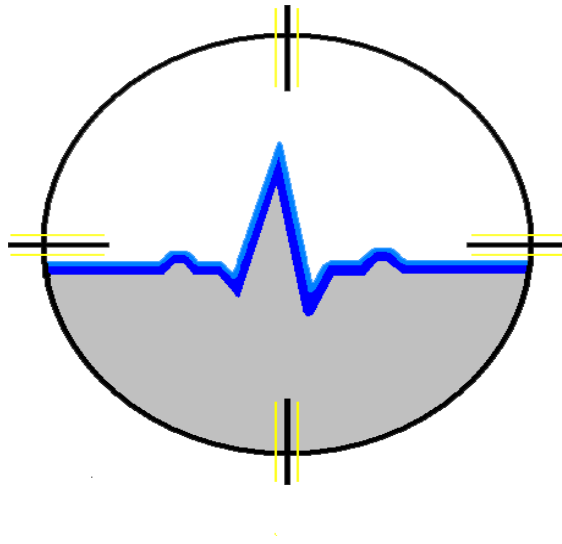


ACLS



Study Guide

Revised 10-25-11

Trinity Training Consultants Inc.

Electrical Conduction of the Heart

For the heart to beat, an electrical stimulus must be created by the heart. This works by means of the "**Sodium - Potassium Pump**" which causes the stimulus to form and move throughout the cardiac muscle. REMEMBER: the atrium and ventricles of the heart do not beat simultaneously. The atrium contract first, moving blood down into the ventricles. Then the ventricles contract, moving the blood to either the lungs (the right side) or to the body (the left side).

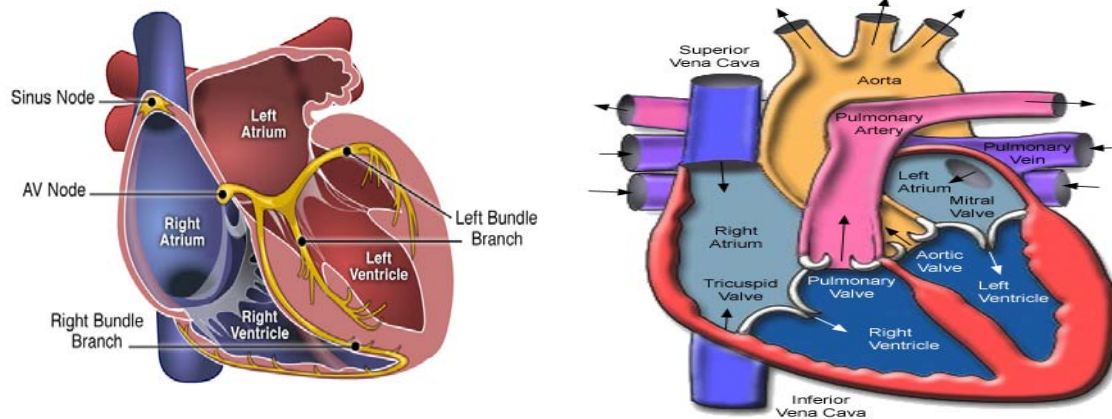
The heart has its own stimulus sites within it. The highest site is the "**SA Node**". When the SA node initiates a stimulus, it then moves to the "**AV Node**". As the stimulus continues to move down the pathways, it goes from the AV Node into the "Bundle of His" and proceeds down to **the "Left and Right Bundle Branches"** down to the ventricles **and "Purkinje Fibers"**.

Each node has its own inherent rate in which it will automatically fire a stimulus. This is to protect the heart in case a node fails to function any further. They are as follows:

SA Node= 60-100 beats per minute

AV Node= 40-60 beats per minute

Bundle branches and Purkinje fibers= 20-40 beats per minute



Basic Anatomy of the Heart

The heart is separated into 4 separate chambers. The upper two chambers are called the "**Atrium**" and the two lower chambers are called the "**Ventricles**". The heart is then separated into the left and right sides by the "**Septum**". The septum also contains the electrical pathways of the heart and cause full ventricle contraction.

- A. The Right Side of The Heart: The right atrium receives deoxygenated blood from the Inferior and Superior Vena Cava. Blood is pumped into the Right Atrium. When the atrium contracts, it pushes the blood into the right ventricle, through the **Tricuspid valve**. Then the right ventricles contracts, it pushes the blood up into the pulmonary arteries, through the **Pulmonic valve** and into the lungs where the blood is oxygenated.
- B. The Left Side of The Heart: The Blood that has been oxygenated in the lungs is then pumped back to the left side of the heart where it enters the left Atrium. When the left atrium contracts it pushes the blood into the left ventricle, through the **Mitral valve**. Once the left ventricle contracts, it has to push the blood up into the **Aorta**, through the **Aortic valve**, where to the blood travels throughout the whole body delivering oxygen and nutrients to all body organs and tissues.

Note: The valves work like trap doors or dams to prevent blood from flowing backwards. After the atrium contract and push the blood to the ventricles, the Tricuspid and Mitral valves close preventing blood from returning into the atrium. When the ventricles contract and eject the blood out, the Pulmonic and Aortic valves close so no blood can not backflow into the ventricles.

ANALYZING THE STRIP

Create a format in which you will analyze your EKG strips. All five areas must be addressed in order to accurately name the strip you are analyzing.

- A. **REGULARITY:**
 - is the rhythm regular or irregular?
 - if it is irregular, is there a pattern to the irregularity
 - are there ectopic beats and are they early or late?

- B. **RATE:**
 - calculate the rate.
 - is the atrial rate the same as the ventricular rate?

- C. **"P" WAVES:**
 - are the "P" waves regular?
 - is there a "P" wave for every QRS?
 - is the "P" wave upright in Lead II?
 - are there more "P" waves than QRS's?
 - do all "P" waves look alike?

- D. **"PR" INTERVAL:**
 - is the "PR" interval within normal limits of 0.12- 0.20 seconds?
 - does the "PR" interval vary from beat to beat?
 - if the "PR" interval varies, does it have a pattern associated with it?

- E. **"QRS" COMPLEX:**
 - are all "QRS" complexes of equal measurement?
 - are all "QRS" complexes within normal limits of less than or equal to 0.12 seconds?
 - do all complexes look alike?
 - are any unusual complexes related to an ectopic beat?

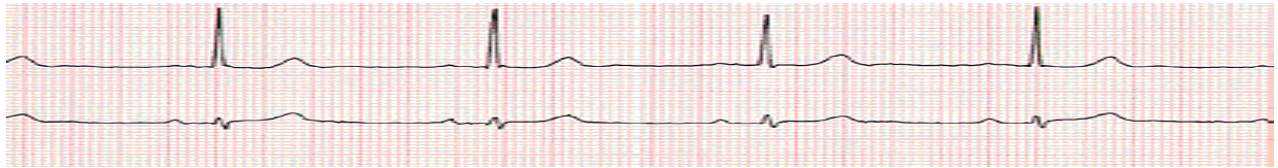
SINUS PAUSE / ARREST:

Rhythm: Unpredictable
Rate: Usually < 80 BPM
P- waves: Underlying rhythm: presents & upright; each QRS
PR Interval: 0.12 - 0.20 seconds
QRS: Less than 0.12 seconds
Treatment: Atropine/Isuprel; if patient is symptomatic



SINUS BRADYCARDIA:

Rhythm: Regular
Rate: Less than 60 BPM
P-wave: Present, upright; before each QRS
PR Interval: 0.12- 0.20 seconds
QRS: Less than 0.12 seconds
Treatment: Atropine, if patient is symptomatic



SINUS TACHYCARDIA:

Rhythm: Regular
Rate: 100-150 BPM
P-wave: Present, upright; may be superimposed on T-wave
PR Interval: 0.12 – 0.20 seconds
QRS: Less than 0.12 seconds
Treatment: Identify the cause, treat the problem:



ATRIAL FIBRILLATION:

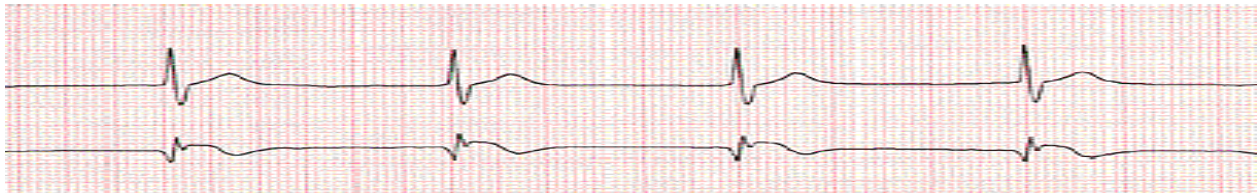
Rhythm: Irregular
Rate: Atrial = chaotic; Ventricular = variable
P-wave: None seen
PR Interval: Unable to measure
QRS: Less than 0.12 seconds
Treatment: Cardizem –Beta Blocker-unstable cardiovert 120J -200J biphasic



RHYTHMS ASSOCIATED WITH THE JUNCTION (AV NODE)

JUNCTIONAL RHYTHM

Rhythm: Regular
Rate: 40 – 60 BPM
P-wave: Inverted, if present; before or after QRS Not present, lost in QRS
PR Interval: Less than 0.12 seconds if found in front of the QRS
QRS: Less than 0.12 seconds
Treatment: Atropine, if symptomatic; TCP



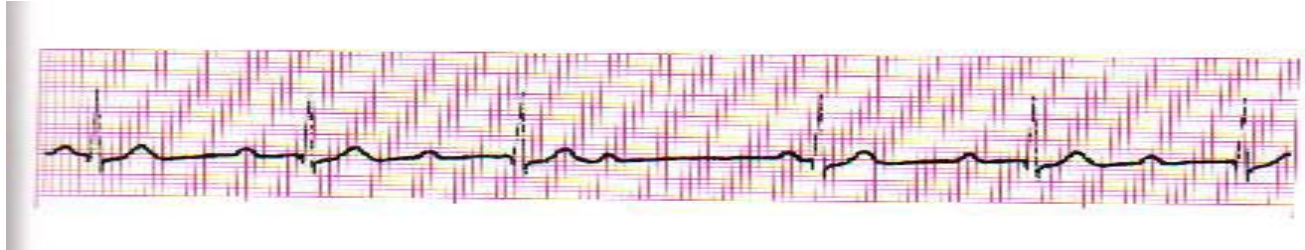
ACCELERATED JUNCTIONAL

Rhythm: Regular
Rate: 60 – 100 BPM
P-wave: Inverted, if present; before or after QRS Not present, lost in QRS
PR Interval: Less than 0.12 seconds if found in front of QRS
QRS: Less than 0.12 seconds
Treatment: Treat underlying cause.



SECOND DEGREE HEART BLOCK. TYPE I (WENCKEBACH OR MOBITZ I)

Rhythm: Atrial = regular; Ventricular = irregular; grouped beatings
Rate: Variable
P-wave: Present, upright; more P's than QRS's
PR Interval: Lengthens with each beat in the group until a dropped beat occurs
QRS: Less than 0.12 seconds
Treatment: Prepare for TCP



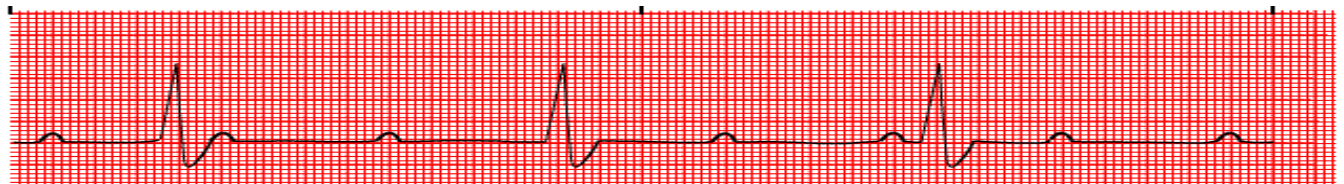
SECOND DEGREE HEART BLOCK. TYPE II (CLASSICAL OR MOBITZ II)

Rhythm: Atrial = regular; Ventricular = regular or irregular
Rate: Variable
P-wave: Present, upright; more P's than QRS's
PR Interval: Remains constant with all conducted beats
QRS: Less than 0.12 seconds
Treatment: TCP



THIRD DEGREE HEART BLOCK (COMPLETE HEART BLOCK OR AV DISSOCIATION)

Rhythm: Atrial = regular; Ventricular = regular
Rate: Atrial = 60 – 100 BPM; Ventricular = 20 – 60 BPM
P-wave: Present, upright; "NO" relationship to QRS's
PR Interval: Unable to measure
QRS: Less than 0.12 seconds if Ventricular rate > 40 BPM
Greater than 0.12 seconds if Ventricular rate is < 40 BPM
Treatment: TCP



VENTRICULAR TACHYCARDIA

Rhythm: Regular
Rate: Greater than 100 BPM
P-wave: None
PR Interval: None
QRS: Greater than 0.12 seconds
Treatment: Depends on the cause; Amiodarone, Lidocaine, Adenosine, Cardioversion (pulse) Shock (no pulse)

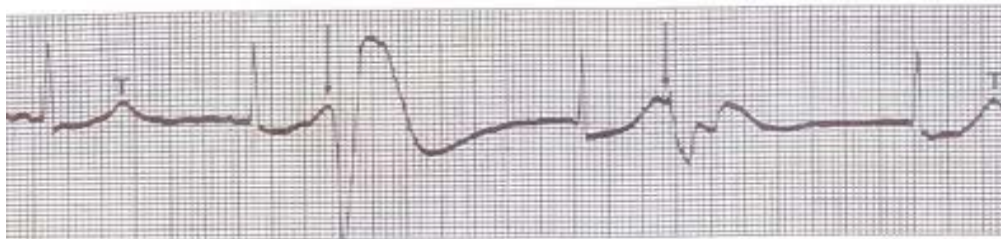


PREMATURE VENTRICULAR CONTRACTIONS (PVC'S)

Rhythm: Early beat
Rate: Variable
P-wave: None
PR Interval: Unable to measure
QRS: Greater than 0.12 seconds Wide and Bizarre "T" wave deflects opposite of QRS
Treatment: Antidysrhythmic Lido, Amiodarone, Oxygen



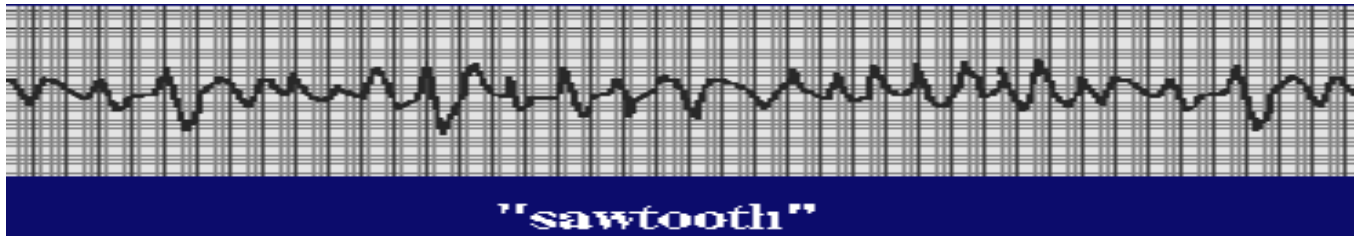
UNIFOCAL



MULTIFOCAL

VENTRICULAR FIBRILLATIOIN (VF OR V-FIB):

Rhythm: Irregular
Rate: None
P-wave: None
PR Interval: Unable to measure
QRS: None
Treatment: Defibrillate; Initiate CPR, Epi, Antidysrhythmic



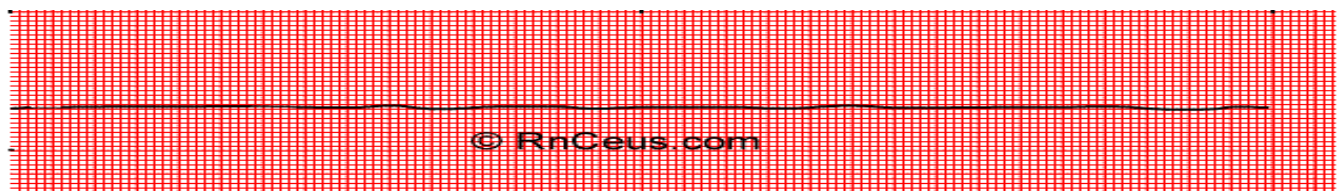
IDIOVENTRICULAR RYTHEM ("THE DYING HEART"):

Rhythm: Regular
Rate: 20 – 40 BPM; NOTE: May be accelerated with drugs, but temporary
P-wave: None
PR Interval: None
QRS: Greater than 0.12 seconds
Treatment: May try Atropine, Isuprel, Epinephrine, or TCP



ASYSTOLE:

Rhythm: None
Rate: None
P-wave: None
PR Interval: None
QRS: None
Treatment: CPR; Drug therapy EPI.



NOTE: Always check asystole in a second lead!

ALGORITHM REVIEW

Always start with the ABCD survey!

VENTRICULAR FIBRILLATION / PULSELESS VENTRICULAR TACHYCARDIA

REMEMBER: Good ACLS starts with good BLS

Algorithm: Pulseless Arrest

- CPR
- Shock
- CPR
- Epi 1 mg q 3-5 min OR 1 dose of Vasopressin 40 U IV/IO to replace 1st or 2nd dose of Epi
- CPR
- Shock
- Antiarrhythmic- Amiodarone 300 mg IV/ IO bolus once or Lidocaine 1-1.5 mg/kg up to 3mg/kg
- CPR
- Shock
- CPR
- Epi 1 mg q 3-5 min OR 1 dose of Vasopressin 40 U IV/IO to replace 1st or 2nd dose of Epi
- CPR
- Shock
- Antiarrhythmic- Amiodarone 150 mg IV/ IO bolus once or Lidocaine 1-1.5 mg/kg up to 3mg/kg
- CPR
- Shock Note: We initiate CPR as soon as possible as soon as possible; after each shock we resume CPR immediately for 5 cycles prior to evaluating the rhythm and minimizing interruptions to chest compressions. Pulse checks are done when an organized rhythm returns.

PULSELESS ELECTRICAL ACTIVITY

Remember: **PEA**

Algorithm: Pulseless Arrest 3mg

P = Possible causes (6 H's, 5 T's)

E= Epi, 1mg q 3-5 min OR 1 dose of Vasopressin 40 U IV/IO to replace 1st or 2nd dose of Epi

A= After second Epi consider termination after H's and T's.

Note: use the 6 H's and the 5 T's to remember the most common reversible causes of PEA

| | |
|-------------------------|------------------------------------|
| Hypovolemia | Toxins |
| Hypoxia | Tamponade, cardiac |
| Hydrogen Ion (acidosis) | Tension Pneumothorax |
| Hypo-/Hyperkalemia | Thrombosis (coronary or pulmonary) |
| Hypoglycemia | Trauma |
| Hypothermia | |

Note: PEA is a problem with the pump, pipes, or volume, not an electrical problem. The electrical system of the heart is still functioning, but the mechanical part of the system is not **working**.

ASYSTOLE

Remember: DEED

Algorithm: Pulseless Arrest

- **D**= Determine whether to initiate resuscitative efforts
- **E**= 1mg Epinephrine IV/IO q 3-5 minutes or 1 dose of Vasopressin 40 U IV/IO to replace 1st or 2nd dose of EPI
- **E**= 1mg Epinephrine IV/IO q 3-5 minutes or 1 dose of Vasopressin 40 U IV/IO to replace 1st or 2nd dose of EPI
- **D**= Are they still dead? Consider reversible causes or ceasing efforts; check blood glucose; check core temperature; and consider Naloxone

ACUTE CORONARY SYNDROMES

Remember: Consider MONA for patients with suspected ACS

Algorithm: Acute Coronary Syndromes

- **M**orphine/Fentanyl
- **O**xygen
- **N**itroglycerine (Check for sex enhancement drugs!)
- **A**spirin... but in the order Oxygen, Aspirin, Nitro, Morphine

BRADYCARDIA

Remember: All Trained Dogs Eat

Algorithm: Bradycardia

- **A**= Atropine .5mg IVP for SB & 1st, 2nd # 1 AV Block
- **T**= Transcutaneous pacing (preferred for 2nd #2 and 3rd)
- **D**= Dopamine 5-10 mcg/kg/min
- **E**= Epinephrine drip 2 to 10mcg/min

Note: Atropine is not indicated, and may actually be harmful, for 2nd #2 & 3rd degree heart blocks. Proceed directly to TCP instead.

TACHYCARDIA – Stable

Remember: if the patient is **unstable**, go directly to **Cardioversion**

Algorithm; Tachycardia With Pulses

- For **Regular** Narrow Complex Tachycardia (Greater than 150 beats per minute)
 1. Vagal maneuvers
 2. Adenosine 6 mg rapid IV push. If no conversion, give 12 mg, then another 12, mg
 3. 50-100 J
 4. Consider expert consultation
- For **Irregular** Narrow Complex Tachycardia
 1. Consider expert consultation
 2. 120-200 J biphasic or 200 J monophasic
 3. Control rate with Diltiazem or B-blockers

For **Regular** Wide Complex Tachycardia

1. Consider expert consultation
 2. Consider Adenosine (wide QRS >.12 second)
 3. Amiodarone 150mg over 10 minutes or Lidocaine 1.0 mg/kg
 4. Elective Cardioversion 100 J
- For **Irregular** Wide Complex Tachycardia
 1. Consider expert consultation
 2. Consider antiarrhythmics
 3. If Torasades, give magnesium 1-2 g over 5-60 minutes
 4. **Note: If unstable-** Irregular / multi-focal wide V-Tach – Defibrillation not Cardioversion

Weight Conversion:

Formula 1:

>pounds to kilograms / divide the weight (in lbs.) by 2.2.

>Kilograms to pounds / multiply the weight (in kgs) x 2.2.

EXAMPLE 1.

A patient weighs 150 pounds.

150 divided by 2.2: The answer is: 68.1 or 68 kgs. (Rounded off)

If you don't have a calculator handy

Formula 2:

Take half off the weight in pounds then take 10% off that answer.

Example 1. 150 pounds / Half off is 75 / then minus 7 = 68 kgs

Example 2. 240 pounds / Half off is 120/ then minus 12 = 108 kgs

Example 3. 120 pounds / Half off is 60 / then minus 6 = 54 kgs

Lidocaine

Drug ordered: 2 mg/min IVPB

Drug on hand: 2 Grams Lidocaine 20% in 5 ml (the 5 ml is irrelevant in our calculations)

IV Solutions: 500 ml of Normal Saline

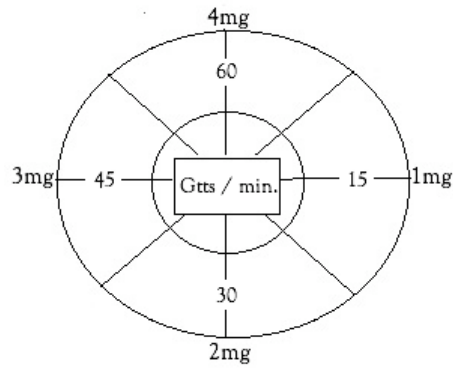
Lidocaine drip dose 1 to 4 mg per minute

Using the "Rule of Fours" or Clock Method

Using the information above for our problem we can conclude that there is 4 mg of lidocaine for each milliliter of IV solution (That is by putting 2 grams or 2000 mg of lidocaine into 500 ml of NS and dividing 2000 mg by 500 ml = 4 mg/ml)

This means that there is 4 mg = 1 ml which means we will have 4mg for every 60 drops of solution because the drip set is a 60 gtts/ml IV set.

The Rule of Four Method (Lidocaine Clock Method)



Look at the drug order and compare to the clock in the circle. 2mg = 30 gtts/min is observed and is the answer to the problem.

Dopamine:

800 mg of dopamine mixed in 500 ml of NS.
Solutions yield 1600 mcg per cc of fluid
Starting Dose: 5 mcg/kg – Titrated to B/P

Method 1:

Drug Dose x kg x drip set (60 gtts) divided by solution yield

Example 1:

Pt's weight is 220 pound
Half of 220 = 110 then 10% from 110 (110-11) or about = 100 kg

$5 \text{ mcg} \times 100 \text{ kg} = 500$
 $500 \times 60 = 30,000$
 $30,000 \text{ divided by } 1600 = 18.75 / \text{ Round up to } 19 \text{ drops per minute}$

Example 2:

Pt's weight 160 pounds
Half of 180 = then 10% from 80 (80-8) or about 72 kg

$5 \text{ mcg} \times 72 = 360$
 $360 \times 60 = 21,600$
 $21,600 \text{ divided by } 1,600 = 13.5 / \text{ Rounded up to about } 14 \text{ drops per minute}$

Don't have a calculator handy and easiest method

Method 2:

You must mix the dopamine, 800 mg in 500mg in 500 ml of NS.

Solution yield 1600 mcg per cc of fluid

Drug dose is 5 mcg / kg

Patients weight in pounds / take the first 2 number then minus 2 = drip rate

Example 1:

Patients weight 220 pounds / 22-2 = 20 gtts/min

Example 2:

Patients weight 160 pounds / 16-2 = 14 gtts/min

Oxygen Concentrations

| | |
|--------------------------------------|--|
| Nasal Cannula | 24 to 44% at 1 to 6L |
| Simple Face Mask | 40 to 60% at 8 to 10L |
| Venturi Mask | 24 to 28% at 4L |
| Non-rebreather mask | 60% at 6L Near 90% @ 15L |
| Bag Value Mask (Ambu bag) | 21% at room air 100% @ 15L with reservoir |

ARRHYTHMIA INITIAL TREATMENT MATRIX

| PULSELESS RHYTHMS | | |
|---|--|--|
| ASYSTOLE “Not Shockable” | PEA “Not Shockable” | VF (all) / VT (some) “Shockable” |
| Leads/power/gain BLS (Primary)- no pulse CPR – 5 cycles (2min) ACLS (Secondary) Epinephrine IV push or Vasopressin x 1 (with CPR) Rhythm (r/o hypothermia/ drug OD + other causes- see PEA) | BLS (Primary Survey)- no pulse CPR- 5 cycles (2min) ACLS (Secondary Survey) Epinephrine IV push or Vasopressin x 1 (with CPR) Rhythm Search for/tx (“during CPR”): Hypoxia, Hypovolemia Hyper/HypoK+/ H+ (acidosis) Hypoglycemia, Hypothermia Tension Pneumo/Trauma Toxins/Tamponade/Thrombosis | BLS (Primary Survey) – verify no pulse Defibrillation (Shock #1) Immediate CPR (compressions 1 st !!) ACLS (Secondary Survey) Epinephrine IV push or Vasopressin XI (with CPR- 5 cycles/2min) Rhythm Defibrillation (Shock #2) Immediate CPR Amiodarone or Lidocaine Magnesium (Torsades) (with CPR-5 cycles/2min) Rhythm Defibrillation (Shock #3) Immediate CPR Repeat med/CPR + shock sequences |

| TACHYCARDIA WITH PULSES (QRS RATE > 100) | | | |
|--|---|---|---|
| QRS NARROW/UNCHANGING (SUPRAVENTRICULAR-SVT) | | QRS WIDE/CHANGING (R/O VENTRICULAR-VT) | |
| Regular | Irregular | Regular | Irregular |
| <u>Reentry SVT (PSVT)</u> <u>Symptomatic</u> (“unstable”) Cardioversion 50-100 J <u>Asymptomatic</u> (“stable”) Adenosine/vagal(#1) Expert Consult Beta blockers Ca channel blockers Cardizem (#2) (Diltazem) | <u>Atrialflutter or Atrial fibrillation</u> <u>Symptomatic</u> (“unstable”) AFib Cardioversion 120-200 J (“unstable”) AFlutter Cardioversion 50-100 J Asymptomatic (“stable”) Expert Consult ----- Beta blockers Ca channel blockers Cardizem (Diltazem) | <u>Ventricular Tachy (VT) or Uncertain</u> <u>Symptomatic</u> (“unstable”) Pulse Cardioversion 100 J NO PULSE- SHOCK 200J Asymptomatic (“stable”) Pulse Expert Consult Amiodarone (can be given “while obtaining expert Consultation”) | <u>Aberrancy (BBB)</u> (see narrow) <u>WPW</u> Amiodarone/ Other <u>Polymorphic VT</u> “Unstable” – defib “Stable”- Magnesium Torsades Expert Consult for all |

| BRADYCARDIAS (QRS RATE < 60) |
|--|
| (sinus brady, Blocks, IVR, AIVR, junctional rhythm, atrial arrhythmias with slow rate) |
| Symptomatic (Unstable”)/ “Poor Perfusion”: (DATE) <u>Dopamine</u> (drip) TCP <u>Atropine</u> (unreliable in some 2 nd deg & 3 rd deg AV block) <u>Transcutaneous- “TCP”</u> (#1) <u>Epinephrine</u> (drip) |

SUMMARY TABLE: MEDICATION DOSAGES

| MEDICATION | IV BOLUS | CONTINUOUS INFUSION |
|---|---|--|
| Adenosine (Adenocard) | 6mg rapid push, flush with 20cc NS, 12mg x2 q 1-2 min | None |
| Amiodarone (Cordarone) | Pulseless: 300 mg IV push, diluted or in 20-30cc D5W, may repeat 150mg in 3 to 5min x1 Pulse Present: 150mg in 100 cc D5W over 10min (600cc/hr)... may repeat q 10min | Slow infusion 1 mg/min over 6hr (Ex. 450mg in 250 cc D5W at 33.3 cc/hr), glass bottle, filter Maintenance infusion: 0.5 mg/min at 16.6 cc/hr up to a total of 2Gms in 24hrs, glass bottle, filter Ocala/Marion County 1. If no Amiodarone bolus given prior to cardioversion, administer 150 mg Amiodarone over ten minutes (see list below) and then administer an Amiodarone drip (see number 2 below). a. 10 gtts/ml set – 150 mg in 100 ml D5W – 100 gtts/minute b. 15 gtts/ml set – 150 mg in 100 ml D5W – 150 gtts/minute 2. If Amiodarone bolus already given, administer an Amiodarone drip: a. 10 gtts/ml set – 150 mg in 100 ml D5W – 7 gtts/min = 1.0 mg/min b. 15 gtts/ml set – 150 mg in 100 ml D5W – 10 gtts/min = 1.0 mg/min |
| Atropine Sulfate | 0.5mg IV, may repeat q3-5min. (total of 3mg) | None |
| Digoxin | 0.125mg to 0.5mg slow IV push (loading doses <10 to 15 mcg/kg) | None |
| Diltiazem (Cardizem) | 15 to 20mg (0.25 mg/kg) IV over 2min., may repeat in 15min up to 25mg (0.35 mg/kg) | 5 to 15 mg/hr (Ex. 125 mg in 100 cc for total of 125cc D5W or NS) at 5 to 15 cc/hr. |
| Dopamine (Intropin) | None | Cardiac doses: 5 to 10 mcg/kg/min (Ex. 400 mg in 500cc D5W/NS at 30 cc/hr or 400 mg in 250cc D5W/NS at 15 cc/hr) Vasopressor doses: 10 to 20 mcg/kg/min |
| Epinephrine (Adrenalin) | 1 mg (10 cc of 1:10,000 solution) q3-5 min., Flush with 20cc | 2 to 10 mcg/min (Ex. 4mg in 250cc NS or D5W at 7.5 cc/hr) |
| Lidocaine (Xylocaine) | 1 to 1.5 mg/kg (50 to 150 mg) repeat ½ dose q5-10 min. up to 3mg/kg | 1 to 4 mg/min (Ex. 2 Gms in 500cc D5W or NS at 2 mg or 30 cc/hr) |
| Magnesium Sulfate | Pulseless: 1 to 2 Gms diluted in 10cc D5W over 5-20 min., Pulse Present: 1 to 2 G in 50 to 100cc of D5W over 5 to 60 min. | Pulse present: 0.5 to 1 Gms per hr (Ex. 40 Gms in 1000cc D5W) |
| Procainamide (Pronestyl) • Up to 20-50 mg/min (recurrent VF/pulseless VT) | 100mg up to 17mg/kg (or 12mg/kg with “bad heart” or kidneys) no faster than 20 to 30 per min. (Ex 500mg in 50 to 100cc D5W or NS over 30 min. or IGM over 1hr) | 1 to 4 mg/min (Ex. 2Gms in 500cc D5W or NS at 2 mg or 30 cc/hr) |
| Vasopressin (Pitressin) | 40 units IV push x 1 | None |
| Verapamil (Isoptin/Calan/Verelan) | 2.5 to 5mg IV over 2 to 3 min., then q 15–30 min 5-10mg up to a total of 20mg | None |

Common Beta Blockers:

Propranolol (Inderal)

Metoprolol (Lopressor/Toprol)

Atenolol (Tenormin)

Esmolol (Brevibloc)

5mg slow IV , then q5min (total 15mg)

5mg over 5min., repeat x1 after 10 min.

| MEDICATION | ACTIONS | SIDE EFFECTS/ PRECAUTIONS |
|---|--|--|
| Adenosine (Adenocard) Endogenous Nucleoside (end product of ATP breakdown) | ↓ AV node interrupting the tachycardia | Brief period of asystole Chest pain/tightness Shortness of breath/flushing No lasting effect in afib/flutter (inappropriate") Wide QRS tachy (can ↓ BP/ ↑ rate)/avoid in WPW |
| Amiodarone (Cordarone) Antiarrhythmic (Diffuse effects: Na, K, Ca channels, extra pathways) | ↓ Ventricular rate (AV node) ↓Electrical instability with conversion of atrial & ventricular arrhythmias | ↓BP/bradycardia, Afib/flutter > 48hrs May prolong QT, ↑ Dig levels Caution in renal failure Do not mix: Aminophylline, Heparin, Bicarb |
| Atropine Sulfate Parasympathetic blocker ("vagolytic", "anticholinergic") | ↑ SA node/ AV node ↑ ventricular rate | Tachycardia/ ↑ ischemia Avoid in 2 nd deg AV block or > wide QRS-brady (also with dose <0.5 Urinary Retention / Dryness of mouth Dilation of pupils (glaucoma/neuro/post arrest pts)/Psychosis |
| Digoxin (Lanoxin) Digitalis Glycoside (direct effect on Na/K pump) (Vagal effect on AV node?) | ↓ AV node ↓ ventricular rate in a fib/flutter Interrupts and converts PSVT ↑ contractility | Bradycardia, ventricular/junctional arrhythmias + selected atrial Anorexia, nausea & vomiting Vision changes (halo, yellow-green) monitor K/Mg/renal function Dig levels >2.5 /antidote-Digibind |
| Diltiazem (Cardizem) Ca channel blocker | ↓ AV node ↓ ventricular rate in a fib/flutter Interrupts and converts PSVT | ↓ BP/bradycardia Wide QRS tachycardia Sick sinus syndrome (↓ SA node) IV Beta blockers |
| Dopamine (Intropin) Sympathetic stimulator ("catecholamine", "adrenergic") | -(1-5 mcg/kg/min-dopaminergic) dilates kidney/GI vessels -(5-10 mcg/kg/min) ↑ heart (beta) rate, contractility -(10-20 mcg/kg/min) Constricts blood vessels alpha) | Do not mix with Na bicarb Extravasation ↑ Cardiac workload PVS's/Tachycardias ↑ BP/renal & GI ischemia |
| Epinephrine (Adrenalin) Sympathetic stimulator ("catecholamine", "adrenergic") | Constricts blood vessels (alpha) -↑BP -↑ coronary/cerebral blood flow stimulates the heart (beta 1) -↑ rate/contraction bronchodilates (lung-beta 2) | Do not mix with Na bicarb Extravasation ↑ Cardiac workload PVS's/Tachycardias (esp. post arrest) |
| Lidocaine (Xylocaine) Antiarrhythmic (Na channels) | ↓ electrical instability in the ventricles | Tremors, twitching, slurred speech, altered consciousness/ psychosis, seizures/ ↓BP (less common) Caution in liver disease/heart failure |
| Magnesium Sulfate Electrolyte (binds with ATPase to stimulate the Na/K pump) | May stabilize repolarization by restoring intracellular K+ | ↓BP/resp/brady ↓reflexes (DTR's) Renal failure |
| Procainamide (Pronestyl) Antiarrhythmic (Na channels) | ↓ electrical instability in the atria and ventricles blocks extra congenital pathways | ↓ BP/widening of QRS (>50% - antidote Na bicarb) prolonged QT (torsades) caution in heart failure/kidney disease |
| Vasopressin (Pitressin) ADH (direct effect on smooth muscle 1 receptors) | Constricts systemic blood vessels (↑ BP/cerebral flow) dilates cerebral blood vessels | ↑ BP/agia |
| Verapamil (Isoptin/Calan/Verelan) Ca channel blocker | Same as Diltiazem (Cardizem) | Same as Diltiazem (Cardizem) but effects stronger Caution in heart failure |