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NOTARZT DR. DANIEL

Emergency & Anaesthesia

The pocket compendium for anaesthesia and emergency medicine

INTERNATIONAL EDITION

- Resuscitation
- Airway & Anaesthesia
- Circulation & Shock
- Neuro
- Paediatric Emergencies



kg	mg
10	0.1
20	0.2
30	0.3

Edited by Dr. Daniel Pehböck

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Emergency number (EU): 112 (European emergency number)
Poisons information: Local poison control centre

1 Resuscitation

Adult resuscitation (ALS)

Immediately: No response → alert the team/emergency services, have a defibrillator brought. No normal breathing → start **chest compressions 30 : 2**. Keep pauses as short as possible.

Quality of chest compressions

Parameter	Target
Compression point	centre of the chest (lower half of the sternum)
Depth	5–6 cm
Rate	100–120 /min
Recoil	complete, hands stay on the chest
Ratio	30 : 2 – with tracheal tube or SGA continuous compressions + 10 breaths/min (SGA with leak: back to 30 : 2)
Pause before shock	as short as possible (< 5 s), continue compressions while charging
Rescuer change	every 2 min (at each rhythm analysis)

Sequence – 2-minute cycles

	Shockable (VF / pulseless VT)	Non-shockable (asystole / PEA)
Rhythm analysis	every 2 min	every 2 min
Defibrillation	1 shock, resume CPR immediately	–
Adrenaline (epinephrine) 1 mg	after the **3rd shock**, then every 3–5 min	**as early as possible**, then every 3–5 min
Amiodarone	**300 mg** after the 3rd shock, **150 mg** after the 5th shock (alternative: lidocaine 100 mg / 50 mg)	–

Amiodarone doses are based on the total number of shocks (3 and 5, respectively) – regardless of whether VF persists or recurs.

If the cardiac arrest is witnessed on a monitor (e.g. cardiac catheter laboratory), up to **three shocks in rapid succession** may be delivered. For the timing of adrenaline and amiodarone, this series of three counts as **one** shock.

Adrenaline (epinephrine) – Resuscitation – adults

- **1 mg** i.v./i.o. [1]
  every 3–5 min · 0.1 mg/ml (1 mg made up to 10 ml with NaCl 0.9 %) · = 10 ml

Give diluted: 1 ml adrenaline 1 mg/ml + 9 ml NaCl 0.9 % = 10 ml (0.1 mg/ml) – 1 mg = 10 ml, then flush with NaCl 0.9 % (SmPC). Prefilled syringes 1 mg/10 ml likewise. Non-shockable rhythm – as early as possible. Shockable rhythm – after the 3rd shock.

Amiodarone – Resuscitation – adults (VF/pVT)

- **300 mg** i.v./i.o. [1]
  after the 3rd shock · 50 mg/ml (3 ml = 150 mg) · = 6 ml
- **150 mg** i.v./i.o. [1]
  after the 5th shock · 50 mg/ml (3 ml = 150 mg) · = 3 ml

What counts is the total number of shocks (persistent or recurrent VF). Three stacked shocks in a witnessed arrest monitored on a cardiac monitor count as one shock.

Defibrillation

- **Biphasic** (rectilinear or truncated exponential): 1st shock **at least 150 J**.
- **Other waveforms** (e.g. pulsed biphasic): 1st shock **according to the manufacturer**.
- If the shock is unsuccessful and the device allows it: **escalate the energy for subsequent shocks.** Recommended device setting unknown: highest energy for all shocks.
- **Refractory VF** (persisting after 3 shocks): check correct pad position, then consider a **vector change** (pads anterior–posterior).
- **Double sequential defibrillation** (second device, a.–l. + a.–p.): **not a routine measure** – the ERC guidelines 2025 do not recommend it routinely. Pad check and vector change take priority; ILCOR considers it merely an option in refractory VF after ≥ 3 shocks (weak recommendation, low-certainty evidence) – this is **not a new standard procedure**, if at all only with a practised procedure.

Access and airway

- **Intravenous access first**; intraosseous if i.v. access cannot be obtained rapidly.
- Stepwise airway approach: bag-mask → supraglottic airway (preferably a second-generation SGA with non-inflatable gel-like cuff, as per local protocol) or intubation – intubation only with a high success rate (> 95 % within ≤ 2 attempts) and a compression pause < 5 s.
- **Waveform capnography** mandatory: tube position, quality of compressions, sudden rise in $etCO_2$ as an indicator of ROSC. A low $etCO_2$ alone is not a criterion for stopping resuscitation.
- During resuscitation, give the highest possible oxygen concentration.

Reversible causes – "4 Hs and 4 Ts"

4 Hs	4 Ts
Hypoxia	**T**amponade (cardiac)
Hypovolaemia	**T**oxins
Hypo-/hyperkalaemia, metabolic	**T**hrombosis (coronary, pulmonary)
Hypo-/hyperthermia	**T**ension pneumothorax

Point-of-care ultrasound to look for causes only by trained operators and **without additional pauses**. Consider **eCPR** as a rescue therapy in selected patients if conventional measures fail and a system is available – think of it early.

After ROSC – targets

Domain	Target
Oxygenation	SpO_2 **94–98 %** (as soon as it can be measured reliably); avoid hypoxaemia and hyperoxaemia
Ventilation	**Normocapnia** ($PaCO_2$ 35–45 mmHg)
Circulation	systolic **> 100 mmHg** or MAP **> 60–65 mmHg**
Temperature	actively prevent fever: **≤ 37.5 °C** for at least **72 h** in patients who remain comatose
Diagnostics	12-lead ECG (repeat if needed); with **persistent** ST elevation emergency coronary angiography (PCI if indicated)

[1] Soar J, Böttiger BW et al. European Resuscitation Council Guidelines 2025 Adult Advanced Life Support. Resuscitation 2025;215 Suppl 1:110769 (Korrigendum 2026).
[4] Kurzfassung der Leitlinien des European Resuscitation Council 2025. Notfall Rettungsmed 2025.
[3] Nolan JP, Sandroni C et al. European Resuscitation Council and European Society of Intensive Care Medicine Guidelines 2025 Post-Resuscitation Care. Resuscitation 2025 / Intensive Care Med 2025;51:2213–2288.
[208] Lott C et al. European Resuscitation Council Guidelines 2025: Special Circumstances in Resuscitation. Resuscitation 2025;215 Suppl 1:110753.
[13] Fachinformation Adrenalin 1 mg/ml Injektionslösung (z. B. Suprarenin®, L-Adrenalin) – aktuelle Fassung.
[304] International Liaison Committee on Resuscitation (ILCOR). Adult Advanced Life Support: 2025 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. Circulation 2025 – doppelte sequenzielle Defibrillation bei refraktärem Kammerflimmern nach ≥ 3 Schocks erwägbar (schwache Empfehlung, geringe Evidenzsicherheit); Bewertung laut externer Fachprüfung 11/2026, Volltext redaktionell nicht eingesehen.

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Paediatric resuscitation (PLS)

Immediately: No response + no normal breathing → **5 initial rescue breaths**, then **15 : 2**. Paediatric emergency table for weight, tube and doses: see chapter *Paediatric emergency table*.

Chest compressions

Parameter	Infant (< 1 y)	Child (1 y to puberty)
Technique	2-thumb technique (encircling)	1 or 2 hands
Compression point	lower half of the sternum	lower half of the sternum
Depth	at least ⅓ of the chest diameter (a.–p.)	at least ⅓ of the chest diameter; adolescents 5–6 cm; never > 6 cm
Rate	100–120 /min	100–120 /min
Ratio	15 : 2	15 : 2
Pauses / rescuer change	< 5 s; change the compressor at least every 2 min	< 5 s; change the compressor at least every 2 min

Sequence

	Shockable (VF / pulseless VT)	Non-shockable (asystole / PEA / bradycardia with poor perfusion)
Defibrillation	**4 J/kg** (not exceeding the adult dose, 120–200 J depending on the device), resume CPR immediately; refractory (after 5 unsuccessful shocks): stepwise up to **8 J/kg, max. 360 J**	–
Adrenaline (epinephrine) 10 µg/kg (max. 1 mg)	after the **3rd shock**, then **every 4 min** (2nd dose after the 5th shock)	**as early as possible** (within 3 min), then **every 4 min**
Amiodarone 5 mg/kg	after the 3rd shock (max. 300 mg), 2nd dose after the 5th shock (max. 150 mg)	–

Adrenaline (epinephrine) – Resuscitation – children

- **0.01 mg/kg (10 µg/kg)** i.v./i.o. [2]
  max. 1 mg · every 4 min (every 2nd cycle) · 0.1 mg/ml (1 mg made up to 10 ml with NaCl 0.9 %)

10 µg/kg = 0.1 ml/kg of the 0.1 mg/ml dilution. Non-shockable rhythm – as early as possible (within 3 min). Shockable rhythm – after the 3rd and 5th shock, then every 4 min.

Adrenaline (epinephrine) – Resuscitation – children

BW	0.01 mg/kg (10 µg/kg) i.v./i.o. · 0.1 mg/ml
3 kg	**0.03 mg** 0.3 ml
5 kg	**0.05 mg** 0.5 ml
10 kg	**0.1 mg** 1 ml
15 kg	**0.15 mg** 1.5 ml
20 kg	**0.2 mg** 2 ml
25 kg	**0.25 mg** 2.5 ml
30 kg	**0.3 mg** 3 ml
40 kg	**0.4 mg** 4 ml

Amiodarone – Resuscitation – children (VF/pVT)

- **5 mg/kg** i.v./i.o.[2]
  max. 300 mg · after the 3rd shock (2nd dose 5 mg/kg, max. 150 mg, after the 5th shock) · 50 mg/ml (3 ml = 150 mg)

Formulations containing benzyl alcohol as an excipient are contraindicated in neonates, infants and children up to 3 y according to their product information – check the excipients of the product used.

Bradycardia with signs of poor perfusion despite adequate oxygenation and ventilation is treated like cardiac arrest: start chest compressions (ERC 2025, without a fixed heart rate threshold). Many algorithms (e.g. RCUK) give a heart rate **< 60/min** as a guide.

Further measures

- Vascular access i.v. or i.o. – i.o. immediately if i.v. access appears difficult or fails; do not delay with repeated venepuncture attempts.
- Fluids if hypovolaemia is suspected: **10 ml/kg** balanced crystalloid, repeat after reassessment.
- Reversible causes (4 Hs / 4 Ts) as in adults – in children mostly **respiratory (hypoxia)** or circulatory failure (shock).

[2] Djakow J, Turner NM, Skellett S et al. European Resuscitation Council Guidelines 2025 Paediatric Life Support. Resuscitation 2025;215 Suppl 1:110767.
[4] Kurzfassung der Leitlinien des European Resuscitation Council 2025. Notfall Rettungsmed 2025.
[266] Resuscitation Council UK. Paediatric advanced life support algorithm – 2025 Resuscitation Guidelines (Fassungen 10/2025 und V2 11/2025) sowie Paediatric Life Support Guideline 2025, Tabelle 1 „Approximate normal values" (Wiedergabe in Medscape: Paediatric Life Support – RCUK 2025 Guideline Summary).

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After ROSC – post-resuscitation care

Immediately: ABCDE and 12-lead ECG. **SpO_2 94–98 %, normocapnia**, systolic **> 100 mmHg** or **MAP > 60–65 mmHg**. Look for the cause (ST elevation → cardiac catheterisation). **Actively prevent fever** (≤ 37.5 °C, ≥ 72 h).

Targets

Domain	Target	In practice
Airway	secured in comatose patients	intubation by experienced clinicians, **capnography** mandatory
Oxygenation	**SpO_2 94–98 %**	start with 100 % O_2; as soon as SpO_2/ABG are reliable → **titrate down**; avoid hypoxia **and** hyperoxia. Pulse oximetry less accurate in dark skin → ABG
Ventilation	**Normocapnia** ($PaCO_2$ approx. 35–45 mmHg)	$etCO_2$ often underestimates $PaCO_2$ → ABG. Risk of hypocapnia during hypothermia. Lung-protective (6–8 ml/kg predicted body weight)
Circulation	systolic **> 100 mmHg** or **MAP > 60–65 mmHg**	avoid hypotension; fluids as needed, **noradrenaline (norepinephrine)**; dobutamine for low cardiac output; echocardiography. Target may be individually higher
Temperature	**≤ 37.5 °C** in comatose patients, **for at least 72 h**	actively prevent fever (device with temperature feedback); mild hypothermia 32–36 °C: **do not actively rewarm**; no prehospital cooling with large volumes of cold i.v. fluid
Glucose	Normoglycaemia	ICU standard protocol, avoid hypoglycaemia
Seizures	treat, do not prevent	**no prophylaxis**; treat clinical/EEG seizures with levetiracetam or valproate; EEG
Sedation	short-acting	facilitates temperature control and later neurological assessment

Noradrenaline (norepinephrine) – Syringe driver 5 mg / 50 ml = 0.1 mg/ml (100 µg/ml)

Rate in ml/h · columns: µg/kg/min

BW	0.05	0.1	0.2	0.3	0.5
50 kg	1.5	3	6	9	15
60 kg	1.8	3.6	7.2	10.8	18
70 kg	2.1	4.2	8.4	12.6	21
80 kg	2.4	4.8	9.6	14.4	24
90 kg	2.7	5.4	10.8	16.2	27
100 kg	3	6	12	18	30
120 kg	3.6	7.2	14.4	21.6	36

Finding the cause

Finding	Procedure
ST elevation on the 12-lead ECG	**immediate coronary angiography** (PCI)
No ST elevation, strong suspicion of acute coronary occlusion (e.g. persistent ischaemia, haemodynamic/electrical instability)	consider emergency coronary angiography
No ST elevation, out-of-hospital arrest, no urgent suspicion	coronary angiography **delayed**, not as an emergency
Cause unclear	**whole-body CT** (head to pelvis, biphasic, with **CT pulmonary angiography**)
Always	labs incl. electrolytes, lactate, troponin; echocardiography; reversible causes (4 Hs and 4 Ts)

Recurrent or treatment-refractory arrhythmias after ROSC: correct electrolytes (K^+, Mg^{2+}), treat ischaemia, antiarrhythmics or cardioversion as described in chapter *Tachycardia*.

Prognosis – not before 72 h

- Do **not assess before 72 h** after ROSC – and only once sedatives, neuromuscular blocking agents, hypothermia and metabolic derangements have been excluded as confounders.
- **Multimodal** (clinical examination, EEG, SSEP, biomarkers, imaging) – **never rely on a single finding**.

Assess all patients who, **≥ 72 h** after ROSC, **are not awake and do not obey commands (GCS motor ≤ 5)** – after excluding confounders. A poor outcome is **likely** if **at least two** of these findings are present:

Test	Unfavourable finding	Timing
Pupillary **and** corneal reflexes	bilaterally absent	≥ 72 h
SSEP	N20 potential bilaterally absent	≥ 24 h
EEG	highly malignant pattern (e.g. suppressed background, burst suppression)	> 24 h
NSE (serum)	> 60 µg/l or rising over time	48 h and/or 72 h
Status myoclonus	persistent, generalised (≥ 30 min)	early (≤ 72 h)
CT/MRI	extensive hypoxic brain injury (CT: markedly reduced grey–white matter differentiation)	CT early, MRI after days

Signs of a favourable recovery (argue against a change in goals of care): motor response GCS-M 4–5 (localising or withdrawal) at 72–96 h · normal NSE values · continuous EEG background without discharges within 72 h · no diffusion restriction on MRI. Myoclonus with a benign EEG: continue wake-up attempts even after days.

Ongoing care

- Change goals of care only after a structured, multimodal assessment and discussion with the relatives.
- Consider **organ donation** if treatment is withdrawn or brain death occurs.
- Before discharge: screening for physical, cognitive and psychological sequelae, rehabilitation, follow-up; investigation of the cause (e.g. ICD, genetic testing after sudden cardiac death).

[3] Nolan JP, Sandroni C et al. European Resuscitation Council and European Society of Intensive Care Medicine Guidelines 2025 Post-Resuscitation Care. Resuscitation 2025 / Intensive Care Med 2025;51:2213–2288.
[1] Soar J, Böttiger BW et al. European Resuscitation Council Guidelines 2025 Adult Advanced Life Support. Resuscitation 2025;215 Suppl 1:110769 (Korrigendum 2026).
[4] Kurzfassung der Leitlinien des European Resuscitation Council 2025. Notfall Rettungsmed 2025.

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Newborn care and resuscitation (NLS)

Immediately: Start the clock · **Warmth** (dry, remove wet towels, hat; preterm infants < 32 weeks' gestation in plastic wrap without drying) · Open the airway (head in neutral position) · absent or inadequate breathing or **HR < 100 /min → 5 inflation breaths** · then check the **heart rate**. Most newborns need only **ventilation**.

Preparation

Area	Checklist
Warmth	Room **23–25 °C** (< 28 weeks ideally **> 25 °C**), radiant warmer/warming mattress on, pre-warmed towels, hat, plastic bag for preterm infants
Ventilation	**T-piece** (preferred, especially for preterm infants) or bag with manometer and PEEP, masks of appropriate size, suction, newborn-size laryngeal mask, intubation set with **videolaryngoscope** (direct laryngoscope as backup)
Monitoring	Stethoscope, **ECG**, pulse oximeter (sensor on the **right hand** = preductal), clock
Access and drugs	Umbilical venous catheter or i.o., adrenaline (epinephrine) 0.1 mg/ml (1 mg made up to 10 ml with NaCl 0.9 %) prepared, NaCl 0.9 %, glucose 10 %
Team	Allocate roles, ask about gestational age and risk factors

Prehospital: use the NLS or the PLS algorithm – whichever is more familiar; switch if necessary and call for further help.

Cord clamping

Situation	Procedure
Baby needs no support	clamp the cord no earlier than **60 s** (longer may be beneficial)
Baby needs stabilisation	if safely feasible: stabilise **with the cord intact**, clamp later – preferred especially < 34 weeks
Delayed cord clamping not possible	cord milking only **from 28 weeks – do not milk the cord < 28 weeks**

Initial assessment (in the first seconds, then continuously)

	Good	Impaired	Poor
Breathing	vigorous, crying	irregular, inadequate	absent / gasping
Heart rate	**> 100 /min**	**60–100 /min**	**< 60 /min**
Tone	good	reduced	floppy
Action	warmth, with the mother, observe	open the airway, **ventilate**	airway, **ventilate**, call for help

- Heart rate: stethoscope is acceptable as a first step; **ECG** measures continuously and most accurately.
- Skin colour is of secondary importance only – subjective and unreliable depending on skin type.
- No routine suctioning; if airway obstruction is suspected, suction **under direct vision**.
- **Meconium:** do not routinely suction the pharynx or trachea – it only delays ventilation. If the baby is not breathing: ventilate immediately.

Ventilation

Parameter	≥ 32 weeks	< 32 weeks
Inflation breaths	**5 ×**, inspiration up to **2–3 s**	5 ×, up to 2–3 s
Inspiratory pressure (start)	**30 cmH_2O**	**25 cmH_2O**
PEEP	**6 cmH_2O**	**6 cmH_2O**
Oxygen (start)	**21 %** (room air)	**≥ 30 %**
Then	**30 ventilation breaths/min**, inspiratory time approx. **1 s**, until adequate spontaneous breathing	as left

- Reduce pressure as soon as the chest rises and the baby improves. No sustained inflations > 5 s.
- Spontaneously breathing preterm infants < 32 weeks with respiratory distress: **CPAP 6 cmH_2O** as the first form of respiratory support.

HR not rising after the inflation breaths? The cause is almost always ineffective ventilation:

Check	Action
Is the chest rising?	Head neutral, **two-person technique** with jaw thrust (preferred if enough staff are available)
Still no chest rise	suction under direct vision, increase pressure, **laryngeal mask** or intubation (videolaryngoscope), then repeat the inflation breaths
Chest is rising	continue ventilation for **30 s**, then recheck the HR

Laryngeal mask: if mask ventilation is ineffective and intubation is not possible/too risky – or as the primary device instead of the face mask if the size fits (data mainly from 34 weeks).

Chest compressions

Indication: HR **< 60 /min** despite at least **30 s of effective ventilation** (visible chest rise).

Parameter	Procedure
Technique	**Two-thumb technique**, hands encircling the chest
Compression point	lower third of the sternum
Depth	⅓ of the a.-p. chest diameter, allow full recoil
Ratio	**3 : 1** – **90 compressions + 30 breaths** per minute
Oxygen	increase to **100 %**
Check	HR **every 30 s**; stop when HR > 60 /min
Airway	consider **laryngeal mask or intubation**; call for experienced help, prepare vascular access

Drugs

If the HR remains **< 60 /min** and does not rise despite a secured airway, effective ventilation and **≥ 30 s** of chest compressions. Access: **umbilical venous catheter** (preferred) or **intraosseous**.

Drug	Dose	Preparation	Repeat / note
Adrenaline i.v./i.o.	**10–30 µg/kg** (RCUK standard: **20 µg/kg**)	0.1–0.3 ml/kg (standard **0.2 ml/kg**) of the 0.1 mg/ml solution	**every 4 min** while HR < 60 /min
Adrenaline endotracheal	100 µg/kg	1 ml/kg of the 0.1 mg/ml solution	only if intubated and no vascular access; as soon as access is available, give the i.v./i.o. dose immediately – regardless of when the tracheal dose was given
Fluids	10 ml/kg	group O Rh-negative packed red cells or isotonic crystalloid (no albumin)	if blood loss is suspected or there is no response to other measures
Glucose	200 mg/kg	2 ml/kg glucose 10 %	only for measured hypoglycaemia – check blood glucose during resuscitation (RCUK)

Sodium bicarbonate: no longer recommended during resuscitation (at most in the post-resuscitation phase according to local protocol).

Adrenaline 20 µg/kg (0.1 mg/ml) by weight:

Weight	1 kg	1.5 kg	2 kg	2.5 kg	3 kg	3.5 kg	4 kg
Dose	20 µg	30 µg	40 µg	50 µg	60 µg	70 µg	80 µg
Volume	0.2 ml	0.3 ml	0.4 ml	0.5 ml	0.6 ml	0.7 ml	0.8 ml

Oxygen – target values (preductal, right hand)

Minutes after birth	3	5	10
SpO_2 target range	70–75 %	80–85 %	85–95 %

- Check SpO_2 and FiO_2 **every 30 s** and **titrate** oxygen; SpO_2 **> 95 %** → reduce O_2.
- Avoid hypoxia and hyperoxia, especially in preterm infants.

Temperature

- Target **36.5–37.5 °C**; avoid hypothermia **and** hyperthermia.
- Preterm infants < 32 weeks: dry the head and apply a hat, place the body in plastic wrap or a plastic bag **without drying**, radiant warmer.
- Measure and record the temperature on admission (prognostic and quality indicator).

After resuscitation

- Monitoring on a neonatal intensive care unit.
- **Blood glucose** closely: hypo- and hyperglycaemia are common in the first 6 h (roughly every 7th and every 4th baby, respectively) – avoid both.
- **Moderate to severe hypoxic-ischaemic encephalopathy** (from 36 weeks): therapeutic hypothermia **33–34 °C** for **72 h**, start **within 6 h**, only in a specialist centre following a strict protocol; discuss transfer early, avoid hyperthermia until then.
- Documentation with times; umbilical cord blood gas analysis.
- **Stopping resuscitation:** heart rate still not detectable **> 20 min** after birth despite all recommended measures and exclusion of reversible causes → discuss stopping within the team and with the parents; in (extremely) preterm infants possibly earlier.

New since 2021

Topic	2025 status
Initial oxygen	only two levels: ≥ 32 weeks 21 %, < 32 weeks ≥ 30 %
PEEP / CPAP	uniformly 6 cmH_2O
SpO_2 targets	target ranges from minute 3; reduce O_2 at > 95 %
Adrenaline	repeat uniformly every 4 min
Sodium bicarbonate	removed from resuscitation
Umbilical cord	no cord milking < 28 weeks; stabilisation with the cord intact preferred, if safe
Airway	two-person technique, early laryngeal mask, videolaryngoscope
Monitoring	ECG as the most accurate HR measurement; skin colour secondary

[262] Hogeveen M, Monnelly V, Binkhorst M et al. European Resuscitation Council Guidelines 2025 Newborn Resuscitation and Support of Transition of Infants at Birth. Resuscitation 2025;215 Suppl 1:110766.
[263] Resuscitation Council UK. Newborn resuscitation and support of transition of infants at birth – 2025 Resuscitation Guidelines (nationale Adaptation der ERC-Leitlinien 2025).
[264] International Liaison Committee on Resuscitation (ILCOR). Neonatal Life Support: 2025 International Liaison Committee on Resuscitation Consensus on Science With Treatment Recommendations. Circulation 2025.
[265] American Heart Association, American Academy of Pediatrics. Part 5: Neonatal Resuscitation – 2025 AHA and AAP Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation 2025.

Reviewed: Dr. med. univ. Daniel Pehböck, DESA, 2026-11-01 (German original)

2 Anaesthesia & Sedation

Emergency anaesthesia & RSI

Principle: Prepare first, then induce. Plans A–D have been discussed **before** the first drug is given and the equipment is ready.

Checklist before induction

✓	Item
☐	Indication clear, team briefed, roles allocated (spoken aloud)
☐	Monitoring: ECG, SpO_2, blood pressure (short interval), **capnography**
☐	Secure, running i.v. access (preferably two)
☐	Preoxygenation for at least 3 min with FiO_2 1.0 and a tight-fitting mask (or NIV/high-flow)
☐	Positioning: upper body elevated, ear level with the sternum
☐	Suction ready and working
☐	Laryngoscope/videolaryngoscope, tracheal tubes (2 sizes), stylet/bougie, cuff syringe, tube tie
☐	Plan B: supraglottic airway (2nd generation) · Plan C: mask ventilation (two-person, Guedel airway) · Plan D: cricothyroidotomy set (scalpel – bougie – tube)
☐	Drugs drawn up and **labelled**; vasopressor ready
☐	Sugammadex available (if rocuronium is used)

Drugs

Drug	Dose i.v.	Comment
Hypnotic		
Esketamine	0.5–1 mg/kg	preserves haemodynamic stability, preferred in shock
Propofol	1.5–2.5 mg/kg	reduce markedly in hypotension/hypovolaemia
Neuromuscular blocking agent		
Rocuronium	1 mg/kg	often 1.2 mg/kg (off-label); reversible
Suxamethonium (succinylcholine)	1–1.5 mg/kg	observe contraindications (hyperkalaemia, MH)
Emergency reversal		
Sugammadex	16 mg/kg	immediate reversal after rocuronium 1.2 mg/kg – **not a CICO rescue**, do not delay cricothyroidotomy

Weight tables

Esketamine – Induction of anaesthesia

BW	0.5–1 mg/kg i.v. · 25 mg/ml	2–4 mg/kg i.m. · 25 mg/ml
50 kg	25–50 mg 1–2 ml	100–200 mg 4–8 ml
60 kg	30–60 mg 1.2–2.4 ml	120–240 mg 4.8–9.6 ml
70 kg	35–70 mg 1.4–2.8 ml	140–280 mg 5.6–11.2 ml
80 kg	40–80 mg 1.6–3.2 ml	160–320 mg 6.4–12.8 ml
90 kg	45–90 mg 1.8–3.6 ml	180–360 mg 7.2–14.4 ml
100 kg	50–100 mg 2–4 ml	200–400 mg 8–16 ml
120 kg	60–120 mg 2.4–4.8 ml	240–480 mg 9.6–19.2 ml

Propofol – Induction of anaesthesia (adults < 55 y)

BW	1.5–2.5 mg/kg i.v. (titrate, approx. 20–40 mg every 10 s) · 1 % = 10 mg/ml
50 kg	75–125 mg 7.5–12.5 ml
60 kg	90–150 mg 9–15 ml
70 kg	105–175 mg 10.5–17.5 ml
80 kg	120–200 mg 12–20 ml
90 kg	135–225 mg 13.5–22.5 ml
100 kg	150–250 mg 15–25 ml
120 kg	180–300 mg 18–30 ml

Rocuronium – Rapid sequence induction (RSI)

BW	1 mg/kg i.v. · 10 mg/ml
50 kg	50 mg 5 ml
60 kg	60 mg 6 ml
70 kg	70 mg 7 ml
80 kg	80 mg 8 ml
90 kg	90 mg 9 ml
100 kg	100 mg 10 ml
120 kg	120 mg 12 ml

Suxamethonium (succinylcholine) – Rapid sequence induction (RSI) – adults

BW	1–1.5 mg/kg i.v. · 2 % = 20 mg/ml
50 kg	50–75 mg 2.5–3.75 ml
60 kg	60–90 mg 3–4.5 ml
70 kg	70–105 mg 3.5–5.25 ml
80 kg	80–120 mg 4–6 ml
90 kg	90–135 mg 4.5–6.75 ml
100 kg	100–150 mg 5–7.5 ml
120 kg	120–180 mg 6–9 ml

Sugammadex – Immediate reversal after rocuronium 1.2 mg/kg

BW	16 mg/kg i.v. bolus · 100 mg/ml
50 kg	**800 mg** 8 ml
60 kg	**960 mg** 9.6 ml
70 kg	**1120 mg** 11.2 ml
80 kg	**1280 mg** 12.8 ml
90 kg	**1440 mg** 14.4 ml
100 kg	**1600 mg** 16 ml
120 kg	**1920 mg** 19.2 ml

If intubation fails – Plan A to D

Based on the Difficult Airway Society algorithm (DAS 2025). Continue oxygen delivery throughout all attempts, call for help early, announce every change of plan out loud.

Plan	Action	Move on if …
A	Intubation, preferably with a videolaryngoscope; no more than three attempts, a fourth only by a more experienced person ("3 + 1"), optimise each attempt	intubation fails → Plan B
B	2nd-generation supraglottic airway, no more than three attempts; oxygenation adequate → stop and decide (wake the patient, intubate via the SGA, proceed)	oxygenation inadequate → Plan C
C	Final attempt at mask ventilation (two-person, oropharyngeal/nasopharyngeal airway); ensure full neuromuscular blockade	oxygenation possible → wake the patient or plan the airway · not possible → **declare CICO**
D	**"Cannot intubate – cannot oxygenate": immediate emergency front-of-neck access (eFONA)** – cricothyroidotomy, scalpel – bougie – tube; ensure full neuromuscular blockade (after sugammadex: see below)	–

Sugammadex can reverse the effect of rocuronium but does not remove swelling, blood or anatomy as the cause of a difficult airway – in CICO it is **not a reliable rescue** and must not delay cricothyroidotomy. If rocuronium has already been reversed with sugammadex, repeat neuromuscular blockade with rocuronium is **unreliable** (according to the sugammadex SmPC, section 4.4: rocuronium 1.2 mg/kg given within 30 min afterwards takes effect up to approx. 4 min later and acts for a shorter time; after **16 mg/kg** wait 24 h, until then use a **non-steroidal neuromuscular blocking agent**, e.g. suxamethonium – onset may be delayed). Re-establishing neuromuscular blockade must not delay cricothyroidotomy.

After intubation

- Confirm tube position by **capnography** (over several breaths) + auscultation.
- Secure the tube, measure cuff pressure, consider a gastric tube.
- Maintain anaesthesia (hypnotic + analgesic), set lung-protective ventilation.
- Monitor blood pressure closely – post-intubation hypotension is common.