

MEDICATION IN ACLS

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GUMS

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In the name of God

Access for medication in ACLS

- **Intravenous (IV) Route:**

- preferred route
 - # central line not required ; can interrupt CPR
- medication take 1-2 min. to reach central circulation
- give medication as IV bolus , flush with 20 ml fluid



- **Intraosseous (IO) Route:**

- secondary method
- safe & effective for administering medication, fluids, and blood as well as drawing blood
- all medication that can be given IV can be given IO
- administer medication and flush with at least 20 ml fluid (as with IV administration)

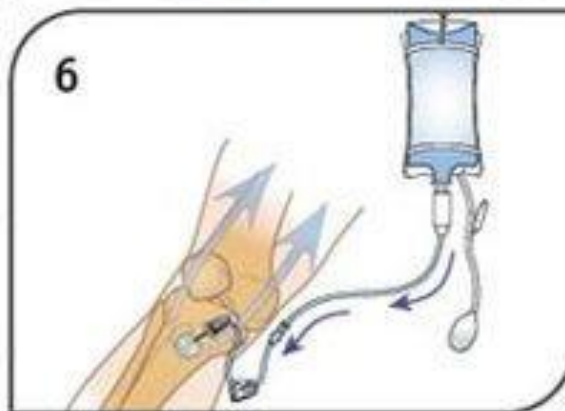
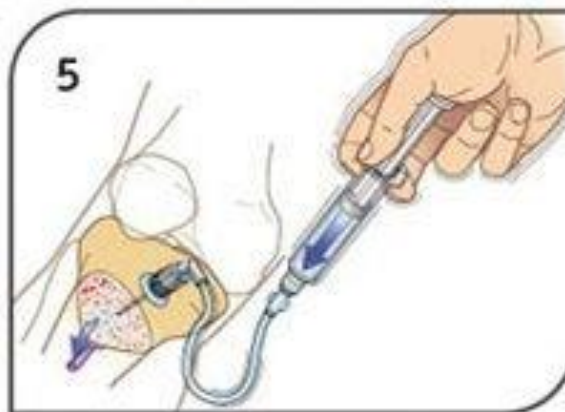
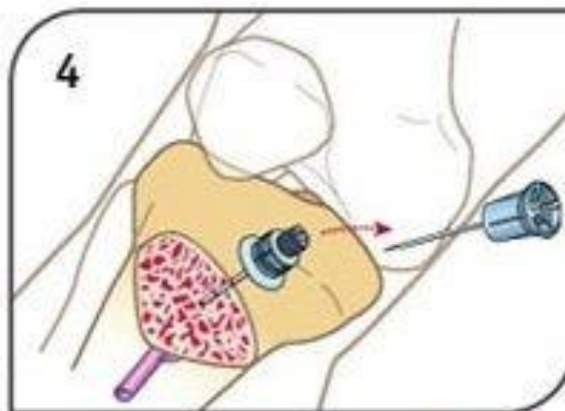
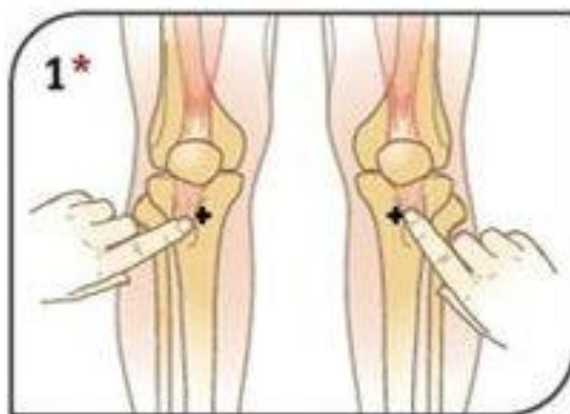


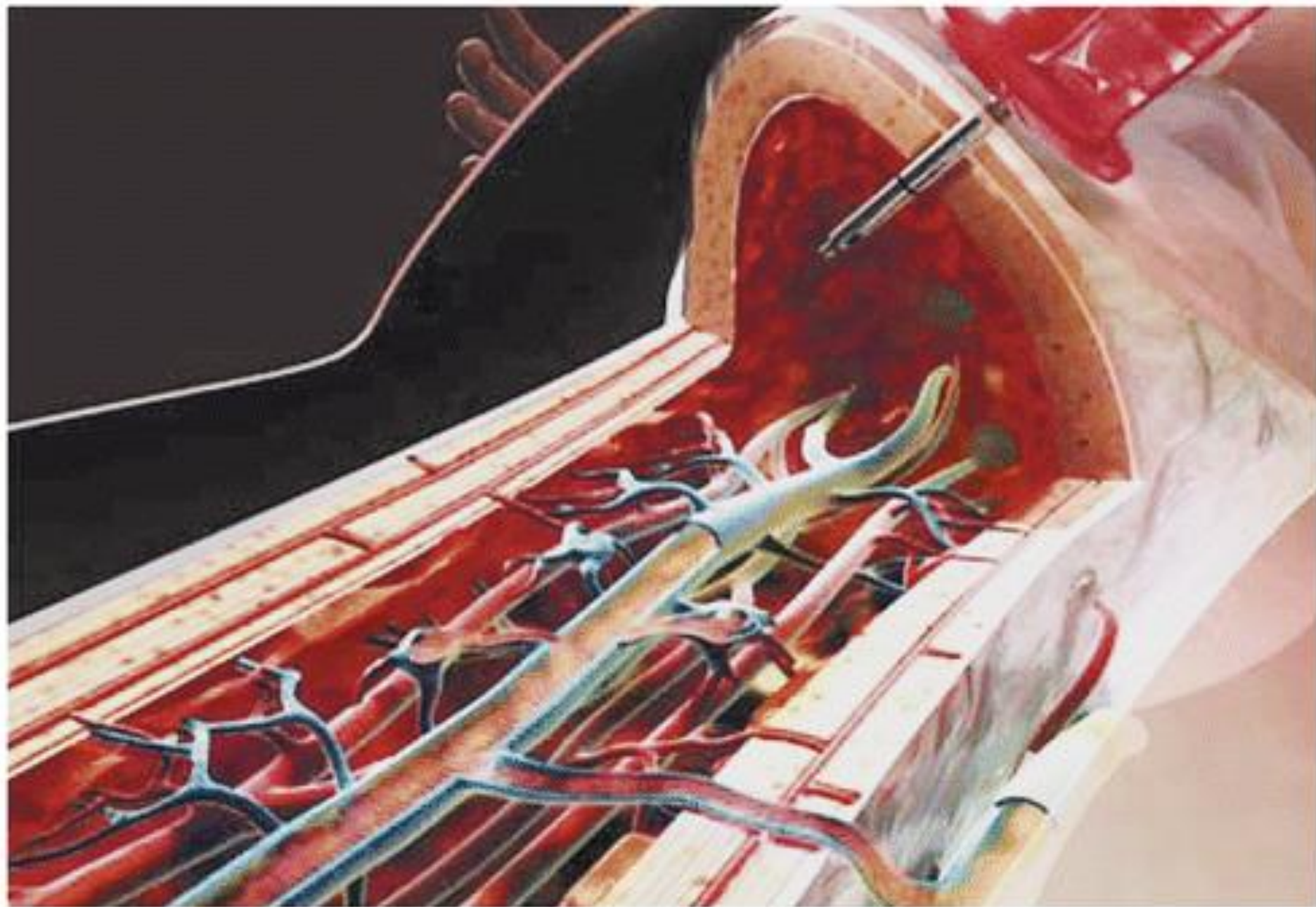


ACLS

Certification Institute

www.ACLScertification.com
ACLS, BLS, PALS and NRP
Certification Online

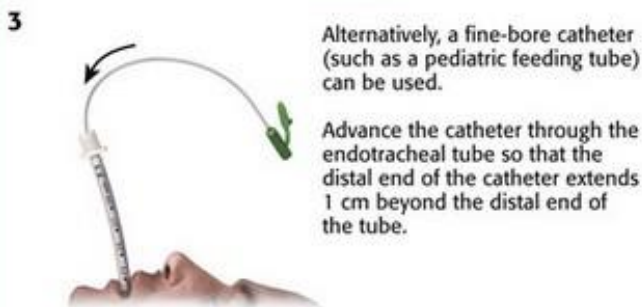




- **Endotracheal (ET) Route:**

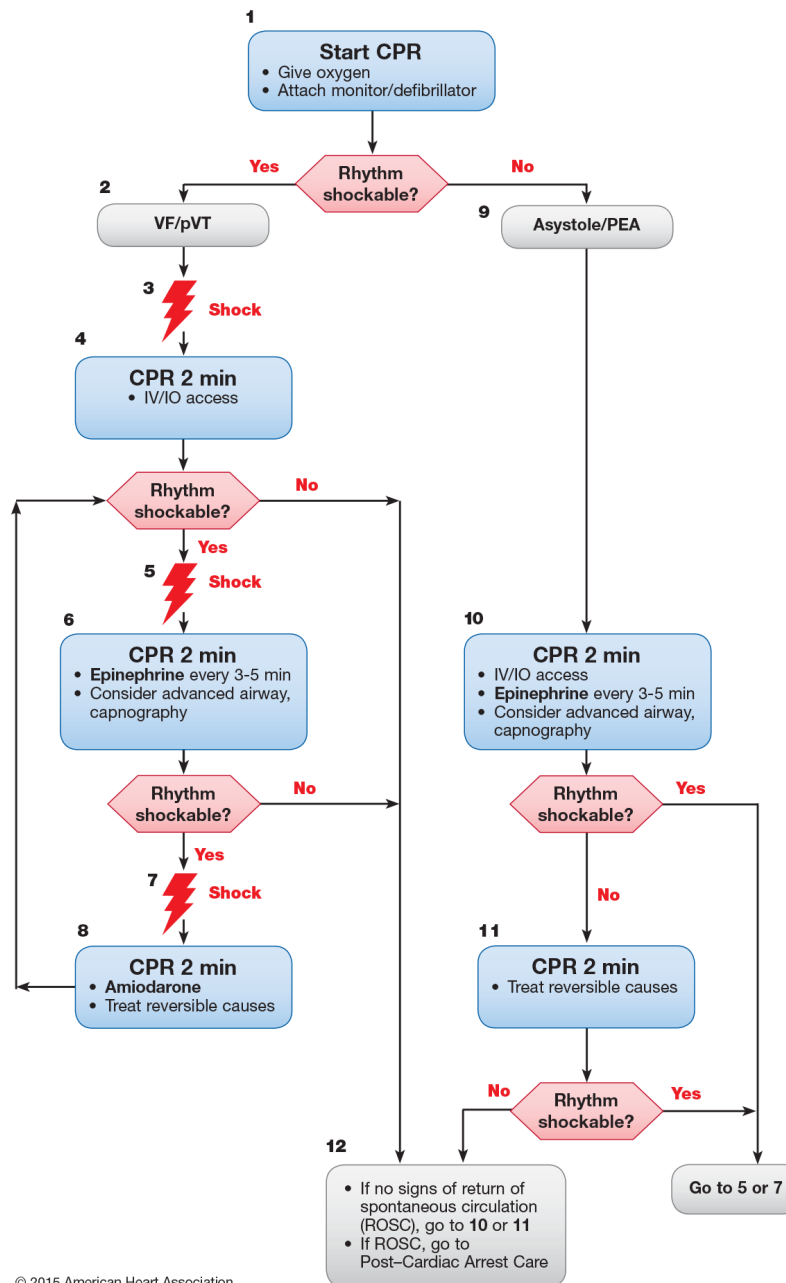
- not preferred ; last resort
- medication doses are 2-2.5 times IV/IO doses
optimal dosing not known
- drugs that can be given ET:
 - 1- naloxone
 - 2- atropine
 - 3- vasopressin
 - 4- epinephrine
 - 5- lidocaine
- dilute with 5-10 ml SW/NS, administer into ET tube,
follow with several PPV

ENDOTRACHEAL MEDICATION ADMINISTRATION



1- ADULT CARDIAC ARREST ALGORITHM

Adult Cardiac Arrest Algorithm—2015 Update



CPR Quality

- Push hard (at least 2 inches [5 cm]) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation.
- Rotate compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography
 - If PETCO₂ <10 mm Hg, attempt to improve CPR quality.
- Intra-arterial pressure
 - If relaxation phase (diastolic) pressure <20 mm Hg, attempt to improve CPR quality.

Shock Energy for Defibrillation

- **Biphasic:** Manufacturer recommendation (eg, initial dose of 120-200 J); if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered.
- **Monophasic:** 360 J

Drug Therapy

- **Epinephrine IV/IO dose:** 1 mg every 3-5 minutes
- **Amiodarone IV/IO dose:** First dose: 300 mg bolus. Second dose: 150 mg.

Advanced Airway

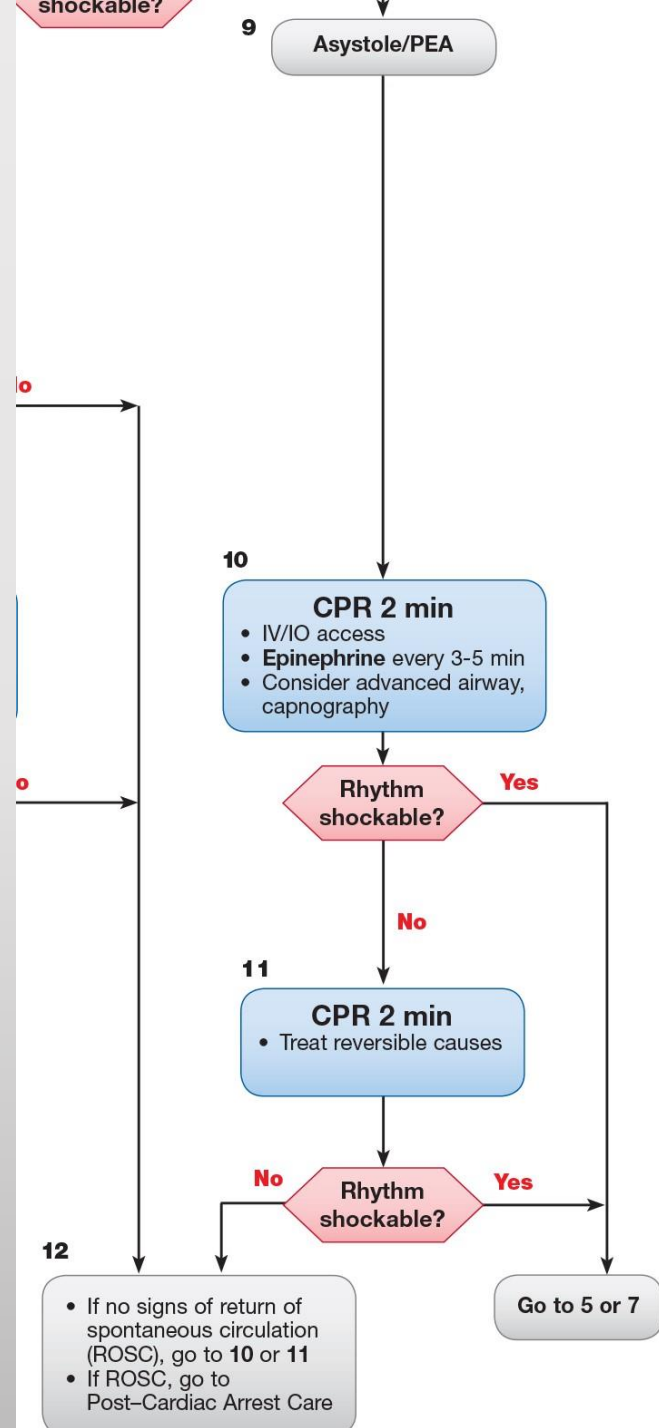
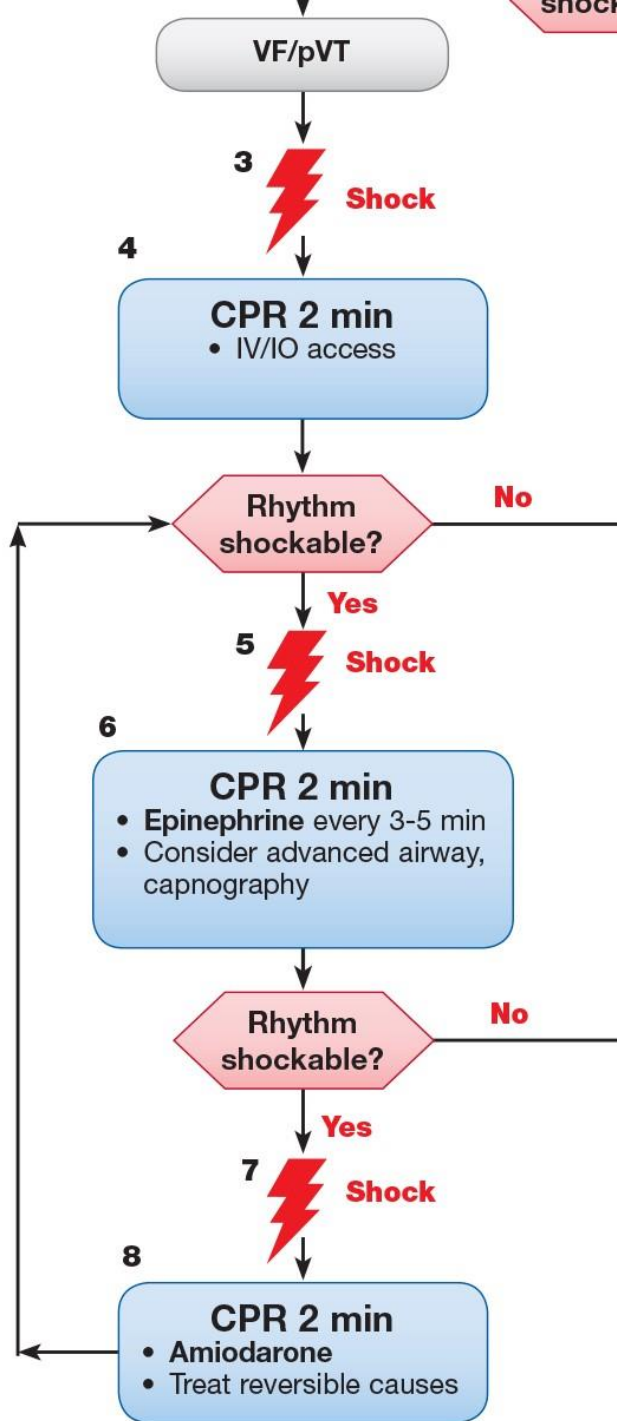
- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions

Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Abrupt sustained increase in PETCO₂ (typically ≥40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

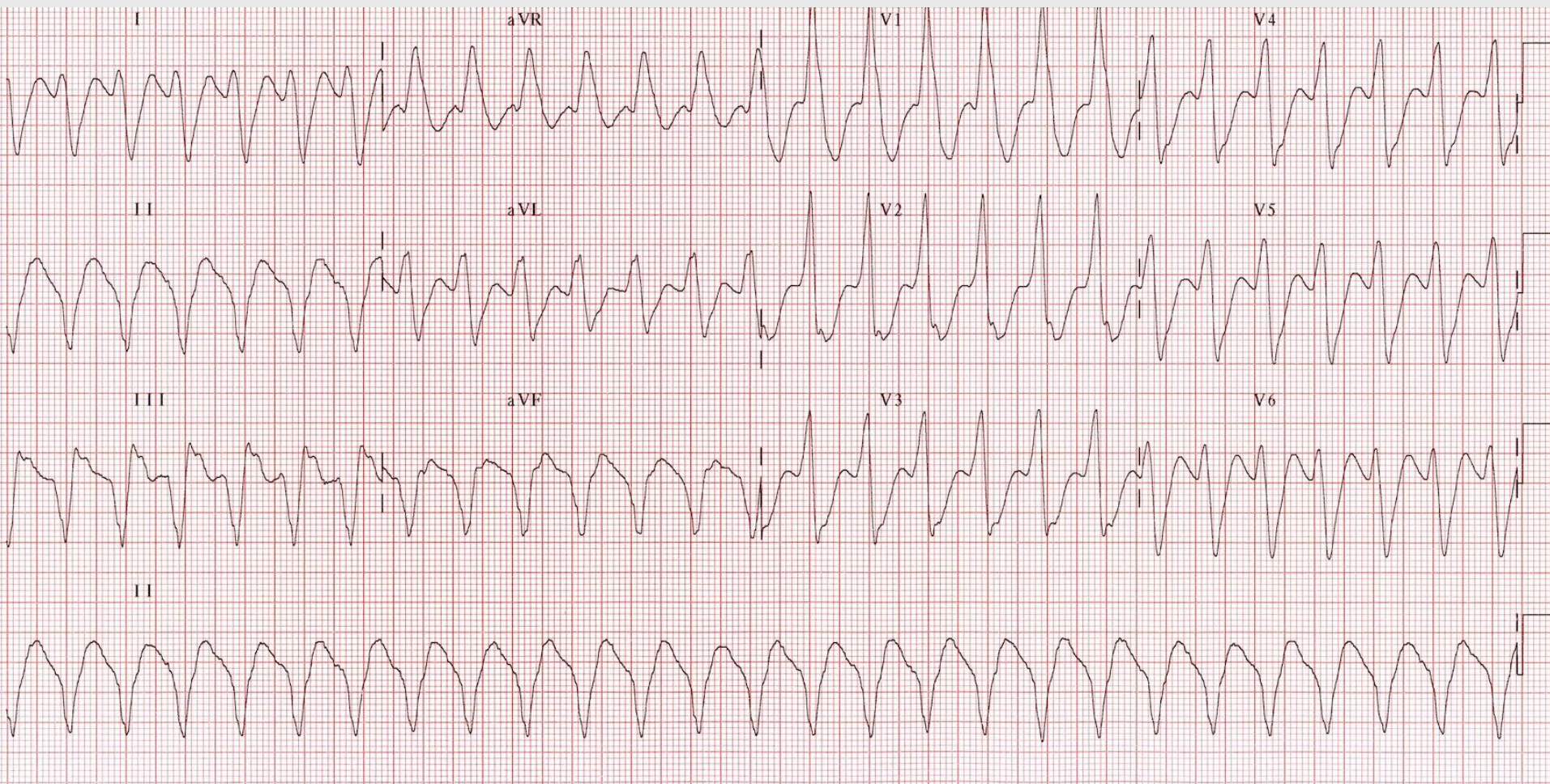
Reversible Causes

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-/hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary



Medication:

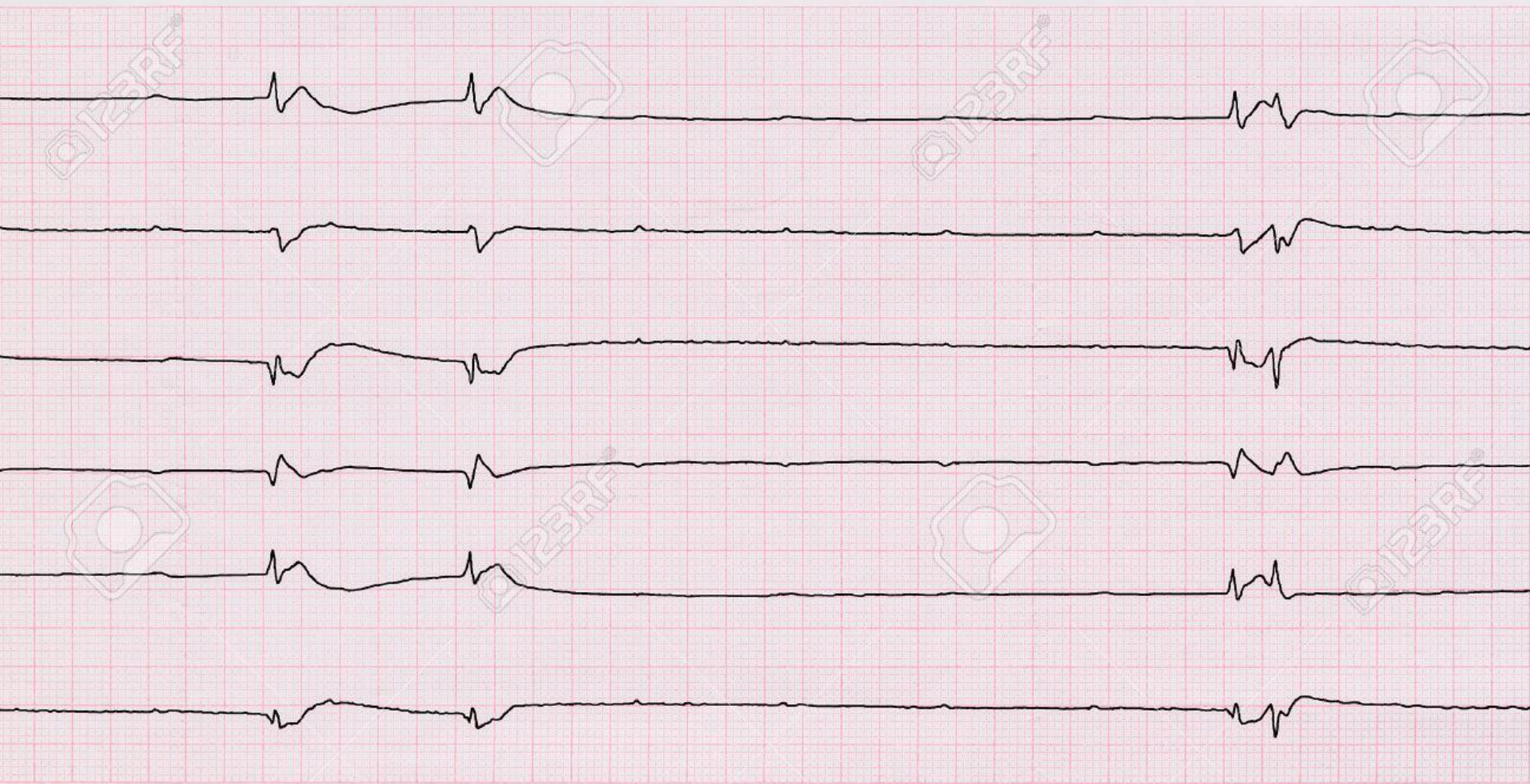
- **Ventricular fibrillation or ventricular tachycardia (VF/VT)**
 - vasopressors: epinephrine , vasopressin
 - antiarrhythmics: amiodarone
 - # not on algorithm : lidocaine , magnesium
- **Asystole/ Pulseless electrical activity (PEA)**
 - vasopressors: epinephrine , vasopressin



Ventricular tachycardia



Ventricular fibrillation



Asystole

Vasopressor medications:

- Include: epinephrine , norepinephrine , vasopressin
- Goal : increase coronary and cerebral perfusion
- Effect:
 - increase systemic arteriolar vasoconstriction
 - maintain vascular tone
 - shunt blood to heart and brain
- ONLY medication shown to improve ROSC (Return Of Spontaneous Circulation) and short term survival

Epinephrine (Adrenaline)

- MOA: α & β receptor agonist
 - α -receptor stimulation restores circulation
 - β -receptor stimulation:
 - may lower defibrillation threshold
 - increases myocardial oxygen demand
- DOSE & ADMINISTRATION:
 - IV/IO: 1 mg every 3-5 min
 - concentration 0.1 mg/ml (1:10000 or 1mg/10ml)
 - flush with 20 ml NS (central line preferred)
 - ET: 2-2.5 mg every 3-5 min
 - dilute in 5-10 ml SW/NS (use epi 1mg/ml or 1:1000)

1 in 10,000

Adrenaline-Link

**DILUTE ADRENALINE
INJECTION**

Vasopressin (ADH)

- MOA: acts on V1 receptor to cause vasoconstriction
 - increase blood pressure & systemic vascular resistance
- Benefits over epinephrine:
 - not inhibited by metabolic acidosis
 - no β -receptor activity
- DOSE & ADMINISTRATION:
 - IV/IO : 40 Units one time (2 vials of 20 U/ml)
flush with 20 ml NS
 - ET : 80-100 units one time
dilute in 5-10 ml SW/NS



NDC 63323-302-01

30201

VASOPRESSIN

INJECTION, USP
(SYNTHETIC)

20 Units/mL

For HA of GC Use
N 100A

Antiarrhythmic medications

- Include: Amiodarone , Lidocaine , Magnesium
 - not on algorithm: lidocaine, magnesium
- GOAL: increase the fibrillation threshold
 - prevent development or recurrence of VF/VT

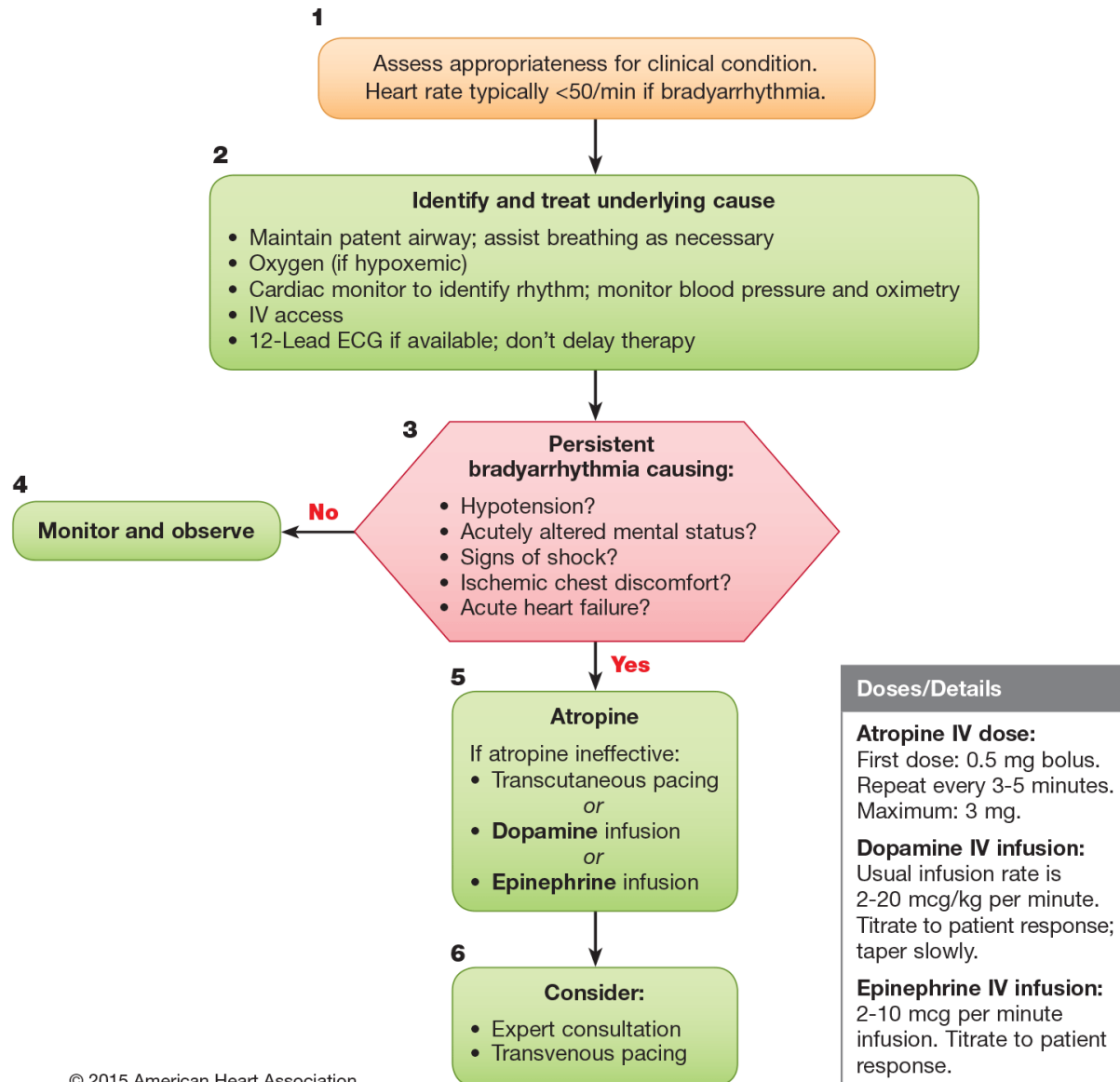
Amiodarone

- MOA: class III antiarrhythmic (K channel blocker)
inhibits α & β -adrenergic stimulation, blocks Ca channels
prolongs action potential
- Side effects: hypotension, fever, elevated LFTs, confusion, nausea, thrombocytopenia
- DOSE & administration:
 - 300 mg bolus IV/IO, follow with 150 mg in 3-5 min
 - give IV/IO push. If possible dilute in 20-30 ml D5W
 - amiodarone vial concentration is 50 mg/ml
 - flush with 20 ml
 - central line preferred
 - incompatible with Na-Bicarbonate



2-ADULT BRADYCARDIA ALGORITHM (with pulse)

Adult Bradycardia With a Pulse Algorithm



3

**Persistent
bradyarrhythmia causing:**

- Hypotension?
- Acutely altered mental status?
- Signs of shock?
- Ischemic chest discomfort?
- Acute heart failure?

Yes

5

Atropine

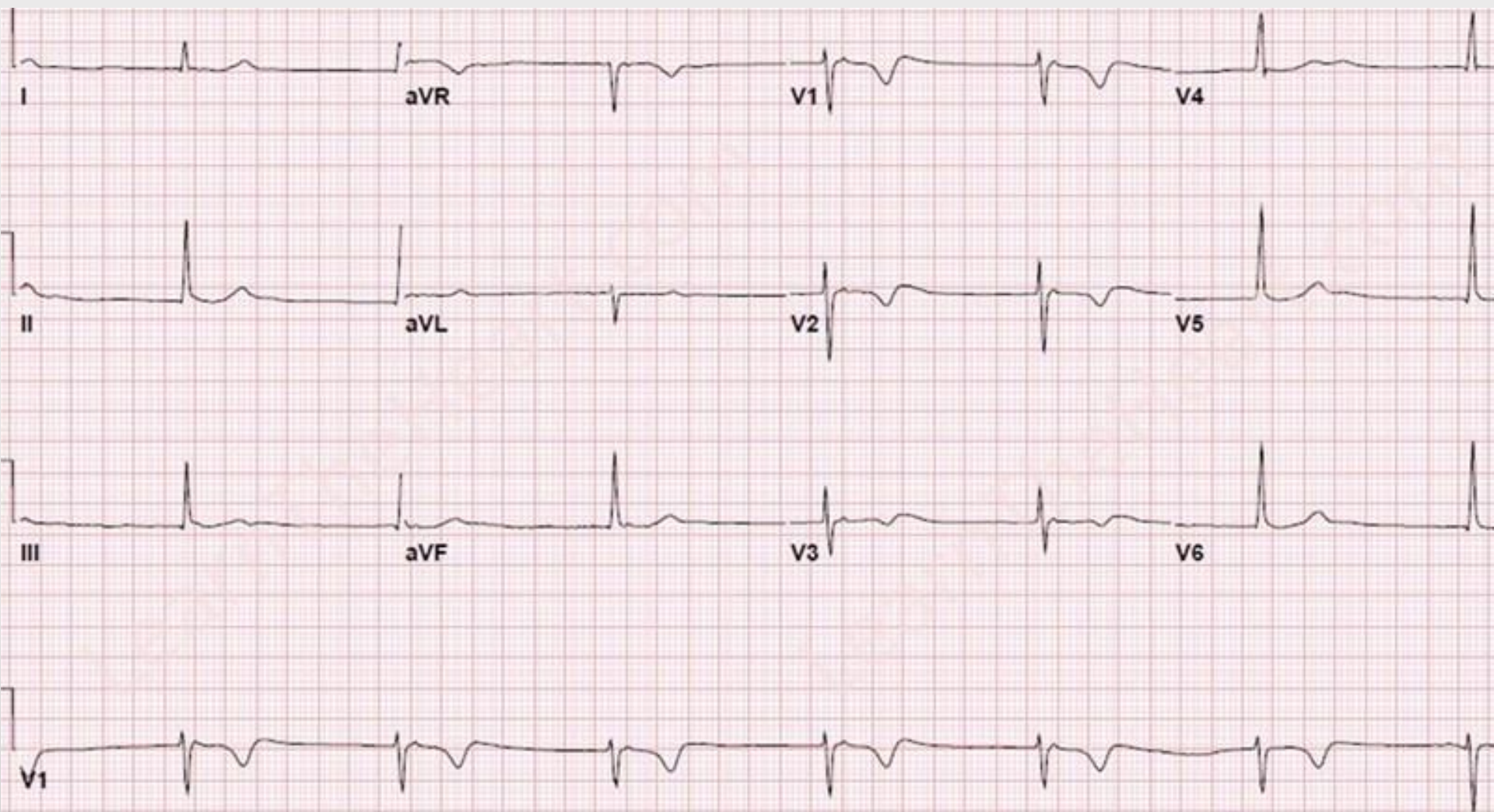
If atropine ineffective:

- Transcutaneous pacing
or
- **Dopamine** infusion
or
- **Epinephrine** infusion

6

Consider:

- Expert consultation
- Transvenous pacing



Junctional bradycardia

Atropine

- MOA: anticholinergic agent, blocks acetylcholine at M2-receptor of heart
- DOSE & ADMINISTRATION:
 - 0.5 mg IV/IO bolus, repeat every 3-5 min
 - Max 3 mg total dose
- CONTRAINDICATION:
 - evidence of a high degree (2 or 3 degree) AV block
 - may be harmful in cardiac ischemia

Dopamine

- MOA: adrenergic & dopaminergic receptor agonist, stimulation of β_1 -receptors increase HR
- DOSE & ADMINISTRATION:
 - 2-10 μ /kg/min IV/IO infusion (up to 20 μ /kg/min)
 - titrate to response, increase by 5 μ /kg/min every 10-30 min as needed
 - central line preferred
 - incompatible with Na-bicarbonate



5 mL Single-dose

DOPamine HCl Inj., USP

200 mg (40 mg/mL)

**CAUTION: MUST BE DILUTED.
FOR I.V. USE.**

Rx only

HOSPIRA, INC., LAKE FOREST, IL 60045 USA

LOT 42-388-DK EXP 1/1

Epinephrine

- MOA: adrenergic agonist, stimulation of β_1 -receptor increase HR
- DOSE & ADMINISTRATION:
 - 2-10 μ /min IV/IO infusion
 - titrate to response
 - central line preferred
 - incompatible with Na-bicarbonate



1 mL
10-1000-0000-01
Epinephrine
Injection, USP
1:1000

3- ADULT TACHYCARDIA ALGORITHM (with pulse)

Adult Tachycardia With a Pulse Algorithm

Assess appropriateness for clinical condition.
Heart rate typically $\geq 150/\text{min}$ if tachyarrhythmia.

Identify and treat underlying cause

- Maintain patent airway; assist breathing as necessary
- Oxygen (if hypoxemic)
- Cardiac monitor to identify rhythm; monitor blood pressure and oximetry
- IV access
- 12-lead ECG, if available

Persistent tachyarrhythmia causing:

- Hypotension?
- Acutely altered mental status?
- Signs of shock?
- Ischemic chest discomfort?
- Acute heart failure?

Yes

Synchronized cardioversion

- Consider sedation
- If regular narrow complex, consider adenosine

No

Wide QRS? ≥ 0.12 second

Yes

Consider

- Adenosine only if regular and monomorphic
- Antiarrhythmic infusion
- Expert consultation

No

- Vagal maneuvers (if regular)
- Adenosine (if regular)
- β -Blocker or calcium channel blocker
- Consider expert consultation

Doses/Details

Synchronized cardioversion:

Refer to your specific device's recommended energy level to maximize first shock success.

Adenosine IV dose:

First dose: 6 mg rapid IV push; follow with NS flush.
Second dose: 12 mg if required.

Antiarrhythmic Infusions for Stable Wide-QRS Tachycardia

Procainamide IV dose:

20-50 mg/min until arrhythmia suppressed, hypotension ensues, QRS duration increases $>50\%$, or maximum dose 17 mg/kg given. Maintenance infusion: 1-4 mg/min. Avoid if prolonged QT or CHF.

Amiodarone IV dose:

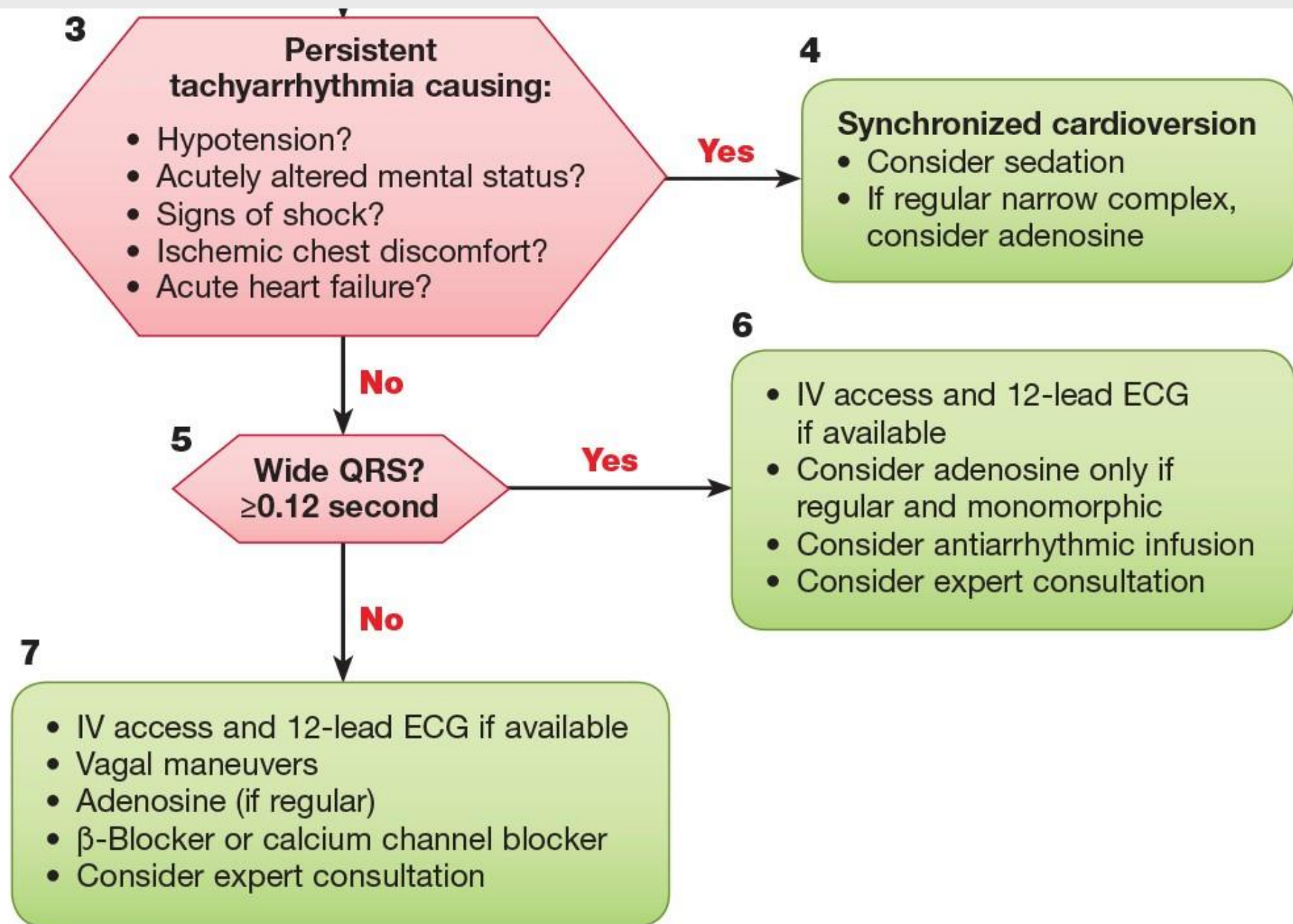
First dose: 150 mg over 10 minutes. Repeat as needed if VT recurs. Follow by maintenance infusion of 1 mg/min for first 6 hours.

Sotalol IV dose:

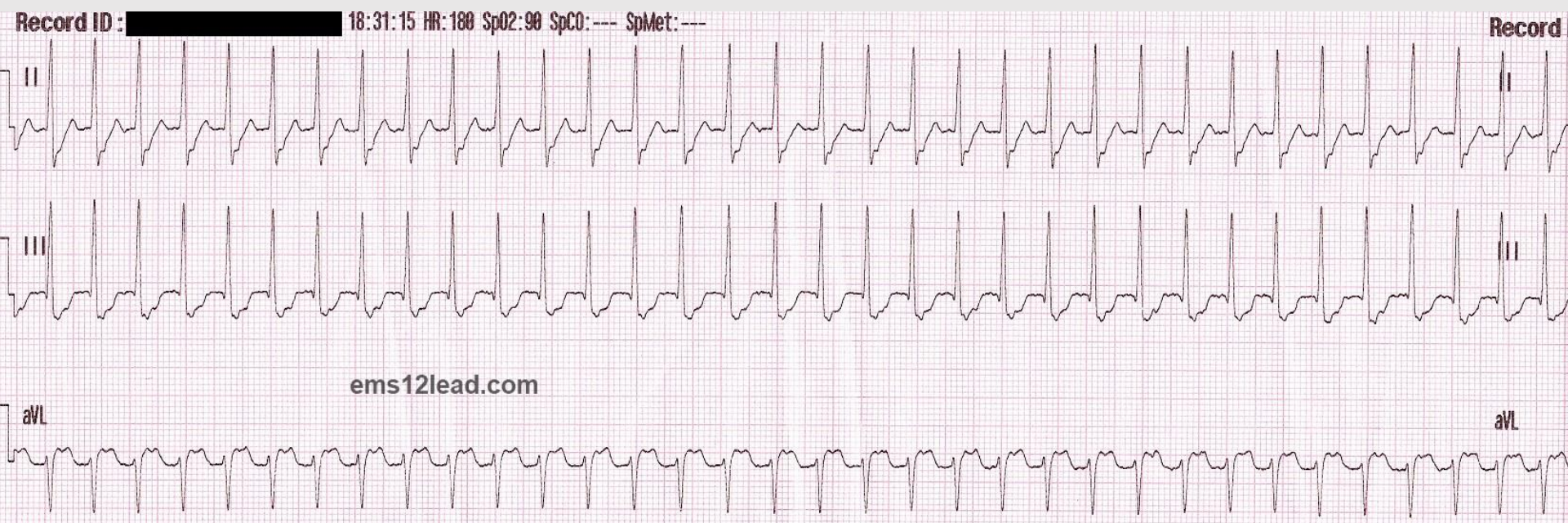
100 mg (1.5 mg/kg) over 5 minutes. Avoid if prolonged QT.

If refractory, consider

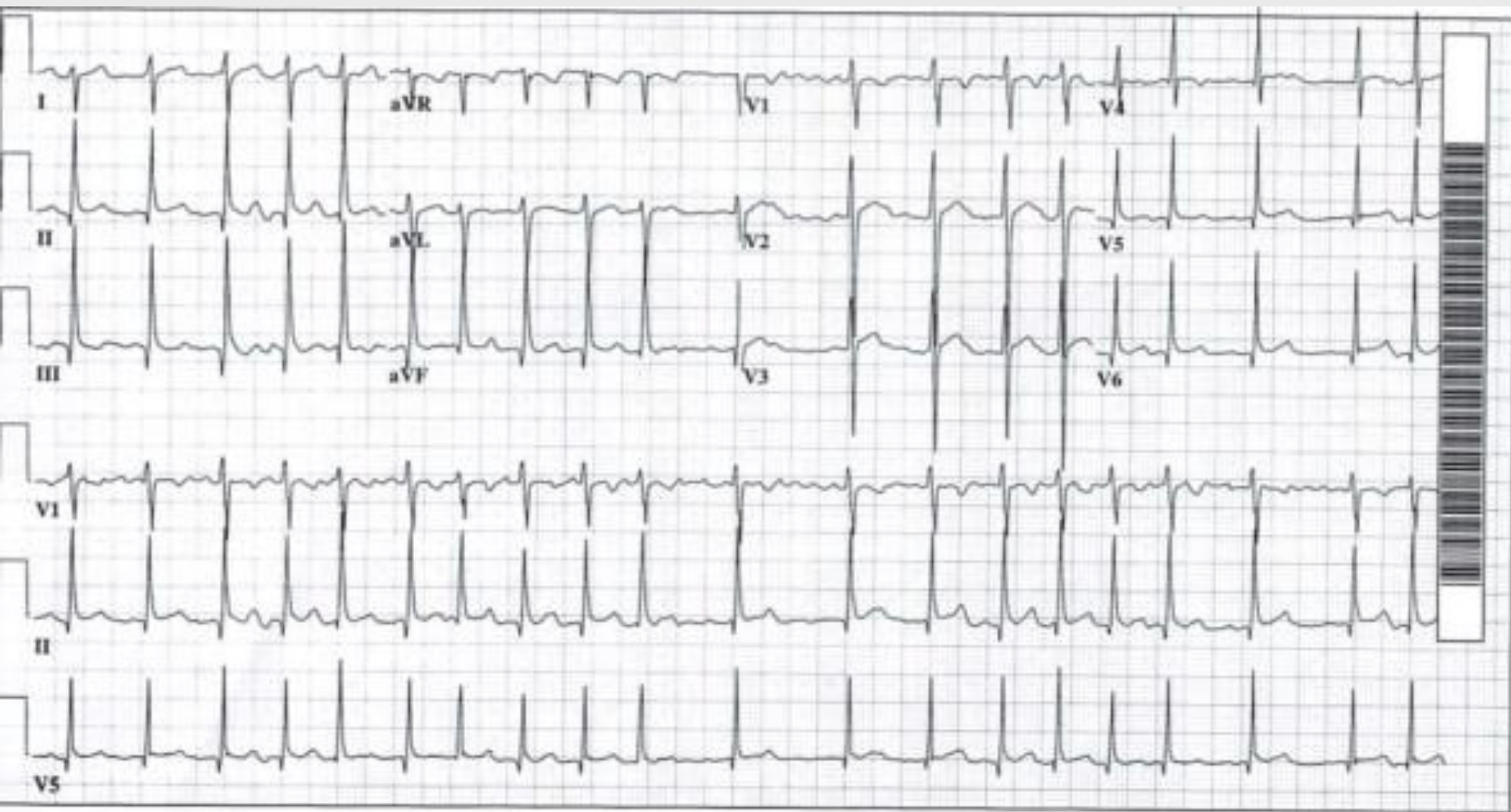
- Underlying cause
- Need to increase energy level for next cardioversion
- Addition of antiarrhythmic drug
- Expert consultation



- **Regular narrow complex:**
 - adenosine
 - Ca-channel blocker or β -blocker
- **Irregular narrow complex:**
 - Ca-channel blocker or β -blocker
 - amiodarone
- **Regular wide complex:**
 - adenosine
 - Ca-channel blocker or β -blocker
 - antiarrhythmics: procainamide, amiodarone, sotalol
- **Irregular wide complex:**
 - antiarrhythmics: procainamide, amiodarone, sotalol
 - polymorphic VT, torsades de pointes: magnesium

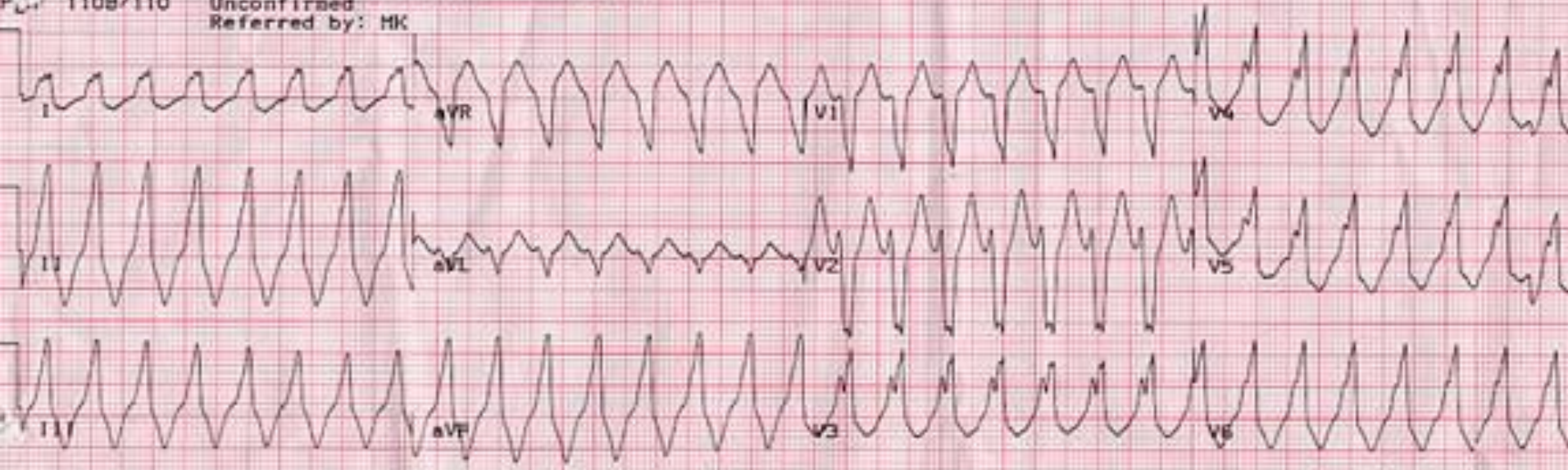


Regular narrow complex



Irregular narrow complex

45yr Ht: Ht: Med: Unknown
Sex: F Race: Cauc Loc: 23 Room: G1020
Option: 4 Vent. rate 186 BPM
Cart: 20 Tech: 4 PR interval * ns
 QRS duration 200 ns
 QT/QTc 320/560 ns
 P-R-T axes * 75 249
2.5m/s 10mm/mV 100Hz
P: 1108/110 Unconfirmed
 Referred by: HK

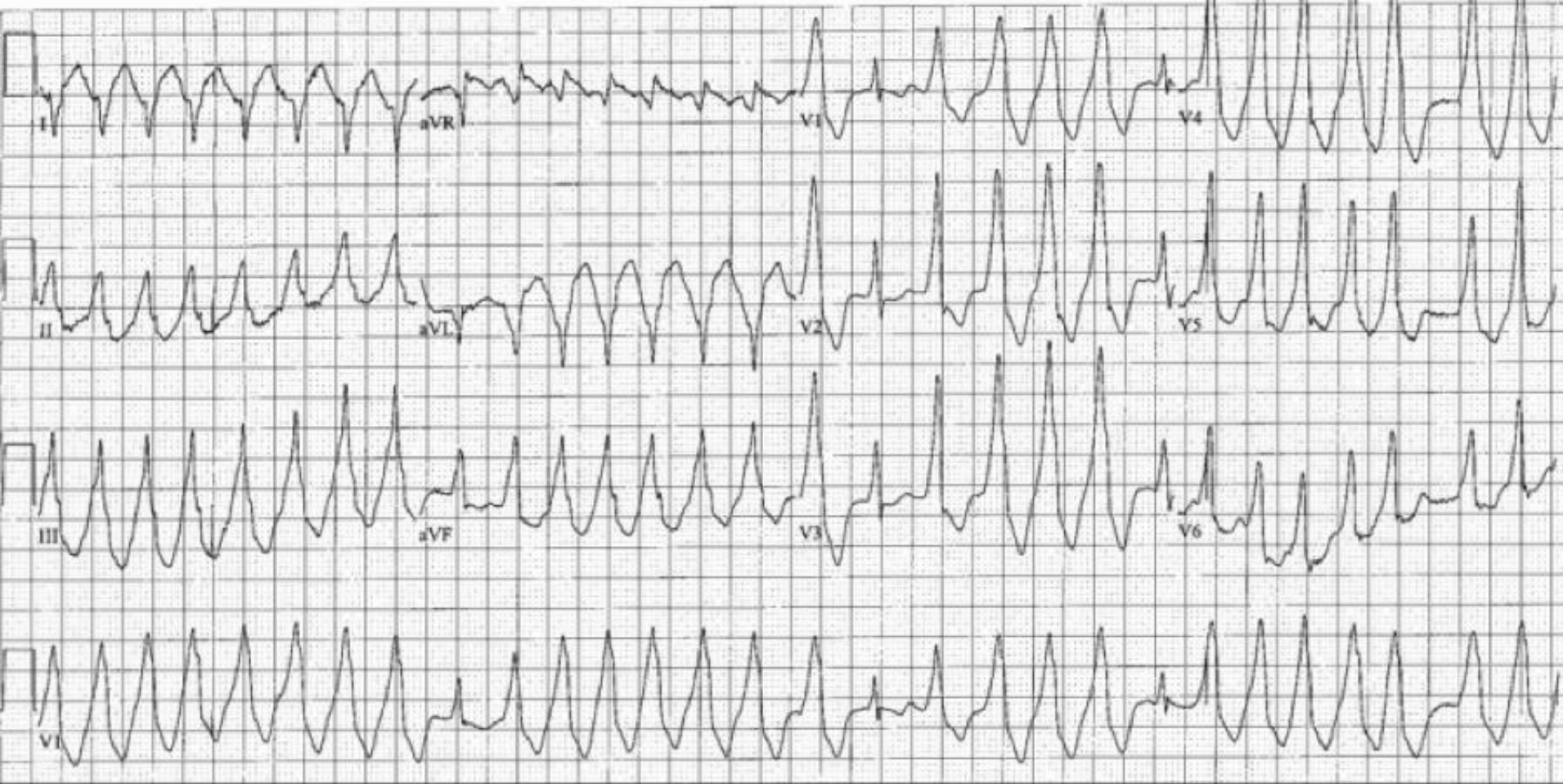


Regular wide complex

Test ind:

Referred by:

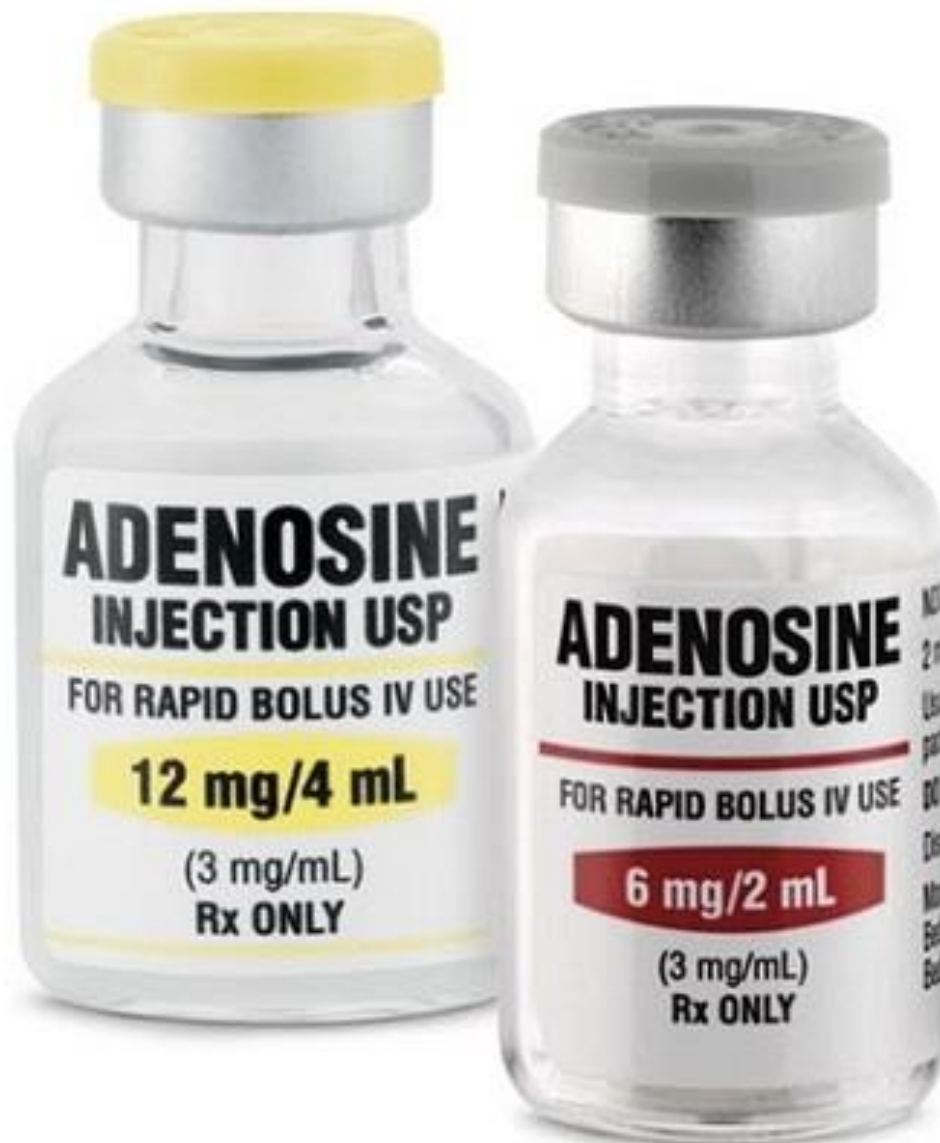
Newly Acquired



Irregular wide complex

Adenosine

- DOSAGE & ADMINISTRATION:
 - 6-12 mg IV into large proximal vein – fast
 - flush with 20 ml immediately, elevate limb
 - extremely short half life
 - may repeat 2nd & 3rd dose of 12 mg
 - larger doses (18 mg) , if theophylline or caffeine be used
 - smaller doses (3 mg) if dipyridamole or carbamazepine be used, or transplanted heart, or into a central vein
- Side effects:
 - chest discomfort, dyspnea, flushing
- Monitoring:
 - continuous ECG recording during administration



**ADENOSINE
INJECTION USP**

FOR RAPID BOLUS IV USE

12 mg/4 mL

(3 mg/mL)
Rx ONLY

**ADENOSINE
INJECTION USP**

FOR RAPID BOLUS IV USE

6 mg/2 mL

(3 mg/mL)
Rx ONLY

Diltiazem

- First choice for acute AF with RVR (rapid ventricular resp.)
 - DOSE & ADMINISTRATION:
 - bolus 15-20 mg IV push over 2 min (0.25 mg/kg)
 - repeat with 20-25 mg IV push over 2 min after 15 min (0.35 mg/kg)
 - IV infusion 5-10 mg/h, titrate up by 5 mg/h as needed
 - Monitor :
 - ECG , BP
- # diltiazem vials 5mg/ml



**DILTIAZEM
HCl INJECTION**

FOR DIRECT IV BOLUS
INJECTION AND
CONTINUOUS IV INFUSION

50 mg/10 mL

(5 mg/mL)

NDC 55-001
Usual Dosage
DISCARD
Rx ONLY
Date Recd
Date To Be
Mfg by:
Ben Venue
Bedford, OH

**DILTIAZEM
HCl INJECTION**

FOR DIRECT IV BOLUS INJECTION
AND CONTINUOUS IV INFUSION

125 mg/25 mL

5 mg/mL
Rx ONLY.

MPC 500

**DILTIAZEM
HCl INJECTION**

FOR DIRECT IV BOLUS
INJECTION AND
CONTINUOUS IV INFUSION

25 mg/5 mL

(5 mg/mL)

NDC 55-001
Usual Dosage
DISCARD
Rx ONLY
Date Recd
Date To Be
Mfg by:
Ben Venue
Bedford, OH

Verapamil

- DOSE & ADMINISTRATION:
 - 2.5-5 mg IV push over 2 min
 - repeat with 5-10 mg over 2 min after 15-30 min
 - max. total dose 20 mg
- Monitor:
 - ECG , BP

verapamil vials 2.5 mg/ml



4 mL Single-dose

VERAPAMIL

Injection, USP

10 mg (2.5 mg/mL)

Amprax, Inc., Lake Forest, IL 60045 USA

Esmolol

- DOSE & ADMINISTRATION:
 - 500 μ /kg IV push over 1 min (may repeat)
 - IV infusion 50 μ /kg/min for 4 min
 - titrate by 50 μ /kg/min every 4 min
 - max. 200 μ /kg/min
 - repeat in 10 min
- Monitor:
 - ECG , BP

esmolol vials 10 mg/ml



NDC 63323-652-10

605210

**ESMOLOL
HYDROCHLORIDE
INJECTION**

100 mg/10 mL

(10 mg/mL)

For Intravenous Use
Rx only

10 mL

Single Dose Vial

Preservative Free

Discard unused portion.
Esmolol Hydrochloride Injection contains no preservatives.
For intravenous use only. Do not mix with other solutions.
See package insert for full prescribing information.

Procainamide

- Class 1a antiarrhythmic (Na channel blocker)
- DOSE & ADMINISTRATION:
 - IV infusion 20 mg/min
(alternate dosing: 100 mg IV over 2 min every 5 min)
 - continue until the arrhythmia is suppressed, or:
 - hypotension
 - QRS widens 50% beyond baseline
 - max. dose of 17 mg/kg
 - maintenance infusion 1-3 mg/min
- Monitor:
 - ECG, QT interval, pulse, BP

One/NDC 0409-1902-01

Rx only

10 mL

Multiple-dose

**PROCAINAMIDE
HYDROCHLORIDE**

Injection, USP

1 gram/10 mL TOTAL
(100 mg/mL)

Warning: Contains Metabisulfites

Hospira, Inc.
Lake Forest, IL 60045 USA



Amiodarone

- DOSE & ADMINISTRATION:
 - 150 mg IV over 10 min, repeat for recurrence
 - follow IV infusion 1 mg/min for 6 hours, then 0.5 mg/min IV for 18 hours
 - max. 2.2 g/24h
 - central line preferred
 - incompatible with Na-bicarbonate
- Monitor:
 - ECG, pulse, BP



Magnesium

- Torsades de pointes
- DOSE & ADMINISTRATION:
 - Mg-sulfate 50% vials : 1-2 g IV
 - dilute to 10 ml (NS)
 - administer over 5-20 min
 - maintenance infusion 0.5-1 g/h
- Monitor:
 - hypotension, respiratory & CNS depression



NDC 0517-2650-25

MAGNESIUM SULFATE

INJECTION, USP

50% (0.5 g/mL)

25 grams/50 mL

(4.06 mEq/mL Magnesium)

50 mL SINGLE DOSE VIAL

FOR IM USE

FOR IV USE AFTER DILUTION

Rx Only

AMERICAN REGENT, INC.
SHIRLEY, NY 11967

Each mL contains
Sulfate, Hypotonic
Water for Injection
pH adjusted with
and/or Sodium Hydroxide
4.06 mEq/mL
Contains no preservatives
12,500 mg
WARNING:
SOLUTION IS FOR IM USE ONLY
UNLASED FOR IV USE
20°-25°C (68°-77°F)
Controlled Substance
Directions for Use
Insert
Rev 11/02

Torsades de Pointes



outline looks like a party streamer



*Thank
you*

