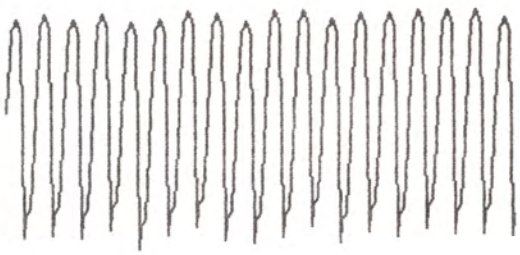
A.C.L.S. Protocols

Having trouble remembering "what comes when" in those new Advanced Cardiac Life Support (ACLS) treatment algorithms? "A.C.L.S. Protocols" is a cardiac scenario simulator designed to teach the basic approach to various cardiac rhythm disturbances. A brief patient history is presented, and a sample EKG is plotted across the screen. The user then enters an order in plain English. Just as in our popular "Cardiac Arrest!" simulator, no special commands or memorization (other than medical knowledge) are required.

Not a true simulator, this disk is a terrific teaching aid in learning to apply ACLS treatment algorithms to clinical situations. The computer guides the user through the appropriate treatment protocol. Practice at endotracheal drugs and other "non-cookbook" situations is included. The user reviews the treatment algorithm for the patient's rhythm either on-screen, or in the 36-page medical reference manual. The manual is organized to assist first-time learners.



```
One rescuer oxygenates the patient
by mask while the IV is started.
What's your next order?
ORDERS: ?EPI 10 C.C. I.V.
```

```
The first defibrillation has been
given.  There's still no pulse
with this rhythm.  Your next step?
ORDERS: ?SHOCK AT 200 JOU
```

Among the protocols practiced are asystole, bradycardia with and without pulse, V-tach with and without pulse, V-fib, paroxysmal supraventricular tachycardia, ventricular ectopy, pediatric arrest, neonatal arrest, endotracheal drug use, and acidosis therapy. And should ACLS recommendations change, an updated disk can be purchased by any registered user for only $6.

Mad Scientist Software

2063 North 820 West, Pleasant Grove, UT 84062
(801) 785-3028



MAD SCIENTIST SOFTWARE
PRESENTS . . .

A.C.L.S. Protocols

an aid to learning
Advanced Cardiac Life Support Protocols

BY BRUCE ARGYLE, MD



*** QUICK REFERENCE ***

THERAPIES USED DURING "A.C.L.S. PROTOCOLS" PRACTICES

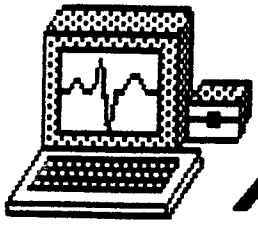
PROCEDURES
Defibrillate
Endotracheal tube
Hyperventilation
I.V.
Observe
Thump

LAB
Blood gases

DRUGS (BOLUS)
Atropine
Bicarbonate
Bretylium
Digoxin
Epinephrine
Lidocaine
Morphine
Verapamil

DRUGS (INFUSIONS)
Epinephrine
Isoproterenol
Lidocaine

OTHER
Help



A.C.L.S. Protocols

Advanced
Cardiac Life Support
Protocol Practice

A medical education aid for computer.

TABLE OF CONTENTS:

Distributed by:
Mad Scientist Software
2063 North 820 West
Pleasant Grove, UT 84062

801-785-3028

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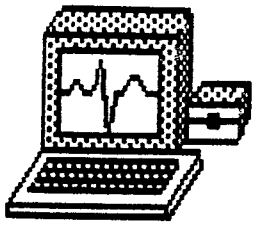
Help



From Mad Scientist Software...

A.C.L.S. Protocols

UPDATE 1987
Resuscitation Protocols Practice Disk
For Atari ST, Atari 800/XL/XE, Apple IIc/IIe, IBM/Compatables
Atari 800, 1200XL require BASIC, 48K RAM
IBM/MS-DOS require color graphics capability, DOS 2.0 or later

INTRODUCTION: 'ACLS Protocols' is part of series of disks teaching Advanced Cardiac Life Support (ACLS), but it can also be used alone. In the series, use of ACLS Protocols is encouraged after EKG TEACHING, and before the CARDIAC ARREST! simulator.

The ACLS Protocols disk gives the user practice at following ACLS protocols. The protocols are based on the current "algorithms for cardiac dysrhythmias" found in the back of the American Heart Association's ACLS textbook. These algorithms change from time to time. It's your responsibility to determine when ACLS recommendations change, and to obtain updated materials from Mad Scientist. Appropriate use of medical therapies for any given patient is the responsibility of the user.

STARTING OUT

DISK BACKUP: Make a backup copy of the ACLS Protocols disk as soon as possible, using an appropriate disk-copy utility. The disk is NOT copy-protected.

Atari 800/XL/XE: Place the disk in the drive, then turn the keyboard on (800 and 1200XL users need to insert the BASIC cartridge first). The disk will boot automatically to the main menu.

Atari ST: When cold-starting with TOS in ROM, the desktop will automatically open to reveal the file "PROTOCOL.PRG" when the disk is in drive A. Double-click on the program icon. The resuscitation simulator is contained in the folder "PROTOCOL", which may be moved to RAMdisk or to hard disk.

Apple IIc/IIe: Place the disk in the drive, then turn on the computer. The program will execute automatically.

IBM/Compatables: Insert the system disk into drive A, and boot MS-DOS. At the "A:>" prompt, type "START" and press RETURN. The program will then load and execute. Most users will, however, want to create an autoboot disk. First format a blank disk as a "system" disk (see your user's manual). Then copy each file from the program disk to your new system-formatted disk (you can omit the "start.bat" file if disk space is critical). The disk is then ready to boot the program automatically, either on power-up or on pressing the CTRL-ALT-DEL key combination.

PROGRAM CHOICE: From the program menu, the user can choose to review program instructions, or choose to practice a protocol. All major protocols are represented by the patients on the ACLS Protocols disk.

HOW DOES IT WORK?

The ACLS Protocols programs guide the user through resuscitation efforts, one step at a time. An EKG is plotted, a situation is presented, and the computer asks for orders. The user types in his order using plain English.

Unlike the Cardiac Arrest! simulator (also from Mad Scientist Software), the ACLS Protocols programs demand that you order the appropriate step in the resuscitation protocol every time. If in doubt, you can call up a screen which shows you the appropriate protocol. If you don't make a correct order after three tries, the program tells you what it expected and goes on.

ACLS Protocols is designed for use after the user has learned ACLS drugs and EKG interpretation. Hospitals using the entire ACLS teaching system should encourage the use of ACLS Protocols as the step immediately before the Cardiac Arrest! simulator.

HOW TO USE THE MANUAL

As you resuscitate your patient, keep the manual handy. If you're just learning cardiac resuscitation, read the manual all the way through, preferably twice. Study the information in the appendixes. If you already know advanced cardiac life support (ACLS), scan through the following instructional section. See what the computer wants you to do, then practice saving a life.

Look at the sample EKG on the screen. What's the rhythm? Not sure? Look through "SAMPLE ELECTROCARDIOGRAMS" in Appendix G. As a rule, the ACLS Protocols patients are fairly simple, and you will need only to identify the rhythm in Part I of Appendix G.

Read about the rhythm under "SOME SPECIFIC PROBLEMS" in Appendix E. More advanced users may need only to look at "A SIMPLIFIED APPROACH", APPENDIX C. Of course, you can get the same information as in Appendix C on screen by typing "HELP". "HELP" also can give other information when it's needed, such as the formula for calculating bicarbonate replacement therapy.

Big words getting to you? Look them up in "GLOSSARY," which is Appendix K.

Now you've read about the abnormal rhythm. What do you do first? "A GENERAL LOOK AT TREATMENT" (Appendix B) can give you a feel for the approach. Refer to Appendix C or type "HELP" to begin learning the protocol. You can read about any treatment you plan under "TREATMENT OPTIONS" in Appendix F. Treatments are listed under procedures, lab, or drugs. Understand WHY you're using a particular treatment.

LEARNING THE PROTOCOLS

The user is confronted with a sample EKG and a very brief narrative description of the patient. No further history or patient information will be available. There is no way, for example, to find out how much a child weighs if you didn't pay attention when you were first told.

When asked for orders, type in an order in plain English, then hit RETURN. You'll see words which are recognized by the program echoed back to the screen. If the order is impossible to execute, or incomplete, you'll be told what's wrong. Once the computer has assembled a meaningful order, it checks it against the protocol. The program is looking for a specific action or specific drug, within a narrow "correct" dosage range. Your order may be completely appropriate, but still be refused because it wasn't exactly what the program wanted.

You have three tries to get the correct protocol step. Otherwise the computer tells you what it wanted and goes on. Pressing RETURN three times is a quick way of advancing on to the correct order.

You can look over the appropriate protocol anytime just by typing "HELP". To encourage the use of grey matter, however, some patients don't quite fit the protocol chart--for example, when the I.V. can't be started right away.

At the end of the practice patient, you're given a rating to indicate how you did. Don't take it too seriously--the scale is just an incentive to do better. You can then return to the patient menu to pick another patient for practice.

ENTERING YOUR ORDERS

You may order any proceedure, drug, or test which is in the ACLS Protocols program vocabulary, using regular English. A listing of treatments which might be needed is found in Appendix F. You never need to order chest compressions, oxygen, or artificial respirations, because these "basic life support" steps are done automatically by your "team" when needed. You might, however, need to ask that the patient be hyperventilated in certain circumstances.

Orders should consist of a single step. Be careful not to make your order too complex, or the computer will get confused. The computer can accept only one procedure or one drug, one numerical value (dose), one route (IV vs endotracheal), one unit of measure (cc vs mg), and one adjective (pediatric vs adult strength) per order. For example: "GIVE BICARBONATE, 1.5 PEDIATRIC AMPULES I.V." contains one drug (bicarbonate), one dose (1.5), one adjective (pediatric), one unit of measure (ampules), and one route (IV).

Doses MUST be given in NUMBERS, not words. Be sure to leave a space between each word, AND a space between the dose and the units. For example, the order "2CC EPINEPHRINE IV" will be refused--the program will not recognize "CC" as a unit of measure because no space was left between "2" and "CC." (When an order is refused because it's incomplete, you'll be told what's missing, but you should re-enter the entire order.)

For drips (infusions), simply order the drug by name (for example, "ISUPREL DRIP"). The nurse will prepare a standard solution and ask you for the rate of infusion (usually in micrograms per kilogram of body weight). You can't order the drip and specify the rate at the same time, because the program considers setting up the drip and adjusting the rate as two separate steps. The computer will NOT honor any special mixing instructions you give it.

If you don't specify a route for a drug (such as I.V., endotracheal, or infusion), it will be assumed that you want the drug given IV bolus. You can't give drugs subcut., I.M., or P.O.

The computer accepts most abreviations and slang terms. Just order your drug or procedure in your usual way, and

almost always the computer will accept it.

The program has some features to try to head off errors. If your "reasonable" order has the computer hissing at you, simplify it down to the bare essence. Watch as the vocabulary search echoes the words back to the screen. If you don't see a word, it is either misspelled or not in the program's vocabulary, or you haven't left a space between the word and an adjacent word or dose. Check your spelling.

EXAMPLES OF ORDERS: Scan through the orders listed below. Don't spend a lot of time worrying about what the program will or won't accept--just try it.

Acceptable orders:

```
DEFIBRILLATE AT 200 JOULES
BRETYLIUM 350 MG
.3 CC EPI BY VEIN
DRAW ARTERIAL BLOOD GASES
HYPERVENTILATE THE PATIENT
EPI 1 AMP BY E.T. TUBE
START AN IV, PLEASE
OBSERVE 15 MINUTES
LIDOCAINE DRIP
I NEED HELP
BICARB 25 CC IV
PLACE ENDOTRACHEAL TUBE
```

Incorrect orders:

```
LIDOCAINE, 5 CC OF 2% SOLUTION
  (contains more than one number)
ONE AMP EPI (dose not in
  numbers: order "1 AMP EPI")
BRETYLIUM 5 MG PER KG (the "nurse" will not
  calculate anything for you)
EPINEPHRINE 3CC (no space between
  dose and units)
GIVE 1 AMP EPI THEN DEFIBRILLATE
  (two orders)
2 AMPS ISUPREL IN 500 CC, 20 DROPS PER MINUTE
  (just order ISUPREL DRIP)
LIDOCAINE 75 MG THEN HANG DRIP
  (two orders)
```

Just remember ONE STEP, DOSES ARE NUMBERS, and LEAVE A SPACE. That's about all you need to remember to make the ACLS Protocols programs understand you.

APPENDIX A

WHAT HAPPENS DURING RESUSCITATION

First, the diagnosis of cardiac arrest is made based on unresponsiveness, absent respirations, and absent pulse. The resuscitation team rushes to begin their duties. The team members are: a triage nurse; medication nurse; recording clerk or nurse; a nurse or EMT to give chest compressions; and a respiratory therapist to give artificial respirations. The emergency physician interprets the EKG, gives orders, and performs certain proceedures.

A "crash cart" is rolled up to the patient. It contains the drugs used in cardiac resuscitation, plus supplies such as endotracheal tubes. An EKG monitoring screen often sits on top of the cart, with a defibrillator.

One team member begins chest compressions. The sternum is pushed down about 2 inches to pump blood through the chest. This pumping, however, does not provide enough blood to keep the patient alive for long, so it is important to get the heart beating again.

Another team member is providing respirations, either with a bag and mask, or through the endotracheal tube after it is passed. In some hospitals, the chest compressions and respirations are done by a machine called a "Thumper."

Electrical cables on the patient transmit the heart's electrical activity to the EKG monitor. An IV is started.

The medication nurse prepares and administers medicines when ordered, and charges the defibrillator (since it usually sits on top of the crash cart containing the medicines).

The triage nurse assists in seeing that the physician's orders are carried out smoothly, helping with medication and supplies. This nurse "directs traffic."

The recorder jots down medication and proceedures, noting the time each order is carried out. He/she may remind the doctor if the patient is ready for another bicarb or epi dose.

The emergency specialist's main job is to gather the facts, think, and order. He decides when the patient is doing well enough to transfer. He may order the resuscitation stopped and declare the patient dead if the situation is looking hopeless. Usually resuscitation efforts are kept up at least 30 minutes.

APPENDIX B

A GENERAL LOOK AT TREATMENT

FIX THE ABNORMAL RHYTHM AS QUICKLY AS POSSIBLE. Don't even think about the underlying cause of a cardiac arrest until you have tried to restore the heart rhythm to normal. Go through the therapeutic plan while waiting for tests to come back. Slow rhythms get drugged, fast rhythms get shocked. In the patient is in V-fib, defibrillation is the first thing you do. Remember, though, if an abnormal rhythm produces a good pulse and a decent blood pressure, DON'T "fix" it. In that case you get lab tests, stabilize the problems, THEN convert the rhythm back to normal.

EVERY CARDIAC ARREST PATIENT NEEDS AN IV. An IV is essential to give the patient the medication he needs. Ordering the IV started should be the first thing you do for the patient with a slow rhythm (see "A Simplified Approach"). If the patient has a rapid rhythm as a cause of cardiac arrest, such as ventricular fibrillation, you try defibrillating first.

STIMULATE THE HEART. Stimulate the heart and constrict the blood vessels with epinephrine (adrenaline). In every type of cardiac arrest (NO PULSE!), epinephrine is the first drug used. The epinephrine is repeated every 5 minutes until a blood pressure is obtained. An epinephrine drip is a good way of delivering adrenaline to the patient who continues to need it.

IF THE PATIENT ISN'T BREATHING ON HIS OWN, INTUBATE. A tube put through the mouth into the lungs gives control of the airway. The endotracheal tube allows better artificial respirations, makes CPR more efficient, and prevents vomit from getting into the lungs. One does not, however, delay immediately beneficial steps in order to get the ET tube in. For example, if a patient is in ventricular fibrillation, you don't spend your first minute intubating--you grab the paddles, and a few seconds later the patient is alive and well. But if the cardiac arrest continues, intubate as soon as practical. Generally, intubation is done at the same time the IV is started, or as the first drugs are given IV.

TREAT IRRITABILITY. If the patient keeps going back into V-fib or V-tach, or can't be shocked out of the bad rhythm, treat the irritability of the heart with drugs. Then see if the cause of the irritability is one you can fix--such as acidosis.

ORDER LAB TESTS. Order electrolytes and blood gases promptly. They don't do much good if the results come back after you've given up and called the mortuary. Blood gases should be repeated as often as necessary to keep the serum pH near normal.

CORRECT ANY ACIDOSIS. The patient may not respond at all to your efforts if he has acid buildup (acidosis).

Although routine use of bicarbonate is no longer recommended, consider using it on the patient who was "down" a long time before CPR was started and is not responding to the usual treatment. Otherwise, use blood gases to help you decide if extra bicarbonate is needed.

FIX WHAT NEEDS FIXING. Blood volume and blood chemistry should be corrected if possible. A word of caution: it's best to leave MILD abnormalities alone. You can do the patient a lot of harm by trying to treat something which isn't bothering him at all.

OBSERVE. After cardiac arrest, the organs take a little while to get going again. The patient will take a few minutes to wake up. In this simulation, observe at least 10 minutes after the patient gets a pulse to see how much he will recover.

FOLLOW THE REGULAR GAME PLAN. Stick to the treatment instructions. Do exactly what is needed for the patient--no more, no less. If you can't think of anything to do at the moment, continue CPR while awaiting tests. In the simulation, just hit [RETURN] to advance one minute. Don't be tempted to give a drug which you haven't PROVEN a need for just because you think you "have to do something". You won't help your patient by "shooting from the hip."

KEEP A RECORD. Keep a "flowsheet" on which you record each order, and the time of the order. Record also lab tests as they return. The flowsheet helps prevent errors. You might want to start your flowsheet with key data from the history: date, time, age, weight, important history.

APPENDIX C

A SIMPLIFIED APPROACH
Part I: Rhythm too fast

DIAGNOSE CARDIAC ARREST by absent pulse and respirations
(note V-tach WITH pulse is treated differently!)

↓

Witnessed arrest? try immediate precordial thump

↓

RHYTHM TOO SLOW, OR TOO FAST?

↓ TOO FAST (V-fib, V-tach)

↘ TOO SLOW? next page

↓

Defibrillate immediately 200 joules (child 2 j/kg)
No change?
Defibrillate again, 200-300 joules
No change?
Defibrillate at 360 joules (child 4 j/kg)

↓

Start I.V. (intubate if ANY delay)
Epinephrine 1 mg (child .01 mg/kg)
(may give endotracheally if no IV)
Intubate (if possible and not already done)
Defibrillate 360 joules
No change?

↓

Lidocaine 1 mg/kg (may give endotracheally if no IV)
Defibrillate 360 joules (child 4 j/kg)
No change?

↓

Bretylium 5 mg/kg IV
IF UNWITNESSED, consider bicarbonate 1 mEq/kg IV
Defibrillate 360 joules
No change?

↓

Bretylium 10 mg/kg IV
Defibrillate 360 joules
No effect?

↓

Continue efforts
Epinephrine 1 mg (child .01 mg/kg) every 5 minutes
Repeat lidocaine or bretylium
Keep trying to defibrillate
Await results of ABG, lytes

Part II--Rhythm too slow

DIAGNOSE CARDIAC ARREST (absent pulse and respirations)
Diagnose asystole, block, or bradycardia
(Note bradycardia WITH pulse is treated differently!)

↓

Start IV (intubate if IV delayed)
Epinephrine 1 mg (child .01 mg/kg)
(may be given endotracheally if necessary)

↓

Intubate (if possible and not already done)

↓

PULSE IS STILL TOO SLOW?
(asystole, bradycardia, block)

↓

Atropine 1 mg (child .01 mg/kg)
(may be given endotracheally if necessary)

↓

No effect?
Repeat Atropine up to 2 mg (child, 3 doses)

↓

IF UNWITNESSED, consider bicarbonate 1 mEq/kg IV

↓

Epinephrine 1 ampule (child 0.1 cc/kg) every five minutes
Consider defibrillating (possible fine V-fib)

↓

Await results of ABG, lytes
Consider epinephrine drip .05-1 mcg/kg/min
Consider isoproterenol drip .03 to .2 mcg/kg/min
Set up for pacemaker

Part III--V-tach with pulse

Unstable vs. Stable

Stable?

↓

Start IV
Lidocaine 1 mg /kg

↓

Lidocaine 0.5 mg/kg every 8 minutes
until V-tach resolves, or total 3 mg/kg given

↓

Procainamide 20 mg/min, up to 1000 mg
No effect?

↓

Cardioversion

Unstable

(chest pain, dyspnea, hypotension, congestive heart failure, ischemia, or infarction)

↓

Start IV
Sedation if not hypotensive or unconscious

↓

Cardiovert 50 joules
No change?

↓

Cardiovert 100 joules
No change?

↓

Cardiovert 200 joules
No change?

↓

Cardiovert 360 joules

↓

If recurrent or resistant
Lidocaine 1 mg/kg
Cardiovert

↓

Bretylium (if hypotensive or unconscious)
Procainamide (all others)

Part IV--PSVT
(Paroxysmal Supraventricular Tachycardia)

Stable vs. unstable
Unstable: Synchronized cardioversion, start 75-100 joules and increase similar to V-tach. If unsuccessful, add Verapamil and cardiovert again.

Stable
↓
Vagal maneuvers
↓
Verapamil 5 mg IV
No change in 15 minutes?
↓
Verapamil 10 mg IV
No change in 15 minutes?
↓
Consider:
Digoxin 0.25 mg up to 1 mg IV
Cardioversion
Overdrive pacing

Part V--Suppressing PVC's

Treatable cause?
(potassium abnormality, digoxin toxicity, bradycardia, acidosis, drugs)
↓
Lidocaine 1 mg/kg IV
Not suppressed?
↓
Lidocaine 0.5 mg/kg every 2-5 minutes until response or 3 mg/kg given
Not suppressed?
↓
Procainamide 20 mg/min until effective or 1000 mg given
Not suppressed?
↓
Bretylium 5 to 10 mg/kg

PVC's resolved after:

Lidocaine 1 mg/kg	--> lidocaine drip 2 mg/min
Lidocaine 1-2 mg/kg	--> lidocaine drip 3 mg/min
Lidocaine 2-3 mg/kg	--> lidocaine drip 4 mg/min
Procainamide	--> procainamide drip 1-4 mg/min
Bretylium	--> bretylium drip 2 mg/min

Part VI--Bradycardia w. pulse

No signs or symptoms?
2nd degree type II or 3rd degree --> pacemaker
Others --> observe

Signs or symptoms present?
↓
Start I.V.
↓
Atropine 0.5 to 1 mg (child .01 mg/kg)
Not improved?
↓
Atropine repeat up to 2 mg
Not improved
↓
CONSIDER:
Isoproterenol drip .03 to .2 mic/kg/min
Epinephrine drip .05 to .1 mic/kg/min
External pacemaker
↓
Transvenous pacemaker

- - -

AFTER RESOLUTION OF SIGNS/SYMPTOMS

2nd degree type II or 3rd degree --> pacemaker
others --> observe

APPENDIX D

REFERENCE VALUES FOR PROTOCOL LEARNING

VITAL SIGNS

above 150 severe tachycardia
above 100 tachycardia
Pulse: NORMAL 60-100
below 60 bradycardia
below 45 severe bradycardia

severe hypertension above 160/110
hypertension greater than 140/90
Blood pressure: NORMAL 120/80, range 140/90 to 100/70
hypotension less than 100/70
severe hypotension below 60/20

above 106 hyperthermia (heatstroke)
Temperature: NORMAL 98.6
below 94 hypothermia
below 89 severe hypothermia

ARTERIAL BLOOD GASES

severe acidosis below 6.9
moderate acidosis below 7.2
mild acidosis below 7.35
pH: NORMAL 7.35 to 7.45
alkalosis above 7.45
severe alkalosis above 7.6

Oxygen (O2): NORMAL above 70 (higher on 100% O2)
hypoxemia below 70
severe hypoxemia below 50

inadequate respirations above 40
Carbon dioxide (CO2): NORMAL 35-40
hyperventilation below 35

severe alkalosis above 45
alkalosis above 30
Bicarbonate (HCO3-): NORMAL 24-28
acidosis below normal
moderate acidosis below 15
severe acidosis below 5

above 15 concentrated blood/dehydration
Hemoglobin (Hgb): NORMAL 12-15
below 12 anemia
below 9 severe anemia

APPENDIX E

SOME SPECIFIC PROBLEMS

Acidosis. Acid builds up in the blood stream when the tissues do not get enough oxygen-rich blood delivered to them. In the patient who is alive, acidosis can result from kidney failure, diabetic ketoacidosis, poisonings (like cyanide), and shock. Any patient in cardiac arrest becomes acidotic. Acid makes the heart more irritable and makes it pump less effectively. This acid buildup can be neutralized with sodium bicarbonate if it's severe. Bicarbonate is NOT given routinely any more--consider the situation, then give it only if you think it's needed. A typical starting dose of bicarbonate is 1 mEq per kg. Monitor the acid-base status with blood gases (ABG). You can calculate the amount of bicarbonate needed from the base excess (B.E.). An approximate bicarbonate replacement dose is one tenth of the person's weight in kilograms times the base excess (Additional bicarb = 0.1 x (weight in kg) x B.E.). Overcorrecting the pH (alkalosis) may be harmful, so be careful. Leave a mild acidosis (pH above 7.25) alone.

Agonal rhythm. Occasional wide, abnormal electrical waves are seen, but there is no pulse. This rhythm means trouble. It usually means that the patient has already suffered such severe heart damage that there is no hope of recovery. Treat it essentially like asystole (see below).

Asystole. No electrical activity at all on the monitor usually means a grim future. It very rare for anyone in asystole to leave the hospital alive. No electrical activity means a very severely affected heart. If it results from electrolyte problems, you may save the patient. Get the pH as close to normal as possible. While awaiting lab, make sure that epinephrine is given frequently. Give atropine up to the maximum dose. Give maximum doses of epinephrine (consider an epinephrine drip). Try an isoproterenol infusion as a last resort. A pacemaker may be tried, but is not available (or required) in this program. Try defibrillating just in case the asystole is really very fine ventricular fibrillation.

Bradycardia. A heart rate which is much too slow does not provide good blood flow. (On the other hand, if there's no pulse at all, treat it just like asystole.) Bradycardia often results from a heart attack or drugs, but can also be seen in hypothermia or electrolyte problems. If the blood pressure is good, do not treat the bradycardia (except to prepare for a pacemaker for certain types). See the protocol in Appendix C. Treat bradycardia first with atropine, up to the maximum dose. Epinephrine provides temporary stimulation if the patient has a poor or absent pulse. If still severe, try an isoproterenol infusion. Alternatively, an epinephrine

infusion may be tried. A pacemaker should be prepared if the patient requires more than atropine for the bradycardia, but this program does not allow you to use it.

Conduction block. When the impulses from the atrium are being stopped from reaching the ventricle, the heart rate can slow enough to cause shock or cardiac arrest. If the impulses are merely being slowed (first degree AV block) but not stopped from reaching the ventricle, this requires no treatment. Conduction block can be caused by heart attack, drugs, hypothermia, or electrolyte problems. Atropine is the first choice--give the maximum amount before trying anything else. An isoproterenol drip is the second choice. Epinephrine is worth a try, and may be very useful in the hypotensive patient. An artificial pacemaker is the next step (for educational purposes, this program requires that you rely on drugs).

Electromechanical dissociation. This means the electrical activity looks OK, but there's no pulse. It usually means something is very wrong--either a severe chemical derangement, a severely damaged heart, or a physical problem in the chest.

Irritability (PVC's or recurrent fibrillation): Many problems, including most heart attacks, make the heart prone to abnormal rhythms. If the heart keeps reverting back to V-fib or V-tach, we call this irritability. Think first of any chemical abnormality: acidosis or an electrolyte abnormality may be the cause. If you have not overlooked an obvious cause, then give a lidocaine bolus. Defibrillate if necessary, then draw ABG and lytes. Start a lidocaine drip. See the protocol in Appendix C.

Paroxysmal supraventricular tachycardia. Often in otherwise healthy people, a "short circuit" develops in the AV node area. This creates a circular electrical circuit which fires the ventricle at a rapid rate. Verapamil is the first choice therapy, unless the patient is unstable (endangered by the abnormal rhythm), in which case you use electrical shocks. See the protocol in Appendix C.

Premature Ventricular Contractions. Occasionally harmless, frequent PVC's occurring in a diseased heart often warn of impending V-fib or V-tach. Usually more than 6 per minute means trouble. Follow the protocol in Appendix C.

Ventricular fibrillation. Unorganized electrical activity in the ventricle can result from heart attack, electrolyte abnormality, abnormal acid-base balance, or hypothermia. The heart cannot pump at all. When confronted with ventricular fibrillation, you immediately try defibrillating to see if you can restore a normal rhythm. Fibrillation which resists the shocks is treated first with epinephrine, then with

lidocaine. For the exact protocol sequence, see the protocol in "A Simplified Approach". If fibrillation still proves resistant, bretylium is added. Get lab tests and keep trying to defibrillate while waiting. A higher setting gives a better chance of conversion to normal rhythm, so all defibrillations after the first two should be at the maximum setting (4 joules/kg in children). Recurrent V-fib (irritability) should be treated with lidocaine, while you look for any treatable problem such as acidosis which could be causing the irritability.

Ventricular rhythm. If slow and accompanied by hypotension or cardiac arrest, treat it as you would a severe conduction block (see above), while setting up for a pacemaker. If the blood pressure is good, leave the rhythm alone.

Ventricular tachycardia. Caused by factors similar to V-fib, V-tach is a more organized, regular ventricular rhythm which can occasionally give a pulse. Even with a fair blood pressure, V-tach often degenerates into V-fib. Treatment depends on whether the patient is 1)fine, 2)unstable, or 3)pulseless. A patient who is not suffering any harm from the V-tach is treated with lidocaine to try to chemically convert the rhythm. If the patient is unstable (for example, low blood pressure), defibrillate--but at a lower starting dose than for V-fib (see protocol chart in Appendix C). V-tach with NO pulse is treated just like V-fib. Resistant or recurrent V-tach is treated with lidocaine.

APPENDIX F

TREATMENT OPTIONS

USEFUL TERMS IN MAKING ORDERS
(Words within parentheses are equivalent)

Units of measure
- MG (MILLIGRAMS, MILLIGRAM)
- GRAM (G, GRAMS, GM)
- CC (CC'S, ML, MILLILITER, MILLILITERS, C.C.)
- AMP (AMPS, AMPULE, AMPULES)
- MEQ (MILLIEQUIVALENT, MILLIEQUIVALENTS) (Bicarbonate only)

Routes drugs can be given
- IV (I.V., BY VEIN, INTRAVENOUS)
- ET (ENDOTRACHEAL, ENDOTRACHEALLY, E.T.)
- INFUSION (INFUSE, DRIP, IVAC, PUMP)

Strengths of medication
- PEDIATRIC (PEDI, SMALL, NEONATAL)
- REGULAR (ADULT, LARGE)

Adjusting dosage
- STOP (DC, D.C., D/C, CANCEL, HOLD)
- DECREASE (DOWN, SLOW)
- INCREASE (UP)

PROCEDURES

DEFIBRILLATE (DEFIB, CARDIOVERT, CARDIOVERSION, SHOCK): Defibrillation means giving a brief direct-current shock across the heart. The strength of this shock is measured in joules or watt-seconds (a joule and watt-second are exactly the same thing). The defibrillator is charged, then the shock is given by two paddles. One paddle is placed just above and to the right of the heart, the other placed lower and around to the left. 200 watt-seconds (joules) is the recommended starting setting to defibrillate a normal adult. The stronger the setting, the greater the chances of converting the patient to a normal heart rhythm. In ventricular fibrillation, increase the setting to the maximum if the first two tries are unsucessful. The maximum for our defibrillator is 360. For children, use a setting of about two joules per kilogram of weight, increasing four joules per kilogram if the first two tries are not successful.

Indications: V-fib. Also use for V-tach or atrial fib if there is absent pulse or significant hypotension. Worth a try for asystole IF it is in reality very fine V-fib.

Actions: Electrically "fires" all of the heart at once, stopping abnormal "short circuits." Often the heart will then resume a normal rhythm.

Precautions: Excessively high settings will "electrocute" some of the heart muscle.

SAMPLE ORDERS:
DEFIBRILLATE AT 50 JOULES
SET TO 360 AND SHOCK HIM

ENDOTRACHEAL TUBE (ET TUBE, E.T. TUBE, INTUBATE): You (or the paramedic or anesthesiologist) place a breathing tube down into the patient's trachea. In many situations, you would not want to delay giving important drugs in order to intubate. But as soon as possible, place the ET tube (unless the patient is conscious). Usually intubation is done about the same time the IV is started.

Indications: Intubate any patient in cardiac arrest or coma.

Actions: Prevents aspiration of stomach contents into lungs. Provides better oxygenation of blood. Makes CPR more effective (yes, the program takes that into account, too).

Precautions: Do not delay life-saving actions in order to get the ET tube in. The patient should be oxygenated well by mask beforehand.

SAMPLE ORDERS:
PLACE ET TUBE
LET'S INTUBATE HIM NOW
REMOVE E.T. TUBE

HELP (CHART, CHEAT): Gives you the appropriate protocol flowchart for the patient's current rhythm. Find the place the resuscitation has progressed to on the HELP chart, then order the next appropriate step.

SAMPLE ORDERS:
SHOW ME THE CHART
HELP

HYPERVENTILATION (HYPERVENTILATING, HYPERVENTILATE): Rapid ventilation of the comatose patient temporarily lowers the acid in the blood stream, as well as supplying increased oxygen and protecting the brain. This will especially make a difference when there is delay getting an IV in place to give bicarbonate. The acid balance returns back to pre-existing values when the hyperventilation is stopped.

Indications: Probably useful for any patient in cardiac arrest, particularly helpful if unable to give bicarbonate.

Actions: Temporarily raises blood pH by blowing off carbon dioxide.

Precautions: Will make a patient with normal pH somewhat alkalotic.

SAMPLE ORDERS:
HYPERVENTILATE
STOP HYPERVENTILATING

IV (I.V., INTRAVENOUS LINE): Medication nurse starts an IV. Occasionally, the IV cannot be easily started. This gives you practice at giving drugs endotracheally. You do not need to keep asking that the IV be started--the med. nurse keeps working at it until it is running, then tells you. The IV is always Dextrose 5% in water (D5W) unless you specify saline or ringer's. If you're running fluids, you can order the IV rate increased or decreased. You can even D/C the IV.

Indications: only route by which most drugs used in resuscitation can be given. Fluid can be given if needed. An IV must be started on every patient.

SAMPLE ORDERS:
PLACE IV
START I.V. WITH LACTATED RINGER'S
TURN UP THE IV

THUMP: Back into the protocol is the precordial thump. For a witnessed arrest (no pulse), you immediately thwack the precordial area with your fist.

SAMPLE ORDER:
PRECORDIAL THUMP

LAB

BLOOD GASES (ABG, GAS, ABGS, ABG'S, PH): Arterial blood is tested for pH, oxygen, CO2, bicarbonate, and hemoglobin. The respiratory therapist sticks a needle directly into an artery to get the sample, then runs off to test it. Normal values, plus the words used to describe abnormalities, are found in the REFERENCE VALUE section. Use ABG to guide your bicarbonate therapy wherever possible.

DRUGS

ATROPINE blocks the effects of a specific body chemical and a specific nerve which can slow the heart and increase conduction block. It therefore usually will speed the heart and decrease the blockage in the AV node.

Supplied: AMPULE = 10 CC = 1 MG

Usual dose: adult--0.5 to 1 MG, repeated up to 2 mg total
child--.01 mg/kg, repeated up to three times

May be given ENDOTRACHEALLY.

Indications: bradycardia or high-grade atrioventricular (AV) conduction block, unless blood pressure is good.

Actions: speeds up atrial pacemaker, decreases blockage within AV node.

Precautions: doses lower than those recommended may actually slow the heart further. Increased heart rate may make a diseased heart work harder, resulting in a larger area of heart damage.

SAMPLE ORDER:
ATROPINE .1 MG ET
10 CC ATROPINE

BICARBONATE (BICARB) neutralizes acid. It's used to reverse the acidosis which results from cardiac arrest, but isn't recommended as part of routine resuscitation efforts. Use it for proven severe acidosis on arterial blood gases, or where you strongly suspect severe acidosis due to a long "down" time before CPR was started.

Supplied: AMPULE = 50 CC = 50 MEQ

PEDIATRIC AMPULE = 10 CC = 10 MEQ

Usual dose: 1 MEQ/kg initially (Give this initial dose only if the patient has been in cardiac arrest without CPR for several minutes). You can then give 1/2 MEQ/kg every ten minutes until a blood pressure is achieved, however, you're better off monitoring the need for bicarbonate with blood gases.

Acute replacement dosage:

bicarb = 0.1 x (-base excess) x (weight in kg)

Indications: suspected or proven severe acidosis.

Actions: directly neutralizes acid.

Precautions: if given in excess, alkalosis results, which is very difficult to treat. Use of an immediate dose in a brand-new cardiac arrest will guarantee severe alkalosis. Use ABG to guide therapy.

SAMPLE ORDER:

20 CC OF BICARB IV

BICARBONATE 2 AMPS

BRETYLIUM (BRETYLOL) is useful in resistant V-fib. After use, the heart can often be successfully defibrillated when it could not before. Bretylium also lowers blood pressure, which may be a problem in some patients.

Supplied: AMPULE = 500 MG = 10 CC

Usual dose: 350 mg or 5 mg/kg, repeat at double dose (10 mg/kg) if not effective.

Indications: Ventricular fibrillation resistant to defibrillation, as a second-line drug to lidocaine. Remember that you still have to defibrillate after giving Bretylium.

Actions: allows easier conversion to sinus rhythm. Also blocks nerves which affect blood vessels, reducing blood pressure somewhat.

Precautions: may exacerbate cardiogenic shock

SAMPLE ORDER:

BRETYLIUM 350 MG

EPINEPHRINE (EPI, ADRENALINE) stimulates the heart, and constricts blood vessels. It raises blood pressure, increases the heart rate, and increases the heart's irritability. It is used during cardiac arrest because 1) it is an extremely potent cardiac stimulator, and 2) it makes fibrillation more course and easier to convert to sinus rhythm. It is not used routinely to raise blood pressure except in anaphyllactic (allergic) shock. This drug occurs naturally in the body, and is degraded over several minute's time.

Supplied: AMPULE = 10 CC = 1 MG
or custom infusion

Usual dose: adult--1 amp every five minutes until pulse and blood pressure achieved. To sustain beneficial effects, an infusion of .05 to .1 micrograms/kg/min may be given.
child--.1 cc/kg every five minutes until pulse and B.P.

May be given ENDOTRACHEALLY in bolus form.

Indications: cardiac arrest, anaphyllactic shock.
Actions: potent cardiac stimulant, blood vessel constrictor.
Precautions: stop use when blood pressure obtained. If B.P. falls as Epi wears off, use an epinephrine drip, or dopamine.
SAMPLE ORDER:
EPI 1 AMP
10 CC ADRENALINE ENDOTRACHEALLY
START EPINEPHRINE INFUSION

DIGOXIN (LANOXIN) has two uses: 1) increasing heart contractility, and 2) increasing AV block to slow the heart rate. It increases the force of contraction in the sick heart, and reduces the heart rate of the patient in atrial fibrillation. The drug has substantial hazards, but is widely used because it offers unique benefits.
Supplied: adult AMPULE = 2 CC = .5 MG
pediatric AMPULE = 1 CC = .1 MG
Usual dose: .25 to .5 mg to start (children, .005 mg/kg), titrating up to effect, not to exceed .025 mg/kg.
Indications: atrial fib with rapid heart rate, conversion of PSVT (PAT) as second-choice after Verapamil, heart failure.
Actions: increases effectiveness of cardiac muscle, slows AV node conduction
Precautions: makes heart more prone to abnormal rhythms, narrow "safe" dosage range
SAMPLE ORDER:
0.25 MG DIGOXIN IV

ISOPROTERENOL (ISUPREL) is a cardiac stimulant, somewhat similar to epinephrine. It raises the heart rate, reduces any conduction block, and increases the force of contraction. It has little effect on blood vessels. It causes a major increase in cardiac irritability and oxygen need.
Supplied: mixed as an infusion. Protocols vary, so order in mcg/kg/min.
Usual dose: start around .03 micrograms/kg/min, increase until effects are seen, avoid exceeding .3 mcg/kg/min.
Indications: second choice drug after atropine for refractory bradycardia, high degree AV block.
Actions: cardiac stimulant which affects primarily heart rate and conduction.
Precautions: may increase the size of an infarct. Increases probability of fibrillation.
SAMPLE ORDER:
ISUPREL DRIP

LIDOCAINE (XYLOCAINE) is a local anesthetic which is also useful in treating abnormal heart rhythms. Of course, if the patient is in V-fib, a shock must still be given after the drug to restore a normal rhythm. Blood concentrations of lidocaine fall off over about 20 minutes, so a second bolus

and/or an infusion is necessary. Lidocaine is also valuable in preventing abnormal rhythms before one has ever occurred. Many experts recommend giving lidocaine routinely to any patient who has had a heart attack. You will probably come out ahead in this simulation if you do so. A bolus of lidocaine should always be followed by a lidocaine drip to keep the level from falling.

Supplied: AMPULE = 5 CC = 100 MG

Usual dose: adult--75 mg bolus. For irritability, repeat doses of 0.5 mg/kg given up to 3 mg/kg. Follow with drip of 2 to 4 mg/min. (If the patient is in trouble, don't waste your "minute" starting the drip right after the bolus--do more important things, then remember to start the drip in a few minutes)

child--1 mg/kg bolus. Cardiac irritability in a child is almost always due to acidosis or electrolyte abnormality, but if a drip is required, use .01 mg/kg/min.

Effective ENDOTRACHEALLY.

Indications: recurrent or resistant V-tach or V-fib, treatment of cardiac irritability. Prevention of fibrillation in heart attack patients.

Actions: reduces risk of rhythm disturbance.

Precautions: excess doses can cause low blood pressure, seizures. Bolus will wear off unless followed by a drip.

SAMPLE ORDER:

LIDOCAINE 75 MG BOLUS

START LIDOCAINE DRIP

VERAPAMIL (CALAN, ISOPTIN) has complex actions. Its primary use is to treat abnormal, rapid atrial rhythms (PSVT--paroxysmal supraventricular tachycardia). It decreases heart rate when in sinus rhythm, increases block in the AV node, and may lower blood pressure somewhat. It is the drug of choice for PSVT when the patient has good blood pressure. It has little utility, though, in the patient in cardiac arrest.

Supplied: 5 mg ampule

Usual dose: 5 mg, then 10 mg after 15 minutes if not effective

Indications: paroxysmal supraventricular tachycardia, rate reduction in atrial fibrillation

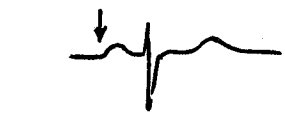
Actions: increase AV block, decreases sinus rate, relaxes blood vessels

Precautions: may predispose to bradycardia and hypotension. Not to be given together with propranolol IV

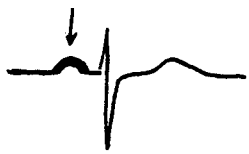
SAMPLE ORDER:

VERAPAMIL, 5 MG IV

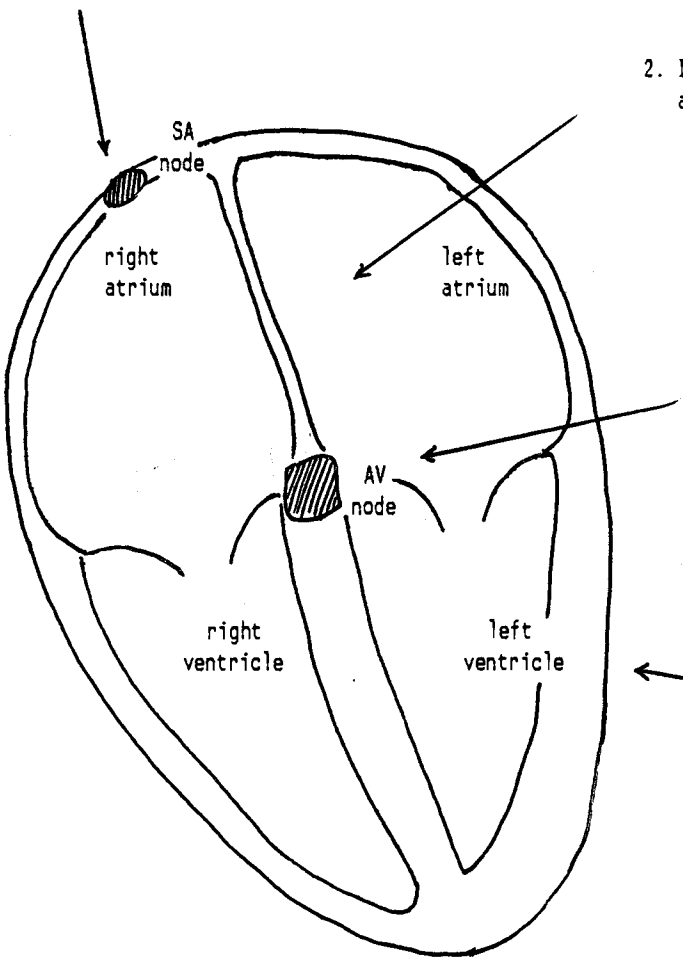
UNDERSTANDING THE ELECTROCARDIOGRAM

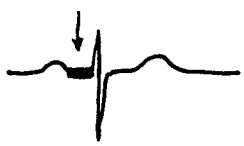


1. Sinoatrial (SA) node fires. (not seen on EKG)

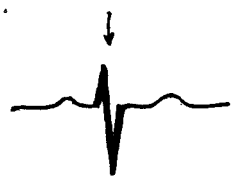


2. Impulse spreads over atrium, causing P wave.

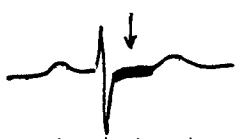




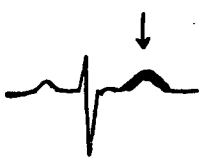
3. Inpulse delayed in atrioventricular (AV) node, causing PR interval. Atrium is contracting.



4. Impulse conducted rapidly over ventricle, creating QRS complex.

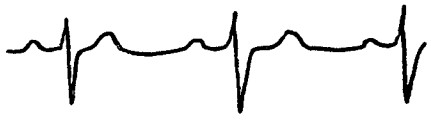


5. Heart is contracting during the ST segment. No current is flowing unless the heart is injured.

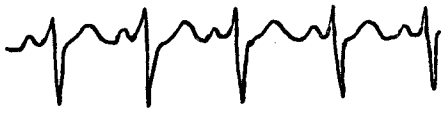


6. The heart electrically recharges itself, creating the T wave.

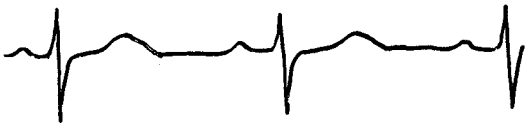
SAMPLE ELECTROCARDIOGRAMS
Part 1: Rhythms



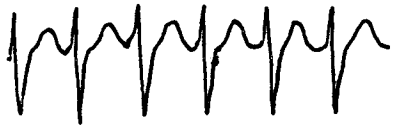
SINUS RHYTHM: Every QRS preceded by a P wave, rate 60 to 100 normally.



SINUS TACHYCARDIA: Every QRS preceded by a P wave, rate over 100.



SINUS BRADYCARDIA: P wave before every QRS, rate less than 60.



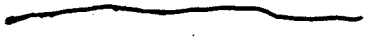
ATRIAL TACHYCARDIA: Regular rhythm, rate 130 to 180, no P waves seen, QRS is narrow.

ATRIAL FIBRILLATION: irregularly spaced QRS complexes, 'wiggling' baseline, no P waves. Rate varies with AV block.

VENTRICULAR FIBRILLATION, coarse: Erratic, wide swings of electrical activity, irregular, no pulse.

VENTRICULAR FIBRILLATION, fine: Erratic, irregular 'wiggling' EKG, with no QRS, no pulse.

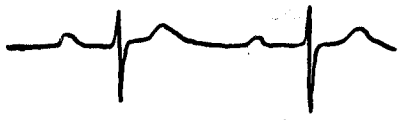
VENTRICULAR TACHYCARDIA: Perfectly regular tachycardia, rate above 200, wide QRS, may cause a pulse.



ASYSTOLE: No electrical activity at all, except for slight waving of the baseline.

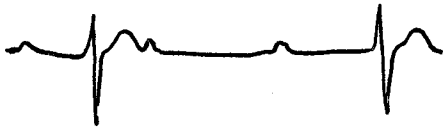
AGONAL RHYTHM: Very slow, wide QRS complexes, without P waves, often without T waves. No pulse.

SAMPLE ELECTROCARDIOGRAMS
Part 1: Rhythms (continued)



FIRST DEGREE ATRIOVENTRICULAR BLOCK: Regular sinus rhythm with every P wave causing a QRS after a long PR interval.

SECOND DEGREE ATRIOVENTRICULAR BLOCK: Some P waves are blocked out from the ventricle, leaving a P without a QRS.

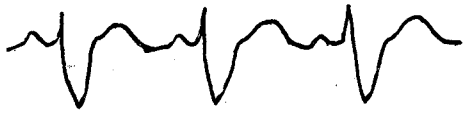


THIRD DEGREE ATRIOVENTRICULAR BLOCK: All P waves are blocked, with the QRS complexes unrelated to the P waves.

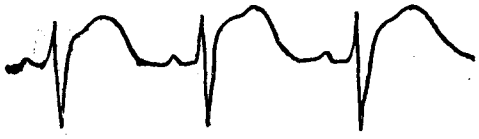
VENTRICULAR RHYTHM: Rhythm is paced entirely from the ventricle, with no P waves seen at all.

Part 2: Specific Problems

RIGHT BUNDLE BRANCH BLOCK: Conduction delayed to the right. Widened QRS with second upward peak.



LEFT BUNDLE BRANCH BLOCK: Conduction delayed to the left. Widened QRS with broad, deep S wave.

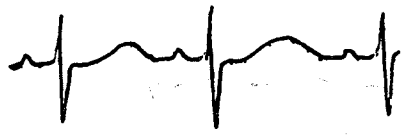


HEART ATTACK: EKG may be normal, or ST segment elevation or depression, or abnormal shape of T wave.

SEVERE HEART ATTACK: QRS may be wide, elevated ST segment, possible loss of the R wave.

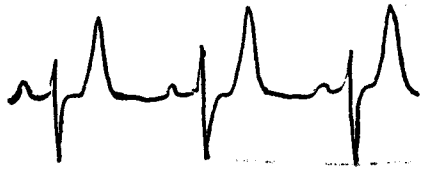
SAMPLE ELECTROCARDIOGRAMS
Part 2: Problems (continued)

HYPOTHERMIA: ALL intervals prolonged, ST segment depressed, long ST and T wave, often right bundle branch block.



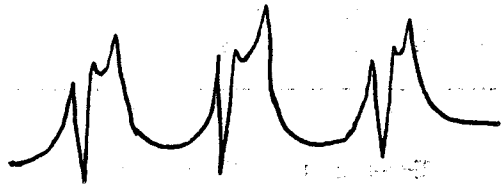
HYPOKALEMIA: Prolonged T wave, possible U wave.

SEVERE HYPOKALEMIA: ST depression, prominent U wave, PR interval fairly short.

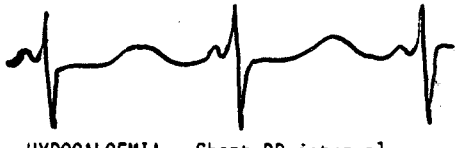


HYPERKALEMIA: Tall, peaked T wave.

MODERATE HYPERKALEMIA: Long PR, wide QRS, ST depression, tall peaked T wave.

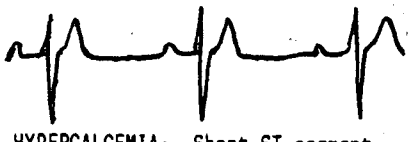


SEVERE HYPERKALEMIA: Disappearance of P wave, wider QRS, may slur into tall T wave.

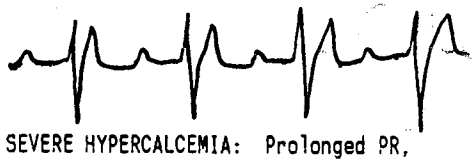


HYPOCALCEMIA: Short PR interval, prolonged ST segment, wide T wave, possible U wave.

SEVERE HYPOCALCEMIA: Very short PR, prolonged ST, very wide T, possible inverted U wave.



HYPERCALCEMIA: Short ST segment, short T wave.



SEVERE HYPERCALCEMIA: Prolonged PR, short ST, short T wave. Ususally tachycardia is present.

APPENDIX H

GLOSSARY

...brief definitions with a pronunciation guide...

acidosis (ass-id-OH-siss), excess acid in body

agonal (A-gun-uhl), slow useless rhythm indicating a dying heart

alkalosis (al-ka-LOH-siss), excess bicarbonate in body

ampule (AM-pule), single-use container of drug, often a pre-filled syringe

anemia (uh-NEEM-ee-uh), deficient in blood or hemoglobin

asystole (ay-SISS-toll-ee), absense of electrical activity

atrial (AY-tree-uhl), pertaining to the upper heart chamber

atropine (A-troh-peen), cardiac drug

bicarb (BY-karb), short for bicarbonate

bicarbonate (by-CAR-bun-uht or by-CAR-bun-ATE), alkaline chemical in blood

bradycardia (brad-i-CAR-dee-uh or bray-dih-CAR-dee-uh), abnormally slow heart rhythm

bretylium (bre-TILL-ee-um), cardiac drug

CPR, cardio-pulmonary-resuscitation

calcium (KAL-see-um), chemical in blood and bones

cardiac (CAR-dee-ack), pertaining to the heart

cardiogenic (CAR-dee-oh-JENN-ik), caused by a heart condition

chloride (KLOR-ide), blood chemical

coma (KOH-muh), unconscious and not responding to pain

defibrillate (dee-FIB-rill-ate), shocking the heart to restore normal rhythm

dehydration (DEE-hy-DRAY-shun), body fluid deficit

dextrose (DEX-trohss), a type of sugar injected IV

diabetes (DIE-a-BEET-iss), abnormal sugar metabolism due to lack of insulin

diabetic (DIE-a-BET-ik), condition of, or person with, diabetes

diazoxide (dy-a-ZOX-ide), blood pressure drug

digoxin (di-JOX-in), cardiac drug

dobutamine (doh-BUTE-a-meen), cardiac stimulant drug

dopamine (DOH-puh-meen), cardiac stimulant and blood pressure drug

electrolytes (ee-LEKT-row-lights), chemicals (ions) in the blood

endotracheal (EN-doh-TRAY-kee-uhl), into the trachea

epi (EH-pee), short for epinephrine

epinephrine (e-pi-NEF-rin), cardiac stimulant drug

fibrillation (FIB-rill-AY-shun), erratic unorganized electrical activity

glucose (GLUE-kohss), blood sugar

hemoglobin (HEE-moh-glow-bin), pigment in blood which carries oxygen

hemolysis (hee-MAW-luh-siss), red blood cells bursting

hemorrhage (HEM-or-rij), bleeding

hypercalcemia (HY-per-kal-SEEM-ee-uh), excess calcium in blood

hyperglycemia (HY-per-GLY-SEEM-ee-uh), excess sugar (glucose) in blood

hyperkalemia (HY-per-kay-LEEM-ee-uh), excess potassium in blood

hypertension (HY-per-ten-shun), abnormally high blood pressure

hyperthermia (HY-per-THERM-ee-uh), body too hot, heatstroke

hypocalcemia (hy-POH-kal-SEEM-ee-uh), abnormally low calcium in blood

hypoglycemia (hy-POH-gly-SEEM-ee-uh), abnormally low blood sugar

hypokalemia (hy-POH-kay-LEEM-ee-uh), abnormally low blood potassium

hypotension (HY-poh-ten-shun), abnormally low blood pressure, shock

hypothermia (hy-po-THERM-ee-uh), low body temperature

hypovolemia (hy-po-vohl-EEM-ee-uh), low blood volume

hypoxemia (hy-pox-EEM-ee-uh), low blood oxygen

infarction (in-FARK-shun), death of tissue due to lack of oxygen

infusion (in-FUZJ-un), steady flow of drug into the patient

insulin (IN-suhl-in), sugar-lowering drug

intravenous (in-truh-VEE-nus), by vein

isoproterenol (IE-soh-proh-TER-en-awl), cardiac stimulant drug

ketoacidosis (KEE-toh-ASS-id-OH-siss), excess acid plus ketones, diabetes

kilogram (KILL-a-gram), 2.2 pounds

lavage (luh-VAWJ as in corsage or triage), flushing fluid in and out

lidocaine (LIE-doh-cane), cardiac irritability drug

milliequivalent (MILL-i-ee-QUIV-uh-lent), unit of ionic activity

milligram (MILL-i-gram), unit of weight, 1/1000 gram

milliliter (MILL-i-LEE-ter), unit of volume, 1 cc, 1/1000 liter

morphine (MORE-feen), narcotic

myocardial (my-oh-CARD-ee-uhl), pertaining to the heart muscle

naloxone (nal-OX-ohn), narcotic antidote

nasogastric (NAY-zoh-GAS-trick), through the nose into the stomach

neurological (NUHR-uh-LOJ-i-kuhl), pertaining to the brain or nervous system

PVC's (pee-vee-sees) premature ventricular contractions

potassium (poh-TASS-ee-um), blood chemical

propranolol (proh-PRAN-uh-loll), cardiac blocking drug

pulmonary (PULL-mun-air-ee), pertaining to the lungs

resuscitation (ree-suss-i-TAY-shun), efforts at restoring life

ringer's (RING-erz), altered salt solution to expand blood volume

saline (SAY-leen), salt solution to expand blood volume

shock (shock), sufficiently low blood pressure to cause damage

sinus (SINE-us), referring to place where normal rhythm originates

tachycardia (tack-i-CAR-dee-uh), abnormally rapid heart rate

triage (TREE-awj as in corsage), deciding who needs treatment first

urea (you-REE-uh), chemical measured in BUN

ventricle (VENN-trick-uhl), lower heart chamber

ventricular (venn-TRICK-you-ler), pertaining to the lower heart chamber

verapamil (ver-AP-uh-mil), cardiac drug

A.C.L.S. PROTOCOLS FLOWSHEET

Sample--This page may be copied

Date:_____ Time:_____ I.V.:_____ ET tube:_____
Patient description:_____
Pertinent history:_____
Age:_____ Weight:_____ Estimated time of arrest:_____

Time	Pulse	B.P.	Resp	Neuro	Orders/lab values/notes