

DEFIBRILLATION

Asynchronous High-Energy Electrical Therapy for Pulseless Lethal Ventricular Arrhythmias

CARDIAC EMERGENCY

ACLS CORE

CRITICAL CARE

NGN PRIORITY

PROCEDURE

● Critical / Emergency

● Pathophysiology

● Safe / Expected

● Complications

● NCLEX Trap

● Procedure / Med

● Pt / Family Edu

1 PATHOPHYSIOLOGY & MECHANISM

01 Disorganized ventricular electrical activity (VF) or pulseless VT

02 Loss of coordinated ventricular contraction → no stroke volume

03 No cardiac output → cardiac arrest → tissue hypoxia begins

04 High-energy unsynchronized shock delivered through myocardium

05 Critical mass of myocardial cells simultaneously depolarized

06 Chaotic electrical activity terminated → brief asystole window

07 SA node resumes intrinsic pacemaker function (ideal outcome)

08 Organized rhythm restored → coordinated contraction → ROSC + perfusion

2 SHOCKABLE VS NON-SHOCKABLE RHYTHMS

⚡ **SHOCK — DEFIBRILLATE**

✗ **DO NOT DEFIBRILLATE**

VF Ventricular Fibrillation — chaotic, no QRS, no pulse

pVT Pulseless Ventricular Tachycardia — wide QRS, no pulse

→ Treatment: **Unsynchronized** high-energy shock + immediate CPR

ASY Asystole — flat line; CPR + epinephrine, find cause

PEA Pulseless Electrical Activity — organized rhythm, no pulse; CPR + epi

VT+P VT WITH pulse / SVT / A-fib → use **SYNCHRONIZED** cardioversion (different procedure)

3 ENERGY DOSING

JOULE SETTINGS BY DEVICE & PATIENT

BIPHASIC (ADULT)

120–200 J

Per manufacturer; commonly 200 J subsequent

MONOPHASIC (ADULT)

360 J

Older devices; full energy each shock

PEDIATRIC

2 → 4 J/kg

First shock 2 J/kg, then 4 J/kg (max 10 J/kg or adult dose)

4 POST-ARREST LABS & PARAMETERS

LAB / PARAMETER	NORMAL RANGE	NCLEX SIGNIFICANCE POST-DEFIBRILLATION
Troponin I	< 0.04 ng/mL	↑ post-arrest from cardiac injury; serial draws to identify STEMI as cause of arrest
Potassium (K⁺)	3.5–5.0 mEq/L	Hypo/hyperkalemia → refractory VF; correct aggressively (a "T" in Hs & Ts)
Magnesium (Mg²⁺)	1.5–2.5 mEq/L	Low Mg → torsades de pointes & refractory VF; give 2 g IV Mg sulfate
ABG / pH	7.35–7.45	Metabolic acidosis universal post-arrest; lactate-driven; do NOT routinely give bicarb
Lactate	0.5–2.0 mmol/L	> 2 = poor perfusion; trend to assess resuscitation adequacy

LAB / PARAMETER	NORMAL RANGE	NCLEX SIGNIFICANCE POST-DEFIBRILLATION
Glucose	70–110 mg/dL	Hyperglycemia common post-arrest; target 144–180 in TTM
EtCO ₂	35–45 mmHg	Sudden ↑ > 40 = ROSC; persistently < 10 after 20 min CPR = poor prognosis
12-Lead ECG	Sinus, no STE	Obtain immediately post-ROSC to identify STEMI → cath lab activation

5 PRIORITY NURSING LADDER (ACLS SEQUENCE)

- 1 Recognize VF/pVT + confirm pulselessness**
Check carotid pulse ≤ 10 sec while assessing rhythm. ≤ 10 sec
- 2 Activate code, begin high-quality CPR**
Compressions 100–120/min, depth 2–2.4 in, full recoil, minimal interruptions.
100–120/min
- 3 Apply defibrillator pads**
Anterolateral (RUE chest below clavicle + LL chest at apex) or anteroposterior.
Pad placement
- 4 Charge device while CPR continues**
Biphasic 120–200 J (per device); monophasic 360 J.
Charge during compressions
- 5 "CLEAR" — visually verify no contact**
"I'm clear, you're clear, oxygen clear." Remove O₂ source from chest.
Safety verbalization
- 6 Deliver single shock**
Press shock button — one shock only; no stacked shocks (current AHA).
1 shock
- 7 Resume CPR IMMEDIATELY × 2 min**
Do NOT pulse-check after shock. Continue compressions. 2-min cycle
- 8 Rhythm check at 2 min**
Pause briefly; if still VF/pVT → repeat shock. @ 2 min
- 9 Epinephrine 1 mg IV/IO q3–5 min**
After 2nd shock; flush with 20 mL NS, elevate extremity 10–20 sec. Epi 1 mg
- 10 Amiodarone 300 mg IV/IO bolus**
After 3rd shock for refractory VF/pVT; 2nd dose 150 mg if needed. Lidocaine alt.
Amio 300 mg
- 11 Address Hs & Ts (reversible causes)**
Hypoxia, Hypovolemia, H⁺ acidosis, Hypo/hyperkalemia, Hypothermia / Toxins, Tamponade, Tension PTX, Thrombosis (PE/MI). 5 H's + 5 T's
- 12 Post-ROSC bundle**
12-lead ECG, MAP ≥ 65, SpO₂ 92–98%, EtCO₂ 35–45, TTM 32–36 °C × 24 hr.
ROSC care

6 IF → THEN CLINICAL DECISION RULES

IF Monitor shows VF or pulseless VT	→	THEN Defibrillate immediately at biphasic 120–200 J	IF Rhythm is asystole or PEA	→	THEN Do NOT shock — CPR + epinephrine + identify cause
IF Patient has implanted pacemaker or ICD	→	THEN Place pads ≥ 1 inch (2.5 cm) away from device	IF Transdermal medication patch on chest	→	THEN Remove patch + wipe area BEFORE pad placement
IF Chest is wet or diaphoretic	→	THEN Dry the chest thoroughly to prevent arcing/burns	IF Excessive chest hair preventing pad contact	→	THEN Quick shave/trim — poor contact = ineffective shock + burns
IF Post-shock rhythm unchanged on next check	→	THEN Continue CPR × 2 min before re-shock; add epi/amio	IF ROSC achieved (pulse + BP return)	→	THEN 12-lead ECG, post-arrest bundle, TTM 32–36 °C × 24 hr
IF Pt has VT WITH pulse + stable	→	THEN Antiarrhythmic (amiodarone) — NOT defibrillation	IF Pt has VT WITH pulse + UNstable (hypotension, AMS)	→	THEN SYNCHRONIZED cardioversion + sedation if conscious

7 8 CLASSIC NCLEX TRAPS

1

DEFIB ≠ CARDIOVERSION

Defib = UNsynchronized, pulseless rhythms.
Cardioversion = SYNCHRONIZED, rhythms

2

DON'T SHOCK ASYSTOLE

"You can't shock a flat line." Asystole needs CPR + epinephrine — NOT defibrillation.

3

PEA IS NOT SHOCKABLE

Organized rhythm on monitor + NO pulse = PEA. Treat with CPR + epi + reverse Hs & Ts.

4

ALWAYS "CLEAR"

Verbalize + visually scan before every shock. If anyone is touching pt or bed → STOP.

WITH pulse (A-fib, SVT, stable VT w/ pulse).

Confirm in 2 leads.

Never shock.

Touching = staff injury + ineffective shock.

5

DON'T STACK SHOCKS

Old protocol = 3 stacked shocks. Current AHA = SINGLE shock then immediate 2 min CPR. Re-check rhythm at 2 min only.

6

NO PULSE CHECK AFTER SHOCK

Resume CPR immediately. Pulse + rhythm check happen TOGETHER at the 2-min mark — not after each shock.

7

REMOVE O₂ DURING SHOCK

Move free-flowing O₂ ≥ 3–4 ft from chest before shock — fire/explosion hazard. Bag-valve attached to ETT can stay (closed circuit).

8

PAD PLACEMENT PITFALLS

≥ 1 in from ICD/pacemaker; remove med patches; dry the skin; trim hair if needed; never on jewelry or wet surfaces.

8

NCLEX QUESTION PATTERNS

"Pt unresponsive, no pulse, monitor shows VF. Priority action?"

→ **Defibrillate**. CPR + early defibrillation = highest survival predictor.

"Monitor shows asystole confirmed in 2 leads. Next action?"

→ **CPR + epinephrine 1 mg IV**. Do NOT defibrillate.

"Stable pt with SVT 180. Vagal failed. Next?"

→ **Adenosine** first; if unstable → SYNCHRONIZED cardioversion (not defib).

"Defib charged. RN's next priority?"

→ **Verify all clear** + remove O₂ source + deliver shock.

"Just shocked. What now?"

→ **Resume CPR for 2 min**. Do not pulse-check.

"Pt has implanted ICD. Pad placement?"

→ **≥ 1 inch (2.5 cm)** from device; anterolateral or anteroposterior.

"Refractory VF after 2 shocks. Drug?"

→ **Epinephrine 1 mg IV**; after 3rd shock add **amiodarone 300 mg IV**.

"Pediatric arrest, pt 20 kg, VF. Initial joules?"

→ **2 J/kg = 40 J** first; subsequent 4 J/kg = 80 J.

"Sudden ↑ in EtCO₂ from 12 to 42 during compressions. Means?"

→ **ROSC** — pause to confirm pulse + BP.

9

NGN BOW-TIE — CLINICAL JUDGMENT SUMMARY

PRIORITY ACTIONS

⚡ Defibrillate immediately — biphasic 120–200 J unsynchronized

PRIORITY CONDITION

PARAMETERS TO MONITOR

Continuous high-quality CPR (100–120/min, 2 in depth) with minimal interruption

**PULSELESS
VF / VT**

Rhythm at 2-min cycles + post-shock response

ROSC indicators: palpable pulse, BP, EtCO₂ rise > 40, SpO₂

10 PATIENT & FAMILY EDUCATION

✓ Survival highest with **witnessed arrest + early CPR + early defibrillation** — every minute without shock ↓ survival ~ 7–10%.

✓ Post-arrest pt: **cardiac rehab, lifestyle modifications**, smoking cessation, lipid/BP control.

✓ ICD activity restrictions: **no driving × 6 mo after shock** (state-dependent), no contact sports.

✓ Cell phones — keep **≥ 6 inches** from device; carry on opposite side. Airport security: notify TSA, request hand-wand.

✓ Call 911 if: **multiple shocks in 24 hr, syncope, prolonged palpitations, chest pain, fever at incision site.**

✓ Teach family **hands-only CPR** + AED location & operation in public spaces (airports, gyms, offices).

✓ If **ICD implanted**: explain it monitors continuously and can deliver internal shock; sensation = "kick in chest."

✓ Avoid **strong electromagnetic fields**: MRI (unless MRI-compatible), arc welding, large industrial magnets.

✓ Carry **medical ID** + ICD card with model/manufacture at all times.

✓ Adherence to **antiarrhythmics, beta-blockers, anticoagulants** as prescribed; never stop abruptly.

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