BLS & ALS ALGORITHMS

European Resuscitation Council
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www.erc.edu

KEY RECOMMENDATIONS

Data from registries should inform health system planning and responses to cardiac arrest

All European countries are encouraged to participate in the European Registry of Cardiac Arrest (EuReCa) collaboration

Resuscitation 121 (2017) A12–A14

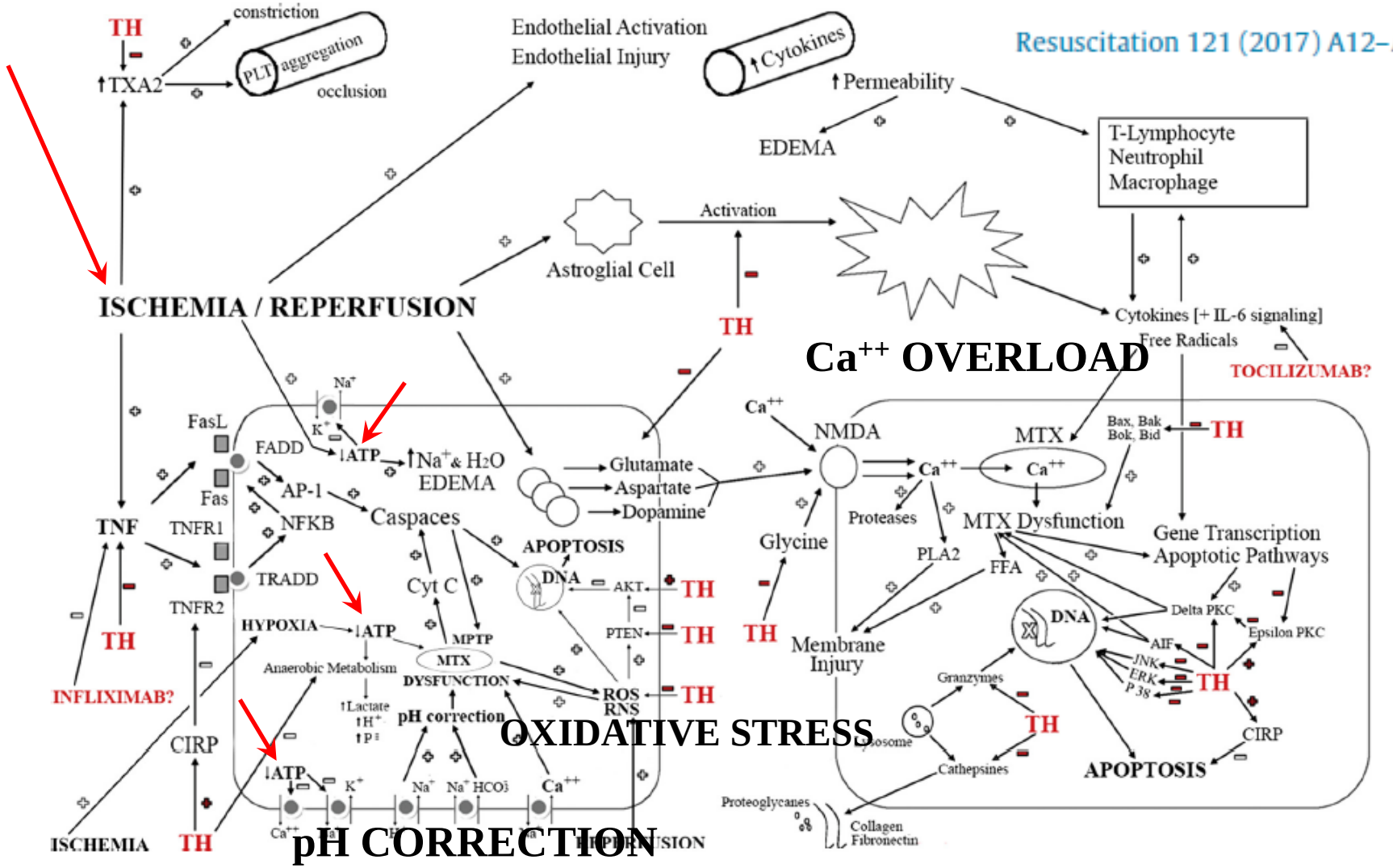
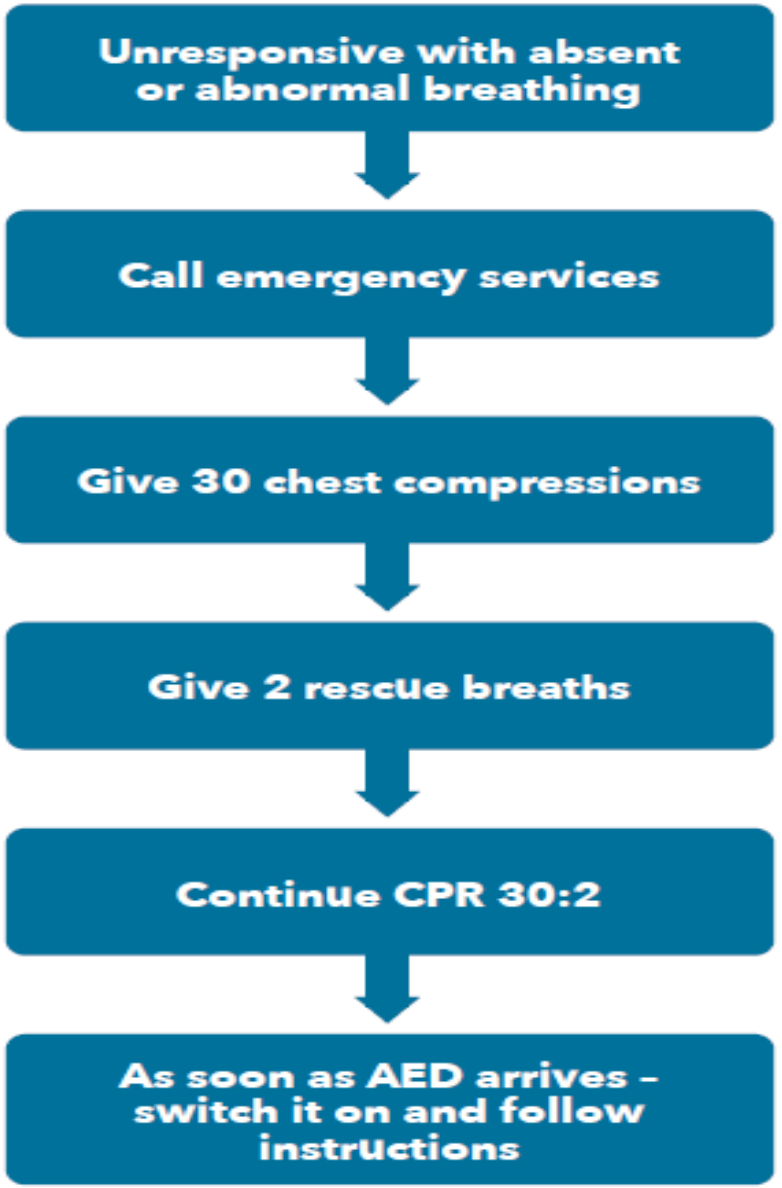


Fig. 1. Schematic representation of pathological processes of the post-cardiac arrest syndrome in the brain, and of single major pathway-level interventions (as proposed in Ref. [19]) versus multiple pathway interventions such as therapeutic hypothermia (TH). Therapeutic interventions are highlighted in red script; the "plus sign" corresponds to augmentation and the "minus sign" to inhibition. TXA2, thromboxane A2; PLT, Platelet; IL, Interleukin; FasL, Fas Ligand; FADD, Fas-associated protein with death domain; TNF, tumor necrosis factor; TNF R, TNF Receptor; TRADD, TNF receptor-associated death domain; AP-1, Activator protein 1; NFKB, Nuclear factor kappa beta; CIRP, Cold-inducible, ribonucleic acid-binding protein; ATP, Adenosine triphosphate; H^+, Hydrogen ion; P^{3-}, Phosphate ion; Na^+, Sodium ion; K^+, Potassium ion; Ca^{++}, Calcium ion; pH, Negative of the base 10 logarithm of H^+ concentration; MTX, Mitochondrion; MPTP, Mitochondrial permeability transition pore; Cyt C, Cytochrome C; DNA, deoxyribonucleic acid; ROS, Reactive oxygen species; RNS, reactive nitrogen species; PTEN, Phosphatase and tensin homolog protein; AKT, Protein kinase B; NMDA, N-methyl-D-aspartate (receptor); PLA2, Phospholipase A2; FFA, Free fatty acids; Bax, Bak, Bok, and Bid, Pro-apoptotic proteins of the Bcl-2 family; PKC, Protein kinace C; AIF, Apoptosis inducing factor; JNK, C-Jun-N-terminal protein kinase; ERK, Extracellular signal-regulated kinases; P 38, P 38 mitogen-activated protein kinase. Adapted in part and re-synthesized into a single Figure from Figs. 1–3 of Ref. [8] (González-Ibarra FP, et al, Front Neurol. 2011;2:4.), in concordance with the Creative Commons Attribution License (CC-BY). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

BASIC LIFE SUPPORT

EUROPEAN RESUSCITATION COUNCIL
GUIDELINES 2021



KEY RECOMMENDATIONS

If unconscious
and not breathing
normally - start CPR

NO, NO GO

Conscious - NO;

Breathing or breathing normally - NO;

GO - start CPR

KEY RECOMMENDATIONS

Place your hands at the center of the chest

Compress at a rate of 100-120 per minute at a depth of 5-6 cm

Don't stop until help arrives or the persons wakes up

KEY RECOMMENDATIONS

Get an AED as soon as possible, turn it on AED and follow instructions

If you are not alone, try to minimize pauses in CPR by having one person do chest compressions while another turns on and applies the AED

KEY RECOMMENDATIONS

Chest compressions should be given to any unresponsive person not breathing normally

When trained and able to provide mouth-to-mouth ventilations, you should start 30:2 CPR

ADVANCED LIFE SUPPORT

EUROPEAN RESUSCITATION COUNCIL
GUIDELINES 2021

Unresponsive with absent

Give high-quality chest compressions and

- Give oxygen
- Use waveform capnography
- Continuous compressions if advanced airway
- Minimise interruptions to compressions
- Intravenous or intraosseous access
- Give adrenaline every 3-5 min
- Give amiodarone after 3 shocks
- Identify and treat reversible causes

Immediately resume chest compressions for 2 minutes

Identify and treat reversible causes

- Hypoxia
- Hypovolaemia
- Hypo-/hyperkalemia/metabolic
- Hypo-/hyperthermia
- Thrombosis - coronary or pulmonary
- Tension pneumothorax
- Tamponade- cardiac
- Toxins

Consider ultrasound imaging to identify reversible causes

Return of spontaneous circulation (ROSC)

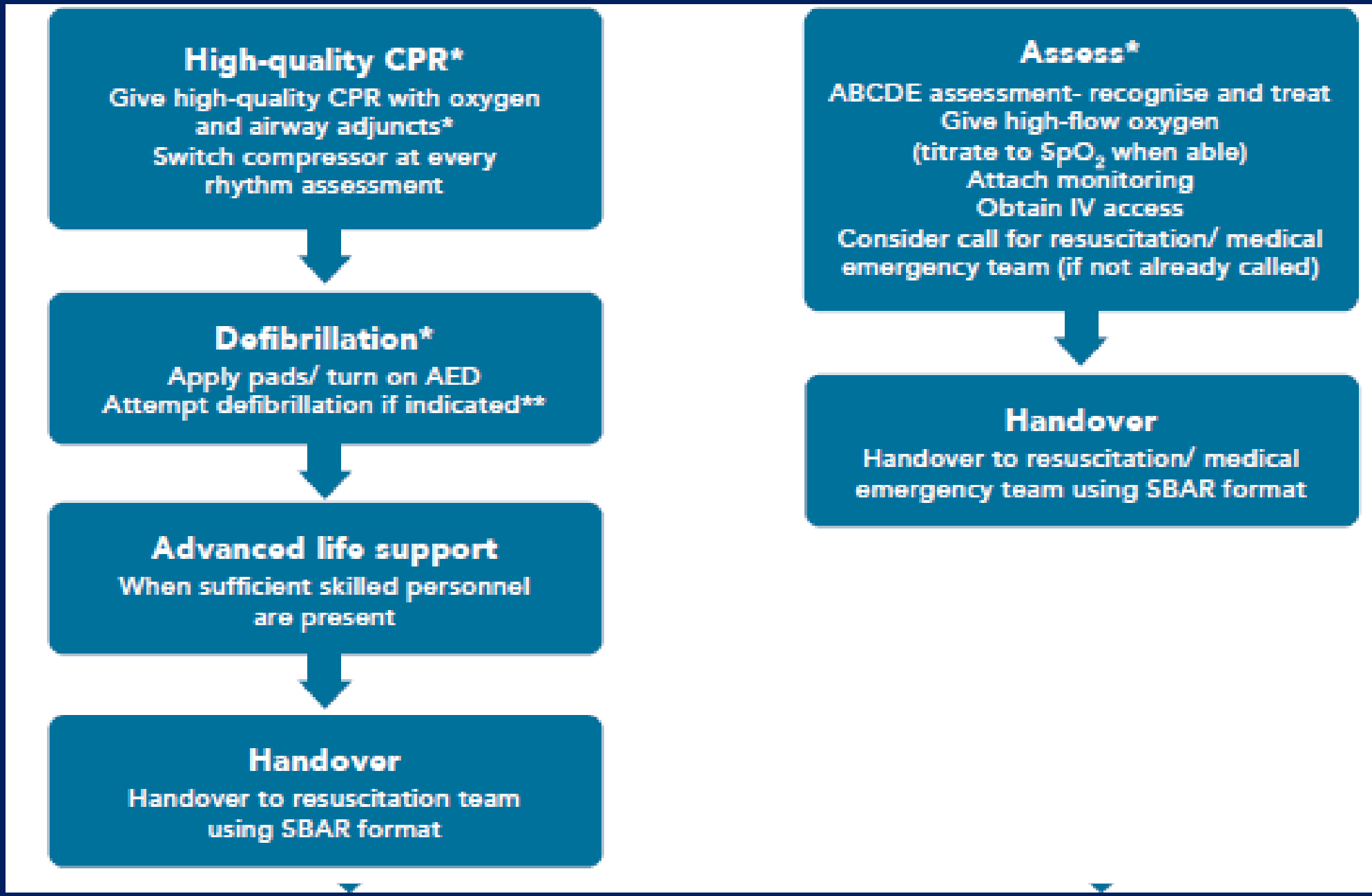
Consider

- Coronary angiography/percutaneous coronary intervention
- Mechanical chest compressions to facilitate transfer/treatment
- Extracorporeal CPR

After ROSC

- Use an ABCDE approach
- Aim for SpO_2 of 94-98% and normal $PaCO_2$
- 12 Lead ECG
- Identify and treat cause
- Targeted temperature management

Immediately resume chest compressions for 2 minutes


High-quality CPR*
Give high-quality CPR with oxygen and airway adjuncts*
Switch compressor at every rhythm assessment
Defibrillation*
Apply pads/ turn on AED
Attempt defibrillation if indicated**
Advanced life support
When sufficient skilled personnel are present
Handover
Handover to resuscitation team using SBAR format
Assess*
ABCDE assessment- recognise and treat
Give high-flow oxygen
(titrate to SpO_2 when able)
Attach monitoring
Obtain IV access
Consider call for resuscitation/ medical emergency team (if not already called)
Handover
Handover to resuscitation/ medical emergency team using SBAR format

ALS 2021

5 TOP MESSAGES

EUROPEAN RESUSCITATION COUNCIL

1. High-quality chest compression with minimal interruption, early defibrillation, and treatment of reversible causes remain the priority

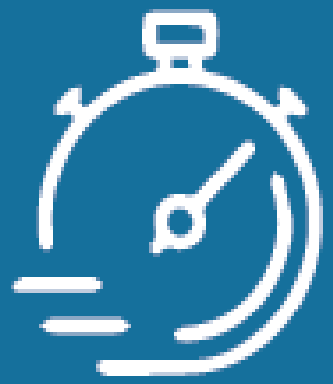
2. Premonitory signs and symptoms often occur before cardiac arrest in- or out-of-hospital – cardiac arrest is preventable in many patients

3. Use a basic or advanced airway technique – only rescuers with a high success rate should use tracheal intubation

4. Use adrenaline early for non-shockable cardiac arrest

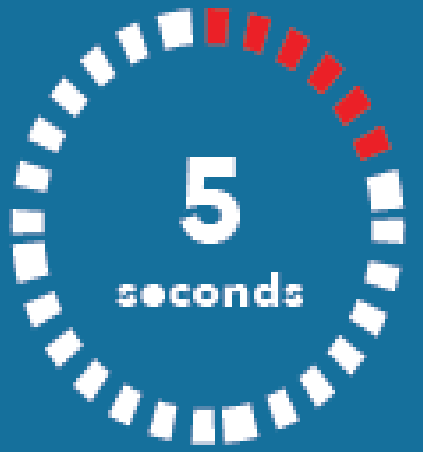
5. In select patients, if feasible, consider extracorporeal CPR (eCPR) as a rescue therapy when conventional ALS is failing

KEY RECOMMENDATIONS



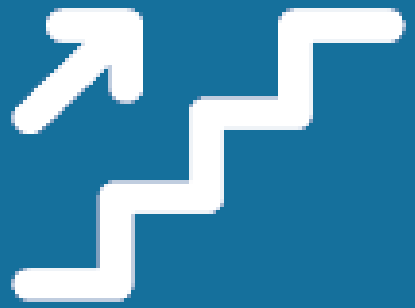
Give a shock as early as possible for a shockable cardiac arrest

Deliver shocks with minimal interruption to chest compression, and minimise the pre-shock and post-shock pause - with a manual defibrillator aim for a total pause of less than 5 seconds

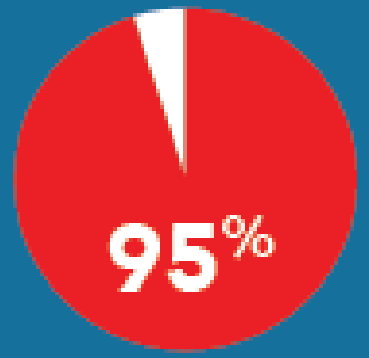


Aim for less than a 5 second interruption in chest compression for tracheal intubation

KEY RECOMMENDATIONS



During CPR, start with basic airway techniques and progress stepwise according to the skills of the rescuer until effective ventilation is achieved



If an advanced airway is required, only rescuers with a high tracheal intubation success rate should use tracheal intubation. The expert consensus is that a high success rate is over 95% within two attempts at intubation

KEY RECOMMENDATIONS

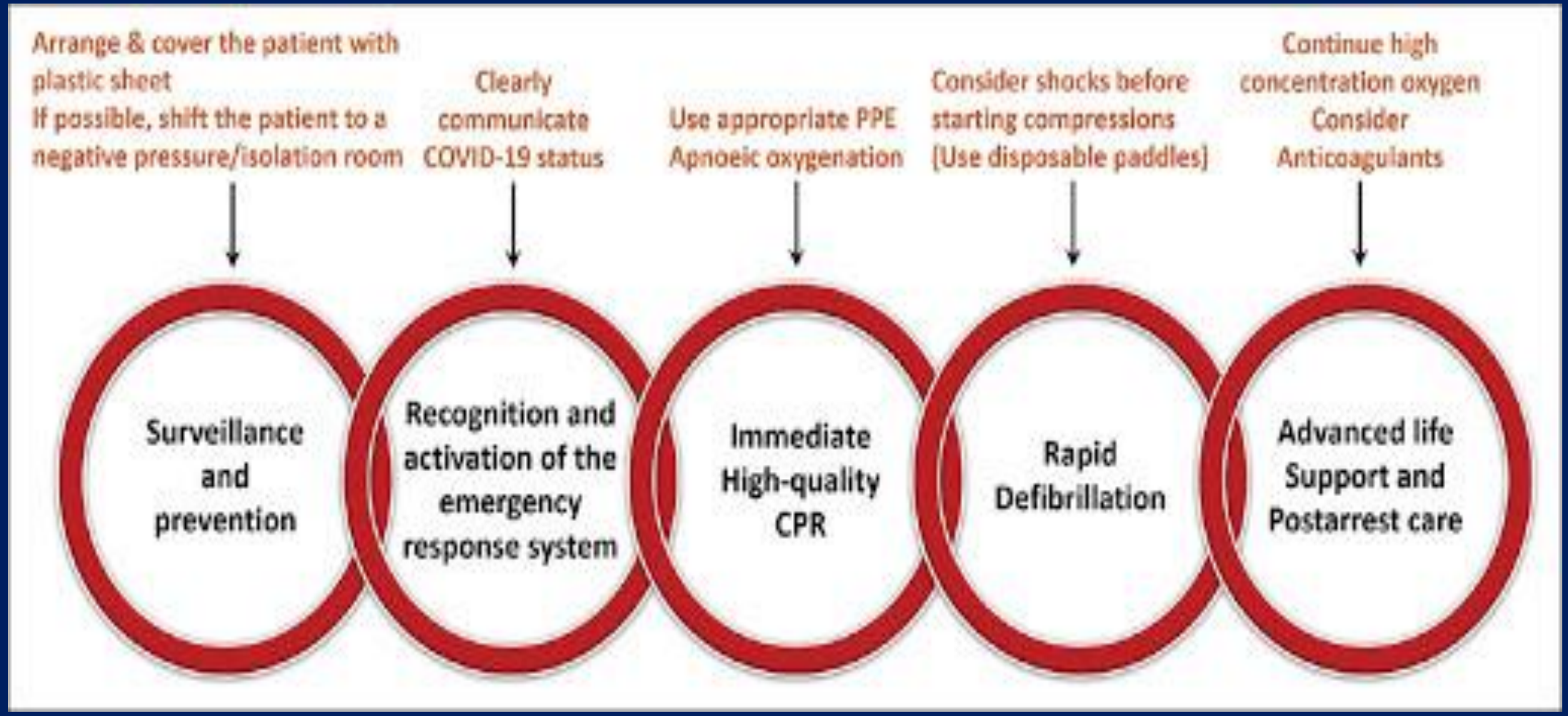
Give adrenaline 1 mg IV (IO) as soon as possible for adult patients in cardiac arrest with a non-shockable rhythm

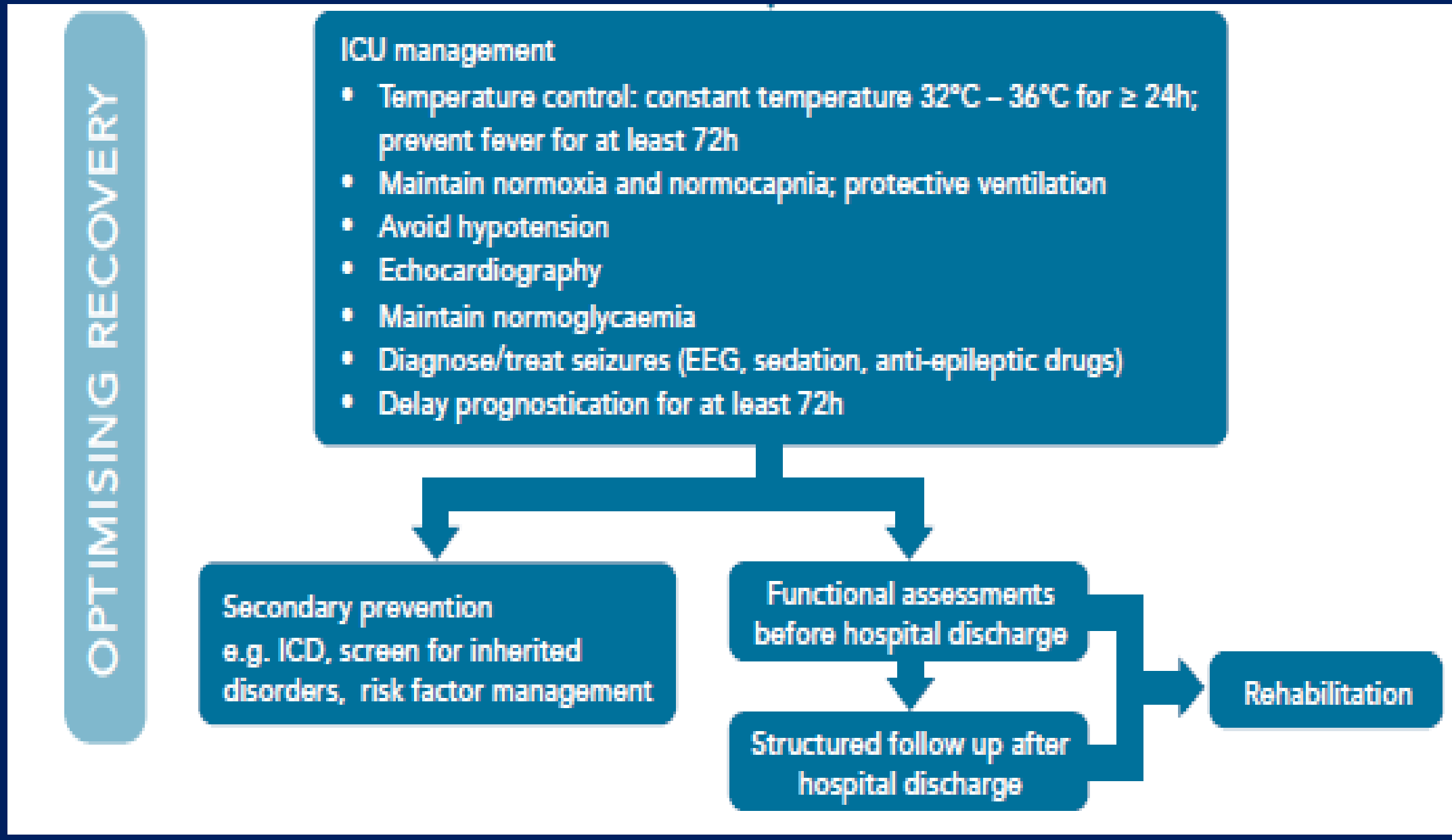
Give adrenaline 1 mg IV (IO) after the 3rd shock for adult patients in cardiac arrest with a shockable rhythm

Repeat adrenaline 1 mg IV (IO) every 3-5 minutes whilst ALS continues

KEY RECOMMENDATIONS

Consider extracorporeal CPR (eCPR) as a rescue therapy for selected patients with cardiac arrest when conventional ALS measures are failing or to facilitate specific interventions (e.g. coronary angiography and percutaneous coronary intervention (PCI), pulmonary thrombectomy for massive pulmonary embolism, rewarming after hypothermic cardiac arrest) in settings in which it can be implemented


Arrange & cover the patient with plastic sheet
If possible, shift the patient to a negative pressure/isolation room
Clearly communicate COVID-19 status
Use appropriate PPE
Apnoeic oxygenation
Consider shocks before starting compressions
(Use disposable paddles)
Continue high concentration oxygen
Consider Anticoagulants
Surveillance and prevention
Recognition and activation of the emergency response system
Immediate High-quality CPR
Rapid Defibrillation
Advanced life Support and Postarrest care


OPTIMISING RECOVERY
ICU management
• Temperature control: constant temperature 32°C – 36°C for ≥ 24h; prevent fever for at least 72h
• Maintain normoxia and normocapnia; protective ventilation
• Avoid hypotension
• Echocardiography
• Maintain normoglycaemia
• Diagnose/treat seizures (EEG, sedation, anti-epileptic drugs)
• Delay prognostication for at least 72h
Secondary prevention
e.g. ICD, screen for inherited disorders, risk factor management
Functional assessments before hospital discharge
Structured follow up after hospital discharge
Rehabilitation

POST RESUSCITATION CARE 2021

5 TOP MESSAGES

EUROPEAN RESUSCITATION COUNCIL

1. After ROSC use ABC approach

- Insert an advanced airway (tracheal intubation when skills available)
- Titrate inspired oxygen to an SpO_2 of 94-98% and ventilate lungs to achieve normocapnia
- Obtain reliable intravenous access, restore normovolaemia, avoid hypotension (aim for systolic BP > 100mmHg)

2. Emergent cardiac catheterisation +/- immediate PCI after cardiac arrest of suspected cardiac origin and ST-elevation on the ECG

3. Use targeted temperature management (TTM) for adults after either OHCA or IHCA (with any initial rhythm) who remain unresponsive after ROSC

4. Use multimodal neurological prognostication using clinical examination, electrophysiology, biomarkers, and imaging

5. Assess physical and non-physical impairments before and after discharge from the hospital and refer for rehabilitation if necessary

KEY RECOMMENDATIONS

Perform urgent coronary angiography (and immediate PCI if required) in patients with ROSC and ST-elevation on ECG

Consider urgent coronary angiography in patients with ROSC without ST-elevation on ECG if estimated high probability of acute coronary occlusion

KEY RECOMMENDATIONS

Use TTM for adults after cardiac arrest (with any initial rhythm) who remain unresponsive after ROSC

Maintain a constant target temperature between 32°C and 36°C for at least 24h

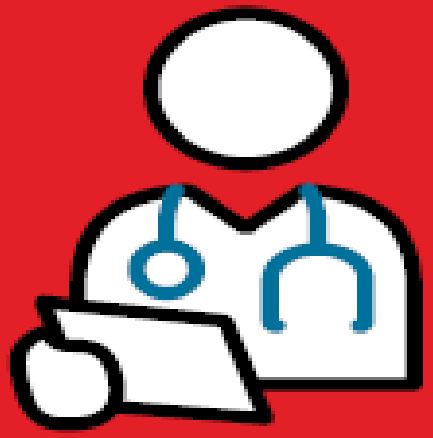
KEY RECOMMENDATIONS

A Glasgow Motor Score of ≤ 3 at ≥ 72h or later after ROSC may identify patients in whom neurological prognostication is needed

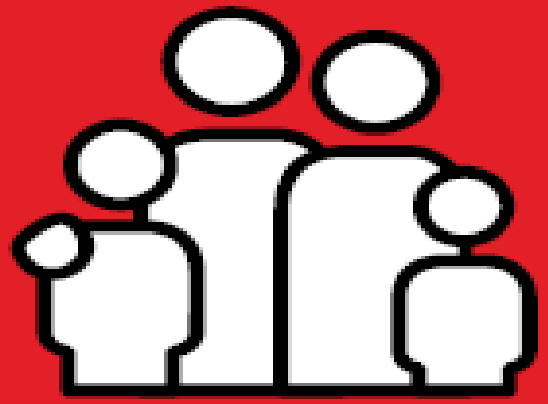
No single predictor is 100% accurate; therefore, use a multimodal neuroprognostication strategy comprising clinical examination, electrophysiology, biomarkers, and imaging

Beware of confounding caused by residual sedation

KEY RECOMMENDATIONS



Perform functional assessments of physical and non-physical impairments before discharge from the hospital to identify early rehabilitation needs and refer to rehabilitation if necessary



Organise follow-up for all cardiac arrest survivors within 3 months after hospital discharge, including screening for cognitive problems, screening for emotional problems and fatigue, and providing information and support for survivors and family members

KEY RECOMMENDATIONS

Consider organ donation in post-cardiac arrest patients who have achieved ROSC and who fulfil neurological criteria for death

In comatose ventilated patients who do not fulfil neurological criteria for death, when a decision to start end-of-life care and withdrawal of life support is made, organ donation should be considered after circulatory arrest occurs

THANK YOU FOR YOUR ATTENTION !!!