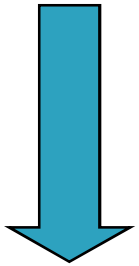
Clinical death. Resuscitation

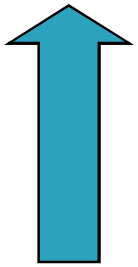
Reanimatology is a theoretical discipline

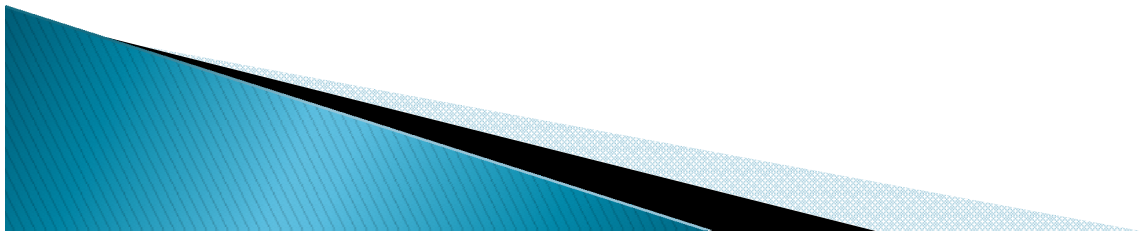
the scientific conclusions of which are used during resuscitation in a clinic, or, more precisely, science that studies the patterns of the dying and revitalization of the body in order to develop the most effective methods of preventing and restoring the extinct or just faded vital functions of the body.

The term of "INTENSIVE THERAPY" includes measures for the temporary replacement of any inadequate vital functions in critical situations.



The concept of "RESUSTITATION" means a set of measures to restore the lost vital functions in the terminal state





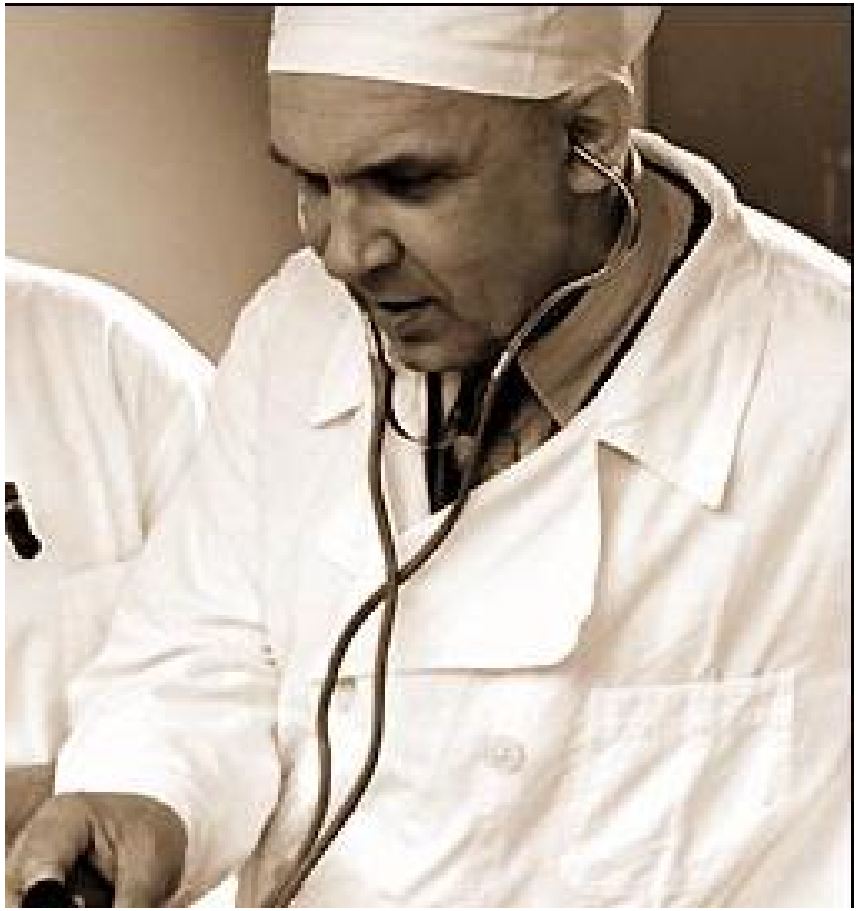
December 14, 1650
completed the first successful resuscitation

Thomas Willis
(1623–1687 гг.)

William Petty
(1622–1679 гг.)

Reanimatology was separated from thanatology as an independent science at the International Congress of Traumatology in Budapest in 1961.

The generalization of the results of our own research, as well as the data of Soviet and foreign authors, made it possible to declare the emergence of a new medical science - resuscitation, the subject of study of which are pathology, therapy and prevention of terminal conditions.



Academician of RAMS
Vladimir Alexandrovich Negovsky
(1909 - 2003)

Peter Safar

in 1968 formed the classical scheme of resuscitation (1924-2003).

Diagnosis: Clinical death

1. **Stop blood circulation** (no pulsation in the main arteries);
2. **The absence of spontaneous breathing** (no excursions of the chest);
3. **Lack of consciousness;**
4. **Wide pupils;**
5. **Areflexia** (no corneal reflex and pupil reaction to light);
6. **Type of corpse** (pallor, acrocyanosis).

The classical scheme of resuscitation (Peter Safar, 1968)

- **A (air way)** - restoration of the airway;
- **B (breathing)** – mechanical lung ventilation;
- **C (circulation)** – chest compression and assist blood circulation

- **D (drags)** – drug therapy;
- **E (ECG)** – type of cardiac arrest
- **F (fibrillation treatment)** – external defibrillation DC 100 - 400 J

- **G** (**gauging)** – condition assessment;
- **H** (**human mentation)** – restoration of consciousness;
- **I (intensive cart)** – correction of organ failure.

Peter J. Safar, MD

HEART–LUNG RESUSCITATION

I FIRST AID: OXYGENATE THE BRAIN IMMEDIATELY

IF UNCONSCIOUS

Airway – *TILT HEAD BACK*

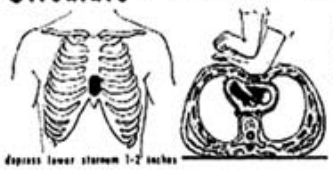
IF NOT BREATHING

Breathe – *INFLATE LUNGS 3-5 TIMES, MAINTAIN HEAD TILT*

MOUTH-TO-MOUTH, MOUTH-TO-NOSE, mouth-to-adjunct, bag-mask

• FEEL PULSE
• IF PRESENT – CONTINUE LUNG INFLATIONS
• IF ABSENT –

Circulate – *COMPRESS HEART ONCE A SECOND. ALTERNATE 2-3 LUNG INFLATIONS WITH 15 STERNAL COMPRESSIONS UNTIL SPONTANEOUS PULSE RETURNS.*



for physicians only

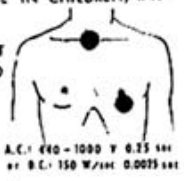
II START SPONTANEOUS CIRCULATION

Drugs – *EPINEPHRINE:* 1.0 mg (1.0 CC OF 1:1000) I.V. OR 0.5 mg INTRACARDIAC. REPEAT LARGER DOSE IF NECESSARY

SODIUM BICARBONATE: APPROXIMATELY 3.75 G/50 CC (1/2 DOSE IN CHILDREN) I.V. REPEAT EVERY 5 MINUTES IF NECESSARY

E. K. G. – • *FIBRILLATION:* EXTERNAL ELECTRIC DEFIBRILLATION. REPEAT SHOCK EVERY 1-3 MINUTES UNTIL FIBRILLATION REVERSED

• *IF ASYSTOLE OR WEAK BEATS:* EPINEPHRINE OR CALCIUM I.V.



Fluids – *I.V. PLASMA, DEXTRAN, SALINE*
Do not interrupt cardiac compressions and ventilation. Tracheal intubation only when necessary.
AFTER RETURN OF SPONTANEOUS CIRCULATION USE VASOPRESSORS AS NEEDED,
e.g. NOREPINEPHRINE (Levophed) I.V. DRIP

III SUPPORT RECOVERY (physician-specialist)

Gauge *EVALUATE AND TREAT CAUSE OF ARREST*

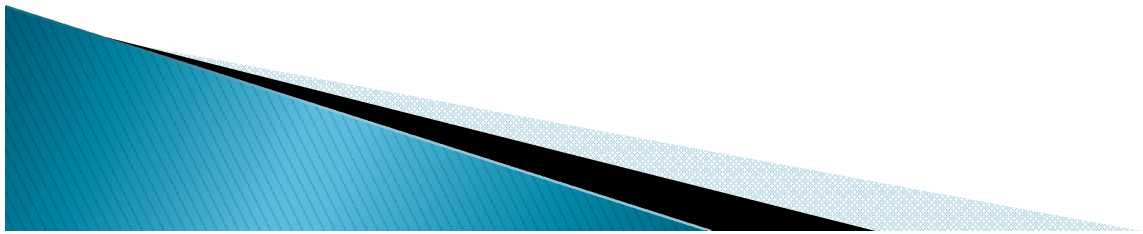
Hypothermia *START WITHIN 30 MINUTES IF NO SIGN OF CNS RECOVERY*

Intensive Care *SUPPORT VENTILATION:* TRACHEOTOMY, PROLONGED CONTROLLED VENTILATION, GASTRIC TUBE AS NECESSARY
SUPPORT CIRCULATION
CONTROL CONVULSIONS
MONITOR

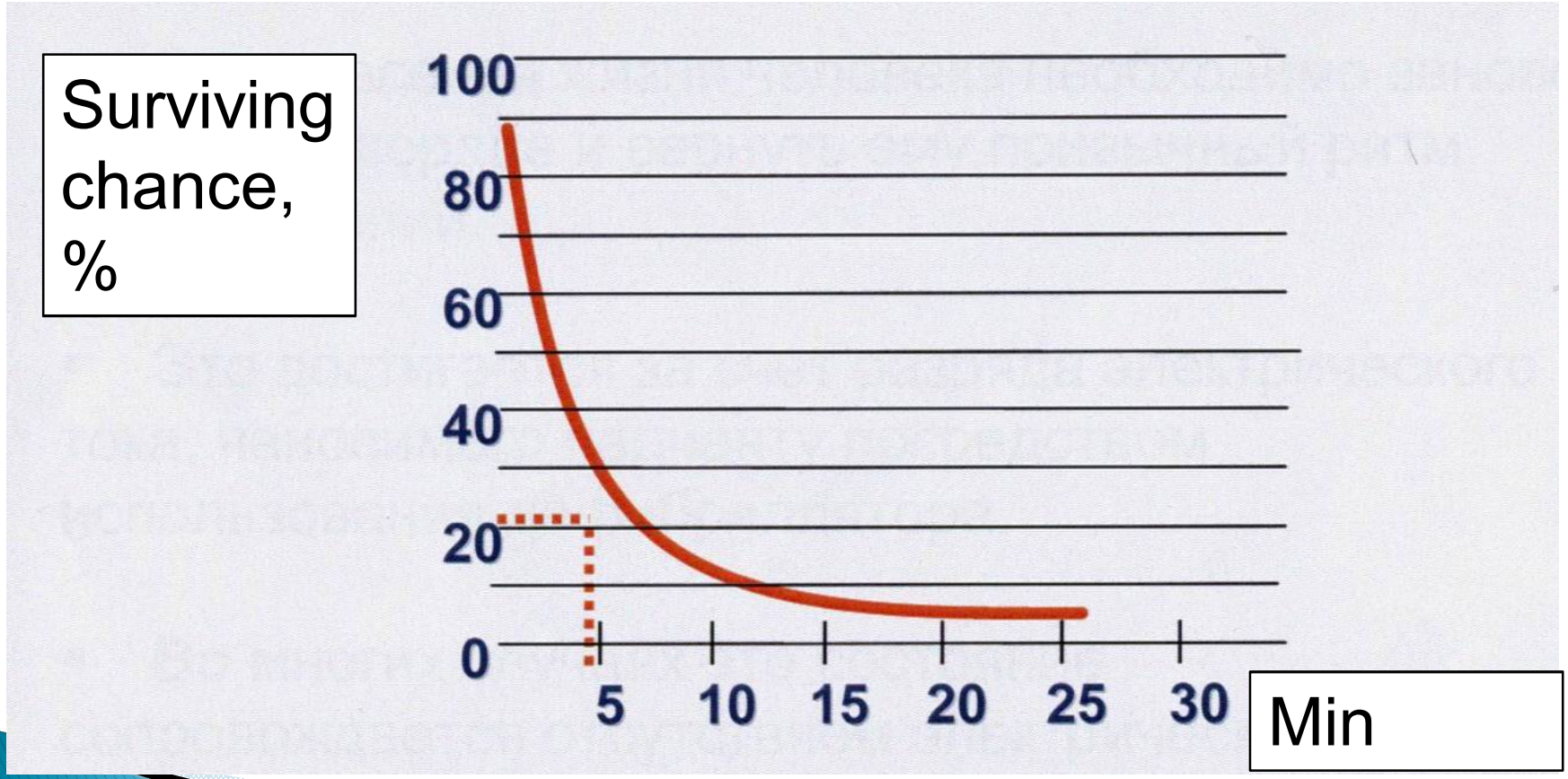
Figure 1. The A, B, C of emergency resuscitation. These instructions have been arranged for the front and back of a billfold card or for a poster which may be obtained from the Pennsylvania Heart Association or the Pennsylvania Department of Health, Harrisburg.

Initial description of the ABCs of resuscitation by Dr. Peter Safar in this classic publication in the Journal of the Iowa Medical Society.

ABC - the first stage is elementary life support (according to P.Safar), the primary resuscitation complex used by medical and non-medical personnel (according to AP Zilber, 1996);
DDD - the second stage - the further maintenance of life, the restoration of independent blood circulation; the normalization and stabilization of blood circulation and respiration parameters (according to P. Safar). Specialized resuscitation complex for all medical workers (according to A.Zilberu, 1996) ;.
GHI – the third stage is long-term maintenance of life, post-resuscitation intensive care (after P.Safar), is performed by resuscitation specialists in intensive care units (according to AP Zilberu, 1996).



Every minute since the development of sudden cardiac death counts. The chance to be successfully reanimated is reduced by 10% every minute, if primary assistance is not provided.



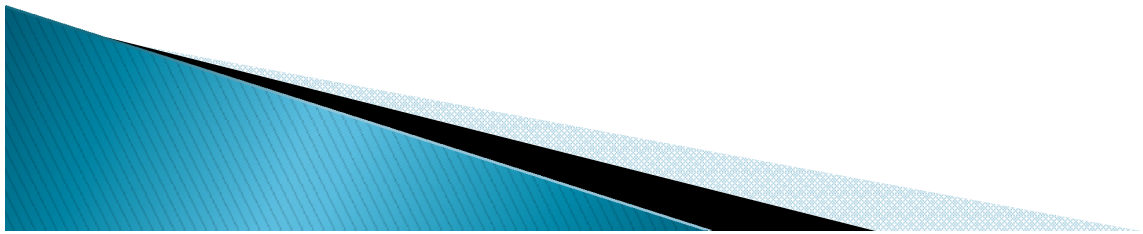
Basics of the concept of early electrical defibrillation

- The most common cause of sudden cardiac arrest is ventricular fibrillation;
- The only effective method of eliminating ventricular fibrillation is electrical defibrillation;
- After a few minutes, ventricular fibrillation is transformed into asystole;
- From the first minutes of a sudden cardiac arrest, the likelihood of successful defibrillation decreases rapidly.

Modern resuscitation scheme

(Guidelines 2000 for cardiopalmonary resuscitation, International Consensus on Sciens)

- D - electrical defibrillation should be performed as early as possible (within the first 5 minutes);
- C – 100 pressure per minute remains the standard, the ratio of chest compression and ventilation is 30: 2.
- A - unchanged, supplemented by capnometry and alternative options (laryngeal mask, esophageal-tracheal tube);
- B - for non-specialists, ventilation-free resuscitation is acceptable, hyperventilation is harmful and should be avoided (6–8 breathing cycles per minute);
- Post-resuscitation management.



REANIMATION ACTION

1) **Primary resuscitation complex (PRC),** used by both medical and non-medical workers who have undergone special training.
2) **Specialized resuscitation complex (SRC),** the mastery of which today is necessary for all medical workers.
3) **Post-resuscitation intensive care (PRIC),** conducted by specialists in intensive care units.

The basic principle of resuscitation for each of these complexes is the triad –

“know,” “can,” “have.”

Общий алгоритм базовой реанимации (BLS)

CPR - CARDIO PULMONARY RESUSCITATION

This information is published for those who have had training in cpr and should not be used by an untrained person except in the gravest emergency where no skilled help is available

• CHECK FOR DANGER • STAY WITH THE PERSON • CALL FOR HELP AND START RESUSCITATION

1 AIRWAY

- Quickly turn person on side
- Remove foreign material from mouth
- Place neck and jaw in correct positions
- Listen for breathing
- Watch for chest movement

2 BREATHING

If not breathing

- Quickly turn person on back
- Open Airway
- Start mouth to mouth or mouth to nose
- 5 full ventilations in ten seconds
- Check neck pulse
- If pulse is present, resuscitation at a rate of 15 per minute (one every 4 seconds) - check the circulation after 1 minute and then every 2 minutes
- If breathing returns - place the person on side - keep the airway clear

3 COMPRESSION

- Check neck pulse

If absent

- Begin external cardiac compression
- Place the heel of one hand on the lower half of the sternum
- Lock the other hand to the first by grasping wrist or interlocking fingers
- Keep fingers of the chest
- Do 2 ventilations and 15 compressions every 15 seconds

Artificial renewal of blood circulation

- The precordial thump is carried out when a specialist directly observes on the monitor the onset of ventricular fibrillation / ventricular tachycardia without a pulse (VF / VT without a pulse), and the defibrillator is currently unavailable.

- It makes sense only in the first 10 seconds of circulatory arrest. According to the results of a number of works, precardiac punch sometimes eliminates VF / VT without a pulse (mainly VT without a pulse), but most often is ineffective and, conversely, can transform rhythm into asystole.

- If the doctor has a defibrillator ready for work, it is better to refrain from precordial thump!

Chest compression

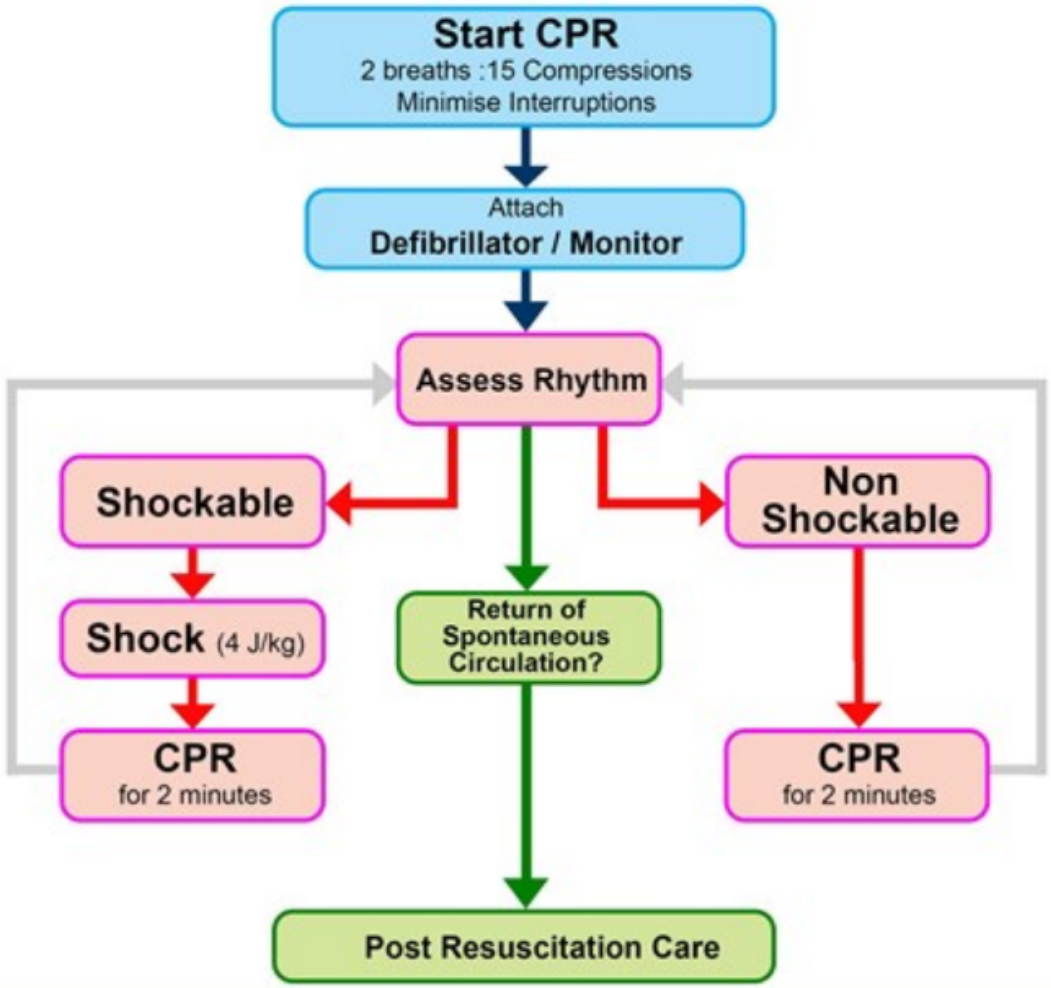
- The fundamental problem of artificial maintenance of blood circulation is a very low level (less than 30% of the norm) of cardiac output (CO), created during chest compression.
- Properly performed compression maintains systolic blood pressure at 60-80 mm Hg, while diastolic blood pressure rarely exceeds 40 mmHg and, as a result, causes a low level of cerebral (30-60% of normal) and coronary (5-20% from the norm) blood flow.
- When compressing the chest, the coronary perfusion pressure rises only gradually, and therefore, with each regular pause required for breath-by-mouth, it quickly decreases. However, carrying out several additional compressions leads to the restoration of the initial level of cerebral and coronary perfusion.

Base resuscitation technique

- Combine the closed heart massage with artificial ventilation of the lungs:
- Depth of indentation should be at least 5 cm for adults and at least one third of the diameter of the chest for children and infants (approximately 4 cm in infants and 5 cm in children).

- After 30 compressions, reopen the airway, using the extension of the head and the lifting of the chin;
- Using your index finger and thumb, pinch the victim's nose;
- Open the patient's mouth, leaving his chin raised.
- Do a regular exhale to the patient's mouth for one second, as in normal breathing, watching the movement of his chest.
- Leaving the patient's head in the same position and straightening somewhat, follow the movement of the patient's chest during exhalation.

Advanced Life Support for Infants and Children



During CPR

Airway adjuncts *(LMA / ETT)*
Oxygen
Waveform capnography
IV / IO access
Plan actions before interrupting compressions
(e.g. charge manual defibrillator to 4 J/kg)

Drugs

Shockable
* Adrenaline 10 mcg/kg after 2nd shock *(then every 2nd loop)*
* Amiodarone 5mg/kg after 3 shocks

Non Shockable
* Adrenaline 10 mcg/kg immediately *(then every 2nd loop)*

Consider and Correct

Hypoxia
Hypovolaemia
Hyper / hypokalaemia / metabolic disorders
Hypothermia / hyperthermia
Tension pneumothorax
Tamponade
Toxins
Thrombosis *(pulmonary / coronary)*

Post Resuscitation Care

Re-evaluate ABCDE
12 lead ECG
Treat precipitating causes
Re-evaluate oxygenation and ventilation
Targeted Temperature Management

January 2016

AUSTRALIAN RESUSCITATION COUNCIL
NEW ZEALAND Resuscitation Council WHAKAHAUORA AOTEAROA

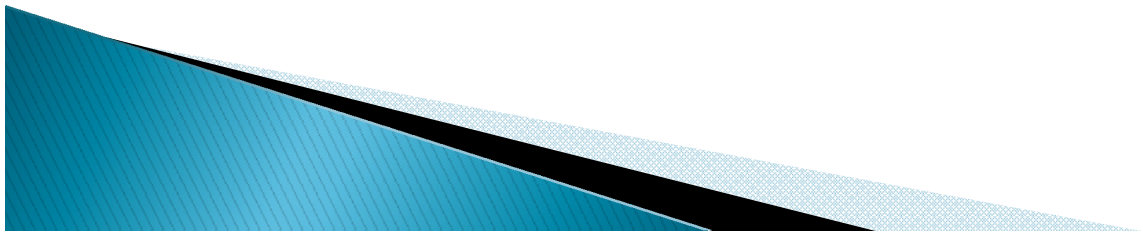
Types of circulatory arrest

Shockable rhythms

- Ventricular fibrillation
- Ventricular tachycardia without a pulse.

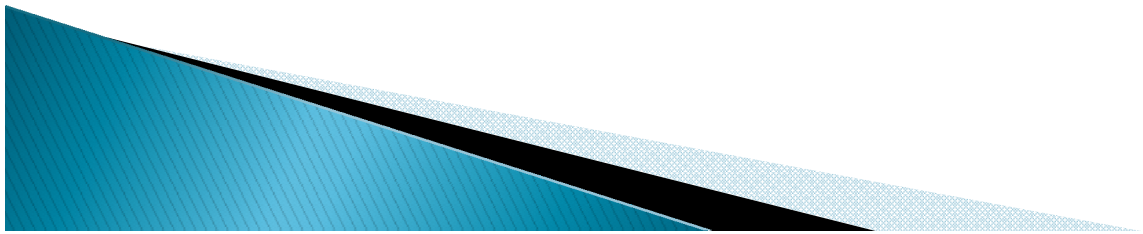
Non-shockable rhythms

- Асистолия
- Электрическая активность без пульса.



Changes in ERC 2010 Extended Life Support Recommendations

- Defibrillation is the passage of an electric current of the corresponding magnitude through the myocardium to depolarize the critical mass of the myocardium and restore the coordinated electrical activity.
- During treatment for circulatory arrest (VF / VT), use epinephrine 1 mg after the third discharge of the defibrillator, along with an indirect heart massage and then every 3-5 minutes (during the CPR cycles). Amiodarone 300 mg is also used after the third discharge.



Defibrilation

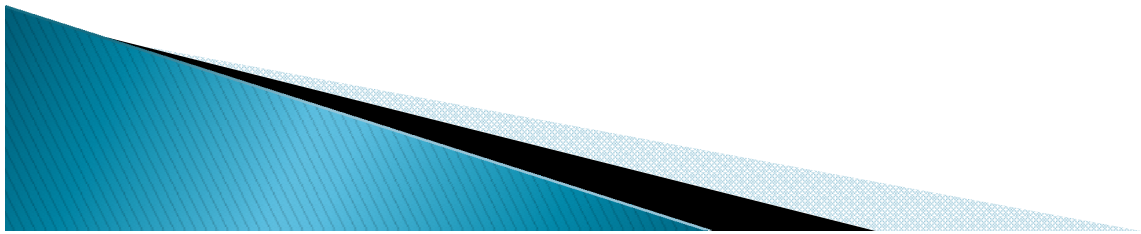
- The energy of the first discharge, which is currently recommended ERC'2010, should be 360 J for monopolar defibrillators, as well as all subsequent discharges, which contributes to a greater probability of depolarization of the critical myocardial mass.

- The initial energy level for bipolar defibrillators should be 150–200 J, followed by an escalation of energy to 360 J at repeated discharges, with a mandatory assessment of the rhythm after each discharge.

Changes in ERC 2010 Extended Life Support Recommendations

- Atropine is NOT RECOMMENDED for routine use in asystole or pulseless electrical activity.
- It is NOT RECOMMENDED to administer medication through an endotracheal tube.
- If intravenous access cannot be established, drugs should be injected intraosseally (IO).
- Sodium bicarbonate is recommended to be administered in a dose of 50 mmol (50 ml of 8.4% solution) in case of circulatory arrest associated with hyperkalemia or overdose of tricyclic antidepressants.
- Euphyllin 2.4% - 250-500 mg (5 mg / kg) IV with asystole and bradycardia resistant to atropine.
- Magnesium sulfate - in case of suspected hypomagnesemia (8 mmol = 4 ml of 50% solution).
- Calcium chloride - in a dose of 10 ml of a 10% solution with hyperkalemia, hypocalcemia, overdose of calcium channel blockers.

Biological death – an irreversible cessation of life, that is, the final stage of the existence of a living system of the body. Its objective signs are hypostatic stains (livor mortis, postmortem lividity, suggillation), lowering of temperature and rigor mortis of muscles.



Resolution of the Government of the Russian Federation of September 20, 2012 N 950, Moscow

"On approval of the Rules for determining the time of death of a person, including criteria and procedures for establishing a person's death, Rules for terminating resuscitation measures and the form of a protocol for establishing a person's death"

Decree of the Government of the Russian Federation September 20, 2012 950 Moscow "On approval of the Rules for determining the moment of death of a person, including criteria and procedures for establishing the death of a person, Rules for terminating resuscitation and the form of the protocol for establishing the death of a person"

Rules for determining the moment of death of a person

3. Resuscitation measures are terminated if they are deemed absolutely unpromising, namely:

while stating the death of a person on the basis of brain death;

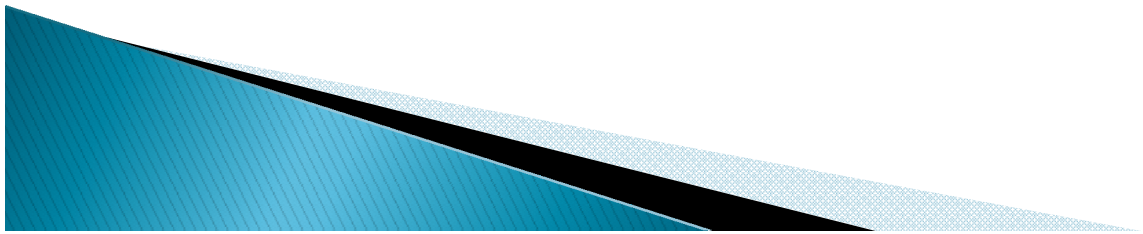
with the ineffectiveness of resuscitation measures aimed at the restoration of vital functions, within 30 minutes;

in the absence of a newborn heartbeat after 10 minutes from the start of resuscitation in full (mechanical ventilation, heart massage, drug administration).

Decree of the Government of the Russian Federation September 20, 2012 950 Moscow "On approval of the Rules for determining the moment of death of a person, including criteria and procedures for establishing the death of a person, Rules for terminating resuscitation and the form of the protocol for establishing the death of a person"

Rules for determining the moment of death of a person

4. Resuscitation is not carried out:
in the presence of signs of biological death;
in the state of clinical death against the background of progression of reliably established incurable diseases or incurable consequences of acute trauma incompatible with life.
5. Information about the time of termination of resuscitation and (or) ascertaining death is entered in the medical records of the deceased person.



Форма протокола установления смерти человека

Протокол установления смерти человека

Я, _____ .

(Ф.И.О.)

_____

_____

_____

(должность, место работы)

констатирую смерть _____

(Ф.И.О. или не установлено)

дата рождения _____

(число, месяц, год или не установлено)

пол _____

_____

(при наличии документов умершего сведения из них

_____

(номер и серия паспорта, номер служебного удостоверения,

_____

номер истории болезни (родов),

_____

номер и серия свидетельства о рождении ребенка),

_____

а также номер подстанции и наряда скорой медицинской помощи,

_____

номер истории болезни (родов),

номер и серия свидетельства о рождении ребенка),

а также номер подстанции и наряда скорой медицинской помощи,

номер карты вызова скорой медицинской помощи,

номер протокола органов дознания и др.)

Реанимационные мероприятия прекращены по причине (отметить необходимое):

констатации смерти человека на основании смерти головного мозга;

неэффективности реанимационных мероприятий, направленных на восстановление жизненно важных функций, в течение 30 минут;

отсутствия у новорожденного при рождении сердечной деятельности по истечении 10 минут с начала проведения реанимационных мероприятий в полном объеме (искусственной вентиляции легких, массажа сердца, введения лекарственных препаратов).

Реанимационные мероприятия не проводились по причине (отметить необходимое):

наличия признаков биологической смерти;

состояния клинической смерти на фоне прогрессирования достоверно установленных неизлечимых заболеваний или неизлечимых последствий острой травмы, несовместимых с жизнью.

Дата _____
(день, месяц, год)

Время _____

Подпись _____ Ф.И.О. _____