and built-up discharge that was formed in the airway can all be airway obstructions.

In case of an adult the narrowest part of the upper airways is the rima glottidis so most of the larger size foreign-bodies get stuck there blocking the way of the air to the lungs.

Smaller airway foreign-bodies initially can get to the bronchial system in a hardly noticable manner where they cause blockage according to their size. This status often gets recognized only in a subsequent phase during the examinations related to conclusive pneumonia.

First the antecedents can refer to airway foreign-body obstructions. The symptoms noticed with the patient's help in distinguishing whether the obstruction is moderate or serious. In a moderate case the patient is usually able to speak, cough and breathe. If he is capable of talking he tells us that he has aspirated something. Inability to speak, breathing difficulties, initial excitement followed by losing consciousness may refer to more serious narrowing. Other than these, cyanosis as a result of oxygen shortage, a startled look and quick heart beat can also be observed.

In case of individuals having been saved from water it always has to be suspected that some foreign-body got into the airway.

Diseases, the consequencies of which are unclear consciousness, disturbed or limited swallowing, make people more susceptible to aspiration. Upon the occurence of atypical symptoms, aspiration must be considered relatively often in case of more serious neurological diagnoses or diseases of the oesophagus or in case of closure disorders at the pit of the stomach.

Things to be done in case of airway foreign-body obstruction

If signs indicating a light airway obstruction can be seen, encourage the patient to cough. While he is coughing observe if his coughing is effective, if his status improves, then the patient may have cleared the foreign body. In case the patient's cough is not effective according to your assessment and signs of a serious airway narrowing appear, further interventions will be needed after evaluating the existence of consciousness.

If we already see serious symptoms of stricture with the patient at the beginning or his status either does not change or gets worse but he kept his consciousness,do 5 back slaps on the back in the following way:

Stand next to the patient, a bit behind his back, put one of your hands on his chest and prop him a little, while with the palmar part of your other hand hit his back distinctly, between the shoulder

blades. Apply 5 hits to the back and after each hit quickly check (ask and watch) if the airway obstruction has been resolved, if the foreign body has been removed. If the patient is capable of doing it, he could bend over so that gravitation can also help the removal of the the foreign-body.

If the 5 hits on the back have not been effective, apply an abdominal thrust 5 times (in other words the Heimlich manoeuvre, which term is no longer used in accordance with the wishes of Professor Heimlich) according to the following instructions:

Position yourself behind the patient and stretch both of your arms forward under the two armpits of the patient. Fold your outstreched hands at the top part of the patient's abdomen (at the 'pit of the stomach'), where the costal arches meet. Then pull your folded hands backwards and upwards so that you press the patient's chest and you lift his diaphragm up. As a result of this motion sequence we squeeze out the air from the chest/lungs which suddenly moving upwards in the trachea forces the foreign body up the airway and out of the mouth. In this way the obstruction is relieved. Check the changes in the patient's breathing and status after each abdominal push, too. In case no change occurs as a result of the 5 abdominal thrusts either and the patient is still conscious, repeat the 5 hits on the back and the 5 abdominal thrusts until the obstruction is resolved or the patient does not lose consciousness. (Illustration 1. Abdominal thrust (which used to be called the Heimlich manoeuvre.) *9.1. video:* Removing Foreign Body Obstruction – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Leguti_idegentest_eltavolitasa_eng.wmv

If the patient loses consciousness or you find him unconscious, proceed according to the updated protocol of resuscitation. It is important for you to look into the patient's mouth and to call for help. Since the patient's breathing is probably not going to be normal during the survey, start a chest compression and do the basic level resuscitation in a 30:2 ratio. In this case the purpose of

Illustration 9/1 Abdominal thrust (which used to be called the Heimlich manoeuvre) in a standing and lying position

compressing the chest is not necessarily the substitution of circulation but more like the option that upon chest compression the air being forced out of the lungs will remove the foreign body.

According to experimental data a larger airway pressure is created upon chest compression than while applying abdominal push. Based on this, starting chest compression in the patient's unconscious status is extremely crucial.

If the patient's breathing becomes normal during chest compression and his consciousness clears up, stop resuscitation, examine the patient's mouth and check the quality of his breathing.

Removal of a foreign-body from the mouth with fingers can be done only if the foreign-body is visible and there is a chance that it can be removed with a single distinct movement. Do not put your hand 'blindly' into the patient's mouth without seeing a foreign-body there, as part of a routine survey since the patient might bite the rescuer's finger.

If the rescuer is alone on the spot and nobody has called an ambulance yet, then call an ambulance after 1 minute of resuscitation. Calling an ambulance can be postponed for later in this case because a defibrillator is probably not going to be needed (unlike in cases of circulation standstills with cardiac origin). In this case the best chance can initially be expected from the properly performed chest compressions. The care is summarized in illustration 2.

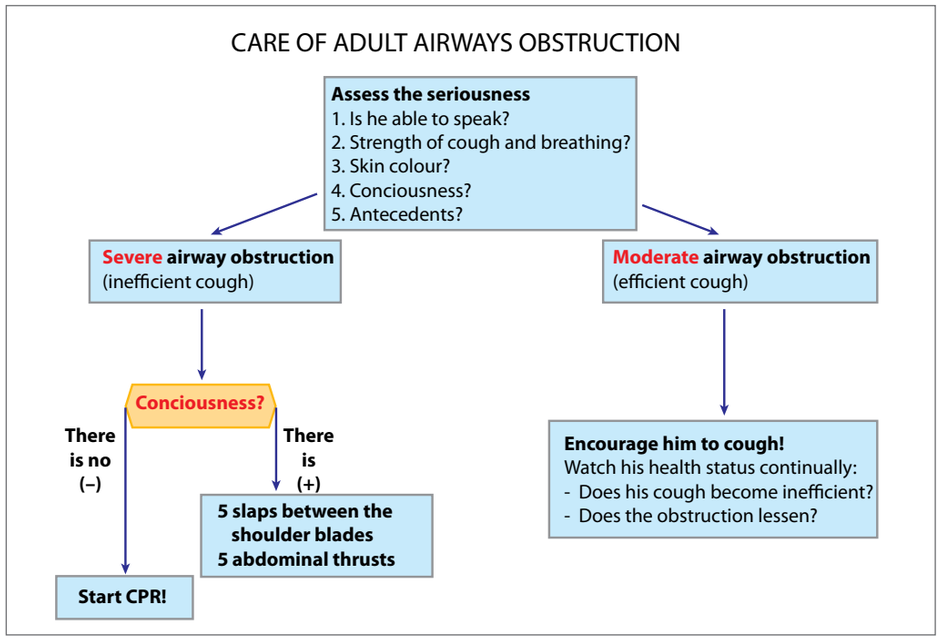

Illustration 9/2 The care protocol of adult airway obstruction

There are also other options for resolving obstruction due to an airway foreign-body but these techniques are usually done by competent professionals (the staff of the ambulance service). This can be the removal with special forceps (Magill forceps) and a syphon after a survey with a laryngoscope. Other than this, there is an option to get air to the airways during obstruction. Coniotomy serves this purpose during which the skin and then the ligament between the cartilages of the larynx (lig. conicum) are cut and that is how the airways are reached. Through a pipe inserted to this opening breathing can be helped.

Seeing a doctor. The patient definitely needs to see a doctor if no ambulance was called especially if abdominal thrusts or chest compressions were done to remove the foreign body from the airway. The reason for this is to ascertain what kind of inner injuries the patient may have suffered as a result of the abdominal thrusts and chest compressions on one hand and the possible remains of any foreign body that might still remain in the airway on the other.

Airway foreign-body with children

In case of children and infants the chances of airway obstructions is rather high since they put a lot of things into their mouths and besides they cannot decide what they are allowed to and what they are able to swallow.

Children playing with tiny objects and toys or sicknesses in connection with meals belong to typical situations. The adult present may be alarmed by the child becoming quiet and inactive after he had been playing actively.

The signs of an airway foreign-body obstruction are listed below:

A sudden start, often in the presence of someone else, cough, suffocation, playing with tiny objects, meals.

Besides effective coughing, crying, verbal answers to questions, breathing disorders/difficulties, lack of breathing, sustained consciousness refer to a moderate airway obstruction. The inability to speak, breathing disorders/difficulties, weak, powerless or missing coughing, the decay of consciousness, the presence of cyanosis and its worsening can indicate a more serious airway obstruction.

Tasks in case of an airway obstruction. The care algorhythm mostly corresponds with the adult protocol. If you notice effective coughing caused by a moderate airway obstruction, encourage the child to cough and watch the changes in coughing, breathing and consciousness. In case the airway foreign-body has been expelled, calm the child down. If it can be suspected that the foreign–body has not been fully expelled but the child is well, see a doctor as soon as possible.

If you see the signs of an airway obstruction or the child's status does not improve in spite of his attempt to cough but he has remained conscious, do 5 back slaps on the back first.

Since infants and children weigh less, they can be positioned more easily, so position the child in a way that gravitation can aid the expelling of the foreign-body in this case as well. In case of an infant, lay him onto one of your lower arms, prop his chin with your fingers while with the palmar side of your other hand apply 5 distinct slaps on his back between his shoulder blades, adapted to his size and build. In case of a bigger child you can lay him on your knees with his back upwards so that his upper body hangs downwards and apply the hits on his back between his shoulder blades this way.

After each hit check how the child's cough, breathing and consciousness changes in this case, too.

In case the child does not show any improvement, apply 5 abdominal/chest thrusts

The implementation of the abdominal thrust corresponds with the methods discussed at the adult protocol part but in each case adapt to the child's build thus avoiding/decreasing the potential development of accompanying injuries.

Abdominal thrust cannot be done with children under the age of 1 since the abdominal organs are relatively bigger and as a result of this they might get injured more easily. In order to avoid injuries apply chest pushes instead of abdominal pushes under the age of 1 according to the instructions below:

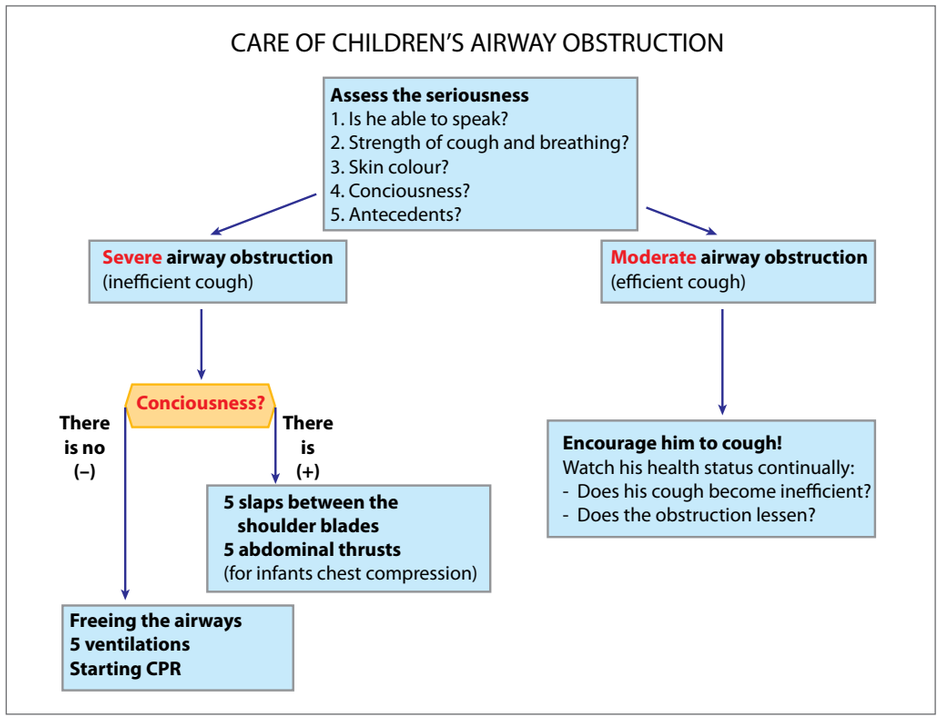

Illustration 9/3 The care protocol of infant / child airway obstruction

Lay the child onto one of your lower arms so that his chest is upwards. Secure his head with your fingers and by putting two of your fingers (usually the middle and index finger) to the bottom part of the breastbone (to the middle of the chest) do 5 distinct thrusts with movements that are similar to chest compressions. Check the effectiveness and efficiency of the intervention here as well.

In case the child's status did not improve even after the 5 abdominal/chest thrusts but he is still conscious, continue again with 5 slaps on the back and 5 abdominal/chest thrusts until his state gets better or he does not lose consciousness.

If the child loses consciousness as a result of airway obstruction or you find him in an unconscious state without any antecedents, begin resuscitation according to the updated protocol. Clear the airways, look into the child's mouth. If you see a foreign-body there that can be removed with one movement, remove it with a distinct movement.

Ask for help and apply 5 initial ventilations. It is usually not effective i.e. it does not go with visible chest rise due to the obstruction. If breathing is not satisfactory after the 5 initial in-blows, begin 15 chest compressions and then 2 ventilations. After 1 minute call for an ambulance if it has not been done yet. The care is summarized in illustration 3.

Seeing a doctor. In case of a child it is also important to see a doctor if you applied abdominal/chest thrusts or chest compressions (resuscitation). Also arrange to see a doctor if you noticed any respiratory disorders independent of the applied intervention. Here the main goal is also to assess the accompanying injuries and remove the potentially not cleared off foreign-body

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10. Further Care of Conscious Patients

By József Marton-Simora and József Betlehem

The content of chapter

Ways of laying positions

In case of certain health damages laying the patients down in a proper position is an important part of first aid care. The position of the patient or injured is crucial not only while moving him but also in rest. The so-called layings are body positions which are created to prevent the worsening of the patient's status, to soothe his pain and to calm him down. In many cases we cannot do anything else but wait for help, for the ambulance together with the patient laid in an appropriate position.

It is a basic rule that if the injured spontaneously positions himself in a way which makes things easier for him (e.g. it mitigates his pain or eases his breathing), do not force any special positions just because you know it. At the same time it is also a rule that any patient or wounded who is in a serious general status should sit or lie down depending on his status.

It is important to emphasize that in case of the laying positions to be discussed here the patient or the injured can be contacted so he is not unconscious. We dealt with the laying position of unconscious patients in chapter 8.

Laying position of a skull injured patient. One of the serious consequences of skull injuries is the increase of pressure within the skull space. This means that the prior normal pressure rises in the closed bony space within the skull for example due to bleeding. The brain cannot avoid this space occupying process so due to the increased pressure it may become damaged. Proper positioning of the patient can decrease the time for the development of damage. In case of the possibility of the increase in the skull space cerebral pressure, the injured must be laid on his back and his head and upper body has to be slightly elevated in about 30°. For positioning the patient in this manner, blankets or coats can be used. With this body position you help the blood flowing back through the veins of the neck which can help the prevention of skull space pressure increase. If we raise only the patient's head then his vessels in the neck might suffer from angulation which can make the venous back flow more difficult. (Illustration 1. Patient with his upper body raised in 30 °)

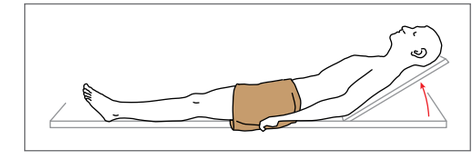

Illustration 10/1 Patient with his upper body raised in 30 degrees

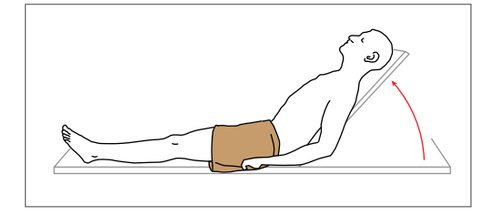

Illustration 10/2 Patient with his upper body elevated in 45-60 degrees (half-Fowler position)

Laying positions in case of chest injuries. In case of chest complaints the patient often gives account of pain in the chest and/or breathing difficulties and suffocation. For easing inhaling the best body position is the so-called half-sit-

ting position (half Fowler position). This means a back support leaned in 45°–60° that we can create with blankets, a chair or some other temporary means. Due to the changed pressure environment breathing improves in this position. Other than this the patient is able to use his additional breathing muscles more efficiently this way and thus he can decrease his shortness of breath or breathing difficulties. (Illustration 2. Patient with his upper body elevated in 45-60 degrees)

In case of rib fractures it may be enough to lay the patient on the given side in a low Fowler position (30°-45°). (Illustration 3. Position of a patient with a fractured rib)

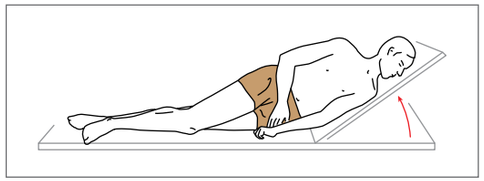

Illustration 10/3 Position of a patient with a fractured rib, upper body raised in 30-45 degrees (low Fowler position)

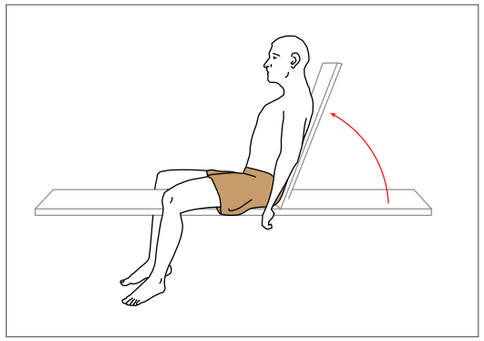

Illustration 10/4 Half sitting position with dangling legs in 80-90 degrees (high Fowler position)

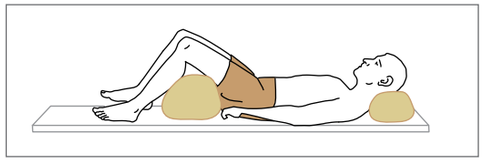

Illustration 10/5 Supine position with raised knees

If the patient inhales with snuffles, with difficulties, has a feeling of suffocation and uses his additional breathing muscles powerfully, we probably see the threatening signs of circulatory and respiratory deficiency. In this case the half-sitting position can be created in a higher degree, even in 80°-90° (high Fowler) which is best to be supplemented by having the patient dangle his legs from the bed. An armchair may be suitable for this purpose. (Illustration 4. Half-sitting position with dangling legs)

Laying position in case of abdominal complaints. In case of abdominal complaints (injuries, abdominal cramps, inflammations) the pain usually originates from the muscular defense of the abdominal wall (defense musculaire). It may bring the mitigation of pain if we can have the patient tighten his muscles. The most suitable position for this is laying the patient on his back with his legs raised and bent in the knees. The patient might pick this posture up involuntarily. In this position a rolled up blanket or coat can be placed under the lower limbs of the patient. If necessary, it can also be resolved by someone holding the patient's raised legs. With this we can decrease the muscular defense of the abdominal wall and thus the pain as well. (Illustration 5. Supine position with raised legs)

Laying position of a seriously exsanguinated patient. The chapter on bleeding also deals with this laying position. Blood outflowing from the vascular passage endangers appropriate circulation that goes with serious consequences. Other than stopping bleeding, the so-called autotransfusional position can help delay the development of life dangering status. While arranging this position, the patient must be laid down on his back and both of his lower legs have to be raised in 60°. This way, taking advantage of gravitation, the blood flowing from the direction of the lower limbs towards the vital organs of the body, resolving the circulation of the seriously bleeding injured can be helped. (Illustrattion 6. Autotransfusional position)

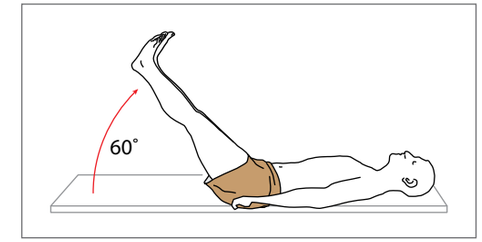

Illustration 10/6 Autotransfusional position in case of a patient in shock

Laying the patient in a prone position. It is a relatively rarely applied position that can be safely done primarily in case of strongly bleeding facial skull injuries. In this case supporting the chest and the forehead a little is needed. In such a position blood and discharge can leave towards the outer world freely and thus preventing potential aspiration or the swallowing of discharge. (Illustration 7. Position applied in case of facial injuries)

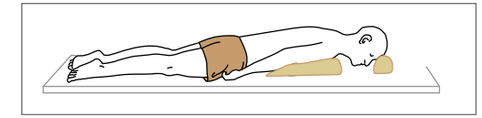

Illustration 10/7 Position applied in case of facial injuries

Special laying positions. If we notice venous circulation disorder (vascular occlusion) on either the lower or upper limbs of the patient then the given limb has to be supported in a slightly raised way and it needs to be brought to rest in every case. Unlike this, in case of arterial circulatory disorder (occlusion) the dangling of the given limb can help improve circulation and thus soothing the pain.

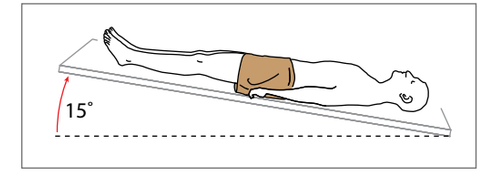

Illustration 10/8 The Trendelenburg position

Patients can also be positioned in special postures with the help of rescue technical devices. These are also used in health care institutions in performing certain interventions. In case of shock one of the most commonly used laying position is the Trendelenburg position when the patient lying flatly on his back is raised from the end of the bed in 15-20° which means about 30 cms. (Illustration 8. The

Trendelenburg position) Raising the bed from its head end the anti-Trendelenburg position can be created which can be advantageous in case the cerebral pressure is increased in the skull space. *10.1. video:* Ways of laying positions – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Fektetesek_kulonbozo_surg_helyzetekben_eng.wmv

The movement, escort and transportation of patients

Sometimes it becomes necessary to transport the patient or the injured from the location of the accident or upon request, to participate in the patients' transportation performed by the ambulance. The location that may be dangerous and the status of the patient always determines when the patient needs to be transported by all means. The optimal conditions that are necessary for moving and transporting the patient can be ensured only by the rescue technical devices that are apt for the patient's status.

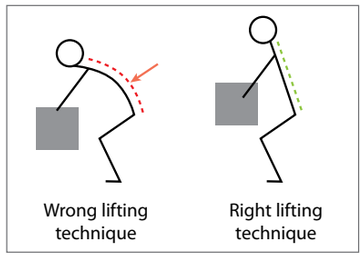

Illustration 10/9 Lifting techniques

On the other hand it can be stated that you should move the patient only if it is absolutely necessary and unavoidable (see rescuing). Never get involved in moving the patient beyond your own limitations since with this you may endanger yourself and you subject the patient to possible injuries thus worsening the patient's health status. If you are necessitated to move the patient, then always explain it to him before it is done and request hos cooperation. It is more ideal if several people can take part in the transportation but it has to be emphasized that one of them has to lead the activities.

While moving the patient, strive for a proper posture and the technique of lifting him. During lifting use your strongest muscles. The back should always remain straight, while upon lifting the patient the knees should be bent. The legs are in a wider straddle. (Chart 1. Lifting techniques)

Illustration 10/10 Leaning on the first aider

Lifting and transportation with a first aid provider

Physical support. If the patient is able to walk and it does not endanger his state of health, then location change can be attempted in cooperation with the patient while physically supporting him. (Illustration 9. Leaning on the fist aider)

A first aid provider can help the patient a lot too since he can unburden walking by the patient's leaning on him and putting his arms around

Illustration 10/11 Forming a two-handed saddle

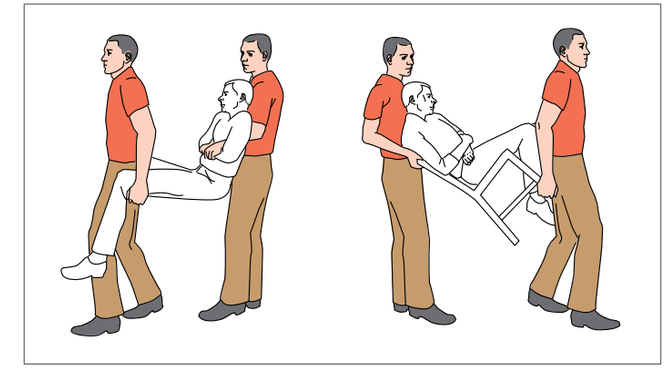

Illustration 10/12 Mobilizing the patient with two first aiders

his shoulders. It is ideal if two first aid providers can do it, since an abasic patient can be transported this way by ***forming a two-handed saddle.*** (Illustration 10. Forming a two-handed saddle)

Two first aid providers can mobilize the patient more easily, even in case of a longer distance, either by lifting him or with the help of a chair. (Illustration 11. Mobilizing the patient with two first aid providers)

Lifting a sitting patient *(Rautek manoeuvre)*. The patient often has to be lifted out of a chair, a bed or a car seat. Before starting to lift the patient, we should always make sure that this serves the purpose the best way and that we do not worsen his status by this. Assumed injuries must be checked (primarily spine injuries) because we can cause fatal damages with this manoeuvre. Further more, we have to make sure that we do not bump into physical obstacles during lifting the patient e.g. striking a leg or hand. Before starting to lift the patient we must inform him about the movements he can expect and about the potential limitations. Upon implementation we need to stand next to the patient in a so-called offensive pose, legs bent in the knees or hips if necessary, with a straight spine, slightly turning towards the patient. With your hand closer to the patient (dominantly the right

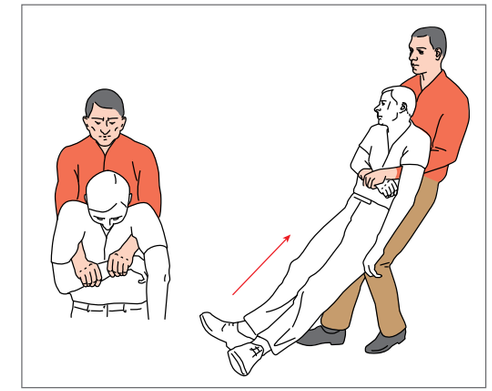

Illustration 10/13 Rautek manoeuvre

hand) reach out behind the patient's back carefully, while leading your hand under his armpit so that you can grab one of his lower arms under the elbow joint. With your other hand you should hold the patient's same lower arm over the wrist joint. Be decisive while lifting the patient and try to pull the patient's centre of gravity to your thigh closer to the patient, placed a little forward. Upon moving the patient, strive for pulling him with tiny backward movements. If you have a helper ask him to hold the legs. (Illustration 12. Rautek manoeuvre.) *10.2. video:* Rautek-manoeuvre – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Rautek_fele_mufogas_eng.wmv

Tray manoeuvre. A special method is needed in case of moving or lifting patients who are suspected to be spine injured. The coordinated work of several people are required for this. In an ideal case four people can perform it expertly whose direction is done by a helper (who counts) standing at the head (cervical spine) of the patient. The second person has to be at the patient's chest, the third one at his pelvis and the fourth person at the lower limbs (knee joint). Before lifting the patient, they should carefully put their stretched lower arms under the patient at the given points at the same time while all of them are next to the same side of the patient. The lifting happens with the same speed by counting and watching out for ensuring the motionlessness of the spine. Moving with the

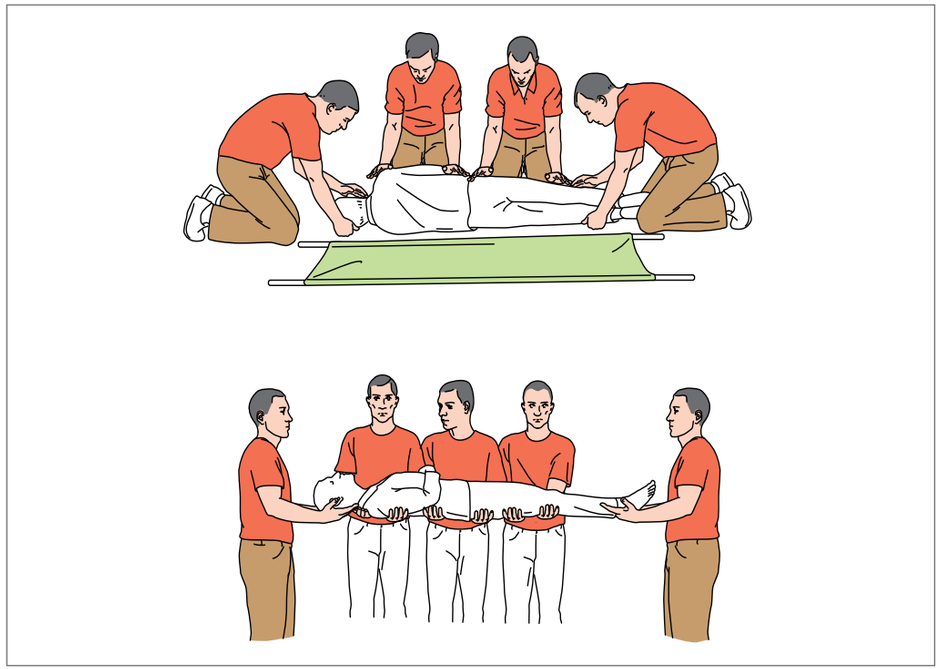

Illustration 10/14 Tray manoeuvre during moving a patient with spinal injury

patient can be implemented with small steps in one direction. (Illustration 13. Tray manoeuvre during moving a patient with a spinal injuriy)

In case of bicycle or motor-cycle accidents the removal of crash helmets may be needed. If the patient cannot be contacted and in order to ensure an open airway, the patient's neck and head need to be freed, we should carefully apply the manoeuvres to remove the helmet with the participation of two first aid providers. (Illustration 14. Removing a helmet)

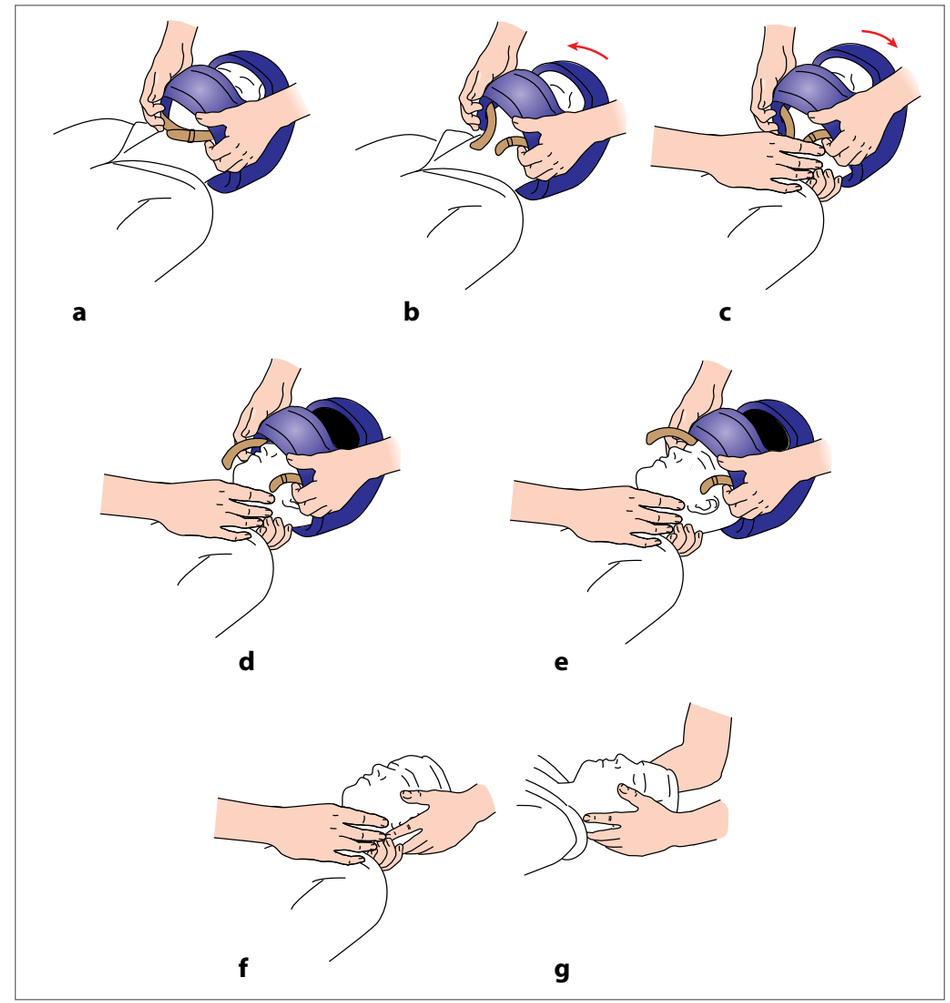

Illustration 10/15 Removing a helmet

Transportation by means of (carrying chair, stretcher, gurney)

For moving and transporting the patient rescue technical means can also be used. A chair or a door can be a simple tool as well. The carrying chair has been developed to expertly mobilize a patient. The transportaion of a bed-ridden patient can be done most easily with a stretcher. Taking ergonomical points of view into consideration several types of stretchers have been developed by now. (Illustration 15. Carrying chair, stretcher during application)

The observation of the patient during transportation

During moving or transporting the patient we must not forget about the changes in his status so it is best to keep the contact with him and to pay attention to his basic symptoms. Before and after transportation we always need to check the patient's status. If you notice worsening intervene and assist the patient where possible. Always escort the patient or participate in his transportation until he gets professional care e.g. the ambulance takes the patient over or transports him to an emergency facility or to a health care institution.

Illustration 10/16 Carrying a chair, stretcher during application

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11. Accident Occurences

By József Betlehem, Tamás Kőcse, József Marton-Simora and Gábor Nagy

The content of chapter

Accident mechanisms

Accidents are occurences that happen in everyday life which necessitate first aid. They can be simple household accidents, or ones related to free time activities or serious traffic road accidents that may **even** result in several injured people. During accidents minor or major injuries occur that can even put an end to the life of the injured. Injuries are difficult to define exactly; usually we consider injuries that cause damage to both physical and chemical factors of the body and affect the unity of these tissues in so far as they no longer function or are impeded from functioning adequately.

In Hungary about 7500 people lose their lives due to accidents in a year. Considering the frequency types of accidents among the adult population the household accidents that happen at home play a determining role (47.6%) in our country. They are followed by the traffic accidents accompanied by personal injuries (28.4%). Occupational accidents are not rare either (14.3%) which are mainly given reports about if they concern several people or if they potentially endanger one's health e.g. chemical pollution. In a statistical sense sport accidents are significant as well (9.7%).

The location reveals a lot about how serious a status the injured can be in, since serious accidents may be assumed on the basis of certain occurences. The signs of this can be if someone falls from high above (more than 5 metres of height) plummets from a moving vehicle, if the person falls onto a sticking out object, is buried for a longer period of time (more than 20 minutes) or is injured near an explosion. In case of road accidents it is important to clarify who was where during the accident e.g. the driver, passenger, pedestrian, motor-cyclist etc. because their injuries might bear certain characteristics and they may project the expected degree of seriousness in their condition.

Grouping the injuries

Injuries can be grouped according to the nature of the injured body part. Besides all of these other groupings exist, too.

According to the nature of the injured body part:

- Soft parts (skin, muscles, connective tissue)
- Bone and joint injuries (sprain, fracture, luxation)
- Neural injuries (peripheral nerves, spinal cord, brain)

According to the causes that evoked the injuries:

- Mechanical
- Heat
- Chemical
- Electricity
- Radiation

According to the appearance of the injury:

- Closed (covered) – without the interruption of the continuity of the skin and the mucous membrane – but inner injuries are possible
- Open – the continuity of the skin and the mucous membrane is interrupted, a wound is formed

Soft part injuries

Wounding (vulnus)

In respect of soft tissue injuries soft part injuries the continuity of the skin (mucous membrane) is interrupted which is often accompanied by the damages of deeper tissues. An external influence that exceeds the resistance abilities of the tissues may cause covered injuries in the deeper soft parts of the body like concussion, strain, bruises, sprain.

Important points of view from anatomical, physiological, pathophysiological and clinical aspects are:

- increased bleeding if the vasculature is larger (injuries of the face, head, outer sexual organs)
- the injury of a bigger vessel (vein, artery) running near the wound increases bleeding
- the bleeding area's height above the heart decreases and its further down location increases bleeding and pain.
- a higher systolic blood pressure increases and a lower one decreases the intensity of bleeding
- blood clotting disturbances and taking anticoagulants increase and prolong bleeding
- wounds in the areas with a lot of nerve endings (e.g. fingers, lips) may be accompanied by more significant pain
- pain can be increased by the spread of e.g. escharotic or irritating materials to the surface or the depth of the wound, foreign-body and personal tolerance
- wounds at an area of lower blood supply are more susceptible to infections
- the complication-free healing of wounds is also important due to aesthetical points of view (cicatrization)
- the basic condition for the primary healing of wounds is to unite the margins of the wound in time (within 4-8 hours)

The characteristics of wounding, the significance of first aid care

Wounding by itself or jointly with other injuries (fractures, luxation, organ injuries) may go with bodily consequencies that disturb the functioning of other organs, body regions or the whole body but it

can also have a psychological aftermath. These can lead from faint, through shock caused by excessive bleeding to a septic status. In organizing the 'patient's path' it is a determining factor to have the patient's wounds being taken care of in a finalized manner as soon as possible but definitely within 4-8 hours. Generally this is not done in basic health care facilities but only at emergency surgical or traumatological facilities. The appearance of larger wounds, the occurence of significant bleeding or pain usually justifies contacting the ambulance service the ambulance (104). Early and adequate first aid care is able to decrease **bleeding, pain and infection** which are general caharcteristics of wounding and it is also capable of decreasing the degree of all the other consequencies.

The significance of bleeding and its types. Bleeding is the most conspicuous consequence of open wounding. It motivates intervention but it also might evoke fear in the ones on the spot. The amount of blood lost externally or internally from within the tissues, the pain and the functional disturbances of organs pressed by the haematoma that was formed mean the most common danger to the injured. Danger to life can also be caused by e.g. blood leaking to the airways or haematoma, pressing cerebral substance in the skull cavity, or pressing the lungs in the thoracic cavity.

The amount of blood may be difficult to estimate; the general status of the casualty has to be basically considered. The total amount of blood makes up 9% of the body mass which comes to 6.3 litres in case of a person who weighs 70 kgs. Depending on the amount of lost blood we can expect the consequences listed below in case of an adult:

- losing 500-600 mls (15%) of blood usually does not cause any considerable disturbances,
- the fast loss of 600-1500 mls (30%) of blood may induce an exsanguination shock,
- Losing 3000-4000 mls (over 30%) of blood may lead to death in case of an adult.

At first the body tries to compensate blood loss mainly by the increased functioning of the sympathetic nervous system. According to this, in case of increased blood loss respiration and the pulse becomes fast, the skin turns pale and and moist and then if this compensation is not sufficient, blood pressure decreases. First the injured becomes anxious, then apathic and finally the loss of consciousness and circulation standstill occurs.

Capillary beeding. Capillary bleeding is red, sometimes mixed with tissue fluids, it leaks and almost never causes danger to life. In case of normal blood clotting it ceases by itself in a few minutes.

Venous bleeding. It is darker in colour, leaks continuously and its intensity depends on the size of the injured vein and the pressure inside of it. This pressure is partly influenced by the distance from the heart and partly a potential circulatory obstruction (e.g. strangulation). In case of a standing patient blood might be shooting out in a thin spurt from a vein through a narrow opening.

Arterial bleeding. It is of bright red colour if it is not mixed with venous bleeding, it is usually discharged in a pulsing way or it shoots out from a wound near the body surface depending on blood

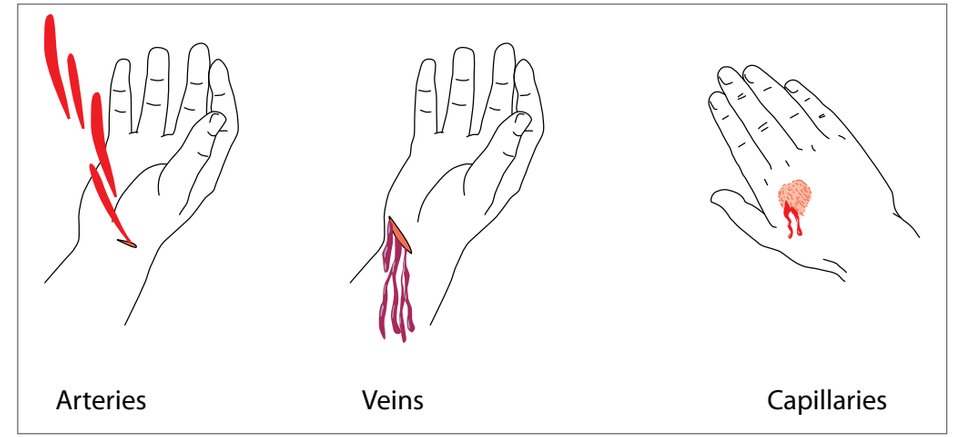


Illustration 11/1 Types of bleeding

pressure. It is characterized by the small arteries not clotting due to the pressure of the blood continually keeping the injured artery open. The clot (thrombus) normally is prepared to fill the injury. Depending on the size of the injured vessel this type of bleeding can lead to fainting, the development of bleeding shock or full exsanguination (aorta, common carotid artery, femoral artery) in matters of minutes. Upon cutting the artery completely through, the vessel quasi withdraws and its narrowing to a certain extent by its own musculature can mitigate bleeding.
The bleeding types listed above naturally also occur in a mixed form which can make assessment more difficult. (Illustration 1: Types of bleeding)

Wound pain as an accompanying symptom. Wound pain depends on the size of the wound, the injuries of nerve endings, secondary influences (wound dehiscence, drying out, irritating substances getting into the wounds). The intensity of the pain can spread from the level of a hardly noticable discomfort to an expressly big pain level.

The infection of wounds. Infection is an existing danger in case of every wound. Injuries where impurities that are difficult to remove are especially susceptible to infections that may get to the wound from the instrument that caused the injury or from the injured body part. Other than this the infestation of wounds is also influenced by the blood supply of the wound and its area. A region with good blood supply is less likely to get infected. The optimal healing of wounds is fundamentally effected by warding off the threatening infection. Consequently among the given circumstances on the spot you should strive for the sterile cover of the wounds as soon as possible. During the provi-

sion of first aid, the first aider must always endeavour to work with clean hands, and the use of sterile gloves where possible, to help limit the degree of infection.

Types of wounding

According to the origins of causes wounds most often come into being mechanically. There are also wounds of a different origin (that of thermic and chemical origin) that will be discussed in a separate chapter. *11.1. video:* Mitigation of bite wounds – www.tamop.etk.pte.hu/elsosegelynyujtas

The **types of open wounds of mechanical origin** are usually well recognizable but once in a while it can be misleading that behind the wound that looks like a cut there is a stab wound or under the lack of epithelium a serious bruise, fracture or some other injury of an organ was developed in the deeper layers. A frequent **closed injury** is the **bruise** (contusion) that goes with pain and functional loss due to the damages of the deeper tissues (with the development of interstitial haematoma/ oedema).

The **types of the open wounds** are as listed below:

Abrasions cause the surface layer of the skin to be removed. On a coarse surface the object removes the epithelium layer as if it were a piece of sandpaper cutting through the nerve endings that become uncovered, the pain is significant. The bleeding in this case is usually capillaric, sometimes mixed with tissue fluids. Healing is usually delayed by the micro-organisms that get to the wound from the surface that caused the injury. (Picture 2: Superficial epithelium injury – abrasion)

A contusion wound (vulnus contusum) is developed either by a hit given off by a blunt object or when a body area over a bony base (e.g. head or knee) is banged to a hard surface. The margins of these wounds are zigzagged, irregular, partly undercut and there is often a haematoma in the area of the wound. The pain can be considerable, the bleeding is relatively minor due to the favourable conditions for blood clotting. Healing depends on the depth and size of the injury. We speak of a bruise (contusion) if the skin surface remained intact as a result of the above described circumstances. (Picture 3: Contusion) **Conquassatio** is a serious damage of the deeper tissues that usually results in necrosis. It is a serious form of contusion. It is often complicated with bone, vessel and nerve injuries and limb amputations. Besides the varying degree, generally minor bleeding pain can be serious and there is a pronounced proneness to infection. (Picture 4: Conquasation)

Illustration 11/2 Superficial epithelium injury - abrasion

Illustration 11/3 Contusion

A **incised wound** (vulnus scissum) and a cut wound are caused by a sharp object when one or more layers of the skin are cut through maybe even the deeper soft parts and often larger vessels are also cut. The direction of the cut is parallel in case of incised wounds and perpendicular in case of cut wounds. Since the margins of the wound are intact the wound can be patulous, bleeding is serious, it might even be dangerous to life, the danger of pain and infection is smaller. These wounds heal well upon proper care. (Picture 5: Incised and cut wound)

A **stabbed wound** is generally caused by a pointed object. In case of a penetrating injury we can also find an in-going and an out-going opening. The shape of the wound is defined by the piercing object. The stabbed wound does not reveal the depth of the piercing passage and neither reveals what kind of tissue or organ was injured there. These wounds claim an extra attention. Bleeding can be significant, even life threatening and it can be seen only partially. The danger of infection is high. (Picture 6: Stabbed wound)

Illustration 11/4 Conquassatio

Illustration 11/5 Incised and cut wound – vulnus scissum et caesum

Illustration 11/6 Stabbed wound – vulnus punctum

A **ruptured wound (**vulnus lacerum**)** occurs if the piercing instrument moves sideways and with this it pulls the soft parts along with it. The wound can be distended, irregular, deep and flapping. The pain and the danger of infection is significant. Bleeding usually ceases soon, infections are relatively common due to the patulous wound and the developed bags. (Picture 7: Ruptured wound)

Illustration 11/7 Ruptured wound – vulnus lacerum

Bite wounds (vulnus morsum) are ruptured wounds caused by animals or human teeth. They can go with lack of tissue and regional haematoma dut to the squeeze of the teeth. Pain can be expressed, the danger of infection is outstanding (tetanus, rabies). (Picture 8: Bite wound). *11.1. video:* Mitigation of bite wounds – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Harapott_sebzes_eng.wmv

Gunshot wounds can be characterized by a smaller in-going opening and depending on the type and speed of the projectile a varying size of out-going opening. In the shooting passage any organ or anatomical formula that got in the way of the projectile can get injured causing danger to life through either external or internal bleeding. The injury of vital organs can lead to death immediately or in matters of minutes. (Picture 9: Gunshot wound)

Illustration 11/8 Bite wound – vulnus morsum

Illustration 11/9 Gunshot wound – vulnus sclopetarium (entry and exit opening)

During **traumatic amputation** upon a large power input the connection of a limb, a part of it, or another organ (ear, penis) is broken partially or completely with the other areas of the body. It may be characterized by extensive bleeding which may be life threatening. The option to surgically replace the severed limb is a surgical decision in all cases of complete or partial amputation.

Primary wound care

Mitigation of bleeding

In case of significant bleeding the most urgent job is stopping the bleeding which also preceeds factual wound care.

General things to be done in bleeding mitigation

Creating security: Creating the safety of care is of fundamental importance before beginning any first aid intervention. This means selecting the appropriate safe environment, eliminating the options for further injuries, using rubber gloves (or a plastic bag) as far as the first aid provider is concerned.
Positioning the injured: The injured should be laid or definitely made to sit down.

For avoiding the tendency to faint due to the vegetative disturbance caused by the loss of blood or the sight of blood or the wound it is absolutely necessary to lay the patient down as soon as possible or at least make him sit down, depending on the circumstances. By proper positioning we can avoid the patient's worsening of status and also further injuries in case he would collapse. The method for positioning a patient who lost a lot of blood is a **flat position with raised lower limbs** (autotransfusional position). If the circumstances give a chance for it, we can create a so-called Trendelenburg position by raising the foot higher than the head and thus making a sunk position (see chapter 10.).

The steps of bleeding mitigation

- *Release every restriction* above the place of the bleeding, even if it is a tight piece of clothing or strangulation done by somebody else. A clamping bandage is mistakenly still often used nowadays, causing venous congestion and thus increasing bleeding with it.
- *The Esmarch clamping bandage* (tourniquet) generally must not be used in first aid. It can be chosen only as a final method e.g. in case of amputation. If you are forced to clamp the artery afterall preferably use a wider piece of textile that does not cause tissular destruction. The essence of the method is to bandage the given limb with a triangular head scarf folded to be about 4 cms wide and then with a stick led through below the bandage it has to be twisted until the bleeding stops. The strangulation must not be left on the patient for longer than 90 minutes in any case. If a bood pressure measuring device is available on the spot you can

arrange an arterial restriction in the proper way with its cuff if you pump the pressure inside it over the systolic figure.

- **Raise the bleeding limb or body part over the height of the heart.** The majority of venous bleedings can be temporarily stopped with this method.
- **Bleeding mitigation with compression at an arterial pressure point** is justified if bleeding does not stop as a result of raising the bleeding part of the body and releasing the bandages, in which case the bleeding is usually of arterial origin. The essence of the method is to compress a part of the bleeding artery at a proximal point with one or more fingers or with a fist. Doing the compression at a section over a bony basis the prior pulsating bleeding ceases.

  The most important compressive points available in case of arterial bleeding are listed below:
  - the *common carotid artery* in the height of Adam's apple at the front edge of the sterno cleido mastoid muscle
  - the *subclavian artery* can be pressed to the first rib in the ditch behind the clavicle
  - the *brachial artery* in the inner side of the upper arm at the inner edge of the double muscle (biceps) can be pressed to the upper arm bone
  - the *femoral artery* under the groin curve sideways from the bulge of the pubic bone about two slant inches pressed to the thigh bone
  - the *superficial temporal artery* in front of the cartilage shell bordering the external auditory passage from the front can be pressed to the temple
  - the *facial artery* at the ridge of the lower chin bone immediately next to the front edge of the chewing muscle (m. masseter) can be pressed to the jaw.

    In exceptional cases (upon the bleeding of both thighs, upon atonic womb bleeding) the compression of the abdominal aorta might be needed. In this case we strongly press the abdominal wall in the height of the navel with our fist. (Picture 10: Aorta pressure points)

- **Compression at the place of bleeding** is necessary if there is no available pressure point at the area over the injury. In a case like this the bleeding vessel has to be pressed directly. This solution is chosen in lack of other options due to the impurities with the blood. Preferably disposable gloves should be put on before the compression.
- **Bleeding mitigation with a pressure bandage** takes over the one discussed in details previously. Its method is the following: If bleeding ceased upon raising the limb or compression with a finger, then there is time for attending the wound (see below). **Cover the area of bleeding with a sterile cut gauze** (in case of a deep wound with lacking tissues tampon it with sterile gauze) and then put a harder **pressure pad** (gauze roll, folded cut gauze) over the sheet. With this we quasi press the bleeding vessel together. We can maintain the pressure with hand or change it to bandage. When a pressure bandage is made the gauze strips should be led in the shape of the number 8 on the limb and the gauze should be crossed over the wound or it may be turned around above the wound. If the tamponing strip is not

high enough put another one over it and arrange it there tightly. A pressure bandage has to be made tighter in case of arterial bleeding and less tight in case of venous bleeding. You need to watch out for avoiding venous congestion due to the tight bandaging. In this case you can even consider loosening the bandage if it does not increase bleeding. An applied pressure bandage can be removed only by qualified health care staff. *11.2. video:* Mitigation of bleeding – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Utoeres_verzes_ellatasa_eng.wmv

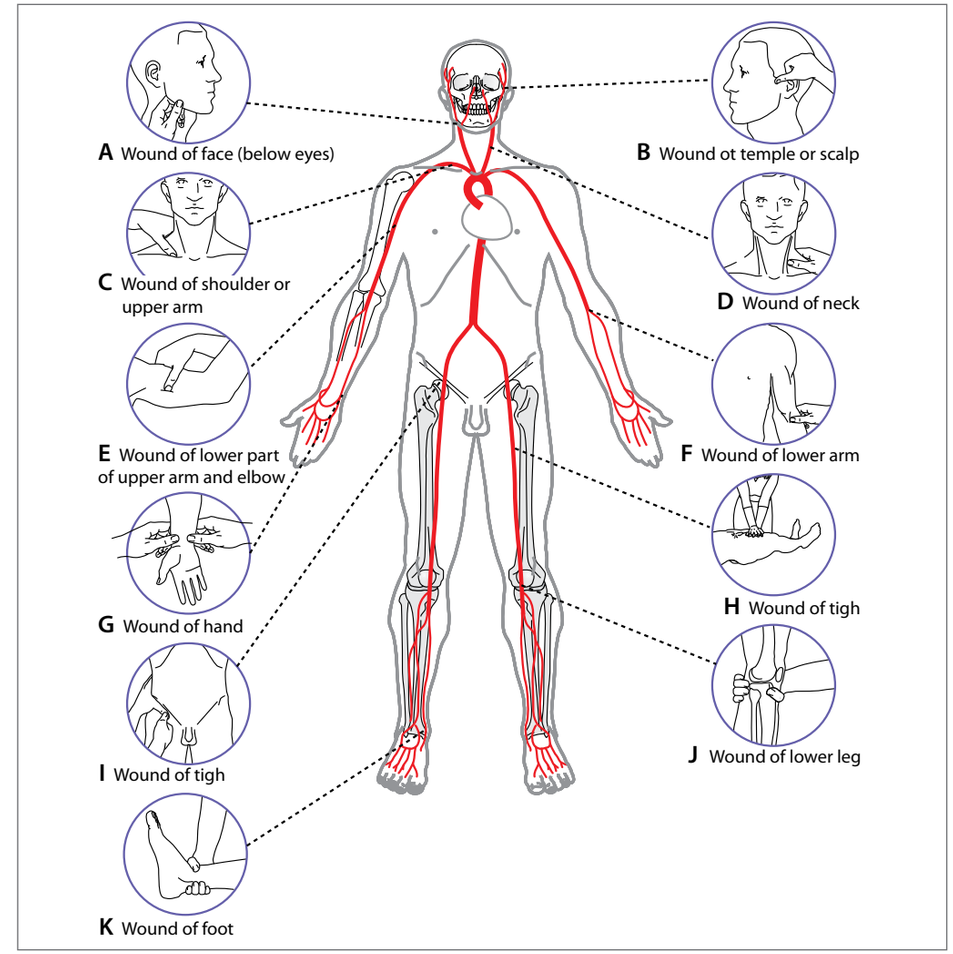


Illustration 11/10 Arterial pressure points

Bleeding mitigation of special areas

Nose bleeding can be caused by blowing one's nose, picking in it, injuries, high blood pressure or maybe complications due to bood clotting disturbances. In cases like this the vessels of the nasal septum are injured. Starting from the inconveniences of slight bleeding it can increase to life threatening exsanguination. In case of an unconscious patient it can lead to airway problems.
Make the patient sit down and bend forward and the wings of the nose should be pressed forward with your thumb and index finger (the patient himself can do this) for 10 minutes. He should keep his mouth open and breathe though it. The patient should not swallow because that can move the developing blood clots. (Some authors recommend e.g. a cork to be placed in between the teeth to prevent swallowing.) Observe if blood is not flowing down the pharyngeal wall because swallowing that might induce vomiting blood. Calm the patient and put a cold press on the back of his head. If the patient has high blood pressure we need to decrease that. After 10 minutes release the pressure and check if bleeding ceased. If it did not repeat pressure for another 10 minutes. The intake of some blood pressure decreasing medicine might be necessary. After half an hour of bleeding ask for help from the ambulance. When the bleeding stops the patient should avoid bending over, coughing, sneezing, picking his nose. The nostrils have to be covered with a sterile sheet and a sling bandage.

Bleeding of the mouth cavity most frequently happens after having a tooth pulled, upon the injury of the gums, lips or tongue. By turning the patient's head sideways we can facilitate the outflow of the blood through the mouth. We press a sterile dressing to the place of the bleeding (have the patient bite on it) for 10 minutes and then we check the situation. The process is repeated twice if necessary. Over 30 minutes of strong bleeding request help from the ambulance. The patient should avoid rinsing his mouth, using a toothbrush, eating and having hot drinks.

Primary wound care

The **detailed things to be done in wound care** follow the mitigation of bleeding. The primary goal is to decrease infection and pain.

Cleaning the wound area is vital in the prevention of infection.. It can be done with clean water or in case of oily impurities, with wound benzine or alcohol. Alcohol and benzine must not get into the wound. Do not remove an embedded **foreign body** because it can cause internal bleeding bleeding in the body on one hand and upon blindly pulling it out it we can cause further injuries on the other hand since the curvature and shape of the object that caused the stab is not always known to us (e.g. the blade of a knife may curve upon stabbing, a shard of glass can be crescent). We anchor these objects in the wound with a support bandage on both sides of the foreign body.

In the Hungarian practice usually an iodine solution called Betadine, Braunol is used (betaisodona, it contains free active iodine) for **disinfecting wounds**. (We have to ask the patient about being allergic to iodine.) The 4.5-18% (1 tablet to 100 ml of water = 1%) watery solution of Hyperol (carbamide peroxide) is recommended for cleaning impure wounds.

By the **sterile cover of the wound** we can decrease the chances for further infections, wound opening, the pain due to wound's drying out and the emotional shock that impacts the injured and his environment. We fix the sterile cover of the wound covering the lip of the wound by 1-3 cms either with adhesive tape or by circumductive swaithing. The sterile dressing covering the wound needs to be put on strongly bleeding wounds in thicker layers. The bandaging is fixed by adhesive plaster or swaithing. The adhesive tape does not stick on wet or hair-coverd surfaces and we need to take the sensitivity of the skin into consideration, too. Bandaging must not be either too loose or too tight, since the latter might cause the wound to open. Among the available lints, other than the traditional sterile gauze, recently there is also gauze with a metal (aluminum) cover on its surface available which stick to the wound to a lesser degree and have a bactericidal effect.

Raising the injured area decreases the congestion of the blood and further haemorrhage, a **rest position** is favourable for blood clotting. **Fixation** is also justifiable in case of wide-spread wounding.

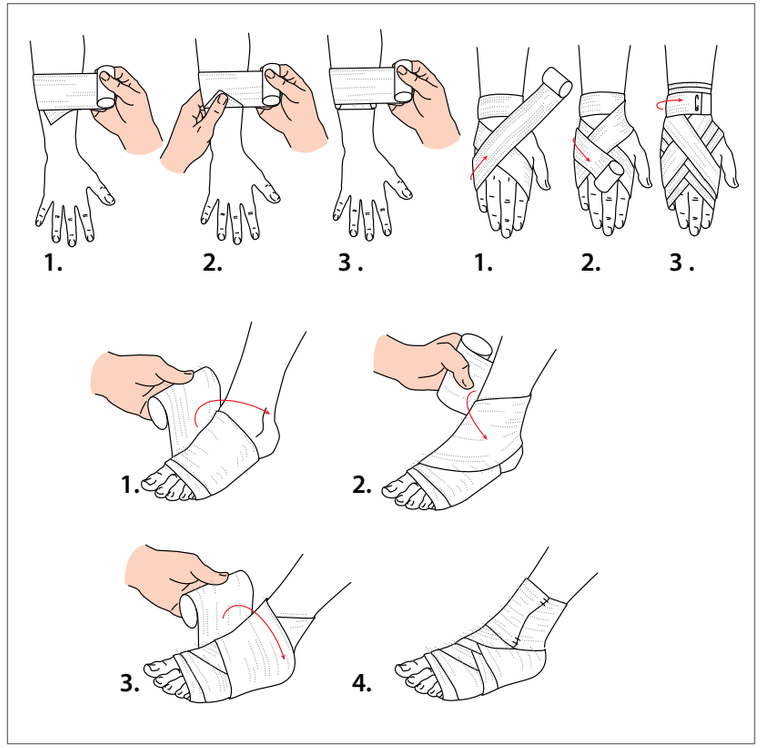
Upon the care of an **amputatum** we prevent its drying out by wrapping it into foil (household foil or plastic bag) and then we transport the injured preferably accompanying him to the given institution having a plastic bag containing icy water to place the amputated limb in. If possible the limb should have been wrapped in a sterile dressing or if not, any clean absorbent cloth. The amputatum must not be frozen in any case!

In the care of **bruises, damages, sprains** that are without an open wound or in case there are deeper injuries near the wound **local cooling** decreases haemorrhage and pain. The method for this is to put a plastic bag containing melting ice not directly onto the skin but to press it to the injured area. Applying a cold press can be repeated in time following the hours or days of the injury.
11.3. video: Primary wound care – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Elsodleges_sebellatas_eng.wmv

The main types of bandages. Nowadays tube-net bandages, as the fixation material for covering wounds, are available at a lot of places but in lack of adhesive plaster and regular and tube-net bandages might be needed. In this case after having covered the wound we begin fixation holding the end of the swaithe in our left hand and partly pressing it on top of the bandage over the wound with 3-4 swaithing circumductions. If it is a wound of a larger surface then further swaithing circumductions might become needed that we can do with twists in a way that the bandage spirals cover one another to a smaller or larger degree (slight or steep twists). Having taken care of the wound

and the cover we finish swaithing with 3-4 circumductions again and we fix the end of the bandage either with an adhesive plaster or with a bandage by cutting the swaithe in the middle and tying it or maybe by crumpling it under the bandage. (Illustration 11: Bandages; Illustration 12: bandages with a triangular sling)

Illustration 11/11 Bandages (circular, spike, eight)



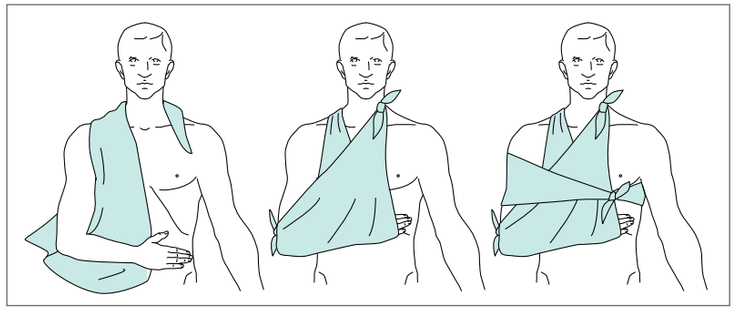


Illustration 11/12 Bandages with a triangular scarf

Illustration 11/13 The most common items of a first aid kit

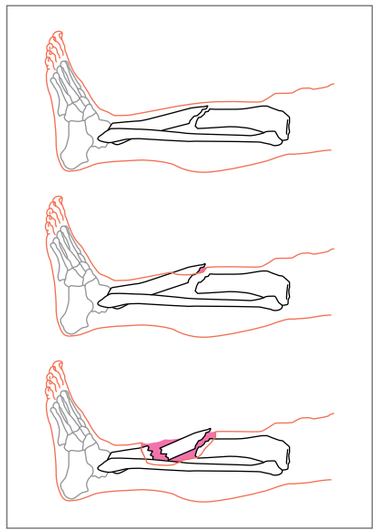
Means of wound care. In everyday life immediate wound care within fist aid may be needed at home, at work or at school. For doing it expertly it is indispensable to use proper means. Among institutionalized circumstances there are standardized requirements about the types of first aid kits to be possessed. These are categorized according to the Hungarian Standards (MSZ) depending on the number of people who potentially need care and they are apt for being used on public roads, in public institutions, at work. It is to the purpose to keep some means and materials needed for wound care at home, too. The most commonly used materials are:

- Disinfectants: Betadine or Braunol solution
- Materials to cover wounds: 1/2m by 80cm sterile gauze; 1/4m ny 80cm sterile gauze; 6cm bx 60cm sterile cut gauze; 10 cm by 10 cm sterile cut gauze
- For fixation: 6 cm by 5 m gauze bandage; 10cm by 5m gauze bandage; 15cm by 15cm gauze bandage (fringed or unfringed)
- For fixation: adhesive plaster, tube-net bandage (in different sizes); triangular scarf
- Materials to cover wounds and to fix bandages: sterile gauze bandage 6cm by 5m; 8cm by 5m; 10cm by 5m sterile gauze bandage. Other than these adhesives in different sizes and shapes. (Picture 13: The most common belongings of a first aid kit)
- Other means: scissors, splinter tweezers, disposable rubber gloves, hand cleansing tissue, safety pin

Fracture, distortion, luxation

The disrupture of the continuity of bone tissue is called **fracture** which is usually caused by external mechanical force but they also occur in certain diseases when they happen as a result of physical burdening, they are the so-called spontaneous (pathological) fractures.

The grouping of fractures can be done in various ways:



According to its appearance (Illustration 14. The appearance of open and closed fractures):

- Closed fracture: at the given area the continuity of the skin is not disrupted due to the fracture
- Open fracture: due to the fracture the continuity of the skin is disrupted.

According to the disruption degree of bone continuity:

- Partial fracture: the bone does not break in its full cross-section
- Full fracture: the bone breaks in its full cross-section

Illustration 11/14 The appearance of open and closed fractures

In case the external influence has an impact on the joints, its parts (ligament, joint capsule, joint surface) can get injured, too. An injury is called a distortion when the articular head leaves the socket (cotyle) but after the force impact ceases the articular head returns to its normal anatomic position.

In case of luxation the force impact is generally of such degree or direction that the articular head moves out of its socket but after the force impact ceases it does not (spontaneously) return to its place. In a case like this the joint is deformed and a pathological articular position is formed. We usually feel it if we move the luxated limb and it is as if some strong rubber held it in that position or in other words the **joint is flexibly fixated (in a pathological position).**

It is important to emphasize that upon a given outer force several kinds of injuries can come into being which largely depends on the individual faculties of the patient (on his tissue build-up). Based on these a given force may cause distortion in one individual and luxation or even fracture in another

one. Fracture, distortion and luxation show similar signs/symptoms so sometimes this type of injury can only be suspected.

These sign of suspicion are the following:

- pain
- deformity
- decrease or loss of function
-

However fractures also have certain signs as:

- rough change in shape/form
- audible bone crack
- pathological mobility
- open fracture (visible bone end)

During the examination of the patient try to find these signs. It is possible that pathological mobility and bone cracks are discovered upon touching or slightly moving the given region of the body. In case of limb fractures the examination of the pulse and sensation can be important, which was already discussed in the chapter on the patient's examination. While doing this, examine the patient's pulse distally from the injury and whether he feels if we touch him (maybe compared to the uninjured side). In case of freactures bleeding always occurs as well. Depending on which part of the body was injured bleeding can be significant. (Illustration 15. The strength of bleeding during fractures)

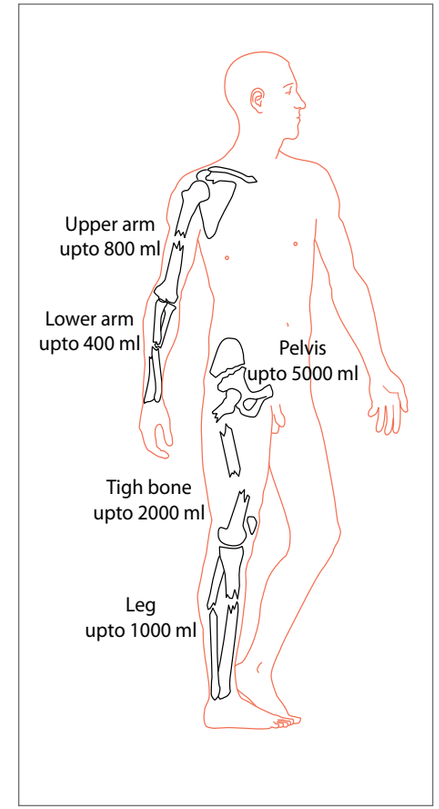


Illustration 11/15 The strength of bleeding during fractures

General care

Neither of the above mentioned injuries can be surely distinguished from each other and they are also often combined so the principles listed below should be followed upon their care:

- Make sure that both the injured and you are safe.
- Assess the danger of potential spine injuries
- If there is no danger of spine injury thoroughly examine the patient. In case of spine injury the examination can be done carefully without moving the patient.

It is important to note that many times other regions of the body can also be injured than the one/s he complains of or that are obvious.

- The very first thing to be done is to put the injured part of the body to a rest position. If the patient is conscious ask him not to move his injured body part (but they usually do not force that anyway) and you should not move it unnecessarily either.
- The fixation of the injured body part is important (but not compulsory) in cases when help can be expected soon.
- Fix the injured limb in a way that the two neighnouring joints are also fixed.
- In case of the fracture of long tubular bones pulling applied in the vertical axis of the bone mitigates pain, it helps the restoration of the out-of position fractured ends.
- In case of the fracture of limbs remove jewellery and clothing from the injured body part, the circulation of the given body part will improve by this
- The patient has to be taken or he has to go to hospital in order to be diagnosed and given up-to-date final care.

Injuries according to body regions (soft parts, fractures, nervous system related)

Injuries of the head

Fractures of the top of the head

The fracture of the skull can occur in several ways. It can be:

- Linear fracture (there are no moving, or pressed in pieces)
- Impressional fracture (a well-defined fracture of the calot when the skull is broken at one place but the broken part is not torn apart but just pressed inwards)
- Depressional fracture (a piece of the calot is broken out and damaging the cerebral substance moves towards it)
- Hole fracture (a type of depressional fracture when a piece of bone is (concentrically) broken out of the fornix.

Each type of skull injuries can be accompanied by haematoma that is formed over the injury and that can disguise the typical (tactile) symptoms. In case of linear fracture there is no other sign than the haematoma. In case of impressional, depressional and hole injuries the skull is pressed in, a deepening can be palpated above its missing part. The knocking sound of the skull can change in each case.

Care. In case of conscious patients we raise his head – upper body in a 15-20 degree angle watching out for the cervical parts not to be broken. We provide care for the injuries on the head according to the general care protocol.

In case of an unconscious patient a recovery position is recommended. An ambulance should be called to the patient.

Basilar fracture of the skull. We distinguish between 3 types of basilar fracture of the skull, depending on which scala it is localized with.

- The frontal basilar fracture (scala anterior) is characterized by a connection that came to being between the nasal cavity and/or the eye socket and the cranial cavity. As a result of this liquor flows from the nose (due to the injury of the dura mater) which is generally mixed with some blood so it is of light red, pink colour. Since there is this connection with the eye socket, a typical deformation is the development of a haematoma around one or both of the eyes.
- In case of a central basilar fracture (scala media) there may develop a pathological connection between the cranial cavity and the auditory passage, the tympanic cavity as a result of the fracture and fluid mixed with blood might leave the ears at such times. Naturally fluid flows from the tympanic cavity only if the eardrums are also injured.
- Upon the posterior basilar fracture (scala posterior) a pathological connection is developed with the region behind the laryngeal wall and the back of the neck (nucha). In this case bleeding makes the laryngeal wall bulge forward and can be seen though the mouth or we can make the conclusion about it from the swelling in the nucha area. Noticing this type of injury is often difficult.

Care. Frontal and central basilar fractures are considered *open fractures* since a connection is developed between the cranial cavity and the external world. Due to the danger of infection and because the complications originating from this can be serious, this injury has to be cared for as soon as possible. In case blood/liquor flows from the patient's nose/ears, applying a covering bandage is necessary. The nose and the ears must not be tamponed.

A conscious patient's head – upper body should be raised in a 15-20 degree angle as it was described earlier. In case of unconsciousness the patient shouls be placed in a recovery position in a way that blood/fluid could leave freely. An ambulance should be called to the patient.

Injuries of the facial skull

Fracture of the nasal bone. The nose is made up of thin bones, consequently they get injured relatively easily. The fracure of the nasal bone is characterized by rhinobasal pain, swelling and deformity and difficulty of breathing through the nose. The injury of the nose is often accompanied by nose bleeding.

Care. In case of nasal bleeding a sling bandage is necessitated. If the nose does not bleed the potentially deformed nose has to be put back in its place so further medical care is needed. Other additional injuries must be considered.

The fracture of the upper and lower jaw bones. A larger force is needed to break the upper jaw bone (maxilla) and the lower jaw bone (mandible). It is characteristic of their injury that a swelling, a haematoma, sensitivity to pressure and pain develops at the place of the force impact. When their injury is suspected the edges of the given bones and the patient's teeth and gums have to be examined, the potential development of scales have to be carefully inspected and/or touched. For the patient moving his mouth and biting are usually painful and difficult.

Care. In case of fracture of the lower jaw bone a sling bandage has to be put on the patient's chin and an ambulance must be called. If there is bleeding from the facial region or the mouth the patient has to be laid face downwards (leaning his head on his lower arm) so that bleeding does not cause aspiration, and breathing is not impeded.

Jaw luxation. The mandible head can leave its socket upon a larger force impact but it can also happen while yawning to individuals who are susceptible to it and thus the luxation of the lower jaw bone (mandibular luxation) is created. At such times the patient usually signals strong pain according to the joint and generally he cannot shut his mouth and cannot speak.

Care. During first aid provision we do not put the luxated jaw back to its place but we can stabilize the patient's jaw by placing a sling bandage on the genial process.

Injuries of the eyes. Though the eyes are located in secured cavities, we can still come across their injuries. The most common reasons are some sort of foreign-body (dust, insect, anvil dross etc.) or maybe some corrosive material getting into the eyes. Its signs are stabbing, burning pain, maybe obscured vision and increased tearing. A foreign-body getting into the eyeballs may cause an injury too.

Care. Ask the patient to open his eyes so that you can see where the foreign-body is. The eyelids can be carefully opened with two fingers and its rinsing through can be attempted by slowly pouring clean water from a glass going from the inner canthus towards the patient's shoulder on the same side. Prior to this a towel is to be put on the patient's shoulder. Afterwards both eyes need to be covered with a sterile bandage.

Injuries of the brainpan (neurocranium)

Concussion (cerebral commotion), cerebral contusion. Independent of the external/visible injuries due to force impacts on the skull and face, the cerebrum can also get injured.

Concussion (cerebral commotion). Its symptoms are:

- short loss of consciousness
- amnesia
- headache
- somnolence, weariness

- nausea, vomiting
- dizziness

In this case there is no demonstrable neural damage, usually the functioning of the neurons is temporarily damaged.

Cerebral contusion. In this case neural damage is already detectable that fundamentally determines the symptoms. The patient's symptoms can vary depending on which region of the brain could have been damaged by the force impact. Subsequent to the injury brain swelling and bleedings of different degree can also occur that can pressurize the brain substance more and more. The developing bleed can break in between the meninges or to the cerebral substance. Consequently its symptoms can be:

- Initially the symptoms of this status can be identical with that of cerebral commotion.
- Disturbed consciousness, disturbed awareness
- Vomiting – radiant vomiting
- More and more worsening headache
- Epileptiform spasms
- Organoleptic and locomotor damages
- Deviations of the pupils
- In serious cases the vegetative symptoms of insertion (bradycardia, slow breathing count, increased blood pressure)

Injuries of the neck

Moving the head in case of suspecting the injury of the cervical spine is prohibited. Strive for stabilizing the head and by this the cervical spinal section as well. The movement of the head in any direction, e.g. turning it sideways due to vomiting or tossing one's head back due to breathing difficulties, may cause the injury of the spinal cord.

Other than suspecting the injury of the cervical spine the irregular position of the head/neck, a swelling along the cervical spine that can be sensed upon touching, discolouration, scale formation etc. may refer to the injury of the cervical spine. The injury of the cervical spine may be accompanied by the damage of the spinal cord running at that place which can cause respiratory paralysis, especially if the injury occurred above the 4th cervical vertebra, or even paralysis spreading to all of the limbs.

Several important formations can be found on the neck, the injuries of which can cause a state that is dangerous to life. The injuries of the vessel formations (the carotid and its branches or the jugular and its branches) may lead to serious bleeding, the injury of the trachea can lead to respiratory insufficiency.

Care. A helper should try to slightly pull the head in the direction which is identical with the vertical axis of the spinal column and stabilize it this way until the ambulance arrives. In case of accompanying consciousness disturbance the patient's airways have to be kept clean.

Injuries of the spine

Spinal injuries including the injuries of the cervical spinal section have to be suspected based on the accident mechanism and caring must be implemented accordingly. The most common accident mechanisms are: the serious car accidents (48%), falling from high above (21%), penetrating injuries (15%), sports related injuries (14%) and other (2%). The mostly injured sections of the spine are the 5-7 and 1-2 vertebrae of the neck and the 12 lumbar vertabrae. Nowadays spinal injuries can be unambiguously rendered if there is a car accident due to high speed, if a person has fallen down from a height three times bigger that his own height, if an agressive injury happened near the spine (stab, shot) or if there is high force sport accident. All of these can be made more serious by osteoporosis or older age.

Pain, painful movement that may appear either near the spine or radiating along some nerve can refer to spinal injuries other than suspecting it.

Besides the potential deformities, symptoms of the nervous system accompanying spinal injuries (movement , sensing and vegetative disturbances) are generally developed if the spinal cord and the exit nerves of the spinal cord respectively are also damaged. It can also happen the other way around, namely that besides the deformities that seem serious there are no noticable sign/symptoms referring to neural damages.

In case of the injuries of the upper cervical spine the innervation of the diaphragm (and the intercostal muscles) may cease and by this breathing may cease too. Upon the injuries of the lower section of the cervical spine section tetraparesis (muscular paralysis located in all four limbs) may develop. Upon the injuries of the dorsal, lumbar and lower sections of the paraparesis (paralysis located in the lower limbs) may evolve. The location of sense disturbances or failure can be similar.

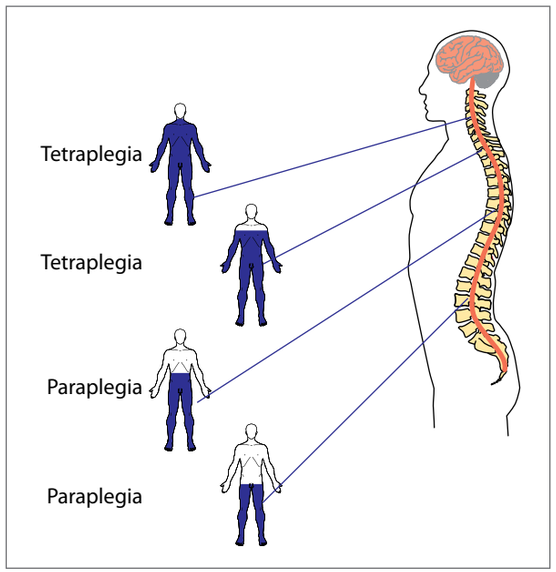


Illustration 11/16 The spastic consequencies of spinal cord injuries

However it must be emphasized that besides the forms mentioned above movement and sense disturbance located elsewhere may also occur accompanying spinal injuries. Vegetative disturbances connected to spinal injuries may cause incontinence of urine and faeces. Besides the innervation of vessels can also be

damaged that may appear as the unusual symptom of erythema (e.g. spreading on both lower limbs) that can evoke the suspicion of injury. In more serious cases thermoregulatory impairment and the decrease of the pulse count and blood pressure can also be observed. The latter does not occur directly upon the injury but later in time. (Illustration 16. The spastic consequences of spinal injuries)

Care. The first important thing to know is that a spine injured person must not be moved. If there is no further danger on the spot he has to be left in the position he was found in. In case of spine injuries assessing the airways and breathing and if needed, ensuring free airways and the artificial substitution of breathing by artificial in-blow respiration may become necessitated. If the patient has to be moved it should happen via tray position with the participation of several (minimum 3) people. It is practical to position the cervical spine continuously by hand in the position the patient was found. Some parts of the spine can be stabilized by different means: neck stabilizing collar, KED vest, Spine stretcher, vacuum mattress. The crash-helmet (there can be several types of it) should be removed only if we can substitute it with some other type of rescue technique device or it endangers the status of the patient (hard breathing, CPR necessitated). (See chapter 10.)

Fracture of the pelvis

Injury of the pelvis should be suspected in the case of most accidents that involve that part of the body. Since the pelvis and its constituting bones are massive, they usually get injured upon a large force impact (falling from big height, car accident).

The pelvis can break in numerous places; some of the fractures may be accompanied by the disrupture of the continuity of the pelvic ring that can make the pelvis instable; the patient's way of walking will be made painful and more difficult that can increase to complete inability of walking. These forms of injuries may be accompanied by the injuries of the organs of the true pelvis so the signs of the injuries of these organs have to be searched for. These signs can be: bleeding from the anus, vagina and bladder.

If the pelvic ring remains intact the patient's complaints might be lighter. The injuries of the pelvis are often accompanied also by serious (internal) bleeding; at such times we can see the signs, symptoms of shock on the patient.

Symptoms referring to the injury of the pelvis are:

- the instability of the pelvis (if we press the pelvis from two sides, or if we pressurize the ilia, pubic bone and we sense a shift while doing it)
- unevenness, swelling sensed on the palpable bones of the pelvis
- (skin) haemorrhages in the pelvic region (including the sexual organs, the area of the perineum)
- pain in the pelvis and its environment

Since neural injuries are common in cases of pelvic fracture accompanied by instability, their symptoms are worth examining e.g. the movements of the lower limbs, the sensations in the perineal and lower limbs regions. Other than these the injuries of the abdominal organs also need to be searched for.

Care. Do not move the patient if you suspect a pelvic fracture since the shift of the broken ends of the pelvic bone may cause pain, further bleeding and worsening of status. Positioning the patient in a recovery position is prohibited. If there is a chance, press the pelvis together ring-wise by winding a towel or a sheet around him. The risk of a shift or bleeding is decreased this way. Pain can also be lessened if the muscles adhered to the pelvis are relaxed. We can make it happen if we slightly raise the the patient's knees and prop them up while he is lying on his back. Since the injuries of the pelvis are caused by a large force impact the thigh-bone and the spine are also often injured so these body parts must be examined with special attention. Watch the patient's vital signs, the symptoms of shock and call an ambulance immediately.

Chest

Out of the injuries of the chest the injuries of the ribs often need to be considered. Since the bony chest protects such important organs as the heart and lungs in the thoracic cavity and the liver and spleen in the abdominal cavity and it also participates in the implementation of the breathing movements, its good condition is crucial.

Fracture of the ribs. Ribs are generally fractured in the line of the armpit since they have the largest curvature there. Several forms of rib fractures are known as:

- single rib fracture (one rib is broken at one place)
- serial rib fracture (3 or more ribs break, usually along one line)
- window rib fracture (one or more ribs are broken at several places)

The symptoms of rib fractures are:

- The patient complains of pain in the given chest region that can increase upon the breathing movements and direct pressure on it.
- The injured part of the chest takes part in the respiratory movements to a limited degree
- A swelling and/or haematoma can be found at the affected area.
- The patient's breathing is superficial and frequent.
- In case of a window rib fracture the broken part usually moves counterwise to the whole of the chest during breathings (paradoxical chest movements).
- In case of multiple rib fractures the patient might be cyanotic due to the decreased respiratory movements.

Care. Ensuring a rest position for the injured is important. If there is an open rib fracture it is common practice to lean the casualty towards the injured side to encourage drainage. If the fracture is closed

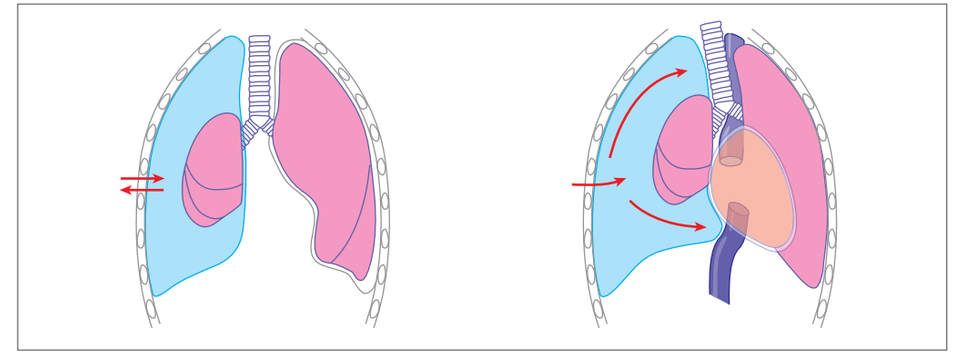


Illustration 11/17 The developmental process of pneumothorax (normal and tensional PTX)

and the casualty is conscious, then sitting the casualty down in a position they find to be most comfortable is advised.

Pneumothorax, haemathorax. The injuries of the chest can lead to the injuries of not just the ribs but also to the injuries of the parts located deeper in the body. When air gets to the thoracic cavity due to the injury of the chest, we speak of pneumothorax i.e. PTX. (Illustration 17. The developmental process of ptx) In case of pneumothorax air is accumulated in between the discs of the pleura. If the amount of air becomes too much, it can worsen respiration and circulation.

- Closed pneumothorax (the amount of the air that got in between the discs of the pleura does not increase but it generally spontaneously absorbed) It can be caused by a light trauma or the rupture of the air pouches of a healthy individual or a patient suffering from pulmonary disease.
- Open pneumothorax (the air between the discs of the pleura is in constant contact with the external world) Upon the effect of the air the surface tension between the pleura discs ceases and the lungs collapse. It is usually caused by a thoracic trauma.

Each of the above types of pneumothorax can also appear as a valve pneumothorax. In this case the pleura is injured in a way that air can only stream into the thoracic cavity but it cannot get out of there (tightening PTX). The accumulated air with its increasing pressure in the chest first presses the lungs on the same side and then the heart and the big vessels so it can cause circulatory disorders (circulatory standstill) too.

The typical symptoms of pneumothorax are:

- the signs of rib fracture (see above)
- hard breathing which is more and more severe in case of the valve form
- chest pain

- missing chest movements on the injured side, superficial breathing
- tympanitic percussion sound
- respiratory deficiency – cyanosis
- in case of a valve form decreasing blood pressure, tachycardia, then circulatory standstill
- in case of tightening ptx the dislocation of the pharynx, full and loose cervical veins

We speak of haemathorax when not air but blood is accumulated in between the discs of the pleura due to chest injuries.

The patient's complaints are similar to the ones described above related to ptx but in more severe cases the shock caused by the loss of blood can also cause symptoms.

Care. During first aid provision recognising pneumothorax and in a severe case ceasing its tightening nature is an important job. In a moderate case the patient has to be brought to a half-sitting position. Some injuries of the chest have to be cared for according to the principles described in the chapter about caring for wounds. In case of an open pneumothorax the place of the injury needs to be closed by a non air-permeable material (e.g. the protective cover of the lint package). This way we prevent the air and other contaminating materials from getting into the thoracic cavity. In case of more serious, mainly in tightening, ptx cases the tigthening nature of the air has to be put an end to (detensioning). At such times the air can be drained by a needle **(more precisely by a small lumen tube)** stuck between the ribs on the given side but this is most commonly done by the ambulance rescue team.

The commotion and contusion of the lungs and heart. The commotions and contusions of the thoracic organs can also occur without accumulated air in between the pleura.

The commotion of the lungs generally hardly causes typical complaints while the symptoms caused by relatively more serious contusion are difficult to be diifferentiated from the complaints caused by rib fracture or pneumathorax.

The commotion of the heart (commotio cordis) (e.g. sudden hits on the chest or breastbone caused by balls during ball games) can be manifested in arrythmia or maybe in sudden circulation standstill. The mechanism of the developed arrythmia is similar to the blow with the fist used in circulation standstill.

Care. The care of lungs damages usually consits of the ensurance of the half-sitting position and rest. In case of commotio cordis, sudden circulation standstill the patient's resuscitation may become necessary. Many times the developed arrythmia can be ceased only by external defibrillation (e.g. AED).

Abdomen

Upon the blunt force impacts on the abdomen several organs of the abdominal cavity may get injured, especially the ones that are better fixed (liver, spleen). The following symptoms indicate blunt

injuries of the abdominal cavity:

- abdominal pain
- involuntary abdominal defence
- purplish discolouration of the skin of the abdomen
- the symptoms of shock in case of intensive internal bleeding

After an abdominal trauma, in case of a liver injury the patient might complain of sensitivity or pain typically under the right rib curve that can radiate to the right shoulder blade or shoulder.

In case of an injury of the spleen similar complaints may appear under the left rib curve.

Both the liver and the spleen possess a capsule made up of connective tissue that initially often does not rupture upon an external force impact. In case of an intact capsule there is no bleeding i.e. free blood in the abdominal cavity and then as a result of the increasing pressure the capsule is ruptured (*two-phase rupture*) and parallel to this the patient's status begins to rapidly worsen.

In case the liver/spleen is injured together with the capsule and the capsule does not mitigate bleeding, we speak of a *one-phase rupture*. It is characteristic of the two-phase rupture that after the injury the patient's status is relatively stable (besides an intact capsule), however his status gets rapidly worse along with the subsequent rupture of the capsule. Based on this the abdominally injured must not be left alone and hospitalized overall check up is needed for determining the potential internal injuries precisely.

The injuries of the liver and the spleen occur more often at the age of infants and small children since these organs are relatively larger compared to an adult's proportions and among normal circumstances they exceed the outer edges of the rib curves.

The other organs of the abdominal cavity may also get injured, like the intestines, kidneys, pancreas and the organs of the lesser pelvis.

The injuries of these organs are initially atypical so it is difficult to make a diagnosis on the spot. If the abdominal cavity opens due to the injury adbominal organs might potentially fall forward.

Care. Putting the patient to rest and relieveing pain are of exceptional importance. The patient should raise his legs at the knees and hips and abdominal pain can be mitigated this way. If the symptoms of shock appear fluid substitution is needed as soon as possible. However, since the patient is not allowed to get any kind of liquid through his mouth in case an abdominal injury is suspected, it is the job of the arriving ambulance to take care of the appropriate fluid substitution.

An open abdominal injury needs to be covered with a sterile dressing as soon as possible. The abdominal or forward fallen parts of the body have to be protected from air i-e- from drying out. We do not put the forward fallen abdominal organs back, we can protect then easily from drying out by putting sterile, wet cut gauze (impregnated with water or physiological salt solution) on it and then we cover all of it air tightly as the circumstnces allow it.

Limbs

Upper limbs

Fracture of the shoulder blade and clavicle. Even though the shoulder blade and the clavicle are situated on the chest, they mainly participate in the movements of the upper limbs so their injuries are discussed in this chapter about the upper limbs.

The shoulder blade gets injured relatively rarely. In such cases the patient feels pain at the affected area especially when he moves his arm/s over a horizontal level or backwards.

In case of a fracture of the shoulder blade a swelling over the fracture and maybe scales formation (angulation) can be touched. The patient moves his arm on the side concerned with difficulties and might feel strong pain during movement.

Care. Putting the limb on the affected side to rest and fixing it is necessary. A triangular scarf or a Desault bandage can be applied for immobilization that fix the upper and lower arm on the injured side to the trunk.

Luxation of the shoulders. The head of the humerus leaves the cotyle located on the shoulder blade upon a direct force impacting the shoulder. The injury is characterized by the classical syndrome of luxation, like pain, deformity (tangible empty socket) functional loss, flexible fixation and swelling. Several forms of shoulder luxation are known, depending on which direction the head of

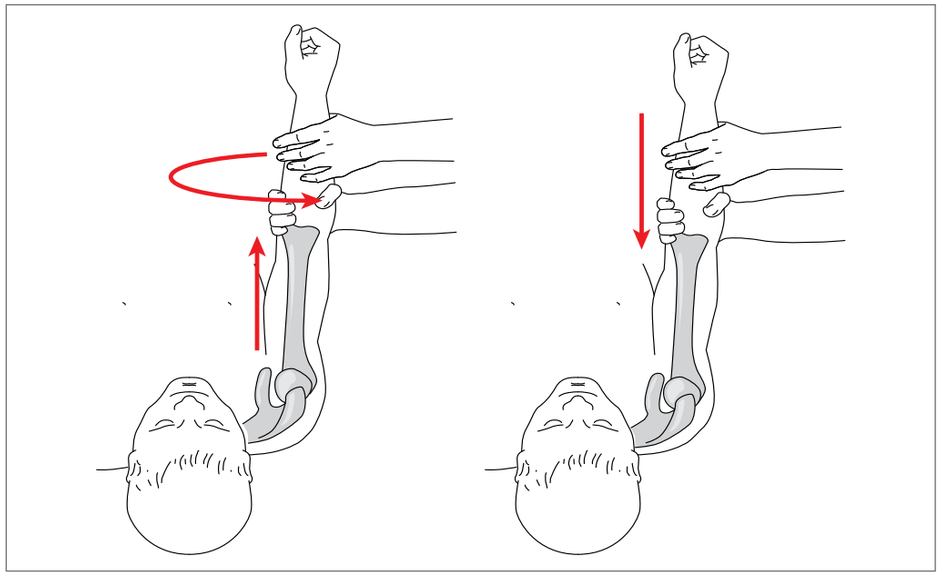


Illustration 11/18 Applying the Spaso method in an institution in case of shoulder luxation

the humerus is moved out and fixed outside the cotyle.

In case a luxation of the shoulder/s is suspected it is important to examine the patient's radial pulse and the sensations, movements of the arm on the affected side. Some of the more severe vascular and neural injuries can be excluded this way.

In case of a habitual luxation of the shoulder/s the ligaments and socket surronding the shoulder/s are loosened and prolonged due to the multiple luxation occurences and consequently luxation happens even upon a small force impact.

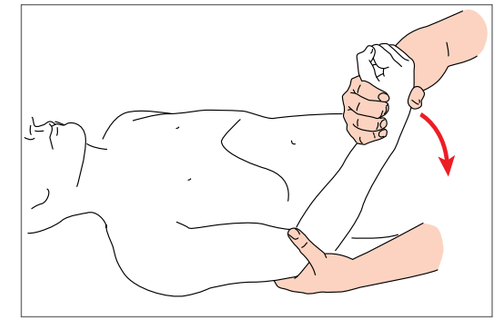


Illustration 11/19 The method of institutionalized reponing of the luxated shoulder

Care. Since potential accompanying fractures are difficult to recognize in case of shoulder luxation, we can immobilize the upper limb on the affected side, treating it as a fracture, with a triangular scarf or with a Desault bandage. Placing the luxated shoulder back to its place is not to be attempted on the spot, especially if the possibility of vascular and neural injuries are present.

In case of a habitual luxation of the shoulder there are several methods available with the help of which the head of the humerus can be placed back to the socket with good chances, with a good rate of success. Some of the methods are often taught to the patient himself and also to his family members. These types of methods are the following:

- According to the ***Spaso*** method, the patient is lying on his back, we hold his affected arm strongly at his wrist with two hands and we pull it vertically upwards while we rotate (twist) his arm outwards. We do the pulling and twisting slowly so that the muscles can slowly relax. The head of the humerus tangibly leaps back to the socket as a result of the pulling and twisting. (Illustration 18. Applying the Spaso method in case of shoulder luxation)
- According to the other method the patient is also lying on his back. First we slowly place the upper arm on the affected side next to the trunk while we bend the elbow in 90 degrees. This is followed by the gradual outward rotation of the (upper) arm that we set earlier and we can supplement it with a slight downward pull along the vertical axis of the upper arm. We need to undertake the task carefully and slowly in order to give the muscles time to relax. (Illustration 19: Reponing the luxated shoulder)

Fracture of the upper arm. The typical fracture place of the upper arm (humerus) is the so-called surgical neck which can be found at its proximal part (under the head). The fracture of the upper arm is to be considered dangerous because some major vessels and nerves, which are located in its neighbourhood, may also get injured. In case of an upper arm fracture the artery running in the

inner side of the upper arm (brachial artery) and the radial nerve, which runs on the upper arm bone may get injured. Other than the suspicion and the sure signs of the upper arm fracture, it may be characterized by significant loss of blood and also sense and motion disorders (extensor muscles) located on the injured arm.

Care. It is important to put the injured arm to rest either by a triangular sling or applying a Desault bandage. The patient has to be transported to a hospital as soon as possible, especially if neural or vascular injuries are also involved.

Fracture of the lower arm. The lower arm is most often fractured in the middle or in the lower third, mostly due to injuries related to falls. As a result of the fracture both bones of the lower arms can get injured together or the radius and ulna separately.

This injury is characterized by the different deformities of the lower arm and by its swelling and pain. The fracture of the distal part of the radius is typically characterized by the formation that reminds one of the 'bayonet stand'. Accompanying vascular and neural injuries are rarely typical of the lower arm fractures. The fracture of the radius is often accompanied by the injuries of the ligaments of the wrist region.

Care. The simplest way to immobilize the lower arm is to do it together with the wrist and the elbow joint with the help of a triangular sling or other improvised methods. The patient has to be directed to a hospital.

Fractures of the carpal, metacarpal bones and fingers. The fractures of the different parts of the hands are characterized by the typical symptoms of fractures.

Care. Immobilization with a triangular sling, gauze strips or incidental means. The fixation of the fingers and metacarpal bones is to be done in a medial position with slightly bent fingers. We can achieve this in the simplest way if we place a gauze roll into the patient's slightly clenched fist and immobilize the injured part this way.

Lower limbs

Fracture of the thigh-bone (femur). The fracture of the thigh-bone can often accompany the fracture of the pelvis. This form of injury generally happens upon a strong force impact as well. However, this type of fracture may occur upon a minor trauma at an older age in case of individuals with ostoporosis.

The femur can be fractured at numerous places, like the head or neck of the femur and the femur itself. The symptoms of the fractures can vary accordingly. The visible changes greatly depend on the place of the fracture, the degree of dislocation and the consequences of the injury. Based on these the symptoms, signs of the fracture of the femur are:

- swelling, pain in the hip region, on the thigh
- haemorrhages in the hip region, on the thigh

- the shortening of the limb, its outward rotation (the so-called corpse position that happens due to the pulling away effect of the muscles)
- limited movements of the lower limb, inability to walk (The option of the fracture of the femur is not excluded if the patient is able to walk.)
- Upon additional vascular injury a large amount of blood may get to the area in between the tissues that causes hardly visible changes on the thigh, however the patient shows the symptoms of shock. The pulse on the patient's lower limb has to be examined. The discolouration, paleness, cyanosis of the skin of the affected limb and its temperature may also indicate vascular injury.
- in case of neural injury the movements and sensations of the lower limb can get damaged. The injury of the head and neck of the femur may be accompanied by the injury of the pelvis so the examination of the pelvis is also needed.

Care. In order to avoid further injuries, the patient must not be moved in case the fracture of the thigh-bone is suspected, similarly to the injuries of the pelvis. The patient must not be put into the recovery position either.

The affected lower limb has to be supported laterally and the vital parametres of the patient and the state of the lower limb need to be checked until the ambulance arrives.

Congenital dislocation of the hip. Upon a significant force impact the head of the femur leaves the socket and while being dislocated in some direction it gets fixed outside the socket. Due to the magnitude of the force impact it can often be accompanied by associated injuries so their signs are also worth being searched for. As a result of the injury vascular and neural parts may be damaged. Its symptoms are:

- the lower limb is generally shortened and painful
- the limb is in a rotated position, it is flexibly fixed
- according to the place of the head of the femur, emptiness, deformity can be touched
- the symptoms of the vascular and neural injuries are similar than that of the fracture of the thigh-bone
- the luxation of the hip is often accompanied by the injuries of the neighbouring bones and soft parts

Care. Putting the luxated hip joint back to its place is strictly forbidden. We fix the affected lower limb in the position we found it and we call an ambulance. The symptoms of the vascular and neural injuries have to be checked continuously

Injuries of the knee

Luxation of the kneecap. The kneecap (patella) is often dislocated towards the outer side of the knee and gets fixated there as a result of a direct kick, hit or fall (e.g. with motorcyclists). The loose

ligament of the knee or earlier injuries make people more susceptible to this type of injury. The luxation of the kneecap is characterized by:

- beside the stretched but typically bent knee, the kneecap that is fixed in a pathological position, can be touched
- pain and limitation of motion appear in the knee joint

Care. A dislocated kneecap is allowed to be placed back by a person who is experienced in it. The injured knee has to be put to rest and the lower limb on the affected side needs to be unburdened till hospitalization.

Fracture of the kneecap. Upon the impact of mechanical force the kneecap may also be fractured which can be characterized by the pain and swelling of the knee joint, limitation of motion and haemorrhage of the joint. The pieces of the fractured kneecap can many times be palpated through the skin. Its care is similar to that of the luxation of the knee.

Ligament injuries of the knee joint. The knee joint is one of the most complicated joints of the body that also has inner ligaments (so-called cross ligaments) besides the usual outer ligaments that stabilize the knee joint. Typically the ligament system is injured during such external force impacts when the fixed leg or thigh is affected by a force which thus damages the ligaments of the knee. The excessive twisting of the knee joint can also damage the ligaments (e.g. in case of skiers and football players).

The symptoms of the ligament system are located to the knee. They are:

- Swelling
- Limitation of motion
- Pathological mobility, loading/walking instability
- Pain

The complaints are not specific so in case of suspicion the patient has to be taken to the doctor who makes a diagnosis after having examined each ligament separately.

Care. Putting the injured lower limb to rest and fixing it. Local cold effects (cold compress, icing) decrease the complaints. On behalf of a precise diagnosis and up-to-date care the patient has to be taken to a physician.

Fracture of the leg. The two bones that constitute the leg, the tibia and the fibula, can get injured together or separately. The complaints caused by the injuries of the fibula are particularly determined by which part of it was injured. In case the part closer to the knee is fractured, the pain and the swelling are located in the region of the knee and on the side of the leg. Except for the pain, it influences walking to a lesser degree. The injury of the middle and lower part of the fibula can already lead to the instability of the upper saltatorial joint that decreases the burdening of the ankle, it may lead to complete inability to walk.

The tibia often gets injured due to its closeness to the skin surface. However its fractures can be relatively easily presumed, since they are easy to touch. The symptoms experienced upon the fracture of the tibia also depend on which part of the bone was injured. The injury of its upper section leads to the haemorrhage, pain and motion limitation of the knee and it is difficult to distinguish from the other injuries of the knee. The injury of the median part and the part close to the ankle worsens the stability of the ankle fork (upper saltatorial joint) so it causes pain and hampered walking. Due to its closeness to the surface the tibia is often fractured in the form of an open fracture.

Care. The aim here is to maintain stabilisation of the leg by not moving it and keeping the fracture site in the position it was found. In case of an open fracture caring for the wound is important to prevent infection. If it is necessary we can fix the injured lower limb to the intact one on the other side which, in this case, functions as a 'rail'. The patient has to be taken to hospital.

Fractures of the tarsal and metatarsal bones. The detection of the tarsal fractures is difficult, the examination of the metatarsal bones is somewhat easier since they are well palpable on the back of the feet. Their injuries are characterized by strong pain, deformity, sensitivity to pressure and swelling which make the precise differentiation from the other injuries of the ankle difficult. Due to the pain the leg on the affected side cannot weight bear.

Care. Unburdening (raising and supporting), immobilization, and applying local cold compression significantly decrease the conplaints. The patient has to be taken to a doctor.

The distortion and luxation of the ankle. It is one of the most common injuries which is caused by the foot being externally rotated in the wrong angle while arriving to the ground e.g. during running or jumping. Mostly the ligaments of the outer ankle are injured by the foot turning inwards but other bones and tendons can also be injured.

The ankle can be injured in many different ways depending on the magnitude of the force impact. In a moderate case the suddenly appearing pain is caused by the ligaments of the ankle being overstretched which is accompanied by the instability of the ankle. In a more serious case the ligaments of the ankle are either partially or completely torn apart. At such times, other than the pain and swelling, the joint becomes instable and it must not be burdened. During its examination the joint can be opened in a pathological degree. In more serious cases haemorrhage can also be seen in the region of the ankle.

Care. Its care is not special, it is identical with the care described in the above part about the tarsal fractures.

Compartment syndrome

The muscles on the limbs are surrounded by strong fibrous capsules which create smaller closed compartments while getting into the depth in between the muscles. If the muscles are damaged due to some impact, they swell and the strong capsule made up of connective tissue does not let

them dilate outwards. The pressure growing stronger and stronger first decreases the blood supply of the muscles, upon the effect of which the muscles get even more damaged and this enhances the swelling further more. As a result of the pressure growing higher and higher the blood supply of the limb is damaged to that extent that finally it leads to its necrosis. This process is called ***compartment syndrome***.

The patient usually feels the swelling and expansion of the affected limb (most commonly on the leg and on the lower arm) which, after a while, is accompanied by stronger and stronger pain. The skin of the limb gets pale, sensing and motion disorders accompany the process. The process worsens within hours and resulta in the patient's losing the limb without intervention.

This phenomenon can be more serious if a treatment with plaster is involved because the circumducted plaster having been applied early, in an inappropriate way prevents the swelling of the limb by itself.

In case a compartment syndrome is suspected, the patient has to be hospitalized as soon as possible. Among circumstances on the spot immobilizing, cooling, raising and supporting the limb may help.

Polytraumatization

We can speak of **polytraumatization** when several body regions and organ systems are simultaneously injured and either one or more of them are life threatening. Different combined injuries, like for example the injuries of two cavities of the body or one cavity and two tubular bones are injured. Most commonly fractures of the lower limbs and the pelvis and skull and cerebral injuries occur. The chest, the abdomen and the spine also often contribute to polytraumatization.

Illustration 11/20
The transportation of a polytraumatized patient

Survey of status and care. Upon arrival at the spot one must gather information about the accident mechanism, the number of injured people and the seriousness of their injuries fast. Striving for avoiding further accidents is recommended.

During the first, quick, exploratory survey of the patient's status examine the airways, respiration and circulation/bleeding of the patient. For assessing consciousness use some earlier discussed assessment systems (AVPU, GCS).

Besides ensuring the permeability of the airways the immobilization of the cervical spine has to be done with almost everybody due to the potential danger of cervical spine injury.

After the examination of the characteristics of respiration (number and depth of breaths) search for external bleeding. For checking circulation the assessment of consciousness and peripheral pulse can be used. In case we do not sense any peripheral pulse and we are experienced in it, we touch a central pulse. Upon lack of a central pulse, resuscitation has to be started if the proportion of the patients and the people caring for them allow it. In case we find serious external bleeding, its care must be started immediately. The first survey of status should be done as soon as possible and an ambulance must be called.

If we do not have any acute tasks during primary survey of status, the patient's detailed examination by body regions is to be done. During this first we have to examine the injuries of the head (the neck) and the chest. The deviations experienced during this examination (respiration regulation disorder, failure of upper airway reflexes, too high or too low number of breathing, instability of the chest) lead to the worsening of breathing and oxygenization. The existence of cyanosis refers to bad oxygenization. These may be beyond the experience and expertise of the First Aider in order to identify them correctly. At the very worst the ventilation of the patient might be needed .

Besides these try to determine the patient's blood pressure, partly by touching the peripheral pulse (peripheral pulse ceases under the systolic pressure figure of 60) and on the other hand we can get a more precise finding if there is a blood pressure measuring device available.

The reason for the change in circulation is most likely to do with blood loss, or in rarer cases different types of arrhytmia, especially due to the large force impact on the heart in case of a chest injury. Substituting the fluid or blood loss by giving liquid orally is strictly forbidden, starting fluid substitution is the job of the rescue team. Naturally the patient is not allowed to eat or drink.

During the survey of the patient's neurological status the potentially existing differences between the two sides of the body are worth examining (during motion implementation and the examination of sensing). Touching through the spine gives little information, concerning a spinal injury the best is to draw a conclusion about it based on the accident mechanism. This is followed by the examination of the other regions of the body, the abdomen, the pelvis and the limbs as was described earlier.

If the patient is conscious, inquire about alcohol or other substance consumption, about the time of the last meal, about the patient's prior diseases, allergy and the medicine he regularly takes.

There are several score systems for the survey of the patients' status in severe conditions but they are not displayed in detail at this point as neither their knowledge nor their application, also due to the lack of means, are included in the required abilities of the first aid provider.

When attending polytraumatized patients or patients with severe injuries we should aim at the followings:

- Quick, primary assessment (consciousness, breathing, circulation/bleeding) and neck and spine immobilization.
- Improving breathing, bleeding mitigation, resuscitation
- Calling an ambulance (in case of more helpers it can be done earlier as well)
- Anamnesis in details, examination of the patient (by body regions) and care
- Observation of the patient, continuous checking, intervention in case of deviation
- Transferring the patient (Illustration 20)

Thermal injuries (burns, frostbite and hypothermic damages/

The causes and developmental process of frostbite injuries

Frostbite injuries are damages of tissue developed by exposure to cold exposing mainly limbs and face to danger. In most cases they affect the homeless and/or drunken people and elderly people living alone and babies who cannot take care of themselves.

The vessels of the affected area are constricted, dwindled due to cold. As a result of this circulation is slowed down so the oxygen supply decreases. The state of the tissue suffering from lack of oxygen results in aneurism and later the regulating function of the dilatation and the constriction of the vessels discontinues. Venous stagnation is developed and the permeability of the vascular wall is increased resulting in oedema (dropsy) (Illustration 21: The degrees of frostbite) In case of first degree frostbite the patient gives account of a burning, pin-prick like pain in the affected area which continually shifts into insensibility. First the skin is pale then it becomes cyanotic and slightly swollen. In case of second degree frostbites bloody serous blisters appear on the damaged part of the body. Pain then insensibility and

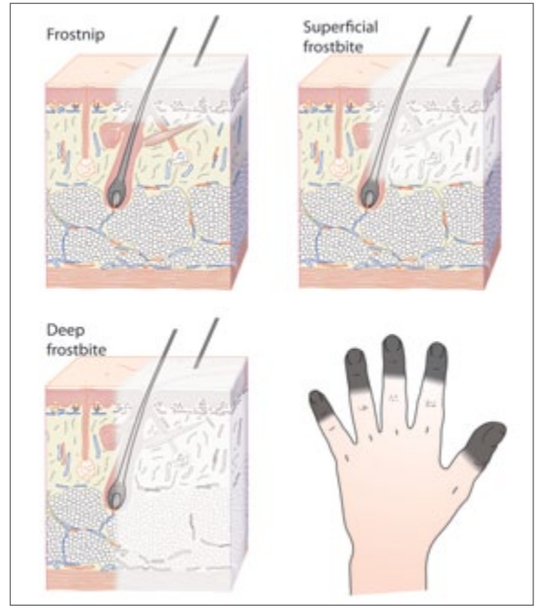


Illustration 11/21 The degrees of frostbite

swelling which is bigger than earlier are typical. In case of third degree burns all layers of the skin freeze. The blisters split and flow together. The damaged skin is of brownish-greyish colour.

Care of frostbites. As in all cases, consider and take care of your own safety this time as well. Do not expose the frozen part of the body to heat suddenly just cover it instead. In case of first degree frostbite you can rub the affected skin with a soft cloth. If the damage is more severe, do not do this, since it might cause further damage. Treat the affected area with great care. If there is some lack of epithelum or you notice split up blisters, cover the damaged areas sterilely. If the patient is not unconscious and is able to swallow, make him drink some warm tea or soup. Ask for help if necessary.

The phenomenon of burns

A great number of things can cause injuries of burn such as flame, hot gases, steam, hot objects, melted metal, lightning, chemicals, radiation, explosion. According to a survey in the United Kingdom open flame causes injuries in 55%, scalding in 40% , chemicals or electical burn in 5%. The most common cases are sunburns during the holiday season. Among the kitchen. accidents scalding is also a common one.

Factors determining how severe the burn injuries are. Dangerousness of any burn injury depends on several factors whatever might have caused them. Localization,(which part of the body is damaged),the size of the area and how deep the burns are –are of vital importance.In case of children and elderly people the same injuries/?effects/ might cause much more severe conditions. As they are much more prone to fluid losses and infection caused by burns. Besides these, burn is affected by the temperature and type of the substance which caused the injury, the length of duration of the exposure and the resistance of the organism.We should endevour to cease the effect of the of material causing the burn,therefore as soon as possible we should go to a cool place, remove it, neutralize it, start cooling the affected area

The localization and expansion of burn injuries. The localization of the injury is determining from the point of view of its seriousness and the status of the injured person because it determines what important organs can be affected by burns. For example the injury of the lower limbs is less dangerous from a certain point of view as no vital organs are affected. The injuries of the head and face are often accompanied by airway and lung damages (burns) as well. Other than this the scars that remain after the injury may cause problems also psychologically and socially in the long run as they stigmatize the patient.

The seriosness of the burn is essentially determined by the size of the surface affected by the injury. The simplest way for estimating the size of the burn area is if we consider the palm (including fingers) of the patient as 1% of his total body surface (in fact it is 0.8%) and on the basis of it we can calculate

the size of the burnt area..This method can be used for estimating the intact skin surface in case of small burns (below 15%) or extremely extended burns (above 85%).

Another method for estimating the burn area of medium extension is Wallace's Rule of Nines. It means body proportions listed in the chart in case of adults. In case of infants it cannot be used because, especially in case of babies, the surface proportions of the parts of body are anatomically diverse. The modified Rule of Nines can be applied in this case. (Chart 1 / Illustration 22: The estimation of the size of the burnt area)

Chart 1. Wallace's Rule of Nines in case of adults and children

Body Region	*Adults*	*Children*
	%	
Head, neck	9	18
Anterior trunk	18	18
Posterior trunk	18	18
Arms (right, left)	18 (9+9)	18 (9+9)
Right lower limb	18 (9+9)	13,5
Left lower limb	18 (9+9)	13,5
Perineal region	1	1
Total	*100*	*100*

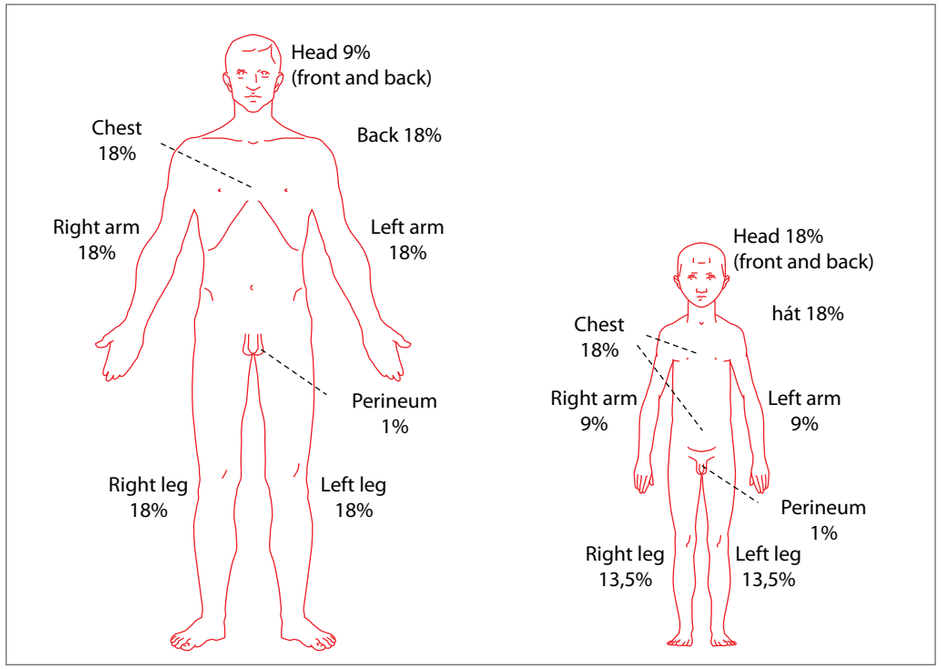


Illustration 11/22 The estimation of the size of the burnt area

The depth and degrees of burns. The seriousness of burn injuries is greatly affected by its depth that is which layer of the skin was burnt. It is expressed by the degrees of burn.

- *First degree burns.* First degree burns are damages exclusively subjected to the cuticle. Generally it is of medium intensity and/or it is caused by short-term heat effects, such as minor scalding or a sunburn. Characteristically the vessels on the surface expand and hyperaemia develops. The skin is painful, tight and red in colour. A slight swelling may also occur. (Illustration 23: Degrees of burns)
- *Second degree burns.* In case of second degree burns the tuederm and the bottom of the skin can also be damaged. It is the consequence of longer or stronger impact. It is characterized by the leaking of the blood-serum (protein free blood plasma) through the vascular wall. As

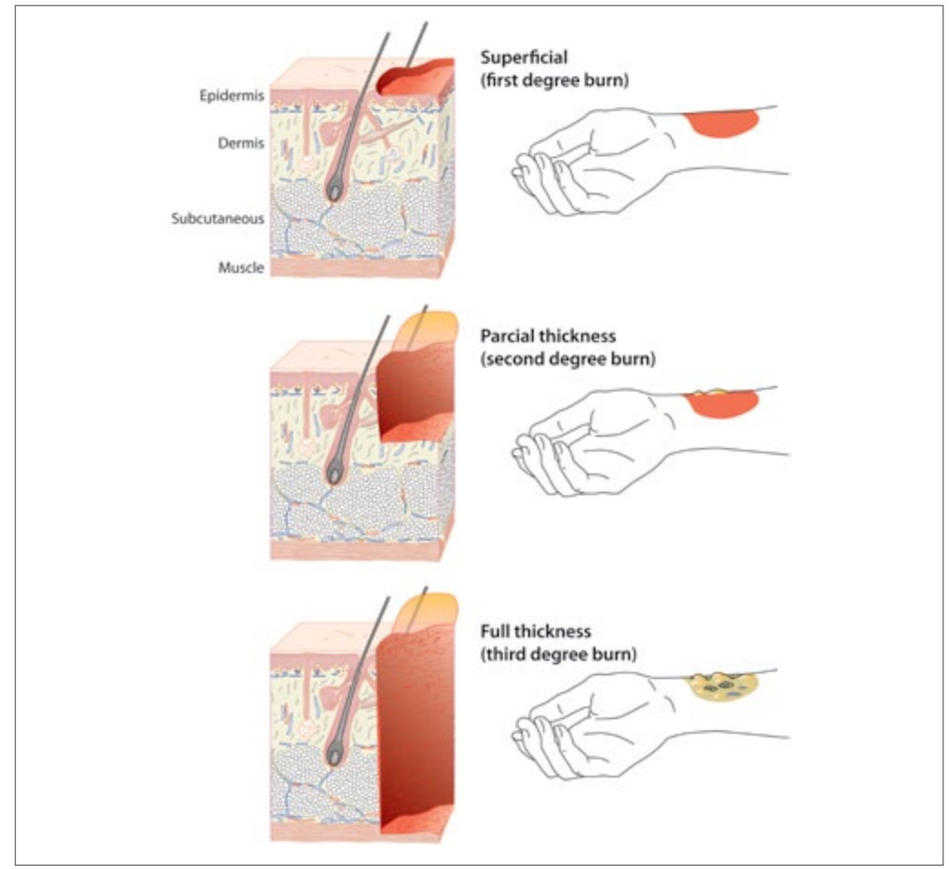


Illustration 11/23 The degrees of burns

a result of this blisters develop in which first waterclean fluid can be found which then becomes turbid. Later the blisters flow together and they might even burst. In this case the infection of the burnt area is high. In second degree burns the burnt surface is distinctly painful, has a reddish marble-like colour, which gradually gets white. (Illustration)

- *Third degree burns.* Third degree burns affect the tissues under the skin as well. The blisters burst in every case and due to this fluid loss can be significant. The damaged surface is greyish in colour. Third degree burns are painless, because nerve endings necrose. The first and second degree burns of the surrounding surfaces cause pain for the injured patient.
- *Fourth degree burns.* When the skin and the underlying tissues are carbonized it is called a fourth degree burn.

Care of the patient with burn injuries. The process of caring for burn injuries is determined by the seriousness of the given burns, the reasons of the injury, the general status of the injured, and the number of first aid providers.

Safety, rescue, ensuring rest. As in all situations when first aid providers are needed, primarily consider your own safety in case of burn injuries as well. If the location is insecure do not enter it or leave it. If necessary call the firefighters, the ambulance and the police.

It is important to terminate the triggering cause (which is not necessarily the duty of the first aid provider) and to place the injured to safety. If the triggering effect has been terminated position the patient with burn injuries at rest. It means that if is possible the patient should sit or if his condition requires it, he should lie down and in the meantime try to offer reassurance.

Try to remove the pieces of clothes and jewelry that have not been caught in the burn injury carefully. If any pieces of clothes got stuck in the wound do not tear them off by force.

Cooling. Burn injuries have to be cooled as soon as possible. It takes away the heat and consequently prevents the extension of the damage in the deeper tissues and respectively mitigates pain. You should use running water for cooling for 15-20 minutes. It is recommended to cool the injury until the ambulance arrives. Simple tap water will do. Even if there is no running water attempt cooling. A sponge, a glass or anything that is suitable for putting water on the injury can be used. Third and fourth degree burns should not be cooled by water because of the significant danger of infection.

Sterile cover. Cover the burnt surface with sterile lint. If it is not available, then a clean, ironed cloth may be also appropriate, especially in cases of widespread burns. Make sure not to burst the blisters. If the clothing burnt into the wound, then cooling and the sterile cover should be applied through it. It is strictly forbidden to put any kind of substance (creme, oil, ointment, powder) on the burnt surface.

Relieving pain. Burn injuries can be extremely painful. The intensive, not ceasing pain itself can impair the patient's general condition. Medicine found at home (Paracetemol, Algopyrin etc.) can be used for relieving pain. The above mentioned cooling. sterile cover, placing the patient in rest and

calming the patient psychologically are of vital importance concerning pain relief. If the patient is unconscious or has swallowing difficulties do not give him any tablets.

Fluid substitution. Significant fluid loss may arise during burn injuries. The lost fluid should be substituted. If the injured person is conscious and can swallow make him drink tea or water.

Asking for help. Ask for help in any case if a child is concerned. In case of an adult, the degree of damage, the injured one's complaints and his general status determines if professional help is needed. If you are uncertain about it, then call an ambulance no matter what.

Hypoterm damages

Burn diseases. The whole of health damages that developed due to burn injuries, even the ones having long term effects, are called burn injuries. They have to be taken into consideration in case of severe, widespread burns. Activities of first aid providers have significant importance in their prevention.

One of the main components of burn injury is fluid loss that results in shock which may cause longlasting damages. The other important component is infection which is also a severe status affecting the whole organism and it may cause sepsis. Any of these two factors in itself may lead to the patient's death.

Sunstroke. Due to lasting solar radiation exposure of the organism, primarily of the head uncovered, the temperature of the body increases, which evokes steril inflammation, oedema in the cerebral substance of the skull. Among its main symptoms, the most determining ones are: headache, dizziness, narcosis, slight fever, perhaps nausea.

Care. During care we have to endeavour to transport the person to a cool, airy, shady place as soon as possible. He has to be made to lie down with his upper body raised (semi –Fowler) and in this case a room temperature water compression has to be placed on his head. If necessary Algopyrin can be given to him for relieving headache and fever, if he has no sensivity reaction to such medicine. In case of high temperature hospitalization might become necessary.

Heat stroke. Heat stroke means a severe heat exhaustion as a result of which the heat regulation of the organism stops functioning. In this case the body becomes overheated, its base temperature exceeds 41°C. The salt and water equilibrium of the body is out of balance and the mechanisms of compensation cease to exist. The patient's skin is hot and dry, his pulse is fast and easily suppressible. Increased convulsibility can be observed in the status of the patient. Disturbed consciousness consciousness, loss of consciousness, severe cardiac arrythmia, damages of organs appear so urgent hospital care is required.

Care. In case of a heat stroke an emergency call is needed since the patient's status can rapidly become life threatening. It is essential to lay the patient down with his upper body raised so that he

can rest at a cool place. We have to start cooling the patient as soon as possible, we might as well do it radically, using ice to be able to decrease body temperature. While observing the status of the patient we should proceed according to BLS if necessary.

Hypothermic damages

Due to external environmental factors the body temperature, is prone to quick cooling especially in winter. Wet clothing or a stronger wind can intensify the exothermic process. The body temperature between 36.4°C and 34°C is already accompanied by physiological changes. Restlessness, muscular trembling and pain in the limbs occur. The increase of the pulse can be observed, although circulation and breathing are not affected. The phase of the exhaustion can be experienced at 34°C - 27°C body temperature. Muscular trembling stops, rigidity of muscles can be felt. The patient becomes somnolent or even soporous. The pulse becomes weak and thready and cardiac arrythmia can be observed. Breathing becomes superficial. If the body temperature decreases below 27°C, then deep unconsciousness and termination of reflexes can be expected. The collapse of circulation and breathing might occer.

Care. The wet cothing if any should be removed from the patient and he should be wrapped in an isolation blanket. If there is not any isolation blanket available, then a few warm blankets will do. The person has to be taken to a warm place. He can be given body temperature fluid to drink if he is conscious. If he is unconscious BLS must be provided.

Electric shock

Electricity affects the organism by changing physiological functions. The changes which have an impact on the organism primarily depend on the type of electricity (DC or AC i.e. direct current or alternating current), the intensity of current, voltage, skin resistance and the time length of impact. 1mA intensity produces formication. 3-10mA is the threshold of pain, while 15-150mA is capable of evoking venticular fibrillation, heart arrest. This latter one may happen at 220V alternating current.

Besides it bears significance where the current passes through the body and what the person's stamina is like and if he suffers from any basic health problems. If the body is affected by electric current, as a direct effect burn injuries of different sizes (from pinhole to 1 cm crater) happen at the entering and leaving points, leaving a **current mark** behind. At the place of the direct contact a greyish-white necrotic tissue pigmentation develops. Other than the local impact the whole body is affected by the current, primarily in the tissues which have good electric conductivity and are rich in electrolytes. Wet, thin skin possesses distinctly good conductivity as far as electric current is concerned. Besides, tissues that induce and conduct electric current, like the heart, the nervous system and musculoskeletal system, can be expressly damaged. The contractions developed as a result of

the electric impulses do not only cause muscular and tendon injuries but they make it impossible to let the source of current go and due to this the person in trouble can remain in the current circuit for a longer period of time.

Thunderstroke. It can also be described as a special type of electric shock. When the current meets the body it leaves a very characteristic print on the skin in the form of a greyish-white branchlike tracery. The electric shock is vibrational and other than light damage it is also accompanied by acoustic effects that can lead to impaired vision and hearing causing even blindness or perforation of the ear-drums.

Step tension. This phenomenon can mainly be experienced when high voltage tension lines break down. Its main point is the fact that significant tension can be recognized in the neighbourhood of a tension line close to the line touching the ground and this tension decreases when advancing farther from it. However, according to the gradient of the voltage, in the neighbourhood of the tension line, if someone steps forward, then due to the growing distance between the two limbs different potential points come into being, between which tension arises. This scene can be left only by spanning steps. *11.4. video:* Handling patient with electric shock – http://tamop.etk.pte.hu/elsosegelynyujtas/videok_eng/Ellatas_menete_aramutes_eng.wmv

Care. The most important thing is to clarify if the person in trouble is still in the current circuit or if he has already been rescued. If necessary, assistance must be called for this. Care can be started only when cutting off the current has already happened at that location, otherwise it can threaten the health providers' lives. If cutting off the current cannot be carried out, then some tools can be used which are not conductive under 1000V (e.g. a wooden stick or a plastic bar) for rescuing the endangered person from the current circuit. Afterwards proceed according to BLS and carry out the necessary interventions. The current mark must be covered with a sterile dressing according to the rules of wound care in every case.

Water accidents

In case of water accidents the person happens to be under the water either as a result of carelessness or with the intention of committing suicide, consequently some water (fresh or salty) or some other fluid gets into his airways (waste-water, river water). Unconsciousness can be triggered by cardiac arrythmia, drunkenness or epyleptic spasms. In the first phase of drowning the person in trouble panics and due to sinking swallows water. If water gets into the trachea and the bronchi the injured person is seized by strong cough. Due to lack of oxygen he loses consciousness. In the second phase some more water gets to the laryngeal entry which causes a laryngeal spasm attack due to the Kratschmer reflex (trigemino.cardiac and respiratory reflex). It prevents the water from getting into the lungs for about 30 seconds, (Sometimes it lasts until clinical or biological death, which is called "dry" drowning). In the third phase as the larynx spasm relieves the water flows into the lungs.

Illustration 11/24 Rescue from water

The water gets as far as the alveoli which results in 'wet' suffocation. In the fourth phase spasms of the striated muscles occur due to the cerebral lack of oxygen and these spasms spread all over the whole body. In the fifth phase there is a circulation standstill and a breathing stop with one or two gasping inbreaths.

During water accidents the phenomenon of the diver's reflex may appear upon the influence of sudden cold on the forehead and face. In this case the patient's skin becomes pale, livid and cool, he has a rapid pulse, his breathing is moaning and snoring. Nausea and vomiting might also accompany this process,

Care. One of the first things to do must be the safe rescue that has to be performed only by an experienced life-saver. The ability of swimming in itself is not always sufficient for rescuing a drowning person. After a quick examination at the shore/riverside or beach breathing and circulation must be checked and continue according to BLS if necessary. The cooling down of the body means an increased risk so wet clothes must be removed and the person in trouble should be dried. An isolation blanket or a dry one can protect the person from cooling down. Notifying the ambulance must be taken care of as soon as possible (Illustration 24).

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12. Illnesses of Internistic Nature

by József Betlehem, Tamás Köcse, József Marton-Simora

The content of chapter

Cerebral blood supply disorders

Definition. Cardiovascular diseases belong to one of the most commonly occuring illnesses in Hungary too, so their rate of occurence is high among situations that require first aid provision. In the developed countries stroke is the third most common reason that leads to death. Proper blood supply for the functioning of the brain is ensured by the cerebral vessels, the damages of which have to be taken into consideration.

The symptoms of the suddenly occuring blood supply disorders primarily induce alteration in the functioning of the central nervous system. We speak about stroke when the global or focal disturbance of brain functioning is detected. It is about a rapidly developing syndrome that has no other reason than a developed pathological deviation in the circulation of the brain. (WHO) Several pathological processes belong to the concept of stroke but most fundamentally two origins need to be distinguished, namely the ischaemic one which is without bleeding and the haemorrhagic one which is accompanied by bleeding. The former amounts to almost three fourth of the cases. (Illustration 1: Possible occurrences of stroke)

Symptoms. Stroke patients complain about speech disturbances, unilateral weakness of limbs, suddenly developed and worsening confusion and maybe about vision disturbances. Headaches and dizziness are also common which can recur or become permanent. Upon the change of breathing snoring, piping breathing can be heard. On behalf of its fast recognition a scale was created that lists four main symptoms, which are facial paresis, upper limb paresis, lower limb paresis and speech. It is the Cincinatti Prehospital Stroke Scale which is the simplified version of the National institute Stroke Scale. (Chart 1. Modified Cincinatti Prehospital Stroke Scale i.e CPSS) Naturally there are also other simply usable symptom scales e.g. the Melbourne scale.

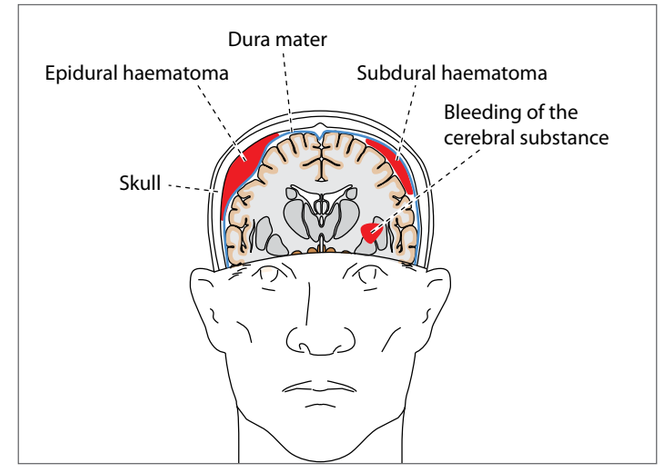

Illustration 12/1
Possible locations of stroke occurrences

Care. The patient needs to be calmed down if we can make contact with him, since paresis can have a frightening effect on him and his environment. After positioning the patient the examination of free airways is among the most important things to be done.

Chart 1. Modified Cincinnati Prehospital Stroke Scale (CPSS)

CPSS	*Facial paresis*	*Upper limb paresis*	*Lower limb paresis*	*Speech*
Question	Show your teeth. or Flash your teeth.	Close your eyes and stretch your arms forward for 10 seconds.	Close your eyes and raise your bent legs for 5 seconds.	Repeat it: e.g. 'You can't teach an old dog new tricks.'
Intact	Both sides move the same way.	Both arms move the same way or neither of them move.	Both legs move the same way or neither of them move.	Proper words, there is no gib-berish.
Pathological	One side of the face is left behind in motion.	One of the arms does not move or it sinks compared to the other one.	One of the legs does not move or it sinks compared to the other one.	Unintelligible speech, wrong words are said or unable to speak.

During positioning mostly in case of laying the patient with a raised upper body we need to watch out for the positioning of the paralyzed limbs in order not to cause injuries because the patient is unable to move his limb and he might not be able to sense it either. Besides continual supervision of the patient an ambulance has to be called since it a life threatening status. Fast institutionalized care is also important because proper treatment can be done with early uncovering visual diagnostics which means solubilizing blod clots in case of ischaemic stroke. Only early treatment, done within three hours after the appearance of the symptoms can ensure healing without residuary symptoms.

Chest pain, heart muscle necrosis

Definition. The significance of chest pain has been upgraded nowadays since the suddenly occuring diseases of the heart are registered among the leading causes of death in the developed societies.

As the engine of circulation, the heart makes the blood present in the organism circulate with its 60-80 contractions per minute. A separate vessel system, called coronary vessels ensure the blood supply for the heart's own muscles. (see Chapter 5) The diseases of these vessels (generally their strictures or obstructions) cause a blood supply disorder in the heart muscle which goes with decreased oxygen and nutrient provision. If the oxygen supply of the heart becomes iasufficient different symptoms appear. (Illustration 2: The obstruction process of the coronary vessels of the heart)

Symptoms. Chest pain (angina pectoris) is a symptom which calls the attention, not exclusively but mostly, for the acute problem of the heart's blood supply. It is a typical kind of pain when the patient

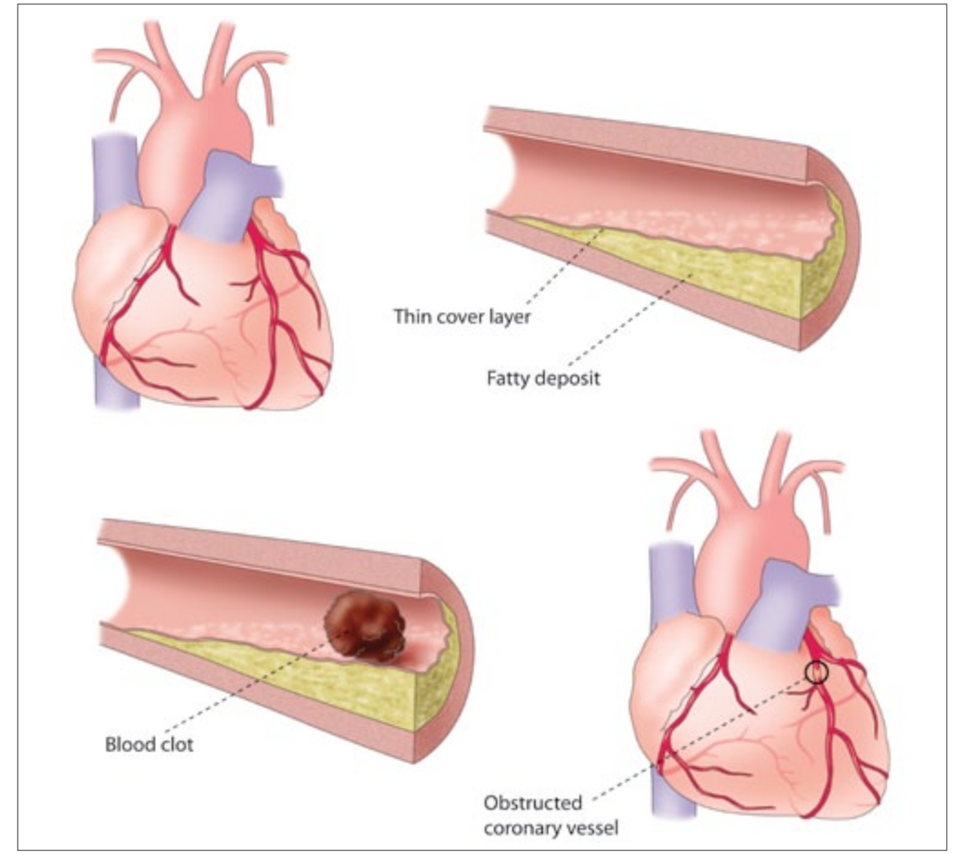

Illustration 12/2 The obstruction process of the coronary vessels of the heart

complains of a suddenly appearing stabbing, compressing, gripping pain behind the sternum that can radiate to the left shoulder, to the upper and lower arm as far as the ring finger. Other than the eradicating pain, the patient patient might give account of fear of death as well. The pain can last from 5 minutes to even half an hour. Its accompanying symptoms can be shortness of breath, perspiration and burping-like feeling.

If the blood supply of the heart decreases to a serious degree due to the obstruction in the coronary vessels, an anoxaemic status presents itself which leads to the necrosis of the heart muscle (acute myocardial infarction). The necrosis of the heart muscle is a life threatening status which, depending on its spread, can lead to the death of the patient even within a short period of time. The

pain is immense in most cases and the complaints remain even after 30 minutes. The patient suffers from pronounced shortness of breath and perspiration.

Care. Loosen the patient's tight clothes, maybe open a window if it is possible. Bring the patient to a sitting position and ask him not to force anything and to speak just a little. Watch his breathing and pulse and measure his blood pressure. Call an ambulance as soon as possible since decreasing the spread of the heart muscle necrosis can be done only by an acute institutionalized intervention. It is feasable at special so-called PCI centres (Percutan Coronaria Interventio) where they open the obstructed vessel section with the help of a heart catheter or they apply a blood clot dissolving treatment trombolysis. This latter is also applied by the ambulance rescue team if the expected length of transportation is relatively long. If the patient is a known to suffer from heart disease and his doctor prescribed him medicine containing nitrate e.g. Nitromin tablets or Nitrolingual spray, then we can give some of that to the patient in case his blood pressure is over 100 Hgmms. If the patient becomes unconscious we have to proceed according to the rules of BLS.

Diabetes

Definition. One of the most significant forms of metabolic disorders is diabetes (diabetes mellitus). Besides oxygen mostly simple sugar i.e. glucose is needed for the basic functioning of the cells, the intake of which happens during nourishment. The glucose level in the blood continuously changes depending on food intake. However, it always remains in a defined range according to the mechanism of blood sugar regulation. The normal range of glucose varies between the figures of 4.4 mmols/l and 4.95mmols/l. The raise of the blood sugar level after meals is a normal phenomenon, the acceptable range of which can change between 6.5 mmols/l and 7.7 mmols/l but two hours after meals the average normal range has to return.

In the regulation of the blood sugar level of the organism hormones participate (insulin, glucagon) which ensure blood sugar consistency. The blood sugar level raises after meals, insulin secretion is increased which stimulates the build-up of glycogen from glucose in the liver. When the liver and the muscle cells are already saturated by glycogen, the subsequently intaken sugar is stored in the form of fat. Upon the decrease of the blood sugar level the glucagon in the liver stimulates glycogenolysis (glycogen disassimilation) and by this gets glucose to the vascular system and thus raises the blood sugar level.

Illustration 12/3 Applicable solutions in case of low blood sugar

Its symptoms. If the blood sugar count goes below 3.5 mmols/l we come across the symptoms of low blood sugar level (hypoglycaemia). It appears most often in case of treated diabetes, when the patient takes his medicine or gives insulin to himself and does not eat and either after this or in general he does more excessive physical activity than normally. However it can also have other reasons e.g. alcohol intake, medicine, hormone disorders, starving. Among the introductory symptoms we can often find strong feeling of hunger, maybe nausea, trembling, numbness, agitatedness, headache, tiredness, vision disturbances, faster pulse, wider pupils, sweating, paleness maybe convulsive attacks. Neural smptoms already appear at the value of 2.2-2.7 mmols/l.

If the blood sugar count remains high duratively (10 mmols/l), we speak about high blood sugar (hyperglycaemia). Among its symptoms we can find a high level of tiredness, depression, unquenchable feeling of thirst, a significant amount of urination, nausea, vomiting, acetone-like breath. In more severe cases the type of breathing may also change (Kussmaul). Forced, loud, deep and fast inbreaths can be observed which belong to the compensating mechanisms of the body. The patient's blood pressure may be low and it is accompanied by fast pulse. Upon its long-lasting occurence losing weight may also be a typical symptom. The patient might even lose consciousness. (ketoacidotic coma).

If the patient's blood sugar level reaches an extremely high value (over 20 mmols/l) the fluid and electrolite equilibrium (osmolality) can also change significantly. It usually develops based on the grounds of old age diabetes. It is accompanied by substantial urination, drying out and being confused which may extend as far as unconsciousness.

Care. If the patient is conscious and is able to swallow then the oral intake of grape sugar (glucose) or food that is absorped fast and contains carbohydrates (fruit juice, bread, biscuit) is justified. If you see that the patient's status has improved then after 15-20 minutes you can give him some food that takes longer to be absorped and contains carbohydrates again. If the patient suffers from such a high degree disturbance of consciousness that he is incapable of cooperation or if he is unconscious, then placing him in the recovery position is the quick task to be done for him in order to maintain the free airways. After this an ambulance has to be called during which we must keep an eye on the patient's status.

In rarer cases it can happen that the patient's therapeutist prescribed an injection medicine for the case of severe unconsciousness. In such a situation the glucagon injection has to be given to the patient preferably the the musculature of the upper arm or the thigh.

If we come across unconsciousness that has presumably developed due to high blood sugar count, then the most important thing to be done is maintain free airways for the patient. The appropriate method for this is the recovery position which was also mentioned. After calling an ambulance keeping an eye on the patient's status is necessary in this case as well. The patients needs hospital care as soon as possible.

Hypersensitive reactions

Definition. The protective system of our organism continually takes care of not letting foreign body substances damage our body e.g. by eliminating infections. If the immune system identifies a substance which is allergen to the body, it gives an immune response. A lot of things can be such allergizing substances in our environment e.g. protein, groceries, insect bites, latex, pollen, toxins, medicine, pathogen agents, additives etc. These are the so-called allergic reactions. In case they occur hyper acutely, an anaphylactic shock may be developed even within 2 minutes (2-31 minutes).

Symptoms. In regard to local reactions the patient may give account of itching, erythema, nettle rash, tearing, runny nose, conjunctivitis and headache. In more severe cases it can be accompanied by nausea, vomiting, abdominal pain, diarrhoea, laryngeal oedema, shortness of breath, fear of death, disturbed consciousness. The patient's blood pressure might drop, bronchospasm and arrythmia may develop.

Subsequent to the appearance of local reactions a serious process spreading all over the body may also develop but it can also stop upon the appearance of skin symptoms.

Care. The patient should be asked if he knows about any allergies of his or if any such reaction has ever occured to him. This may lead our attention in the direction of a potential allergen substance. If the patient is known to suffer from allergy, it is possible that his therapist has already prescribed an injection medicine for it. In this case the patient needs to be helped in applying the given product as soon as possible or we should administer it ourselves. This is usually either Epipen® or Adreject® or Anapen®, which are self-injective adrenalin products. Our most important task is to put an end to the allergic substance of getting into the body if it can be done e.g. by removing the sting of an insect. If we notice only a skin symptom, which mostly does not exceed a diametre of 10 cms, we can apply local cooling and compression. We can give the patient some product with a calcium content (effervescent tablets, Calcimusc injection) but in any case observing the patient for an hour is necessary. During this, it is fundamentally required to watch the patient's breathing, pulse, blood pressure and state of consciousness. If further respiratory and vascular symptoms appear besides the skin symptoms, then it is not just about a local reaction but a process spreading all over the body. In this case an ambulance should be called with no delay. Loosen the patient's tight clothes and lay him down with raised lower limbs. If there is self-injective adrenalin product near at hand give it to him. In case we experience a circulation standstill or breathing stoppage we should begin resuscitation. We have to expect that the ventilation of the patient might be difficult because the most common reason leading to death is suffocation that develops due to laryngeal oedema. In this case keep on applying chest compression by itself until the ambulance arrives. If it is a reaction with a slower progression or the patient took medicine for his allergy earlier as well, then giving him Fenystil (dimetindene) or Suprastin (cloropyramine) can be also attempted.

Bronchial asthma

Definition. The word 'asthma' originates from the Greek word for gasping which expresses the appearance of this disease well. In this diagnosis there is a large degree of shortness of breath with weighed, prolonged exhalation which is caused by the narrowing of the bronchial system and the swelling of the mucous membrane. The patient passes glassy, sticky, thick sputum.

Symptoms. The patient is restless, he positions himself in a half-sitting position. During breathing, he exhales with difficulties for which he forcefully uses his additional breathing muscles as well. His skin is greyish-pale, cold perspired, his cervical veins are full and well visible. Upon his breathing a whistling, humming sound can be heard. His pulse is fast.

Care. Other than calming the patient down a half-sitting position should be ensured for him further on. His clothes need to be loosened. If the patient has his usual medicine with him, which are usually aerosole products with a pump, he can be given some of that.

The process of shock

Definition. As a result of the external and internal damaging impacts on the body, a health status may develop that is life threatening, which evokes the functional disorder of circulation and respiration. Independent of the triggering cause, after a certain period of time has passed, this situation leads to the gradual, or sometimes rapid worsening of the patient's status. The most conspicuous signs of shock can be seen from the worsening of the patient's general health status in relation to time. This state is a progressive, fast proceeding process that results in the significant worsening of circulation and breathing. On a tissular level hypoperfusion (the decrease of tissular blood supply) occurs during this time. Circulatory disorder occuring on a tissular level (microcirculation) is capable

Chart 2. The classification shock after Hinshaw and Cox

Type of Shock	*Its characteristics*	*Example*
Hypovolaemic	Loss of circulating fluid from the vessels	Exsanguinational status, large area burns, vomiting of blood, serious electrolite loss
Cardiogenic	The pumping function of the heart worsens	Heart muscle necrosis, severe arrhytmia
Distributional	The distribution of the circulating fluid in the vessels change (relatíve loss of fluid)	Septic processes, severe hypersensitive reactions, serious spinal cord injury
Obstructional	Sudden obstruction of the heart or the large vessels	Heart tamponade, expansive pneumothorax, pulmonary embolism

of creating a serious hypoxaemic status spreading all over the body. As a delayed effect, complications can often be expected even in spite of proper medical treatment. Consequently this is about a high time factor oxyological process i.e. non-professional recognition and intervention are of extreme importance.

The process of shock can be classified in numerous ways. One of the oldest and widest spread grouping applied is the quadruple division introduced by Weil and Shubin which is based on the above mentioned tissular blood supply decrease. (Chart 2. The classification of shock after Hinshaw and Cox) The bases of this partition is connected to the work of Hinshaw and Cox (1972).

In case of hypovolaemic shock the intravascular loss of fluid is the determining process. Upon the occurence of cardiogenic shock the pumping function of the heart is significantly damaged. During obstructional shock an obstruction comes to being in the heart or the arteries or maybe in the large veins. Distributional shock is developed upon the sudden change of the blood distribution within the body. In the first three cases the decrease of the output of the heart can be experienced which, in the end, causes hypoxia on a tissular level and starts anaerobic metabolic processes. In the latter case the output of the heart does not change basically, further more, it sometimes even grows. However

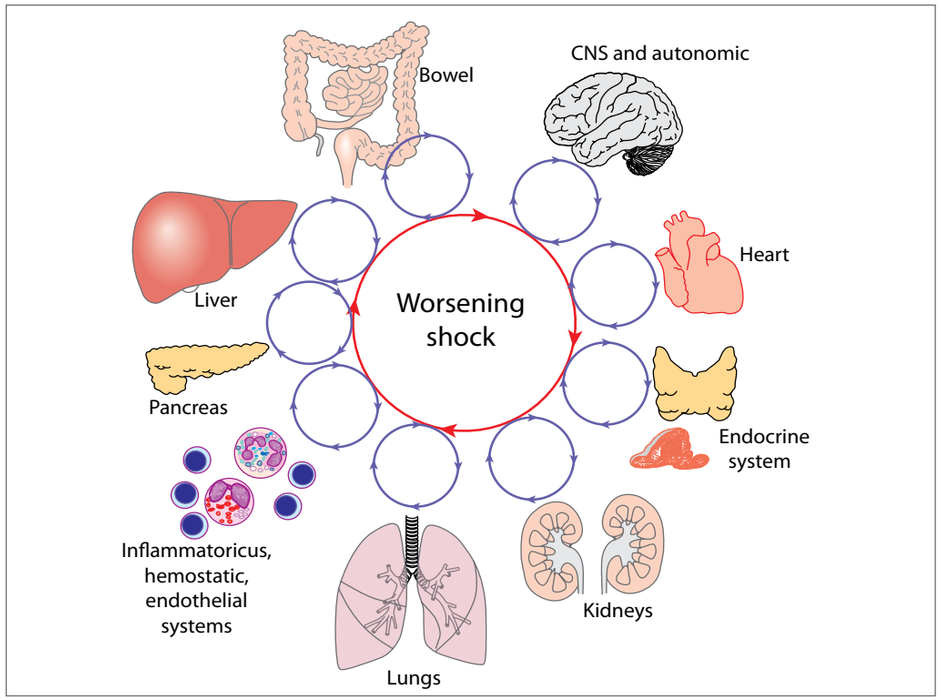

Illustration 12/4 Organs influenced by shock

a microcirculation disorder develops due to the obstructions that prevent the blood from getting to the tissues. Shock has an unfavourable effect in almost every organ, depending on to what extent a tissue can endure the lack of oxygen. (Illustration 4. Organs influenced by shock)

In emergency medical science the grouping of shock is often simplified to the narrowing of the vascular system (vasoconstriction) and the dilatation of the vascular system that goes with 'loss of tone' (vasodilatation). Examples to the former can be: bleeding, trauma, of burn and cardiogenic origin, while examples to the latter one are: hypersensitive, of the spinal cord, hypothermic origin.

Recognition, symptoms. The sign of shock can be rather diverse. However they logically reflect the ongoing alterations in the body. That is why these signs are worth being searched for immediately from the moment we meet the patient or injured person.

In the initial phase of shock it can be stated that the patient's heart beat speeds up which happens upon the loss of about 15% (750 mls) of the complete blood volume of an adult in rest. If the loss of blood is larger, between 15-30% (as far as 1500 mls), then besides tachycardia the pulse pressure is also decreased which makes the pulse more and more suppressable while touching it. The capillary refill time (CRT) is prolonged. We can examine it by pressing the finger tip from the side of the nail and we watch its repeated resaturation by blood. This can be considered normal if it happens within two seconds. In case it takes longer, it counts as pathological.

In case the blood loss increases to about a 40% volume loss (2000mls), the compensational mechanisms begin to become depleted which leads to a significant drop in the blood pressure and fast, easily suppressable pulse. The loss of blood exceeding 40-50% already induces severe damages in the organs with unmeasurable blood pressure and slow pulse being maybe palpable only on a central artery (cervical or lumbar artery).

In accordance with this initially we experience excitedness, restlessness on the patient. His state of consciousness can change further and turn to somnolence and then unconsciousness due to the decreased cerebral blood supply and hypoxia.

The patient's pulse becomes rapid and easily suppressable and the drop of blood pressure can be observed. If the patient loses at least 750 – 100 mls of blood, the pulse will exceed 100/minute and the systolic blood pressure goes under 90 Hgmms. As a result of the decrease in the peripheral circulation and the constriction of the vessels the patient's skin will be cool. Fast, superficial breathing develops due to the increase of the sympathetic nervous system and acidosis (the body becoming acidic). The patient may be tormented by thirst and his mouth may dry out. Marbleization appears on the cold touching skin, especially on the limbs. In case of a cardiogen shock the cervical (jugular) veins get swollen, maybe irregular heartbeat appears on the patient. It can be different if the patient suffers from blood infection. In a septic shock patients often have a high fever when their skin becomes wet and touched as hot. In case of a shock that developed from a hypersensitive reaction, oedema can be observed either locally or spread all over the body. The sound of breathing also changes from the tiny coughs, due to the narrowing of the airways, to loud, pulling breathing, maybe even suffocation.

During first aid it is not so customary to speak about some situations that can also evoke severe life-threatening states, the nature of the development of which is very similar to the one experienced in shock but these can also be equaled to the groups above (endocrinologic processes).

The four shock types can often appear in combinations, so paying attention to the symptoms continuously is indispensable, which means that the patient must never be left alone!

Care. After recognizing the development of shock, the worsening and worsening process must be intervened as fast as possible. Before intervention, the proper survey of the situation, the assessment of the patient's status and calling for help need to be done.

The purpose is to recognize and eliminate the triggering causes as soon as possible. Conclusions about it can often be drawn based on the accident mechanism. If the signs of blood loss are unambiguous, then preventing the further loss is blood definitely has to be strived for. In case of visible bleeding it can be done by the method of bleeding mitigation which is discussed in details in another chapter. The lost fluid also has to be substituted. The first solution to this can be the 'usage' of the patient's own blood. If the patient's injuries do not exclude it, the patient's lower limbs can be raised and we can arrange an autotransfusional or shock position this way with the help of gravitation. (See chapter 10.)

This also serves the patient's appropriate positioning depending on his injuries. It is discussed in a separate chapter.

Oral fluid substitution is not by all means one of the most necessary interventions on the spot. It can be dangerous in case of a patient whose state of consciousness changes fast and he might aspire or it can also worsen the patient's chances for further treatments if there are more serious injuries of inner organs. That is why the real solution among circumstances on the spot is infusion administered by professionals. Nowadays numerous products are available in emergency care which can also be used in an optimal way at the location of the injury as well (crystalloids, colloids, HHO).

During continual assessment, if the patient's state of consciousness gets worse significantly, his breathing has to be checked and ensured. The method for this was discussed in the chapter about resuscitation. Upon reclining the head special attention has to be paid to the potential cerebral and spinal injuries. If we see the consequences of a hypersensitive reaction, then the change in the breathing sound, its becoming pulling or maybe squelching over the lungs can call our attention to the insufficiency of respiration.

If respiration and circulation cease, then resuscitation has to be started with no delay, even without any appliances.

Poisoning

During the history of humanity poisonings played crucial roles in solving disputable affairs but they also caused the death of a lot of people accidentally. That is why scientists and average people have dealt a lot with finding antidotes for poisons. Today toxicology endeavours to discover the antidotes

for more and more toxins with up-to-date appliances and methods at a higher and higher standard. In spite of this poisonings are still one of the determining reasons of death and disease factors even in developed countries.

This topic is also important because in some cases it is difficult to recognize the cause of poisoning so the security risk is higher and treating is more difficult, too. By all means first aid provision and first care endeavours to avert functional disorders that threaten the patient the most, however we can do much about ceasing the triggering cause.

The first aid provider on the spot of poisoning plays a key role in forwarding information that can be obtained at the location and by this he also plays a key role in promoting the recovery of the patient.

The definition of toxicology

The term 'toxicology' originates from the Greek word 'toxon' meaning bow and arrow. The significance of poisons in history, in the prehistoric ages were to obtain food, protection from animals, killing the enemy, later gaining power and killing rivals. The knowledge of poisons developed to become a science, further more a form of art, in the historic ages. Today's civilization is also unimaginable without chemicals/poisons.

The definitive explanation of poisons can be given in several ways. Scientifically poisons are chemically, physically, psycho-chemically effective substances that are foreign to the body or organs regarding their quality, quantity and concentration and they cause functional changes in the living organism. Putting it in simpler words they are substances that damage the processes of the organism when they get in there in small amounts (in mg/ml amount).

The definition of poisoning. Health damage in the human organism which is caused by some lifeless, even small amount of substance with a poisoning effect.

According to its source poisoning can be:

- of exogenic origin which gets into the body from outside (animal and plant poisons, poisonous substances manufactured in a natural and chemical way)
- of endogenic origin which means the pathological agglomeration of substances that can be found within the body (diabetic ketoacidosis, tireotoxicosis, hepatargic coma)

According to the speed of the poisoning process

- acute, when the symptoms of poisoning appear within a short period of time (minutes, hours) e.g. Cl, CO, CO2, cyanide
- subacute, getting into the body and the development of the effect last longer but the organism being damaged has already begun e.g. mushroom poisoning
- Chronically developing, when the poison gets into the body during a long period of time (from days to months), where it agglomerates and causes symptoms e.g. lead, digoxin

Illustration 12/5 Substances that cause poisoning

According to the triggering cause:

- Intentional (murder, suicide)
- Accident-like (occupational, household, industrial, agricultural)
- Random (medicine exchange, overdose)

According to the entry gate: digestive tract, airways, skin, connective membrane, vessels etc.

In the development of the poisonous effect the following issues play some role:

- toxicity (the value of the 'dosis toxica minima' i.e. the smallest poisoning dose, 'dosis letalis minima' i.e. the smallest lethal dose),
- solubility (in water, fat, tissular moist),
- quantity,
- concentration, state of matter, dispersity,
- the entry gate (skin, mucous membranes, airways, gastrointestinal system, poisons that get to the body subcutaneously, that get to vessels, muscles or body cavities),
- the attck point (place/s, organ/s where the poisonous effect develop/s),
- expositional time (the period of time while the poison gets into the body and connects with it),
- cummulative skill (material and biological cummulation),
- the health state of the posioned person prior to poisoning,
- the sensitivity of the organism against poisoning,
- latent period (short, mediocre, long) (see later!)
- physical activity (by increased respiration, circulation and metabolism),

Body defense against poisons:

- it inhibits the further getting in of the poison (the spasm of the rima glottidis or the eyelids)
- it endeavours to get rid of the poison (tearing, coughing, vomiting, diarrhoea, perspiration, diuresis)
- decomposes, transforms the entered poison (by liver functioning)
- extracting certain poisons from circulation it stores them in the bones, skin (e.g. lead, arsenic)

The classification of acute poisonings according to latency

- immediately affecting e.g. the effects of corrosive chemicals,
- of short latent time (¼-1 hour) e.g. poisonings caused by alcohol, petrol, cianide,
- of medium length latent time (1-4 hours) e.g. poisoning caused by fly agaric mushrooms,
- Poisonings of long latency (6-36 hours or more) phalloid type mushroom poisoning, metanol poisoning.

Chart 3. The most common symptoms indicating poisoning

Symptoms	*Poisonous substances*
unconsciousness	anaesthetics, tranquilizers, neuroleptica, drugs, CO, ethyl alcohol, methyl alcohol, paraffin, petrol, benzene, turpentine, trichlorethilen, TCADs etc.
disturbed consciousness	the ones above + atropin, lead tetraethil, muscaridine type mushrooms etc.
epileptiform spasms	kinin, caffeine, lidocaine, aminophenasol, INH, alkylphosphates, nicotine, CO, amphetamine, teophilline, strychnine, cocaine, anticolinerg products, TCADs, phenitoine (!), cyanide, methyl alcohol etc.
muscular weakness	sleeping pills, CO (lower limbs!), alkylphosphates, nicotine, petrol, benzene etc.
wide pupills	atropin, scopolamine, muscaridine type mushrooms, kinin, cocaine etc.
narrow pupills	barbiturates, alkylphosphates, opiates, muscarine type mushrooms, pilocarpine etc. running saliva: alkylphosphates, muscarine type mushrooms, parasympatho-mimethica (pilo-carpine, prostigmine), corrosive chemicals (locally!) etc.
dryness of mouth	atropin, scopolamine, muscaridine type mushrooms, botulism, chlorpromazine, opiates, actedrone etc.
cyanosis	poisons forming methemoglobine (anilin, nitrobenzene, TNT) and medicines (nitrates, nitrits, sulphonamids), products causing respiratory depression, airway obstruction (comatose patient), toxic gases causing oedema of the lungs (phos-gene, chlorine, nitrous gases) etc.
bulls on the skin	barbiturates, CO, mustard gas, methyl bromide etc.
hypothermia	ethyl alcohol, barbiturates, tranqulizers, anaesthetics, phenothiazine, TCADs, CO etc.
hypertermia	atropin, amphetamine, salicylates, cocaine, TCADs, haloperidole, fencyclidine etc.
Hipertermia	atropin, amfetamin, szalicilátok, kokain, TCAD-ok, haloperidol, fenciklidin stb.

Circumstances and signs indicating poisoning, conveying the suspicion of poisoning

- Medical history (activity with chemicals)
- insisting on suicidal intentions from the patient's part or suspecting suicidal intentions, depression
- healthy individual/s sudden, unexpected sickness among suspicious circumstances without antecedents
- the appearance of such symptoms on an earlier ill person that do not fit his prior diagnosis
- typical changes on the patient (impurities, odour of chemicals, remnants of corrosion, scabs etc.)
- several people get ill among similar circumstances at the same place at the same time
- unconsciousness with an unclarified reason

The chart below includes the most important symptoms of poisonings and the substances that most often cause the symptoms:

The primary care of poisoned patients according to the 'S-ABCDE' algorhytm

'S' (safety) - Tasks related to creating security:

- Usage of the available protective (or occasional) means (rubber or plastic gloves, protective coat, protective outfit, protective glasses, mask, plastic bag, wet cloth etc.)
- gathering information, surveying dangers
- rescue in case of need and opportunity, calling the technical and chemical emergency rescue teams to the location of occurence, identifying the poisons according to the given options, removing the poisonous substance from the skin and clothes, neutralization of the poisonous substance with substantial water, washing the poisons off with detergents.

The specific first aid care in case of poisoned patients is the 'ABCDE' surveying and care providing strategy (see Chart 4. The application of the ABCDE algorhytm in case of poisoned patients). Purpose: to ensure free airways, stabilizing and maintaining respiration and circulation.

Specific care in case of poisoning

(Besides or after 'ABC' intervention which serves stability, if necessary):

- preventing further poisons from getting into the body (the removal of contaminated clothes, washing the skin, rinsing of the eyes and pharynx)
- removal of the substance that got into the body i.e. decontamination: making the patient vomit, gastric lavage, colonic irrigation, binding
- dilution (making the patient drink cold water in case of corrosive poisons)
- indifferentiation (with milk), deactivation (e.g. petrol, lipoid soluble poisons with paraffin oil)

Chart 4. Applying the ABCDE algorhytm with poisoned patients

	Problem (upon the effect of poisoning)	*Symptom, recognition*	*Possible/necessary task*
A (airway)	• -airways are threatened /obstructed • -in case of disturbed consciousness • -direct damages of the upper airways, spasm of the rima glottidis, due to laryngeal oedema (corrosive poisons) • -damaged deeper airways, Bronchial spasm (irritatíve, corrosive gases)	• symptoms of airway constriction/obstruction (noisy, stridulous /missing breathing sound) • Remnants of substance, vomit, saliva, blood in the mouth/nasal cavity/in the pharynx • Swelling of the airway mucous membrane	• primarily positioning on the side/raising the chin • Sellick manoeuvre (pressing the thyroid cartilage down to prevent regurgitation, due to the increased danger of vomiting with unconscious poisoned patient) • early endotrach. Intubation to prevent aspiration • rinsing with cold water, gargling • inhalation of powdered salt solution
B (breathing)	• lack of breathing /insufficient breathing (due to paresis of breathing centre, CO2, anaesthetics/tranqulizers, opiates). • too slow or too fast breathing frequency (due to substances inhibiting or irritating the breathing centre) • paresis of the breathing muscles (due to muscle relaxing substances)	• no air flow, breathing sound • increased breathing work • noisy breathing (squelching/stridulous-humming) • signs of lack of oxygen (cyanosis)	• ventilation (in case of contact poisoning only with appliances!) • positioning (laying, maybe sitting) • in case of milder breathing disturbance taking the patient to fresh air, giving oxygen if possible
C (circulation)	• circulation standstill, arrhytmia (TCAD, atropin, scopolamin, beta-blockers, cocaine etc.) • blood pressure drop /jump (blood pressure decreasers, poisons influencing the autonomic nervous system)	• no touchable carotis pulse • slow / fast heart frequency • irregular heart rhytm • -ow / high blood pressure	• resuscitation • Pozitioning (laying / with raised lower limbs if necessary, • giving infusion • care with medicine
D (consciousness/awareness)	• direct /indirekt damage of the central nervous system, • consciousness- awareness disorder, paresis, trembling, spasmic seizure, (amaesthetics, tranqulizers, drugs, organic solvents etc. / CO, insulin, cyanide etc.)	• disturbance of consciousness /awareness, spasmic seizure, reflex drop-out, pupill deviations, muscular palsy	• ABC optimatization, • inhibition of spasms, giving tranquilizer, glucose if necessary
E Antecedents, examination of the whole body and environment	• the possibility /certainty of poisoning may arise	• anamnesis, • traces of poisons, remnants of poisons, • suicide note, • looks (clothes, body surface) • prior activity, prior illness etc.	• necessary tasks – see specific therapies!

- speeding up emptying (e.g. in case of CO poisoning taking the patient to fresh air, ventilation with oxygen, increasing urination, increased fluid intake, haemodialysis, haemoperfusion)
- giving antidotes (e.g. atropin, Fuller soil, glucosum, Konakion etc.)
- giving pain killers (in case of injuries caused by corrosive poisons)

Making the patient vomit: Making the patient vomit is only allowed to be done with a person who cooperates well! It makes sense mostly in the first hour. If we apply it, it should be done as soon as possible. Its method is: the patient should drink a substantial amount of (1-2 glasses of salty) lukewarm water, then he should irritate his pharynx. In case of children salt cannot be applied.

Contraindications of making the patient vomit: Unconsciousness, corrosive substance poisoning, poisoning caused by detergents, washing powder, organic solvents. It is not worth applying in case of antiemetic poisonings.

Gastric lavage: It is a more efficient way of removing poisons than by making the patient vomit. Gastro-lavage is only worth doing in the first hour following the consumption of a substantial amount of toxins. It is the first aid provider's job to ask for early help if necessary.

Binding the toxins that got into the stomach with active carbon: In case of swallowed toxins active carbon: in a single dose (50 gramms/kg for adults and 1gramm/kg for children under the age of 12. It is recommended to be applied within 1 hour following a substantial amount of toxins.

Giving active carbon is not recommended in case of poisonings caused by the following compounds that do not bind with active carbon well: the salts of iron, lithium products, potassic salt, ethanol, methanol, ethilene glycol, acids, bases, fluorides, organic solvents, mercury and its salts, lead and its salts.

Toxicological information can be obtained at the

Health Care Tocicological Service
1096 Budapest Nagyvárad tér 2.
Tel: 06 80 201-199

1074 Budapest Alsó erdősor 7.
Telefon: +36-1-3-215-215
Klinikai Toxikológiai Osztály (KTOX) Clinical Toxicological Ward

Striving for security and using protective means are fundamental in case of suspecting or being certain of poisoning. After having stabilized the patient's ABC functions, decontamination and the neutralization of the absorbed toxic substances can follow. The early called professional rescue team is better equipped for this so the basic job of a first aid provider is to call for help as soon as possible.

Detailed toxicology

Ethyl alcohol (ethanol) poisoning

Definition. This is damage to the central nervous system that arises as a result of the consumption of drinks containing ethyl alcohol by itself or combined with other substances. The developing effect is determined by the consumed quantity, its concentration, the tempo of consumption and by the individual tolerating and decomposing capabilities.

The phases of alcohol poisoning:

1. Tipsiness is characterized by alcohol smelling breath, reddened skin, congested mucous membranes, cheered up, euforic consciousness, maybe restlessness, irritabiity, disturbances of balance and keeping distance.
2. Drunkenness is characterized by anxiety maybe rage, agressive or somnolent behaviour. The speech is unintelligible, faltering, vomiting is common, the swagging, taggering way of walking may lead to falling off and injuries.
3. Intoxication is characterized by being disturbed, somnolence, weakness, decreased blood sugar, vomiting, coma. Upon severe poisoning the reflexes of the pharynx are decreased and there is a danger of suffocation and breathing in the vomit.

Care. In the milder phases caring for the injuries and preventing further problems can mean a job to be done. Considering that we can expect deepening consciousness disturbances upon the gradually developing effect of the consumed alcohol, these patients must not be left alone or let go. In case of the danger or existence of injuries and other serious complications (suffocation, breathing disturbance, breathing stop, circulation disturbance or standstill, cooling down etc.) help must be called for by all means. The already existing injuries have to be attended, the breathing, unconscious poisoned person has to be turned on his side in order to protect his airways and protection against cooling down or becoming overwarmed has to be taken care of. In case of respiration stoppage or circulation standstill beginning resuscitation is necessary.

Metyl alcohol poisoning

Definition. This is a widely used substance in the chemical industry that gets into the body by breathing it in or swallowing it. Upon its decomposing formic acid and lactic acid are formed that cause the severe damage of the retina of the eye. In an amount of 5-100 mls it is lethal.

Its symptoms are: after a 24-48-hour latent period, maybe even earlier, there is a headache, dizziness, weakness, blurred, foggy vision. Death takes place due to the damage of the respiratory and circulatory regulation centres that are sometimes preceeded by spasms. It is not rare that the first symptom is the loss of vision which can be reversed in some cases and final in others (it turns out

only poteriorly whether it is reversible or irreversible). The patient's pupils are wide, his breathing is fast and deep. His face and limbs are cyanotic, his consciousness is disturbed. In the more severe phase of the poisoning unconsciousness, then spasms and finally the paresis of the respiratory and vasomotor centres occur which lead to death.

Care. According to the symptoms but the patient has to be made to drink ethyl alcohol which inhibits the decomposition of methyl alcohol and the formation of harmful metabolites.

Ethylene glycol poisoning

Definition. Ethylene glycol is widely applied primarily in the liquid of the car's winter windshield cleaner substance. To prevent poisoning a colouring agent is also added to it. Industry uses it as an additive or for substituting glycerine. It can be mistaken for ethyl alcohol but it is not just coincidental poisoning that happens with it but also suicidal attempts. The colourless, odourless, sweetish liquid can also be used for making drinks illegally. This substance is more poisonous than ethyl alcohol even if some of its effects resemble that of ethyl alcohol.

Its symptoms are seemingly identical with that of ethyl alcohol but there is no alcohol smelling breath.

In the first 12 hours the symptoms of ethyl alcohol poisoning dominate. In the next 12 hours breathing disturbances and blood pressure rise occur. In the third phase the signs of kidney damages dominate. There is pain in the lumbar region, in the kidney area and there is decreased urinary excretion.

When the cause of poisoning is detected, make the patient drink hard liquor (ethyl alcohol slows down the decomposition of ethylene glycol and the formation of poisonous metabolites). Ask for help, the patient has to be hospitalized as soon as possible.

Psychoactive stimulants (drugs)

- Amphetamine (speed, Extasy, white, crystal, ice), Metamphetine
  Symptoms: euforphoria, hyperactivity, trembling, wide pupills, fast heart functioning, convulsive attack, fever, psychosis etc.
- Cocaine (snow, white gold, Charly, coke, etc.)
  Symptoms: as in case of amphetamine and also chest pain (a heart attack can come to being), life threatening arrhytmia, circulation standstill
- Hallucinogenics (LSD, hashish, cannabis derivatives, mezcaline, ketamine, GHB)
  Symptoms: hallucinations, dizziness, disturbance of speech, anxiety, panic, psychosis)
- Marihuana
  Symptoms: euphoria, dryness of mouth, wide pupils, decrease in appetite

- Opiates (heroin, morphine, codeine, pethidine)
  Symptoms: reduced alertness, narrow pupils, slow heartbeat, blood pressure drop, breathing depression, decrease of body temperature
- Anaesthetics, tranquilizers (barbiturates, benzodiazepines)

Care. According to the symptoms. Special attention has to be paid to the supervision of the poisoned person whose consciousness is far from reality. Call for help by all means, since the patient may not just be threatened by the direct effect of the substance that caused posioning but also by additional dangers (injuries, suicide etc.). The first aid provider has to be in special consideration of the danger of infection (HIV, hepatitis B et.) especially in case of users of intraveneous drugs. Consequently, at such time use rubber gloves and do not ventilate the patient without some form of necessary protection such as a resuciaide or ventilation mask / pocket mask. Under the influence of some drugs (sextasy, GHB) the bodily and psychological consequences of sexual abuse and even group rape may appear with the victims of the drugs.

Gas poisoning

Carbon monoxide (CO) poisoning

Definition. CO is a colourless, odourless poisoning gas which is lighter than air, it has no taste and it is not irritating. It can be produced by imperfect burning upon the burning of every material that contains carbon which can be solid (hard coal, wood), liquid (petrol, diesel oil, paraffin, kerosene), gas (methane, ethane, natural gas, PB gas) or the smoke of badly ventilating heating appliance (ovens, stoves, furnaces, gas boylers). While breathing it in, it is bound to haemoglobin since it is bound to it about 250 times stronger than to oxygen. The symptoms are evoked by the lack of oxygen. Foetuses, newborn babies and children often get poisoned. 40% of the patients who have received a hyperbaric therapy are children.

Symptoms in the different phases of carbon-monoxide poisoning:

1. Stupor phase: the first symptoms appear frontally or temporally, which can be a pulsing headache, tinnitus, nausea, vomiting, diarrhoea, stupor, confused consciousness, decreased discernment, maybe excitedness. The patient is tired, exhausted, his breathing count and heartfrequency becomes faster upon burdening. Weakness of the limbs starts on the lower limbs and later it is typical there (which means he cannot escape but it is also important from the point of view of isolation!). Later fast, deep ispirations, difficulty of breathing, coughing, chest pain and palpitation (fast heartbeat) feeling appear.
2. Convulsive phase: confused consciousness, somnolence then coma can be recognized. The increased tightening and then the convulsions of the bending muscles of the upper limbs and lockjaw (trismus) occur and then later tonoclonic (tightening-convulsing) convulsions appear. Arrhytmia is often induced. The patient may become incontinent of faeces. Vomiting, aspiration (vomiting and trismus together mean the sure death of the patient if he is left alone or found late).

3. Paralytic (with suffocation, asphyctic) phase: blood pressure drop, complete loss of reflexes, toneless musculature, wide light stiff pupills, paresis of breathing and then death can be recognized. Patient can often have uncertain, misleading symptoms, they can produce almost any possible symptom e.g. melena (pitch-coal chair), angina (chest squeeze), nistagmus (the vibration of the eyeballs), DIC (severe blod clotting system disorder, cherry-red skin colour (it is said to be a classical symptom but it cannot always be observed), paleness etc.

Care. Besides intensive airing of the place, preferably immediate rescue from the gas space (it is also dangerous to the first aid provider), taking the patient outside to fresh air. The most important element of the treatment of such poisoned person is oxygen given in high concentration (100%) which, in case of a satisfactory exchange of gas, overwhelms the CO molecules that have bound to haemoglobin so that they can be evacuated from the patient's body during breathing or ventilation. In case of existing basic life functions ensuring free airways (trismus can make the clearing of the airways difficult) the patient needs to be turned on his side. The proper exchange of gas has to be ensured by ventilation in case the spontaneous breathing work is not sufficient. As a preventive step installing a CO detector and its regular checking can be done. It should be placed in the room in front of the bedrooms. Its ideal installing height is 1.6 metres and it should not be covered by furniture or anything else.

Carbon dioxide (CO_2) poisoning

Definition. Carbon dioxide in a natural concentration is a not poisonous, not irritating, colourless, odourless gas that has no taste. In a large concentration it causes suffocation, it is of an acerbic taste and pungent smell (CO2 + H2O ⟶ H2CO3) (carbonic acid), it is heavier than air (wine cellar, cesspool, ensilation basin etc.) and it does not feed burning. (A burning candle being lowered to the bottom of a room, submerging in a gas of as much as only 10% in concentration, is blown out (candletest!)). Cooled to under -78°C this gas is transformed to solid state of matter (dry ice, carbonic acid snow). Dry ice is used for cooling. During this it warms up and in the meantime it directly becomes gaseous (sublimation). Under high pressure (> 5 atm) it can be liquefied. The evaporation heat of liquefied CO2 is large so upon evaporation it cools its environment excessively. Poisoning generally develops upon the effect of fermentation processes, maybe among industrial circumstances. The gas is accumulated at the bottom of the given room. Breathing in the gas cannot only happen when someone enters a room filled with gas but also when he bends down to pick something up in a room where he might have been working for a longer period of time or having a headache he sits or lies down and inhales the high concentration gas filling the deeper part of the place. (This latter case is more common.) The first aid providers hurrying to help the patient are also often victimized by this when they bend down to the poisoned person lying on the floor.

Symptoms: in case of inhaling 1-2% CO2 the depth of inbreaths grows due to the stimulus of the breathing centre, the respiratory output begins to rise. (Chart 5. The effect of carbon dioxide concentration on the body)

Chart 5. The effect of carbon dioxide concentration on the body

CO_2 concentration	*Symptoms*
3-4%	The breathing count also begins to rise, the respiratory output gets doubled in this case.
5%	Perceptible shortness of breath appears in this case.
7%	Pronounced dyspnea is noticeable, the respiratory output is seven times bigger than normally in this case.
10%	Unbearable shortness of breath, confused consciousness, headache, dizziness, anxiety, a state similar to drunkenness can be experienced. Excessively increased breathing work can be observed, the breathing count is about 35/min, the breathing volume is about 2,5 litre (the respiratory output is about ten times larger than normally) in this case.
15%	Losing consciousness occurs, muscular stiffening, trembling, generalized spasms appear in this case.
20%	Over this value deep narcosis occurs, surgical interventions may be done! The respiratory output decreases due to the paresis of the respiratory centre. Inhaling concentrated gas causes immediate death.

Care. Rescue from the gaseous space (it is also dangerous to the first aid provider), checking vital functions, ensuring free airways, turning the patient on his side and ventilating him if necessary.

Chlorine gas poisoning

Definition. Its most comon appearance is in households as a result of the chemical reaction that develops between the mistakenly poured together hydrochloric acid (HCl) and sodium hypochlorite (NaOCl).

It is used in the chemical industry and also as a discolouring agent and a disinfectant. It is a pungent smelling yellowish green gas. When inhaled, on the mucous membranes (conjunctiva, airways) as a reaction with water, hydrochloric acid is formed and it causes mucous membrane irritation and toxic pulmonary oedema.

Symptoms: their seriousness depends on the concentration of the inhaled gas. In case of breathing in high concentration gas the poisoned person can get suffocated even within minutes due to the spasm of the larynx and the bronchi. During a milder case of poisoning the spasm of the larynx, then convulsive coughing, a so-called chlorine coughing, the feeling of suffocation, dyspnea, cyanosis, runny saliva and nose, tearing and chest pain appear. The patient may become temporarily relieved but after a few hours the liquid that separates out in the lungs (oedema) causes dyspnea which can be dangerous to life.

Care. The patient has to be removed from the gaseous space and he should do the smallest possible physical activity. A rescue team equipped with a compressed air respirator may be needed. The

rinsing of the eyes, nose and pharynx with clean water decreases pain and the damage of mucous membranes. The patient must strictly be kept in a rest position until the ambulance arrives. The ambulance staff give oxygen, respiration if necessary and medicine that decreases the damage of the pulmonary mucous membranes. They definitely transport the patient to a medical facility due to the lasting damages.

Ammonia poisoning

It is a pungent smelling gas which is used in the chemical industry and for filling refrigerating machinery. When inhaled, it has an effect on the mucous membranes and the conjunctiva of the eyes. It reacts to the water on wet surface and ammonium hydroxide (NaOH = ammonia water) is formed, which as a strong base, causes a corrosive effect.

Symptoms and things to be done: see chloine gas poisoning.

Medicine poisoning

In milder cases these poisonings are caused by the mistaken overdose of different kinds of medicine, whereas the severe cases are more like results of intentional deeds. Suicidal intake is common but in case of medicine affecting the central nervous system (tranquilizers, anaesthetics, antidepressants, neuroleptica) abusive i.e. extreme medicine consumption is also a frequent occurence. Medicine getting into the body in a large amount at the same time can cause poisoning. During the joint intake of different kinds of medicine their effects may be asserted as strengthening or antagonizing one another. The presence of a different substance complex may also result in uncalculable consequences. In general the following effects can dominate:

- The expected effect of the medicine in the therapy becomes increased which means the functional disorder of the different organs (e.g. consciousness and awareness disturbance, respiratory disorder, circulations disorder, metabolic disorder and disorder of excretion etc.).
- The symptoms known as side-effects appear in an increased degree. – A counter-effect develops which is contrary to the therpeutic effect.
- In case of externally used medicine, their local corrosive effect emerges.

Care. If the medicine in question were certainly taken a short while before (within one hour), then if the appropriate conditions are given, making the patient vomit may serve the purpose best. Under the influence of certain medicine (e.g. Digitalis types) making the patient vomit is strictly forbidden due to their arrhytmia causing effects.

Help for the patient has to be called for by all means, since the subsequent effects are incalculable so a more efficient detoxification and other interventions (antidotes etc.) may also be needed. Detecting the specific medicine that was taken, finding the medicine packages that may have been thrown to the trash are emphasized components of first aid provision. Supporting the patient in a psychogenous crisis (exhaustion, suicidal intention) is also an important task.

Solvent poisoning (petrol, benzene, carbon tetrachloride)

Poisoning can happen accidentally (e.g. inhaling vapour within the frame of occupational poisoning), mistakenly when some diluent or other unknown solvent is kept in an unlabelled bottle and somebody drinks from it, or intentionally (sniffing glue, huffing trichlorethylene or toluol). Poisoning can be even life threatening!

Symptoms: Due to their lipid solubility (fat solubility) industrial solvents primarily affect the central nervous system and by this they first cause excitedness, dizziness, tiredness, trembling, ataxia and then narcosis. If they get into the body in a large amount or repeatedly they also damage other specific organs (e.g. heart muscle, liver, kidney). When these substances are in a durable contact with the skin, they may cause severe inflammation.

Within a short period of time serious respiratory symptoms may appear: coughing, dyspnea, suffocation, terminal breathing (gasping). Their serious poisoning may lead to death.

Care. Keeping the security rules is of extreme importance due to the danger of fire and explosion and also due to the poisonous effect of the vapour of volatile substances. Intensive airing is needed, avoid activities that may create sparks (e.g. ringing the bell, turning on lights, smoking etc.) For the inhibition of absorption make the conscious patient drink paraffin oil. Making him vomit is not recommended because there is the danger of inhaling the emesis that may lead to severe bleeding pneumonia. An unconscious patient has to be positioned turned on his side, into the recovery position. If his clothes are contaminated they need to be removed.

Poisoning caused by corrosives (acids, bases)

From a toxicological point of view corrosives are so-called locally effective concentrational poisons since their effect is primarily local, the alteration caused by them depends mainly on their concentration. In case of accidental poisoning the patient drinks maximum one síp, whereas in case of intentional (suicidal) poisoning a larger amount is drunk (even as much as 1-5dls) so its degree of lethality is higher.

Symptoms:

- strong pain in the oesophagus and stomach
- nausea, vomiting (the emesis is sticky, slippery to the touch, reddish brown in colour in case of alkaline poisoning and rough to the touch, brownish, coffee-grounds-like in case of acidic poisoning).
- Further symptoms:
- salivation, traces of its flow
- swollen mucous membrane)lips, mouth, pharynx) – it is more pronounced with alkaline poisoning
- eschar formation, bleeding (especially with acids)

- swollen laryngeal mucous membrane (if there is a corrosive effect also at the entry of the larynx)
- insufficient peripheral circulation (shock)

Care

- the corrosive substance that got on the body surface, to the eyes has to be washed off immediately with substantial amount of water
- the corrosive substance that into the mouth, pharynx has to be washed out, diluted by rinsing and gargling
- In case of swallowed poison (in order to dilute the corrosive substance) the patient immediately has to be made to drink cold water (it does not make him nauseous)
- The ambulance team called to the spot apply mucous membrane anaesthesia, relief of pain (with narcotic pain killer if necessary), ensuring vein, fluid substitution, even laryngotomy in case of upper airway stricture.

In case of swallowing corrosives making the patient vomit and gastric lavage are strictly FORBIDDEN!

Mushroom poisoning

Certain cases that are suspected to be mushroom poisoning do not qualify as poisoning:

- sickness due to excessive mushroom consumption
- mushroom food poisöning
- sickness due to individual sensitivity
- imagined sickness due to fear of mushroom poisoning

The outcome of real mushroom poisoning depends on:

- age (mainly because of body weight)
- state of health
- the amount of the consumed poisonous mushroom, the proportion of the poisonous mushroom in the consumed food
- the amount of the poisonous substance in the poisonous mushroom

Mushroom poisonings with a short latent time

Muscarine type poisoning They are caused by the consumption of inocybe type mushrooms

Symptoms:

15-60-minute latent time, narrow pupils, perspiration, salivation, runny nose, nausea, vomiting, abdominal spasms, diarrhoea, the heart functioning slows down. Drying out due to the large fluid and electrolyte loss (exsiccosis), calf spasm, maybe the symptoms of increased muscle tightening appear.

Illustration 12/6 The most common poisonous mushrooms – deadly amanita (amanita phalloides); citocybe (omphalotus olearius); inocybe (inocybe patouillardii)

Muscaridine type poisoning It is caused by falseblusher and fly agaric.

Atropine, scopolamine cause the following poisonous symptoms:

After a 1-2-hour latent time symtoms that are similar to atropine poisoning appear: red, warm, dry mucous membranes, fast heart functioning, psychomotoric restlessness, hallucinations, delirium.

Gastrointestinal (causing stomach and intestinal complaints) type poisoning.

Most commonly they are caused by the following mushrooms: fluorescent citocybe (Citocybe phosphorea). satan boletus (Boletus satanas), wolf boletus (Boletus calupus), leaden entoloma, russula type mushrooms, lactiferous type mushrroms

Phalloid type poisoning

They are caused by fly agaric and fly agaric-type mushrooms. Some of its toxins are responsible for liver and kidney damages while other for the gastrointestinal symptoms. The seriousness of the poisoning depends on the absolute amount of auratoxins and also on the relative amount of antamanide which is an antitoxin produced in the mushroom, too. The amanitine content of fly agaric depends on several factors and it changes yearly. The quantity of antamamide also changes. In a lucky case, when the mushroom has a small amanitine content and a large antamanide content, lethality decreases significantly. However, if it coincides with trying out a new medicine (antidote), it can lead to serious mistakes.

Symptoms: after a 5-24-hour latent time the poisoning occurs in two phases:

First phase: unstoppable vomiting, diarrhoea, rice liquid-like stool, exsiccosis develops in a short time, weakness of muscles, muscle convulsions, blood pressure drop, collapse.

Second phase: With the patient who survived the first phase, jaundice, liver and kidney deficiency occur, that lead to death in case there is no medical intervention.

To avoid mushroom poisoning the most important rules are the following:

- Only known mushrooms are allowed to be gathered, every unknown type has to be considered poisonous.

- All of the mushrooms gathered for eating have to be shown to an expert in every case.
- Knowledge about the lethally poisonous mushrooms has to be acquired.
- Upon the smallest suspicion the mushroom or food in question has to be thrown out. (Picture 12/6. The most common poionous mushrooms)

Poisoning by plant protection chemicals

The requirements about plant protection chemicals:

- it should definitely kill the living being damaging the plant
- it should be cheap
- it should be easily manufactured even in large amounts
- its poisonous effect should last only for a certain period of time, after that it should be decomposed to atoxic substances

These requirements are mainly fulfilled by the alkylphosphates (organic hydrogenphosphate esters), they are the most widespread, poisonings are most common with them.

A lot of different kinds of chemicals and even more manufactured products belong here. Newer and newer products are continuously distributed.

The main effective agents are:

- barium (e.g.: Neopol)
- dicoumarol (e.g.: Redentin)
- 2,4-D type herbicidals (e.g.: Dikamin D)
- dinitro-orthocrezol (DNOC), dinitro-orthophenol (DNOP) (e.g.: Novenda)
- dithiocarbamate (e.g.: Cineb 80)
- chlorinated hydrocarbons (e.g.: Thionex 50 WP)
- cholinesterase inhibitors (alkylphophate, carbamate) (e.g.: Unifosz 50 EC)
- nicotine (e.g.: Gaucho 70 WS)
- parakvate, dikvate (e.g.: Reglone)
- pyrethrum, pyrethroid (e.g.: Coopex)
- cupric sulfate (e.g.: copper sulphate)

Illustration 12/7
Agricultural sprayer machines

Alkylphosphate poisoning

Effect mechanism: The alkylphosphates (esters!) irreversibly paralyze the functioning of the acetylcholinesterase (AChE) enzyme. Acetylcholine (ACh) is a neurotransmitter which transmits stimuli between two nerve endings. Since acetylcholinesterase is the enzyme that breaks down acetylcholine in the sympathetic gap within moments, upon the inhibition of this enzyme acetylcholine is accumulated in the synapse and the stimulus becomes permanent until the exhaustion of the body ('cholinergic crisis').

The activity of the cholinesterase increases again only by the physiological regeneration of the enzyme (50-100 days!).

Entry gate

- orally (per os) it has an effect within minutes, hours

due to incidental reason:

- consumption of unwashed sprayed fruit
- drinking the chemical (rare)

due to intentional reason

- suicide (common)
- murder

reason of an accident e.g. during spraying

- **through the skin** (has an effect within hours)
- **by inhaling it** (has an effect very fast)
- **through the conjunctiva** (has an effect very fast)

Symptoms: (after a 10-30 minute latent time)

'cholinergic syndrome'

'parasympathomimetic syndrome'

The multiplied, non-decomposing acetylcholin (ACh) is responsible for the symptoms and it maintains the continuous excitement of the M and N receptors.

The symptoms of the excitement of the M receptors are:

- bradycardia (slow functioning of the heart), even asystolia (cardiac arrest)
- blood pressure drop (negative inotrope effect – vasodilatation)
- pulmonary oedema
- bronchospasm, increased airway discharge (as asthmatic seizure)
- chemical smelling breath
- myosis, adaptation spasm (fixed to near, sees hazily to far), tearing
- salivation
- sweating
- diarrhoea, abdominal colic, enuresis

The symptoms of the excitement of the N receptors are:

- weakness
- muscular fibrillation, increased muscle tone
- clonic or tonic-clonic spasms
- ataxia
- headache, dizziness
- nausea
- anxiety, confusion
- tremor
- coma
- paresis of respiration

Care: The first aid staff should protect themselves from poisoning (rubber gloves!)

- preventing the poison from getting in further
- removal of the contaminated clothes
- washing of the whole body (hair, under the nails too!) with soapy water or water with dishwasher detergent (bases hydrolyze esters i.e. the alkylphosphates
- washing the eyes with 2-4 % bicarbonate solution
- out of the activities that ensure vital functions ventilation is allowed to be done only with appliances due to the possibility of contact poisoning (ventilation from mouth to nose or mouth to mouth is strictly forbidden!)

Within the ambulance care, besides the aspecific therapy gastric lavage is done and Atropin, as an antidote and infusion are provided and in case of spasms anticonvulsive medicaments, infusion (500-1000 mls of crystalloid) are also given.

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13. Assisting at Childbirth

by Gábor Nagy

The content of chapter

Physiological grounds of pregnancy

Childbirth is a physiological process in the course of which a foetus with its collateral parts is delivered. Mature childbirth occurs between the 39th and 42nd week of pregnancy. During regular childbirth the foetus is delivered in a cranial, longitudinal position, alive, without any complications due to the appropriate delivery forces. After the foetus is born the complete placenta departs and is ejected from the uterus within regular time. Subsequently to childbirth the uterus constricts and bleeding ceases. Aiding obstetrication at the level of providing first aid should be finalized outside a medical institution if we find the woman in labour in second stage labour pains or if the circumstances do not make hospitalization immediately possible.

During physiological childbirth pains appear which help to determine the expected time of delivery. The pains are the following:

- Predictive pain (initial, usually irregular contractions, which indicate the beginning of delivery)
- Preparatory pain (during which the cervical orifice opens and disappears)
- Dilating pain (intensive pain serving pushing and the delivery of the baby)
- Placental pain (serving the detachment and delivery of the placenta)

The duration of the pain greatly depends on how many times the woman has delivered a child, the age of gravidity and the physical build of the mother.

The movements of the foetus during childbirth

Under normal circumstances the foetus accomodates to the entry of the birth canal during the preparatory pains. If this happens properly, the foetus's skull, or more precisely the sagittal suture of the skull (this is the suture line connecting the anterior and posterior fontanels) takes a transversal position in the mother's pelvic inlet. To put it more simply, the foetus's head takes the position so that it faces one of the mother's ilia. Then it carries out a specific series of movements. Under regular circumstances the sagittal suture follows the largest pelvic diametres to enable the foetus to pass through the birth canal the easiest possible way. In order to be able to assist at childbirth we need to know these movements. They are as listed below:

1. The first movement is the ***flexion***, during which the foetus slightly bends its head forward while its chin gets closer to its chest. The purpose of this is for the skull to start its way through the birth canal.with the smallest possible diametre.
2. The second movement is the ***internal rotation***. At this time the sagittal suture, the foetus's skull, turns 45 degrees in the lesser pelvic cavity. From the transversal diametre the sagittal suture gets into the oblique diametre. After the further contractions the head gets to a lower position

and makes another 45 degree rotation. At the end of the 90 degree rotation the foetus's back of the head usually touches the mother's pubic bone. The sagittal suture of the skull gets into the straight diametre of the pelvic outlet.

3. The third movement is ***deflexion***, during which the back of the head is supported by the mother's pubic bone, the head is leaned back and the skull tilts backwards. While the head is being leaned back, the face rolls out, the skull is almost completely born. At this time the foetus's face faces the mother's anus. (Illustration 1. Flexion, internal rotation, deflexion)
4. The last phase is the so-called ***external rotation***. At this time the foetus's head makes another 90 degree turn after getting through the pelvic outlet so as to make it possible for the shoulders, which make a similar rotation, to be born. By the time the shoulders are born, the foetus's face looks in the direction of one of the mother's thighs. The baby's chest, abdomen and limbs quickly follow the birth of the shoulders. In case the head and the shoulders have already been born in the regular way, the other parts of the body follow them fast since their diametre is smaller than that of the skull.

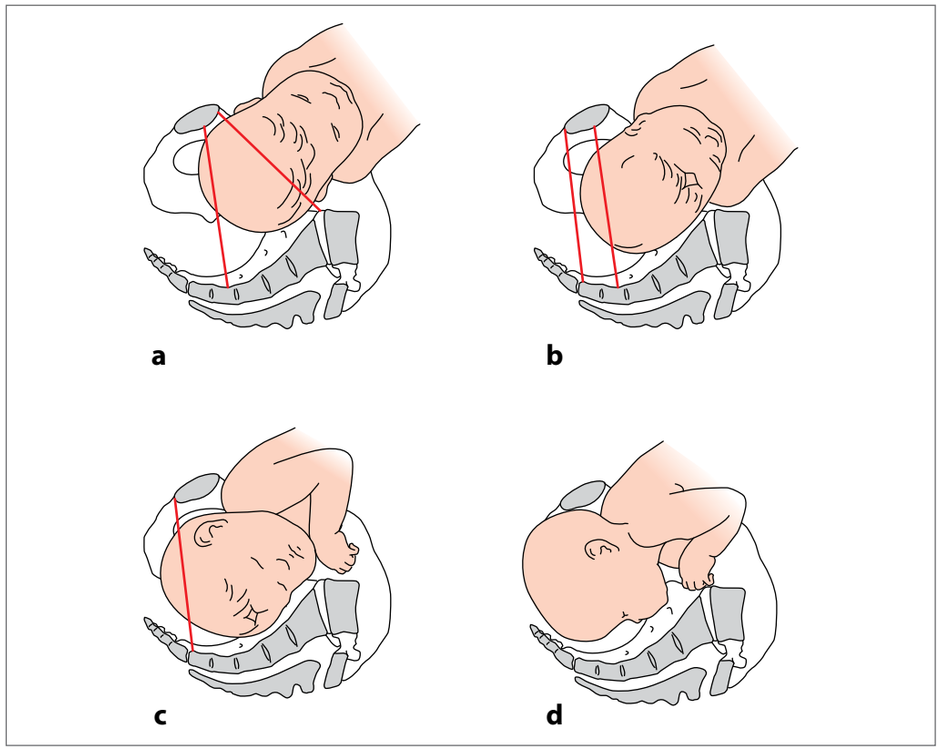

Illustration 13/1 Flexion, internal rotation, deflexion

Naturally the implementation of each and every movement is aided by the contractions of the uterus. Pushing from the mother's part, the pressure of the abdominal muscles helps the rotation of the skull, the outward motion. In the intervals between the contractions of the womb the head and the shoulders take their proper position slowly, they try to 'accomodate', so the mother does not have to push in the breaks between the contractions either. At such times the goal is to gather strength and have a temporary rest.

Knowing the stages of childbirth is also important since we should only conduct delivery on the spot if the mother is in the stage of expulsion. The preceding stage of dilatation is usually long enough to take the mother, who is getting ready to give birth, to hospital or to call an ambulance for her transportation.

Thus the stages of childbirth are the following

1. *Phase of dilatation*
   Conventionally, this lasts from the appearance of the regular contractions until the disappearance of the cervical orifice. The period of time for this is relatively long, in case of women giving birth for the first time it generally takes 8 to 10 hours which can be shorter if they have already given birth. The stage of dilatation is characterized by regular contractions, which occur at regular cycles of time and get more and more frequent as the actual delivery approaches. Amniorrhexis and the flow of the amniotic fluid are characteristic of the end of dilatation stage. The woman giving birth might feel an increasing defecation stimulus. The irregular contractions are generally predective pains, which may already occur days before the delivery. Naturally the examination of the cervical orifice is not the task of the first aid provider. The helper may get information about the actual stage of the delivery by examining the vaginal orifice (with the appearance of the skull in it) and the area of the perineum (its bulging). (Illustration 2 Stages of dilation and expulsion)
2. *Phase of expulsion*
   This stage lasts from the disappearance of the cervical orifice until the delivery of the foetus. It is characterized by intensive and frequent strong pains, i.e. contractions to aid childbirth. Its time frame is usually 20 to 30 minutes in case there are no complications.
3. *Placental phase*
   It lasts from the delivery of the foetus until the placenta is born. It takes 10 to 40 minutes.

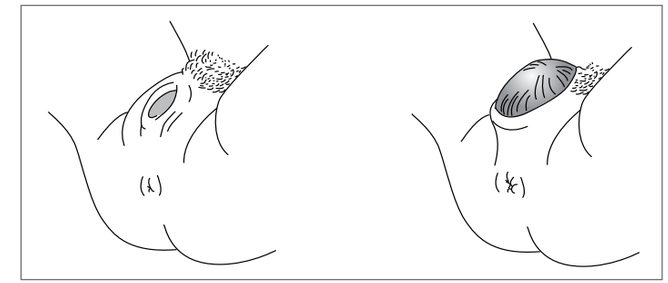

Illustration 13/2
Stages of dilatation and expulsion

Things to be done before childbirth

In case of pregnant women, especially before chidbirth the following things have to be assessed fast in order to gain a full picture about how endangered the mother is, about the present status of the delivery and other inportant things to be arranged on the spot.

The woman in labour has to asked if she has been pregnant or given birth before. Women who have given birth before usually know the process so they can even help the work of the person assisting them. If she has already had a pregnancy and delivery she should be asked about potential previous complications. Such might be premature delivery, difficult delivery, irregular foetal position, caesarean section, spacial disproportion, etc. If there has been a problem before, professional help, an ambulance should be called as soon as possible, since there is an increased risk that a problem may also occur during the present delivery. It is important to ask if she has regularly attended prenatal care, if she has been told there that she might have a problem. Other than this she should also be asked about other diseases or conditions, such as hypertension, diabetes, albuminuria, anasarca.

If there is an opportunity, the mother's limbs should be examined, signs of excessive oedema should be searched for, her pulse has to be taken, and her blood pressure measured (e.g. with an automatic sphygmomanometer.

After that it is practical to gather information about the status and the position of the foetus. You should inquire if the amniotic fluid has drained, about the quality of the pains, about the time factors of the regular pain activity (how frequent the pains are and how long they last).

Subsequently it is necessary to survey the intra-uterine position of the foetus. This is aided by the so-called Leopold's manoeuvres. They are shortly discussed here, however it is important to emphasize that they do not necessarily belong to the routine first aid tasks since great experience.is needed to their evaluation, despite their they are easy to do.

- *First Leopold's manoeuvre:* Facing the pregnant woman stand on her right and place both palms on the fundus, the upper part of the uterus. Try to palpate what you feel in the uterus (the skull, the buttocks, or if it is empty). Incase the foetus has already taken its regular predelivery normal position, the buttocks can be felt. In case it is empty, it can indicate transverse positioning, whereas if the skull can be touched there, it can refer to breech presentation.
- *Second Leopold'd manoeuvre:* While carrying out this manoeuvre place your palms on both sides of the uterus and search for the foetus's back (generally this can be felt) on either side.
- *Third and fourth Leopold's manoeuvres:* The part of the uterus at the pelvic outlet is examined and there the position and characteristics of the so-called front lying part. Among normal circumstances the foetus's skull can be felt there, which may be moved out of there depending on the phase of the delivery,. If the skull can be felt here and it cannot be moved out, it can indicate a more advanced status. (Illustration 3 Leopold's manoeuvres)

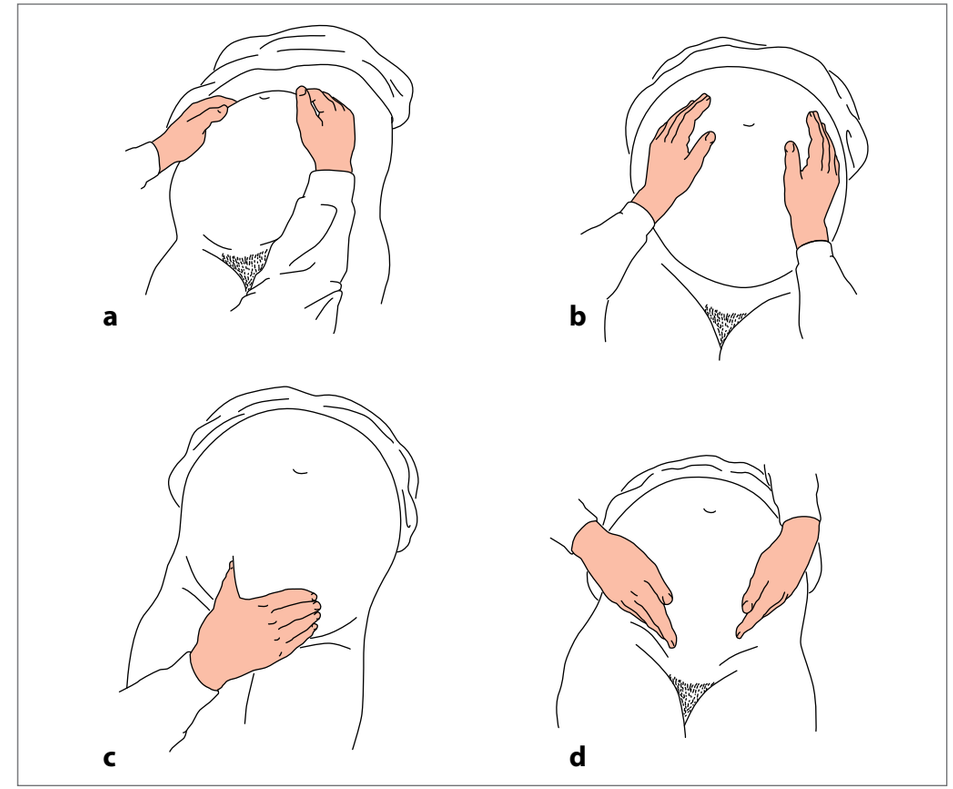

Illustration 13/3 Leopold manoeuvres

It is important to note that the examination should not be carried out via the vagina, putting your fingers in there is strictly forbidden. Although it is important to have a look at the vaginal orifice and the perineum area. Its bulging forward, the appearance of the foetus's skull is a significant sign.

On the basis of the available information it has to be decided fast if the childbirth is in an advanced status and it will probably have to be completed on the spot or due to other reasons (early stage, complications) the the woman in labour needs to be hospitalized as soon as possible. In this case calling an ambulance with no delay can be helpful.

Preparations for childbirth on the spot

If the delivery is in an advanced status, usually in the stage of expulsion, or very close to it, and according to all of the signs the foetus is positioned properly for a vaginal birth, the necessary preparations have to be arranged as soon as possible.

Clean, warm water and clean, freshly ironed textiles have to be obtained as soon as possible. Other than this try to have disinfectants, sterile, clean rubber gloves and also sterile bandage brought to the given location.

The mother giving birth should be assisted to take the proper body position so that it is comfortable for her and there is also room for us to help the newborn be born. It is practical to lay the mother with her upper body slightly raised, both of her legs bent at the knees, she should place the bottom of her feet on a flat surface and her knees should be parted at a distance so that we can easily get to the area of the perineum and the vaginal orifice.

The person assisting childbirth has to wash hands thoroughly, preferably with a disinfectant or wear sterile rubber gloves. In addition to these, adequately warm temperature and proper lighting should be provided in the room we are in.

Conducting childbirth

If possible, stand on the right of the woman giving birth and watch the vaginal orifice and the perineum region. When the perineum starts bulging and the vaginal orifice opens (with the skull in it) often some stool leaves the woman's rectum (pressed out by the foetus's skull). Keeping it away from the newborn is of vital importance, too. The first important job is to wash the perineum with clean or slightly disinfected warm water. This should be done with movements from the top downwards (from the pubic bone towards the rectum). Following this the anus should be covered with a clean piece of cloth or gauze and perineum protection has to be applied due to the danger of injury of the perineal region.

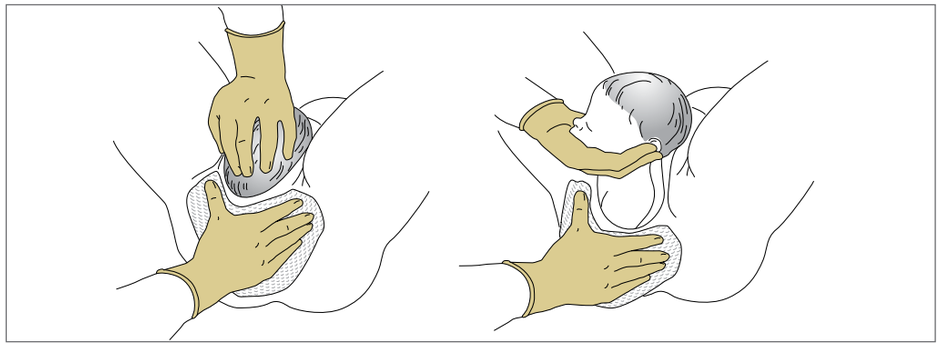

Illustration 13/4 Protection of the perineum and assisting the rolling out of the head

Generally we place a wet cloth in our right hand and we hold and slightly push the perineum with it. With the fingers of our left hand the large pudental lips should be drawn apart and in addition to this the skull of the foetus should be held softly.

In case of women giving birth the first time who are inexperienced in this field, it is important to direct them. The mother should be told to take a deep breath at the beginning of a pain and push strongly as if she were to stool. It might make things easier for her to hold onto her bent legs under the knees. If her air supply has run out during the pain, the mother should be encouraged to take another deep breath and push as long as the pain lasts. When the pains cease, the mother should be praised and told to relax.

We should hold and protect the perineum until the skull rolls out and we should help the mother by telling her when she has to push hard.

After the rolling out of the skull the birth of the shoulders have to be assisted. For this the head of the newborn has to laid hand on held properly. When the head has rolled out we usually take the foetus's neck between the index and middle fingers of our left hand and we hold the skull with the rest of our fingers. (Illustration 4 Protection of the perineum and assisting the rolling out of the head)

Helping with the other hand it has to be pushed slightly downwards until the newborn's shoulder at the side of the pubic bone is born, then the infant has to be raised until the other shoulder is born too. After this the newborn still rotates some more (external rotation), this movement should also be helped, usually only by simply holding the newborn's head, shoulder or chest. The other body parts are easily born afterwards.

It is important to pay attention to the protection of the perineum and after the skull is born the process must not be urged, the newborn's neck must not be pulled.

The placental phase

After the child is born, it is important to keep an eye on the birth of the placenta. By this time the pain activity slowly ceases, the pains become less painful. The complete detachment and exit of the placenta through the vagina usually happens in a short time. It is important that the birth of the placenta must not be urged either by pulling or applying pressure from the abdomen, because it can get injured and cause a haemorrhage.

According to new recommendations, we generally wait one minute after the child is born before we cut the umbilical cord.

The detached placenta has to be examined and the arriving helpers will have to take it, together with the mother, to the hospital for further examinations. Nevertheless, the fast informative examination of the placenta is worth doing. Both surfaces of the placenta should be examined, the little 'biscuits', the cotyledons on the side of the uterus should be checked for being unharmed. Other than this potential vascular injuries should be searched for on the foetal side since they can indicate an additional placenta.

The initial care of the newborn baby

The newborn baby's quick intitial care and survey of his status can also be the first aid provider's task to attend to before the placenta is born.

The initial tasks include the draining of the newborn's airways if an instrument for this is available. It can even be done with the help of a small diametre, soft tube but in that case the helper creates vacuum with his mouth cleaning the baby's pharynx and nose this way. To prevent heat loss the baby has to be quickly covered into an isolation foil or his body should simply be wrapped up in a kitchen foil leaving his face free. Then the newborn baby, having been rolled in foil, has to be covered. Wiping the baby is not necessary, though wiping may mean a stimulus for him to take breaths.

After the umbilical cord stops its pulsation (usually after one minute) it is necessary to cut the cord. First the umbilical cord has to be tied at a distance of 10 centimetres from the newborn baby's navel, then another clamp needs to be applied at a few centimetres away from the first one but in the direction of the placenta. Between the two clamps the umbilical cord has to be cut with sterilized scissors.

After the care of the newborn, the baby's status must be assessed, the standardized and simple way of which is the APGAR score index. While determining the scores, 5 factors are examined.

Altogether the newborn baby can score maximum 10. One factor scores 0 in the worst case and 2 in the best case. The APGAR scoring is generally done when the infant is 1 to 5 minutes old and sometimes when it is 10 minutes old. Details can be found in studies on paediatrics.

Naturally it is sometimes too complicated and its assessment requires sufficient experience. It is important to assess respiration and the heart frequency because the newborn baby's resuscitation is also done mainly based on these scores. See detailed description in the chapter on resuscitation of newborns.

Chart 1 APGAR scores

Attributes	*0*	*1*	*2*
(1) Heart operation	Lack of heart f unctioning	Heart frequency under 100/minute	Heart frequency over 100/minute
2) Respiration	Lack of respiration	Superficial, irregular respiration	Powerful cry
3) Muscular tone	Flaccid, toneless newborn	Newborn lying with slightly bent limbs	Actively moving newborn
4) Reflex, irritability tested by stimulating the nasal pharynx with a soft nasal tube	Lack of response	Facial grimace	Cough, sneeze
5) Skin colour	Pale or cyanotic newborn with blue discolouration	Blue discolouration only perceivable on the limbs	Pink newborn throughout the body

After the primary care of the newborn is completed and the baby feels well, he/she should be placed on the mother's chest. Naturally upon the beginning of every childbirth help or an ambulance should be called for. When help or the ambulance arrives the tasks and transportation to the hospital are already taken care of by the professional personnel.

It is important to document, take notes of the time and place of birth, the sex and name of the newborn and the APGAR scores in case they have been determined. These data should be passed on to the personnel transporting the mother to hospital.

Childbirth with complications

Most women, who regularly go to prenatal care, are aware of the risks that may occur during childbirth. They are more often checked and if necessary, they are placed under hospital observation before the expected time of delivery. Independent of this, it can still happen that problems occur during pregnancy or childbirth. Summing it up at the beginning, it can be stated that in case of any complications the most important thing to be done is notifying the ambulance and transportation to the hospital as soon as possible.

In the complicated process of childbirth numerous problems can occur, the adequate recognition and treatment of which is a specialist's job, so it exceeds the boundaries of the present chapter. Only a few signs or symptoms are mentioned here that can refer to a life threatening status.

In case the signs listed below appear during the examination of the mother, childbirth may become difficult or accompanied by complications, so the mother has to give birth to her newborn baby among instituionalized circumstances.

Transverse position, breech presentation, if smaller parts appear in the vaginal orifice, spacial dispropotion (mother with a small pelvis - large baby), earlier problems upon childbirth, frontally positioned placenta etc. are of such signs. In cases like this the purpose is to mitigate the already existing labour pains, to slow down the process of childbirth.

This is served by the proper positioning of the mother which, in this case, is the knee-elbow position. The mother is supported by her elbows and knees, her belly hangs downwards. This position slows down the forward (downward) advancement of the foetus. (Illustration 5. Knee-elbow position).

Other than this the uterine contractions can be slowed down or inhibited by medicaments (mainly by inhaling medicine that contains primarily sympathetically irritant (Beta 2) effective agents, which is used in bronchial asthma) and by consumption of alcohol (a drink with 1 dl of 30-40° hard liquor content). A first aid provider should apply this method, using medicine or alcohol, strictly in emergencies.

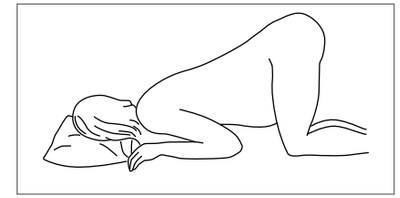

Illustration 13/5 Knee-elbow position

Non-recognized positional abnormality, spacial disproportion or prolonged childbirth may be followed by consequences such as uterine rupture or consequences that are accompanied by dangerous to life bleeding. You have to be watchful about the signs or symptoms of threatening uterine rupture which are the following:

- the uterus is stone-hard, the contractions are almost uninterrupted
- the abdominal wall, the uterus are expressedly painful
- high blood pressure, fast breathing and pulse
- the woman complains of fear of death

In case this status progresses further, uterine rupture occurs which is felt by the woman giving birth as if something had popped inside her. Her pain suddenly decreases. The foetus's body parts can be palpated directly through the abdominal wall. The process advancing further threatens the life of the mother and the child, maybe even causing bleeding to death.

Besides hospitalization as soon as possible, the above mentioned positioning and also the consumption of alcohol are recommended in case the threat of uterine rupture is present.

Atonic bleeding is one of the other potentially dangerous to life statuses. The essence of it is that after the foetus is born the contractions in the uterus cease in the placental phase or after it and the uterus becomes atonic and significant venous bleeding starts from it.

Atonic bleeding is characterized by the palpable atony of the uterus. The woman in question has no pain or contractions. On the whole a significant amount of dark blood of venous nature is emptied from the vagina. Along with this, the symptoms of shock can also be seen, such as pale, perspiring skin, fast, easily suppressable pulse and then declining consciousness.

In case of atonic bleeding, the icing of the uterus/abdomen, rubbing the abdominal wall and also emptying the bladder can help. If these techniques are not sufficient we can apply special manoeuvres, one of which is the following:

We stand facing the woman in labour, holding gauze in it, we place one of our hands on the perineum, and holding the area of the bottom of the uterus with our other hand we press the whole uterus to the pubic bone.

After assisting childbirth institutionalized care has to be taken care of.

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14. Relatively Common Paediatric Occurrences Requiring First Aid

by József Betlehem

The content of chapter

General points of view

Among the determining occurences of childhood accidents happen in large numbers. Smaller children are pimarily subjected to accidents at home, whereas traffic accidents play the leading role with elder children (about 75 %) causing injuries of the skull. One has to be aware of the fact that children's anatomic facilities and physiological parameters differ from that of adults' as a result of which the dynamics of certain emergency occurences can also be different i.e.:

- ***increased cerebral pressure*** due to a skull injury develops faster even while consciousness is seemingly maintained and this may lead to deep unconsciousness, respiratory disorders and spasms
- ***severe injuries of the chest*** do not always turn out since the chest is more flexible in childhood and it is more capable of taking in larger force impacts but the organs of the thoracic cavity hand may be injured seriously at the same time
- compared to the body sizes of grown-ups children's ***abdominal organs*** are relatvely bigger and the skin and musculature protecting them is thinner, less resistant, consequently the injuries of the abdominal organs can be suspected even without external traces of injuries
- the total blood amount of children is 75-85 mls/kg i.e. a smaller amount of ***blood loss*** is accompanied by severe circulatory consequences. On the other hand the compensating mechanisms that serve the sustenance of circulation are extremely efficient in the first phase of blood loss, the pulse and blood pressure are maintained for a long time. However children who have suffered from a 20-30 % loss of blood show signs of instability suddenly, their statues worsens fast
- due to their large outer exothermic surface children are more susceptible to ***cooling down*** even among normal ouside temperature circumstances which has to be taken into consideration to a greater extent upon each accident occurence

- other than all of these, it cannot be left out of account that certain indirect signs have to be taken more seriously when children's status is assessed since the 'little patients' are not always able to express themselves verbally.

Diseases belonging to internal medicine by their nature which can be accompanied by frightening symptoms are not to be neglected in childhood either. Regarding also their appearance, cases that go

Illustration 14/1 A healthy infant

with respiratory disorders are the most outstanding ones among these. *14.1. sound file:* normal sound of crying infant – http://tamop.etk.pte.hu/elsosegelynyujtas/hangok/14_1_egeszseges_cse-csemo_siras-normal_sound_of_crying_infant.wav

Pseudo-Krupp (larnygotracheobronchitis)

The most common childhood problem leading to a sudden respiratory disorder is suffocation which is discussed in a separate chapter.

As a result of different childhood infections we can come across the so-called ***Krupp*** syndrome that got its name from laryngeal inflammation caused by the diphtheria bacterium (the French denomination is Croup).

Fortunately, nowadays this is a rarer phenomenon due to the introduction of vaccinations but different infections, pimarily viral infections but sometimes bacterial ones are capable of causing inflammation at the lower part of the larynx and at the upper part of the trachea which is accompanied by serious oedema (**pseudo-Krupp, laryngotracheobronchitis)** The inflammation occurs mostly between the ages of 3 to 6 months and 3 years. The reason for this diagnosis being especially dangerous is because the larynx is larger and located higher and due to this the laryngeal entry is narrower in case of newborn babies, infants and small children. During an infection the swelling of the mucous membrane may easily obstruct the airway under the epiglottis and at the initial narrow section of the trachea and by this it can make breathing difficult.

Symptoms. Among the symptoms there are high fever and a typically barking cough that torment the child mostly in late autumn and winter in the evening and night hours. The child is often woken up by these symptoms which evoke anxiety and fear in him. This disease can be accompanied by hoarseness and fading of the voice, fast breathing and during inhalation a so-called stridor (a sharp, pulling, whistling sound) can be experienced. (In a severe case this latter can also be heard upon exhalation.) The stridorous breathing occurs as a result of laryngostenosis which developed due to the swollen mucous membrane. The child looks scared, his skin is greyish, pale and perspired.

Care. The most important task for both the parent and the child is to calm down which cannot be achieved easily in a case that goes with expressed shortness of breath. It is still crucial since crying increases the child's need for oxygen which worsens his level of oxygenization. Making the child trust you can help a great deal. The very first job is to take the child from the dry-aired room to cool humid air, maybe to an outside terace or balcony but airing the room might also bring relief. If this cannot be realized, running the water in the bathroom or using a humidifier may serve the purpuse well, too. The child should preferably left in the company of the mother or the father which helps him calm down. Calling an ambulance is justified by all means but it should be done from another room without creating an atmosphere of panic. When the ambulance arrives at the spot, its team help the mitigation of the process by dosaging oxygen and giving a suppository with steroid content. Institutionalized care might be necessary even if the complaints have been spectacularly moderated.

Acute epiglottic inflammation (Epiglottitis acuta)

Fortunately it occurs more seldom than pseudo-Krupp and in an older age (2 to 7 years). In its background there is bacterial infection (Haemophilus influenzae, Streptococcus pneumoniae, Str. pyogenes). The whole of the epiglottis is swollen and inflamed. Upon careful looking into the mouth, red bulging epiglottis can be seen.

Symptoms. The symptoms develop relatively fast and they appear to be frightening. As a result of bacterial infection high fever and fast pulse develop. Shortness of breath is increased during inhalation, it is accompanied by stridor and hoarseness, the worsening of which may be easily noticable. Typical accompanying symptoms are the difficulty of swallowing, sore throat and salivation. The patient's skin may be pale and cyanotic and his mouth is open.

Care. During the care of the child reassurance and making him trust you, are the most important tasks in this situation as well. Many times the child is already in a weakened state and his status is truly rather severe. Among the circumstances on the spot the unjustified examination or moving of the child or the immediate physical suppression of fever with cooling compression or a cooling bath should be avoided. These latter methods could mean serious stress for the child which may worsen his general status. It is practical to leave the child in the parent's lap or arms and he should not be laid down in any case. Institutionalized care has to be ensured as soon as possible since the child's status, which is life threatening by itself may quickly get more serious. Ensuring the flow of cold humid air may be applied among the immediate things to be done. *14.2. sound file:* whooping cough – http://tamop.etk.pte.hu/elsosegelynyujtas/hangok/14_1_Harmadik_bekezdes_utan_Krupp_szindroma_hangja-whooping_cough.wav

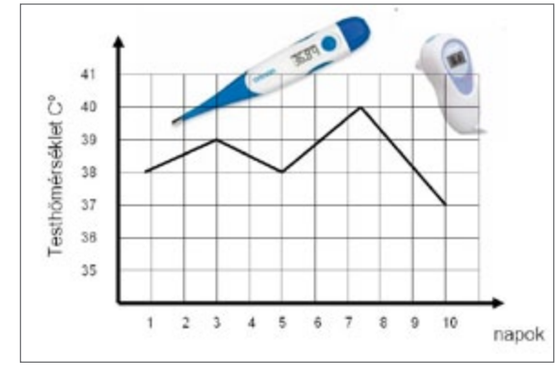
Fever spasms

In case of children it is a convulsive status that mostly develops as a result of fever which is an accompanying symptom of infections. (Naturally convulsions can also be caused by other reasons in

Chart 1. Comparison of the most common childhood infectious airway diseases

Attributes	*Pseudo-Krupp*	*Acute epiglottic inflammation*
Beginning	Prodromal period 1-7 days	Rapid beginning 4-12 hours
Typical age	3 months – 3 years	2-7 years
Seasonality	Late autumn – early winter	Atypical
Causes	Mostly viral	Bacterial
Pathology	Subglottic oedema	Inflamed epiglottic oedema
Clinical symptoms	Runny nose, barking cough, insp and exsp stridor, fever	Swallowing difficulty, hoarseness, salivation, high fever
Care	Rest, cool humid air, ambulance (oxygen, steroid, adrenalin)	Ambulance, rest, cold humid air

Illustration 14/2 Body temperature monitoring is important



childhood e.g. epilepsy, metabolic disorders, injuries of the skull, lack of oxygen.) In case of children fever spasms most commonly occur between the ages of 6 months and 5 years. A typical fever spasm lasts for a few minutes (5-10 minutes) and it is accompanied by tonic-clonic spasms and loss of consciousness. In the majority of cases it develops at the early stage of the advancement of the disease when the body temperature suddenly increases within a short period of time.

Symptoms. The most determining symptom is fever which is not necessarily enforced by other signs at the initial stage of infection. The child's gaze is fixed on one side. His breathing is irregular, superficial as a result of which cyanosis may develop. During spasms the patient loses consciousness. Although after the convulsions he will be alert but he is disoriented, his breathing becomes normal.

Care. Similarly to the care of an epileptic patient, holding a patient down during a seizure is strictly forbidden. It has to be ensured that during convulsions the child does not get injured. In order to avoid injuries the usage of blankets and/or coats is recommended. The child's status has to be kept an eye on during and after a seizure. Ensure free airways and position the child appropriately. After having measured the child's temperature the alleviation of fever needs to be arranged with the help of a cold compress, cold bath or shower. If the child has no medicine allergy and his consciousness has cleared up, giving him medicaments can also be attempted (e.g. Nurofen suspension, Paracetamol tablets). In the case of noticing spasms, calling an ambulance is also justified and the rescue team can intervene with further medicaments if necessary.

Sudden infant death syndrome

Sudden infant death syndrome (SIDS), also called as 'cradle death' or 'cotdeath', occurs with newborn babies and infants without almost any antecedents. The exact cause of this diagnosis has not yet been clarified even until today but it has numerous victims. The direct cause of this occurence is the high degree disorder or the stoppage of respiration. A few endangering factors about the development of SIDS have already been documented which are primarily related to the mother's lifestyle during pregnancy (using drugs, smoking, bad social circumstances) but genetic irregularities and physiological functioning disorders are also assumed. Other than these, there can also be diathetic factors like low birth weight, premature childbirth and if such case has already happened in the family.

It may be expected in the first six months in case of babies and it is most common in the first 28 days and between the ages of 2 to 4 months.

Symptoms. The most conspicuous signs for the parents generally are the intermission of breathing, its stoppage, the skin turning pale and greyish, the tonelessness and coolness of the body.

Care. When the frightening symptoms are noticed it is important to check for a response from the baby by speaking to them and gently shaking. If there are no reactions we should proceed according to BLS. In favour of prevention different respiration monitoring devices can be purchased which might decrease the risk of the development of SIDS.

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Test questions

Test instructions

Multiple choice test: the only one correct or the least incorrect choice indicated by letters has to be selected from the four or five answers to the given question. These tests are often put together in a way that the correct answer is not entirely an accurate solution to the given question, but you can choose from the options.

Multiple response test: one or more of the numbered answers is/are in compliance with the correct solution. The test can be solved on the basis of the following combinations.

A: answers 1, 2 and 3 are true
B: answers 1 and 3 are true
C: answers 2 and 4 are true
D: only answer 4 is true
E: all four answers are true

True-false statement test: it must be decided whether the given statement is true or false.

A: true
B: false

Multiple choice test

1. Which place is listed for accidents to be the most common reason for death according to international epidemiological data?
   A) First place
   B) Second place
   C) Third place
   D) Fifth place
   E) Seventh place

2. Who gave the following definition for first aid: *'administering first aid is not only a skill or ability but it is also the unity and harmony of intention, knowledge and action.'* ?
   A) Róbert Almási
   B) The British red Cross

C) St. John (the Johannitas) Ambulance Service
D) Aurél Gábor
E) Rezső Lendvai

3. Who interpreted first aid the following way: *' first aid means the first help or medical attendance given to the injured or people who became suddenly ill'?*
   A) Róbert Almási
   B) British red Cross and the St. John (the Johannitas) Ambulance Service
   C) Gábor Göbl
   D) Aurél Gábor
   E) Rezső Lendvai

4. In Hungary which law specifies the obligation of non-professionals to administer first aid?
   A) Act CI of 2001
   B) Act LXXIX of 1993
   C) Act CXXXIX of 2005
   D) Act CLIV of 1997
   E) Act LXXVI of 1993

5. Which is the second level of the chain of survival?
   A) general practitioner's care
   B) non-professional first aid
   C) notification of professional aid providers
   D) hospital treatment
   E) ambulance care

6. Which is the third level of the chain of survival?
   A) general practitioner's care
   B) non-professional first aid
   C) notification of professional aid providers
   D) hospital treatment
   E) ambulance care

7. What do we call the unselfish behaviour occurring upon providing help which does not serve one's own interest but the interest of a fellow human being?
   A) reciprocal altruism
   B) exchange theory
   C) altruism

D) prosocial behaviour
E) empathy

8. What is the behaviour of helping others called when it is accompanied by social rewards in every case?
   A) reciprocal altruism
   B) exchange theory
   C) altruism
   D) prosocial behaviour
   E) empathy

9. How often is any kind of first aid administered in Hungary in case of road accidents?
   A) in 40% of road accidents
   B) in 10% of road accidents
   C) in 25% of road accidents
   D) in 50% of road accidents
   E) in 60% of road accidents

10. What do we call a change in health status, when the patient's life would be directly threatened or he would suffer serious or irreversible health damage in the lack of immediate health care provision?
    A) an urgent need
    B) threatening condition
    C) life threatening condition
    D) consequential subsequent status
    E) the state of expectable help

11. Accidents cause the death of this many people in the world per year.
    D) 100.000
    E) 1.5 million
    F) 5 millió 5 million
    G) 790.000
    H) 3 millió 3 million

12. Most accidents occur at this location in Hungary:
    A) at home
    B) at work
    C) during leisure time activities
    D) on public roads
    E) at the location of sports activities

13. In the case of lethal accidents safety belts are not fastened with the frequency of the following percentage:
    A) 20%
    B) 40%
    C) 55%
    D) 75%
    E) 80%

14. This many people are affected by sudden circulatory arrest in Europe each year:
    A) 100.000
    B) 700.000
    C) 82.000
    D) 790.000
    E) 3 millió

15. Which age group is subjected most to children's accidents in Hungary?
    A) 0 to 1 year
    B) 2 to 3 years
    C) 4 to 6 years
    D) 7 to 14 years
    E) over 14 years

16. The most common site for children's accidents is the following in Hungary:
    A) playground
    B) kindergarten
    C) vehicular traffic
    D) home
    E) school

17. This is the most common accident mechanism for infants:
    A) scalding
    B) aspiration
    C) mechanical injury due to abuse
    D) poisoning
    E) falling

18. According to the Hungarian research data the most common reason for childhood burn injuries until the age of 4 is:
    A) solar radiation

    B) contact with hot surfaces
    C) scalding
    D) electric current
    E) the use of open flame

19. The most common reason for poisoning in childhood in Hungary is as follows:
    A) the consumption of mushrooms
    B) the consumption of parts of other plants
    C) the consumption of rat poison
    D) the consumption of medicine
    E) they are caused by household cleaning supplies and chemicals

20. The rate of wearing helmets among the children who regularly ride a bicycle in Hungary is:
    A) 8%
    B) 18%
    C) 42%
    D) 74%
    E) 28%

21. In the course of GCS evaluation opening the eyes scores 3 if the injured person:
    A) spontaneously looks at us
    B) he groans upon a stimulus of pain
    C) he opens his eyes upon instruction
    D) he opens his eyes upon pinching his skin
    E) he squeezes his eyes shut upon blowing on his eye-lashes

22. During GCS evaluation the casualty scores 3 on verbal response if he:
    A) does not respond
    B) gives unrecognizable vocal sounds
    C) his speech is slightly confused
    D) uses incorrect words
    E) does not remember the precise date

23. During GCS assessment the injured person scores 2 on the motoric response if he:
    A) follows instructions
    B) pulls away his limb upon pain
    C) there is no response
    D) there is abnormal flexion upon pain
    E) there is abnormal extension upon pain

24. The minimum value of the GCS total score is:
    A) 0
    B) 3
    C) 5
    D) 15
    E) 6

25. The maximum value of GCS total score is:
    A) 0
    B) 3
    C) 5
    D) 15
    E) 6

26. A slight skull or brain damage of the patient may be assumed if the GCS total score is:
    A) 0-6
    B) 13-15
    C) 10-12
    D) 3-12
    E) 8-12

27. A severe skull or brain damage of the patient may be presumed if the GCS total score is:
    A) 0-6
    B) 13-15
    C) 10-12
    D) 3-8
    E) 8-12

28. The danger of airway obstruction is high if the GCS total score is:
    A) 0-6
    B) 13-15
    C) 10-12
    D) 3-8
    E) 8-12

29. What can be simply assessed with the AVPU scale?
    A) the severity of the paient's disturbed consciousness
    B) the patient's muscular strength
    C) the patient's degree of orientation in space and time

    D) the patient's reflexes
    E) the patient's degree of bleeding

30. According to the AVPU scale P means that:
    A) the patient's Pulse is normal
    B) the patient responds to a stimulus of Pain
    C) the patient's pupil does not respond
    D) the patient's perception is normal
    E) the patient is pale

31. The following issue must always be considered in case of the sudden occurrence of unilateral weakness of the facial muscles:
    A) cerebral blood supply disorder
    B) thyroid disease
    C) low blood pressure
    D) eye disease
    E) myocardial infarction

32. The type of breath that refers to the serious metabolic disorder of diabetics is breath that smells like:
    A) urine
    B) honey
    C) acetone
    D) alcohol
    E) chemicals

33. The life threatening cause of the lateral displacement of the larynx is:
    A) inflammation of the adenoids
    B) pneumothorax (PTX)
    C) pulmonary embolism
    D) heart attack
    E) bronchial asthma

34. Tachypnoea means the following quality of breathing:
    A) the decrease in its number
    B) the decrease in its depth
    C) the increase in its number
    D) its irregularity
    E) its absence

35. A health state accompanied by rapid pulse except:
    A) high temperature
    B) pain
    C) cooling down
    D) fluid loss
    E) physical activity

36. If an AED is available the rate of chest compression and ventilation is:
    A) 15:2
    B) 2:15
    C) 30:2
    D) 2:30
    E) 1:5

37. It is true about the placement of the electrodes with the exception of:
    A) Remove the protective foil before application
    B) good adhesion helps giving off energy more efficiently
    C) the electrodes must be placed directly under both clavicles of the patient
    D) the polarized electrodes must be placed to the spots indicated on them
    E) the electrodes placed on an adult's chest must not touch one another

38. In the case of an electrode type below you do not need to pay attention to which electrode is to be placed over the apex of the heart and under the right clavicle.
    A) unpolarized
    B) polarized
    C) bipolar
    D) unipolar
    E) isopolar

39. The time interval between the rhythm analyses /shocks is usually:
    A) 1 minute
    B) 2 minutes
    C) 3 minutes
    D) 4 minutes
    E) 10 minutes

40. The type of labour pain occurring irregularly before childbirth is the:
    A) placental pain
    B) terminal pain

    C) predictive pain
    D) threatening pain
    E) dilating pain

The orientation suture of the foetal skull while it is passing through the birth canal is the:
    A) saggital suture
    B) squamous suture
    C) temporal suture
    D) frontal suture
    E) nasal suture

42. The correct sequence of foetal movement in passing through the birth canal is:
    A) deflexion, flexion, rotation
    B) flexion, external rotation
    C) flexion, internal rotation, deflexion, external rotation
    D) deflexion, internal rotation, flexion, external rotation, deflexion
    E) rotation, flexion, deflexion

43.The last phase of foetal movement in passing through the birth canal is:
    A) flexion
    B) internal rotation
    C) deflexion
    D) external rotation
    E) retroflexion

44. The phase from the regular contractions until the diappearance of the cervix is:
    A) pacental phase
    B) maternal phase
    C) lactation phase
    D) phase of dilatation
    E) phase of expulsion

45. In case of childbirth at a non-hospital location the mother must push until:
    A) the helper can pull the baby's head
    B) the phase of dilatation lasts
    C) the dilating contractions last
    D) the baby starts crying
    E) the umbilical cord has been cut

46. The initial care of the baby delivered at a a non-hospital location, with the exception of:
    A) draining of the newborn baby's airways
    B) cutting the umbilical cord after 1 minute
    C) rolling the newborn baby into an isolation foil
    D) measuring the baby's weight and body sizes
    E) assessing the APGAR score

47. Part of the APGAR index with the exception of
    A) heart functioning
    B) respiration
    C) muscular tone
    D) blood pressure
    E) skin colour

48. The minimum value of the APGAR score is:
    A) 3
    B) 1
    C) 0
    D) 5
    E) 10

49. The maximum value of the APGAR score is:
    A) 3
    B) 1
    C) 0
    D) 5
    E) 10

50. The following measurement scores 0 according to the APGAR score system:
    A) heart frequency over 100/minute
    B) toneless newborn
    C) facial grimace when the airways are drained
    D) pink skin throughout the body
    E) superficial breathing

51. The content of the fundus of the uterus is examined by the
    A) First Leopold's manoeuvre
    B) Second Leopold's manoeuvre
    C) Third Leopold's manoeuvre

    D) Fourth Leopold's manoeuvre
    E) Leopold's protection of the perineum

52. In case of complicated childbirth the mother is best positioned in the following body position in order to slow the delivery down:
    A) flat supine position with straight legs
    B) lying on her side with legs pulled to the chest
    C) prone position
    D) knee-elbow position
    E) shock position

53. The following symptoms indicate uterine rupture with the exception of:
    A) the prior prolonged pain suddenly decreases
    B) foetal parts may be palpated under the abdominal wall
    C) the mother empties urine
    D) the mother feels as if 'something snapped in her'

54. Which of the following telephone numbers is used in Hungary to contact the National Ambulance Service?
    A) 105
    B) 107
    C) 104
    D) 114
    E) 117

55. Which of the following occurrences is considered a mass accident?
    A) there are 5 or more injured persons
    B) there are over 20 casualties
    C) there are atleast 2 casualties
    D) an incident, which requires having to call a technical rescue team (firemen) there are at least 50 casualties

56. What does the term 'hypoxia' mean?
    A) oxygen poisoning
    B) temporary, relative absence of oxygen
    C) oxygen therapy
    D) death caused by choking
    E) circulatory arrest

57. Which one of the following sub-tasks precedes all the others in the adult BLS algorhythm?
    A) ventilation
    B) the examination of breathing
    C) chest compressions
    D) contacting the patient
    E) calling an ambulance

58. What is the purpose of head tilt in case of an unconscious patient?
    A) to free the airways
    B) to evoke a pain stimulus
    C) to stabilize the cervical spine
    D) to make the pupils visible
    E) to contact the patient

59. Which of the following persons is considered unconscious?
    A) a person who has no circulation but has respiration
    B) a person who has no respiration and circulation
    C) a person who has breathing and circulation but cannot be contacted
    D) a person whose speech is confused and who is agressive
    E) a person who has circulation but has no respiration

60. When does the ambulance have to be called in case of an adult person in trouble if you are the only first aider present and the patient needs resuscitation?
    A) after 1 minute of resuscitation
    B) immediately after having noticed the absence of normal breathing
    C) after the first 30 chest compressions
    D) when the first aider got tired
    E) when someone else arrived at the location too and you are able to call an ambulance

61. In which of the following places would you assume with the highest probability that there is an automated external defibrillator (AED)?
    A) in a block of flats
    B) in a holiday home
    C) in a wine cellar
    D) at an airport
    E) in a museum

62. Which of the following is the most accurate description of defining the place for chest compression?
    A) the middle of the patient's chest, over the lower third of the sternum
    B) the middle of the patient's chest, under the lower third of the sternum
    C) the middle of the patient's upper body
    D) the left side of the patient's chest
    E) the middle of the patient's chest, over the upper third of the sternum

63. Which of the following is the first thing to be done when you would like to ventilate the patient but you cannot ventilate into his mouth?
    A) The ambulance must be called again.
    B) The patient's mouth has to be looked into and an airway obstruction must be search for.
    C) With the same movement blowing into the patient's mouth or nose must be attempted 10 more times.
    D) The patient must be positioned in a recovery position.
    E) With your hand in the patient's mouth his tongue must be pulled forward.

64. While providing care for a child, which of the following is the next thing to be done after having noticed that the child's breathing is not normal, there is no visible airway obstruction and you are the only first aider?
    A) Chest compressions must be started immediately.
    B) The child must be positioned in a recovery position.
    C) An ambulance must be called immediately.
    D) Five quick ventilations must be administered.
    E) You must pull the child's tongue forward with your hand.

65. What is the correct chest compression / ventilation rate during a child's resuscitation?
    A) 5:2
    B) 15:2
    C) 30:5
    D) 30:30
    E) 2:12

66. Regarding chest compressions what does the expression 'EFFICIENT' mean?
    A) Chest compression is efficient if the first aider does not get tired while carrying it out.
    B) Chest compression is efficient if (in the course of performing it). a central pulse can be palpated as a result of it
    C) Chest compression is efficient if, as a result of it, the airways can be maintained to be free.

D) Chest compression is efficient if, as a result of it, the patient's skin colour changes.
E) Chest compression is efficient if the patient gives out sounds while it is being administered.

67. What is the purpose of the AVPU scale?
A) the indication of the cause of unconsciousness
B) the indication of the duration of unconsciousness
C) indicating the degree of depth of unconsciousness
D) indicating the cause of circulatory arrest
E) indicating the cause of respiratory failure

68. What is the basic purpose of the recovery position?
A) ensuring free airways
B) ensuring the proper frequency of breathing
C) ensuring the comfort of the patient
D) ensuring proper circulation
E) ensuring peace of mind

69. The steps of bleeding mitigation can include:
A) compression of the bleeding artery distally to the wound
B) compression of the bleeding artery proximally to the wound
C) applying a clamping bandage (tourniquet) around the neck in case of arterial bleeding
D) hanging the bleeding limb
E) positioning the patient with his upper body raised

70. In case of nose bleeding:
A) the patient may blow his nose
B) the patient should swallow the blood that has flown into his pharynx
C) the first aid provider should tamponade the nasal cavity
D) the first aider should bend the patient's head forward
E) the first aider should apply head tilt

71. The steps of primary wound care comprise:
A) the use of disinfectants
B) washing with alcohol
C) washing with wound benzine
D) foreign body removal from the wound
E) washing with running water

72. Means of wound care include:
A) 10 cm by 80 cm sterile gauze
B) 20 cm by 80 cm sterile gauze
C) 50 cm bx 80 cm sterile gauze
D) 1 cm by 5 m sterile gauze bandage
E) 5x80 cm sterile gauze

73. Distortion is characterized by:
A) the continuity of the bones is disrupted
B) severe bleeding
C) pain
D) deformity
E) cold sweat

74. It is called distortion when:
A) the joint head is fixed in an abnormal position
B) the glenoid cavity is fixed in an abnormal position
C) the joint head and the glenoid cavity depart and get back to the anatomical position
D) the joint head and the glenoid cavity depart and get fixed in an abnormal position
E) there is serious bleeding into the external world

75. It is called luxation when:
A) the ligaments are torn apart
B) the joint head and the glenoid cavity depart and the anatomical position is restored
C) the joint head and the glenoid cavity are fractured
D) the joint head and the glenoid cavity depart and get fixed in an abnormal position
E) the injury enters the joint and it opens

76. It can be used for the mitigation of venous bleeding:
A) 50 cm by 80 cm non-sterile gauze
B) strangulating rubber
C) tube-net bandage
D) sterile gauze bandage
E) adhesive plaster

77. Venous bleeding is characterized by:
A) venous stasis may occur after applying a pressure bandage
B) 'shooting out' type of bleeding
C) bright red bleeding

D) the applied pressure bandage often has to be removed and then applied again
E) a clamping bandage (tourniquet) must be applied

78. It is applicable for the disinfection of wounds:
A) Spitaderm
B) Promanum
C) Braunol
D) water
E) boron water

79. The impressional fracture of the skull is characterized by:
A) it cannot be accompanied by haematoma
B) a deepening can never be palpated over the place of fracture
C) it may be accompanied by loss of consciousness
D) during the positioning of the injured person the head is supported with pillows in 45 degrees
E) the casualty is positioned in an anti-Trendelenburg position

80. Injuries of the eye are characterized by:
A) upon their dressing only the injured eye should be covered
B) a wedged-in foreign body must be removed before covering the eye with a bandage
C) both eyes should be washed with disinfectant and then sterile cover must be placed on the injured eye
D) both eyes must be covered when one eye is injured
E) the patient has to be laid down in a flat supine position

81. After a knife stabbing you can see a fallen forward bowel section on the abdominal wall. What would you do?
A) You position the injured person in a Trendelenburg position.
B) You cover the fallen forward bowel section with foil so that it does not dry out.
C) You give the casualty a lot of fluid to drink.
D) You place wet sterile gauze on the fallen forward bowel part.
E) You position the patient in a prone position.

82. Burn injuries are characterized by:
A) stopping the burning process is of primary importance
B) cooling the burned area is of primary importance
C) a sterile sheet or sterile gauze must not be used
D) localizing the burn injuries is irrelevant
E) expressed sweating

83. Regarding Wallace's Rule of Nines:
A) the anterior trunk is 36% in case of an adult
B) the perineal region is 2% in case of an adult
C) the left lower limb is 18% in case of an adult
D) the left lower limb is 24% in case of a child
E) the head is 8%

84. It does not play a role in the development of the poisonous effect:
A) dispersity
B) the point of attack
C) the cumulative skill
D) congruance
E) age

85. Ethyl alcohol (ethanol) poisoning is characterized by:
A) the feeling of euphoria
B) raging attitude
C) increased level of blood sugar
D) decreased level of blood sugar
E) causes decortication

86. Methyl alcohol poisoning is characterized by:
A) being always reversible
B) being always irreversible
C) narrow pupils
D) dilated pupils
E) causing the trembling of the eyeballs

87. Ethylene glycol poisoning is characterized by:
A) it cannot be mixed with the symptoms of alcohol intoxication
B) increases the excretion of urine
C) decreases the excretion of urine
D) the poisoned person's breath smells like alcohol
E) the poisoned person's breath smells like ammonia

88. Carbon monoxide poisoning is characterized by:
A) it is bound to the white blood cells in the blood
B) it is bound to the red blood cells in the blood, in a 10 times stronger way than oxygen
C) the poisoned person may complain of chest pain

D) headache is not a typical symptom of it
E) an ataxic way of walking develops

89. The effect of CO2 on the body is:
A) it causes loss of consciousness in 5% concentration
B) it depresses respiration in 1-2% concentration
C) it may cause muscle stiffness, tremors
D) generalized spasms appear in 7% concentration
E) it causes low blood sugar level

90. Chlorine gas poisoning is characterized by:
A) it develops when hydrochloric acid and sodium chloride are pored together
B) it dooes not cause death even if inhaled concentrated
C) pleural oedema may develop
D) it cannot damage the mucous membrane of the eyes
E) black smoke develops

91. A typical case of poisoning caused by solvent substances is characterized by:
A) the central nervous system is involved
B) coughing appears as a late symptom
C) there is not any among them which is inflammable and explosive
D) the poisoned person must be made to vomit
E) the patient complains of thirst

92. A typical case of poisoning caused by corrosive agents is characterized by:
A) i t is not painful
B) it cannot cause gastric perforation
C) it cannot cause swelling of the mucous membrane
D) it may cause shock
E) it is always accompanied by bleeding

93. Mushroom poisoning is characterized by:
A) the outcome does not depend on age
B) the muscarine type poisoning is caused by the fly agaric
C) the muscaridin type of poisoning is caused by the inocybe type mushrooms
D) the phalloid type poisoning is caused by the deadly amanita
E) the poison is often aflatoxin

94. Alkylphosphate poisoning is characterized by:
A) it does not belong to the toxic agents
B) it cannot occur via dermal absorption
C) it cannot occur via absorption through the conjunctiva
D) it causes cholinergic syndrome
E) it causes adrenergic syndrome

95. Alkylphosphate poisoning typically:
A) can only get into the body through the skin
B) it may be absorbed through the skin and also by inhalation
C) it does not cause pulmonary oedema if inhaled
D) salivation, diarrhoea and sweating do not belong to the symptoms
E) a foul smelling breath is typical

96. Ammonia poisoning is characterized by:
A) a pungent smell may call attention to it
B) having to suspect the possibility of poisoning is rare in the chemical industry
C) it causes acid burns on the mucous membranes
D) it causes acid burns on the oral mucosa
E) there is scurf formation on the skin

97. Small pupils are caused by:
A) atropine
B) opiates
C) kinin
D) cocaine
E) amidazophen

98. Dilated pupils are caused by:
A) barbiturates
B) alkylphosphates
C) atropine
D) pilokarpin
E) adrenalin

99. How do you position a skull injured patient?
A) with elevated upper body
B) in a lateral lying position
C) in a sitting position with the head leaning forward

D) in a semi-sitting position
E) in a prone position with the head supported

100. What is a triangular scarf used for?
A) for a covering type bandage
B) for the fixation of the lower arm
C) for the fixation of the fractured thigh-bone (femur)
D) for stabilizing a fractured pelvis
E) for the care of a burn injury

Multiple response test

1. The chain of survival includes the following care levels and activities:
1) administering non-professional first aid
2) the notification of professional aid providers
3) ambulance care
4) hospital treatment

2. Within the chain of survival ambulance care involves the following activities:
1) higher level medical care on the spot
2) monitoring
3) interventions in accordance with the changes in health state
4) final care

3. The following statements apply to the exchange theory model:
1) The person giving help receives symbolic resources in return.
2) Due to empathy, the person noticing the emergency experiences a feeling of pressure.
3) The more we are capable of empathizing with the situation of the other one, the stronger the feeling of pressure and also the desire to act are.
4) It is typical only in aid providing situations occurring in the family.

4. According to the directives of the European Resuscitation Council in which activities do qualified first aid providers have to be competent in?
1) fast patient's examination and decision making
2) the care of patients with airway foreign body obstruction
3) calling for help (ambulance)
4) immediate interventions for supporting vital functions

5. Which factors have been proved to affect the willingness to provide first aid?
1) The gender of the first aid provider.
2) The momentary mood.
3) The number of people present.
4) Relationship factors.

6. Which factors have a driving, motivating effect in providing first aid?
1) pressure of conscience
2) the effect of panic
3) family and/or school example
4) being terrified of death

7. Which factors have a driving, motivating effect in providing first aid?
1) lack of earlier positive examples
2) highly developed empathic skills
3) being sorry
4) searching for new things, curiousity

8. Which are the obstructive factors in providing first aid?
1) passivity, as a habitual factor
2) inability to make decisions
3) lack of confidence and/or faith in success
4) pressure of conscience

9. Which are the obstructive factors in providing first aid?
1) lack of initiative skills and perseverance
2) former success or failure in providing first aid
3) feelings of fear and uncertainty
4) sense of duty

10. Accidents cause the death of this many people in the world each year:
1) 100,000
2) 1.5 million
3) 790,000
4) 5 million

11. The strategic approaches to the prevention of accidents are:
1) engineering design changes
2) education, training

3) enforcement / legal regulations
4) individual health education

12. The following activities are taught about at every level of first aid education:
    1) basic recognition of the incident
    2) simple patients' examination
    3) the assessment of life or death
    4) carrying out the most necessary first things to be done

13. The most common household accidents occur in the following situations:
    1) scalding
    2) electric shock due to the malfunction of electric appliances
    3) carbon monoxide toxication
    4) mechanical injuries as a result of family members' assault

14. In case of work related accidents (occupational injuries) the following injuries are the most dangerous ones:
    1) injuries caused by different chemicals
    2) electric shock
    3) injuries caused by production machines
    4) injuries caused by fire

15. Regarding the parents which factors influence the proper usage of safety devices (according to Canadian research)?
    1) the gender of the parents
    2) the parents' educational level
    3) the difficulty of obtaining information
    4) the parents' age

16. During the assessment of the patient's consciousness the strength of the physical contact (shaking) primarily depends on:
    1) a suspected spinal injury
    2) the age of the injured person
    3) the size of the visible injury
    4) the patient's chest movements

17. The GCS grading scale includes:
    1) opening the eyes
    2) chest movements

3) verbal response
4) visual analog scale (VAS)

18. The degrees of depth in terms of consciousness disturbance are:
    1) somnolence
    2) stupor
    3) coma
    4) vigilism

19. Before the assessment of breathing you have to look into the mouth:
    1) if the patient is surrounded by remains of food
    2) if there are small toys around the injured child
    3) if fresh vomit can be seen near the patient
    4) routinely in all cases

20. Heteroanamnesis can be obtained:
    1) from the patient
    2) from relatives on the spot who saw the sickness
    3) from anyone who was walking in the street when the sickness occurred
    4) in case of children from the parents

21. During the history taking it is worth asking questions early about the following issues:
    1) the patient's known diseases
    2) the patient's social circumstances
    3) if the patient is in pain
    4) the patient's ethnicity

22. The underlying disease of dizziness may be:
    1) a disease of the inner ear
    2) nervous system defficiency
    3) the calcification of the cervical spine
    4) the effect of strong cold

23. Ischaemic chest pain is caused by the following:
    1) angina pectoris
    2) pneumonia
    3) pulmonary embolism
    4) rib fractures

24. Increased respiratory work is indicated by:
    1) pulled in intercostal muscles
    2) external nose breathing
    3) the usage of other subsidiary breathing muscles of the chest
    4) slow respiratory rate

25. The following symptoms can refer to a fallen back tongue:
    1) the existence of seriously disturbed consciousness
    2) the patient's chest pain
    3) the patient's breathing is like snoring
    4) the patient's increased salivation

26. From the point of view of first aid pupils /pupil reactions are considered abnormal in case of:
    1) asymmetric pupils
    2) the breadth of the pupils is not appropriate in relation to the given light conditions
    3) the pupils do not respond
    4) the colour of the pupils is different (e.g green-brown)

27. Increased venous drainage, vascularity of the conjunctiva, may indicate the following:
    1) allergy
    2) conjunctivitis
    3) drug effects
    4) smoky environment

28. In case blood is flowing from the ear/s the following must be considered:
    1) central cranial fracture
    2) external ear canal obstruction
    3) external ear injuries
    4) posterior basilar fracture of the skull

29. The increased protrusion of the veins in the neck may refer to:
    1) increased right heart pressure
    2) dehydration
    3) fluid overload
    4) pneumonia

30. The shape of the chest can be significantly altered by:
    1) chest trauma
    2) spinal deformation (severe scoliosis)

    3) previous respiratory diseases (e.g COPD)
    4) inflammation of the pleura

31. Signs of traumatic injuries of the chest:
    1) unmoving half of the thorax
    2) change in the rib positions
    3) the patient complains of hampered respiration, i.e. dyspnoea
    4) wounding can be seen on the chest

32. Upon palpation of the chest a blunt sound may indicate:
    1) thoracic air
    2) thoracic blood
    3) myocardial infarction
    4) accumulated thoracic fluid

33. Rhythm to-be-shocked:
    1) asystole
    2) ventricular tachycardia
    3) atrial tremor
    4) ventricular tremor (ventricular fibrillation)

34) The main part of the AED:
    1) central unit
    2) central control panel
    3) electrodes
    4) pacemaker

35. The AED electrodes are typically:
    1) self-adhesive
    2) supplied with gel at the part towards the patient
    3) detecting the cardiac rhythm and energy transmission occurs through them
    4) there is only one size of it

36. The people near the patient must not touch the patient during:
    1) the placement of the electrodes
    2) rhythm analysis
    3) chest compressions
    4) the transmission of the shock

37. Normal childbirth is characterized by:
    1) the foetus is in a cranial position
    2) the foetus is in a longitudinal position
    3) the foetus is alive
    4) it generally occurs between the 30th and the 32nd week of pregnancy

38. Physiological childbirth may include the following types of labour pain:
    1) preparatory pain
    2) expansion pain
    3) dilating contractions
    4) terminal pain

39. The expected time of delivery depends on:
    1) the time of pregnancy
    2) how many times the mother has given birth
    3) what the mother's body type is
    4) when the mother had her last meal

40. Before childbirth ask the pregnant mother about:
    1) her previous deliveries
    2) previous complications if she has already given birth to a baby
    3) if she has regularly attended a prenatal care course
    4) if she has high blood pressure or protein urination

41. Make sure to call for an ambulance to the pregnant mother and childbirth on-site must not be started if contractions appear:
    1) but the pregnancy is not yet near its due time
    2) there have been prior complications
    3) the foetal head is not in the birth canal yet
    4) the mother is in the phase of expulsion and the skull has already appeared in the vaginal orifice

42. The following steps need to be done before assisting at childbirth on-site:
    1) clean, warm water must be obtained
    2) clean, ironed textiles must be fetched
    3) the mother in labour must be appropriately positioned
    4) wash your hands thoroughly, preferably put rubber gloves on

43. The placental phase is characterized by:
    1) the umbilical cord must be cut immediately after birth
    2) after the birth of the placenta, the placenta is to be discarded without examination
    3) the birth of the placenta may be urged by pulling it
    4) the cotiledos of the placenta must be examined

44. According to the APGAR scoring the following characteristics score 1 point:
    1) cyanosis can be seen only on the limbs
    2) lack of reflex
    3) the heart rate is below 100/minute
    4) lack of respiration

45. Make sure to document the following after delivery:
    1) time and place of birth
    2) gender of the newborn baby
    3) the APGAR scores
    4) body weight

46. The course of childbirth can be problematic in case of the following:
    1) transverse position
    2) the foetal skull can be palpated during the first Leopold's manoeuvre
    3) there is a spacial disproportion
    4) the foetal skull can be seen in the vaginal orifice

47. The signs of threatening uterine rupture are:
    1) the uterus is stone-hard, the contractions are almost continuous
    2) the abdominal wall and the uterus are expressedly painful
    3) there is high blood pressure, fast respiration and pulse
    4) the woman complains of fear of death

48. Atonic bleeding may be indicated by:
    1) severe bleeding in the placental phase
    2) the absence of uterine contractions after birth
    3) the mother shows the symptoms of shock
    4) too much amniotic fluid during the rupture of the amniotic sac

49. Which of the following are the elements of the chain of survival?
    1) early detection
    2) early call for help

3) early resuscitation
4) early resuscitation with devices

50. Which of the following are the health care damage location commander's tasks?
1) assigning the place for the relocation of the injured persons
2) organizing how to gather the injured persons
3) organization of the rating and care
4) maintaining continuous contact with the rescue crew, institutions and partner organizations

51. Which of the following elements are included in the examination of an unconscious patient's breathing?
1) observing the movements of the chest
2) the palpation of the movements of the chest
3) observing on a surface the humidity of the flux of air leaving the body
4) observing the sound of exhalations

52. Which of the following are the tasks that definitely have to be carried out during the care of an unconscious patient's care?
1) resuscitation with chest compressions
2) ensuring free airways
3) replacing breathing with ventilation
4) callling an ambulance

53. Which of the following statement/s is/are true about basic life support procedures (BLS)?
1) in case of children it is compulsory to look into their mouth to search for an airway foreign-body
2) in the course of children's resuscitation frequent re-checking is necessary
3) the conditions for stopping resuscitation are the same as those applied in case of adults
4) an unconscious child can be positioned in the recovery position the same way as adults

54. Which of the following may be symptoms that precede fainting?
1) concentration disturbance
2) dizziness
3) impaired eye-sight
4) redness of the skin

55. Which of the following contraindicate positioning the patient in a recovery position?
1) when spine injury is suspected
2) pelvic fracture or when it is suspected

3) femoral fracture
4) severe open chest injury

56. Which of the following represent the algorithm of removing an airway foreign-body in case of an adult?
1) encouragement to cough
2) hitting the area between the clavicles
3) Heimlich's manoeuvre
4) Rautek's manoeuvre

57. Which of the following are suitable for the mitigation of arterial bleeding?
1) administering pressure bandage
2) dangling the bleeding limb (positioning it lower than the heart)
3) compression at an arterial pressure point
4) cold water compress

58. Which of the following are the signs of a suspected fracture?
1) pain
2) deformity
3) decrease or loss of function
4) audible bone crack

59. Injuries can be caused by:
1) heat
2) chemicals
3) electricity
4) radiation

60. In case of adults:
1) losing 500 to 600 ml (15%) of blood usually does not cause any considerable circulatory disturbances
2) losing 3000 to 3600 ml (15%) of blood usually does not cause any considerable circulatory disturbances
3) the rapid blood loss of 600 to 1500 ml (30%) may induce an exsanguination shock
4) losing 2500 to 3600 ml (15%) of blood usually does not cause any considerable circulatory disturbance

61. At first the body tries to compensate for blood loss by:
    1) mainly the increased functioning of the parasympathetic nervous system
    2) mainly the decreased functioning of the sympathetic nervous system
    3) does not try to compensate
    4) mainly the increased functioning of the sympathetic nervous system

62. Capillary bleeding characteristics are:
    1) it is bright red
    2) it almost never causes danger to life
    3) it is discharged in a pulsing way
    4) it is a leaking type of bleeding

63. Venous bleeding characteristics are:
    1) it is always discharged in a pulsing way
    2) it is lighter in colour
    3) it is always discharged in a leaking way
    4) it is darker in colour

64. Arterial bleeding characteristics are:
    1) it is usually bright red
    2) it is usually discharged in a pulsing way
    3) it can lead to exsanguination in a matter of minutes
    4) it is usually dark red

65. The steps of bleeding mitigation may include:
    1) releasing strangulation
    2) laying down the injured person
    3) disinfection
    4) the application of 20% solution of Hyperol

66. What is used for the disinfection of wounds?
    1) Betadine
    2) 20% solution of Hyperol
    3) Braunol
    4) 25% solution of Hyperol

67. Materials used for covering wounds include:
    1) adhesive plaster
    2) 1/2m x 80cm sterile gauze

    3) tube-net bandage
    4) 6cm x 6cm sterile gauze

68. Items suitable both for covering wounds and the fixation of bandages are:
    1) 6cm x 5m sterile gauze
    2) 6cm x 5m sterile gauze bandage
    3) 1/2m x 80cm sterile gauze
    4) 8cm x 5m sterile gauze bandage

69. According to its source, poisoning can be:
    1) endogenous: originating from animals
    2) exogenous: originating from animals
    3) exogenous: diabetic ketoacidosis
    4) endogenous: diabetic ketoacidosis

70. According to the speed of the poisoning process poisoning can be:
    1) acute, e.g. CO2
    2) subacute
    3) acute, e.g. CO
    4) chronic, e.g. mushroom

71. It plays a role in the development of the poisonous effects:
    1) toxicity
    2) solubility
    3) expositional time
    4) cumulative skill

72. Substances that often cause unconsciousness:
    1) atropine
    2) quinine
    3) muscaridine type of mushrooms
    4) barbiturates

73. Substances that often cause muscle weakness:
    1) CO
    2) scopolamine
    3) nicotine
    4) cocaine

74. Substances that often cause epileptiform seizures:
    A) CO
    2) quinine
    3) gasoline
    4) cyanide

75. Substances that often cause dry mouth:
    1) scopolamine
    2) opiates
    3) atropine
    4) ethyl alcohol

76. Substances that often cause hyperthermia:
    1) ethyl alcohol
    2) tranquilizers
    3) anaesthetics
    4) cocaine

77. Substances that often cause cyanosis:
    1) chlorine
    2) amphetamine
    3) phosgene
    4) cocaine

78. Ethyl alcohol is characterized by:
    1) if it causes poisoning it has three main stages
    2) if it causes poisoning there is a potential danger of suffocation
    3) if it causes drunkenness, vomiting is common
    4) if it causes tipsiness, it is often accompanied by euphoria

True – false statements test

1. The complex interpretation of first aid application includes all the primary activities around the person in trouble that are aimed at the elimination of the dangers that people might find themselves in and the objective environment is subjected to and at the prevention of the development of further damages.
2. The failure to provide reasonable first aid constitutes a misdemeanor which can be punished by imprisonment of up to two years.

3. People are more likely to help strangers than their own group members in every culture.
4. The graduates of health sciences education have to be competent in carrying out immediate interventions that support life functions.
5. The graduates of health sciences education have to be competent in resuscitation without appliances.
6. The body responds to a stress situation of the person providing help by increased parasympathetic nervous system activity.
7. The first aider's first thing to do after having noticed the need for help is to request professional help by calling the ambulance.
8. The application of a semi-automatic defibrillator is not a required competency for qualified first aid providers.
9. According to the exchange theory model the person giving help receives symbolic resources in return.
10. The more people are present in an emergency that requires help, the smaller the chances are for giving help.
11. Being related to or acquainted with the person in need of help is a driving factor for providing first aid.
12. Being against death is an inhibitory factor in providing first aid.
13. The first aider's desire to prove things to him/herself and to those present is an obstructive factor for providing first aid.
14. Sensing blood, smells, the sight of vomit are inhibitory factors for providing first aid.
15. The lack of professional knowledge and experience do not affect attitudes regarding first aid provision.
16. The purpose of accident prevention is to prevent the development of injuries or to reduce their number.
17. Warning signs have to be provided for railway and road vehicles transporting dangerous substances.
18. The colour of the warning signs is red with a black border on the edges, their size is 30 by 40 cm.
19. If the first digit of the Kemler number is 3 in the top part of the sign indicating the transportation of dangerous substances, that means flammable liquid or self-heating liquid.
20. If the first digit of the Kemler number is 8 in the top part of the sign indicating the transportation of dangerous substances, that refers to some radioactive substance.
21. If the first digit of the Kemler number is 5 in the top part of the sign indicating the transportation of dangerous substances, that means some oxidizing substance or organic peroxide.
22. Subsidiary danger is indicated by the digit 2 or 3 on a sign indicating the transportation of dangerous substances.
23. Pictograms are only used in Hungary in order to make the recognition of the characteristics of dangerous substances easier.

24. The substance numbers are shown at the bottom of the the sign indicating the transportation of dangerous substances.
25. Substance numbers are three-digit numbers which indicate a specific substance or substance group.
26. A spinal injury can only be assumed if there is a palpable deformation on the patient's spine sensed during the examination.
27. The injured person whose eyes are open is sure to be alive.
28. In the case of a patient in coma there is breathing and circulation.
29. It is called heteroanamnesis when information is obtained from the patient about the patient's prior history.
30. Chronic bronchitis is characterized by inhalation difficulties.
31. Upper airway stricture is characterized by obstructed inhalation.
32. Bronchial asthma is characterized by obstructive exhalation.
33. Pleural pain originates from the the visceral disc of the pleura.
34. The eye and pupil reactions can only be assessed in case of conscious patients.
35. In the case of unilateral facial paralysis if the raising of the brows is kept on the affected side, stroke may be suspected.
36. The sunken state of the superficial veins of the neck may indicate lack of fluid.
37. During bradypnoea the individual's breathing is superficial.
38. The percussion sound of normal lungs is tympaniC)
39. In case of a silent abdomen, ileus can be highly suspected.
40. If the patient has no palpable radial pulse, the patient is sure to be dead.
41. An AED always transmits energy, any time the shock button is pressed.
42. Early defibrillation is part of the chain of survival.
43. During BLS an AED equipment can be made to function to transmit shock (energy) with any regularity.
44. If an AED is available, there is no need to perform chest compressions because it is sure that the energy transmitted by the equipment restores the heart function.
45. If an AED is available, there is no need to call an ambulance because it is sure that the energy transmitted by the appliance restores the functioning of the heart.
46. If AED involved resuscitation is successful, the electrodes must be removed from the patient who has to be escorted home.
47. In case of a not-to-be-shocked rhythm the patient may be touched during rhythm analysis.
48. If the shock button of the equipment is pressed energy can be transmitted also in case of a not-to-be-shocked rhythm.
49. During childbirth the skull of the foetus takes a transversal position in the mother's pelvic inlet in a normal case.
50. If a pregnant woman has predictive contractions, the first aider must stay on the spot until the baby has been born.

51. By the end of the internal rotation the saggital suture of the foetal skull gets into the straight diametre of the pelvis.
52. In the course of assisting at childbirth the first aid provider has to check the state of the cervical orifice by palpation several times.
53. During childbirth perineum protection must be applied if we could not wash the vaginal orifice before childbirth.
54. The APGAR scores have to be assessed after 1 to 5 minutes following birth.
55. The Leopold's manoeuvres I to IV are to be carried out through the vagina.
56. In the case of atonic bleeding the uterus is palpated to be hard.
57. In the case of atonic bleeding the uterus is pressed to the pubic bone to mitigate the bleeding.
58. When a single harmful events occurs at a static site of damage, the vast majority of injuries occur in the first few minutes.
59. Basic life functions can still be restored after the occurrence of biological death.
60. If an adult injured person does not respond to an attempt of being contacted, then the person in question is sure to be dead.
61. The most common airway obstruction is the unconscious patient's own tongue.
62. During the resuscitation of an adult the frequency of the chest compressions should be approximately 100/minute.
63. Regarding resuscitation, a person is considered a child if s/he has not yet reached puberty according to the first aider's assessment.
64. The majority of pediatric circulatory arrests is of cardiac origin.
65. Contacting a child lying on the ground happens exactly the same way as if we provided care for an adult in trouble.
66. The mouth of an unconscious child must be looked into in all cases (regardless of antecedents).
67. During children's resuscitation the next step after the initial fast ventilations is checking circulation.
68. Collapse is the loss of consciousness for a short time (5-10 minutes) due to the temporary oxygen shortage of the brain.
69. A conscious patient with serious skull injury has to be positioned in a semi-sitting position i.e. with the upper body elevated in about 45-60 degrees.
70. The Rautek manoeuvre serves moving the patient.
71. Wallace's Rule of Nines is suitable for determining the extent of burns.
72. There is a danger of infection if third degree burns are cooled with tap water.
73. Wounding may result in not only physical but also psychological damage.
74. Wounds must definitely be cared for within 3 hours.
75. The intensity of the pain is mainly determined by the individual's level of tolerance.
76. The loss of a smaller amount of blood is never life-threatening.
77. The 'shooting out' type of bleeding is always of arterial origin.
78. A stabbed wound is always life threatening.

79. The biggest danger of a bite wound is usually bleeding.
80. During first aid provision the application of the clamping type of bandage (tourniquet) could be considered in exceptional cases.
81. Apart from the cases of arterial bleeding, raising the bleeding limb usually stops bleeding.
82. From the point of view of surgical care the mild freezing of an amputatum is not harmful.
83. Primarily Hyperol solution should be used for the disinfection of wounds.
84. Wound benzine is only allowed to be used around the wound area.
85. In case of nose bleeding the tilted head is the best position.
86. A pressure bandage is justified also in case of leaking bleeding.
87. The femoral artery can be pressed at the outer side of the thigh.
88. The Pseudo-Krupp is accompanied by very high fever.
89. The childbirth process consists of three phases.
90. Atonic bleeding is a life-threatening condition of the foetus.
91. Collapse may be a short-term temporary loss of consciousness.
92. A cerebral blood supply disturbance may be an occurrence accompanied by bleeding.

Tests on First Aid – Key

Multiple choice test

1. C	21. C	41. A	61. D	81. D
2. A	22. D	42. C	62. A	82. A
3. B	23. E	43. D	63. B	83. C
4. D	24. B	44. D	64. D	84. D
5. C	25. D	45. C	65. B	85. D
6. E	26. B	46 D	66. B	86. D
7. C	27. D	47. D	67. C	87. C
8. D	28. D	48. C	68. A	88. C
9. B	29. A	49. E	69. B	89. C
10. A	30. B	50. B	70. D	90. C
11. C	31. A	51. A	71. A	91. A
12. A	32. C	52. D	72. C	92. D
13. D	33. B	53. C	73. C	93. D
14. B	34. C	54. C	74. C	94. D
15. B	35. C	55. A	75. D	95. B
16. D	36. C	56. B	76. D	96. A
17. E	37. C	57. D	77. A	97. B
18. C	38. A	58. A	78. C	98. C
19. E	39. B	59. C	79. C	99. A
20. A	40. C	60. B	80. D	100. B

Multiple response test

1. E	21. B	41. A	61. D
2. A	22. A	42. E	62. C
3. A	23. B	43. D	63. D
4. E	24. A	44. B	64. A
5. E	25. B	45. A	65. A
6. B	26. A	46. A	66. B
7. C	27. E	47. E	67. C
8. A	28. B	48. A	68. C
9. B	29. B	49. E	69. C
10. C	30. A	50. E	70. A
11. A	31. E	51. A	71. E
12. E	32. C	52. C	72. D
13. A	33. C	53. E	73. B
14. E	34. B	54. B	74. C
15. A	35. A	55. E	75. A
16. A	36. C	56. B	76. D
17. B	37. A	57. A	77. B
18. B	38. B	58. B	78. E
19. A	39. A	59. E	
20. C	40. E	60. B	

True – false statements test

1. A	21. A	41. B	61. A	81. A
2. A	22. A	42. A	62.	82. B
3. B	23. B	43. B	63. A	83. B
4. A	24. A	44. B	64. B	84. A
5. A	25. B	45. B	65. B	85. B
6. B	26. B	46. B	66. A	86. B
7. A	27. B	47. B	67. A	87. B
8. B	28. A	48. B	68. A	88. B
9. A	29. B	49. A	69. B	89. A
10. A	30. B	50. B	70. A	90. B
11. A	31. A	51. A	71. A	91. A
12. B	32. A	52. B	72. A	92. A
13. B	33. B	53. B	73. A	
14. A	34. B	54. A	74. B	
15. B	35. A	55. B	75. B	
16. A	36. A	56. B	76. B	
17. A	37. B	57. A	77. B	
18. B	38. B	58. A	78. B	
19. A	39. A	59. B	79. B	
20. B	40. B	60. B	80. A	