

**Proposal For Trial Program  
Emergency Medical Technicians Establishing  
Intravenous Infusions  
Ventura County, California**

September 1996

**I. Introduction**

In 1987, Ojai Ambulance received approval by Ventura County Emergency Medical Services (EMS) to staff its ambulances with one paramedic and one Emergency Medical Technician (EMT) who has received advanced training allowing them to assist the paramedic in providing advanced life support (ALS). This advanced training includes assisting the paramedic with such skills as, intravenous cannulation set-up, airway management, trauma skills, cardiac skills, legal issues, and manual defibrillation (Ventura County Policy 505 attached). After reviewing our current system, it is our belief that these advanced EMTs should be allowed to extend their current scope of practice by allowing them to perform intravenous cannulation in the field. By adding this skill to our system we can further improve the efficiency of the team. It has long been demonstrated that IVs can be established in the field setting and have a medically proven track record. Until now, this skill has been traditionally reserved for the paramedic. Under this trial program, the knowledge base of the paramedic will be utilized to direct the EMT to proceed with the mechanical skill of establishing the IV line. At no time will the EMT be attempting cannulation based on his/her assessment. Cannulation by the EMT may only be done at the direction of the paramedic.

**II. Study Design**

- A. Initial study will be for 18 months, then evaluated for extension.
- B. The study will be a joint venture between Ojai Ambulance, Ventura County Medical Center, Ventura County EMS and The State of California EMS Authority.
- C. EMTs will be selected for this program based on satisfactory performance as an EMT/1 and EMT/D. Each candidate must satisfactorily complete a screening evaluation by their provider, and Base Hospital.

**III. Description of Procedure**

Peripheral intravenous cannulation with appropriate IV fluid or saline lock.

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- IV. **Medical Condition(s) Requiring Procedure**
  - Any patient who, under existing Ventura County EMS policies and procedures, would require intravenous cannulation by a paramedic.
- V. **Patient Population To Be Benefited**
  - Those patients who are provided service by Ojai Ambulance, Inc. within the service area known as Ventura County Ambulance Service Area one. (See exhibit "A" attached)
- VI. **Medications Utilized**
  - A. Normal Saline
  - B. Dextrose 5% and Water
- VII. **Relevant Training Guidelines**
  - The attached reference materials have been taken from well established paramedic and EMT training manuals and text books. (See exhibit "B" attached)
- VIII. **EMT-1 Training**
  - A. Instruction for this trial program will be provided by the Base Hospital Pre-hospital Care Coordinator and Ojai Ambulance Paramedic Supervisor. Instructors will be approved by the EMS Medical Director or his designee.
  - B. Objectives
    1. Describe the purpose for starting an intravenous line in the field.
    2. Identify the IV solutions approved for use by field personnel in Ventura County.
    3. Identify the IV solution appropriate for volume replacement and as a medication delivery vehicle.
    4. Identify three types of IV tubing and give examples of their use.
    5. Define "large bore" IV cannula.
    6. Identify the checks which should be made prior to using an IV solution.
    7. Demonstrate venipuncture and techniques.
    8. Identify the indications for using a saline lock.
    9. Identify the rationale for using an arm board.

- 10. Identify possible complications of IV therapy and treatment for each.
- 11. Identify the need for "sharps" awareness and describe the management of sharps containment.
- 12. Define: IV push/bolus, IV piggyback, PVDs and the paramedics responsibility.
- 13. Identify the purpose for labeling all piggyback medication and the information which must be included on the label.
- 14. Demonstrate, by written and practical testing, an overall understanding of cannulation and IV therapy techniques. (See exhibit "C" attached)

C. Competency testing

Training will be followed by competency testing with a performance standard of 80% - All questions missed will be reviewed with understanding confirmed by verbal feedback.

IX. Medical Control

- A. The program will be evaluated on an ongoing basis at appropriate committees by Ventura County EMS and the State of California EMS Authority.
- B. Each IV start will be evaluated by the Paramedic, Receiving Hospital, Paramedic Provider and Base Hospital.
- C. (See exhibit "D" attached)  
Program oversight will be performed by the EMS Medical Director or his designee.
- D. All data will be stored and reviewed utilizing current confidentiality standards.

X. Outcome Evaluation

- A. A success rate of 90% is expected. The EMT-D will be allowed two attempts, after which, the paramedic will assume responsibility for further attempts.
- B. The outcome expected will demonstrate that EMT-Ds and paramedics are equally successful in the establishment of intravenous cannulation.
- C. Retrospective data from paramedic intravenous cannulation attempts within the same service area will be used as a comparison.

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# Prehospital Emergency Care & Crisis Intervention

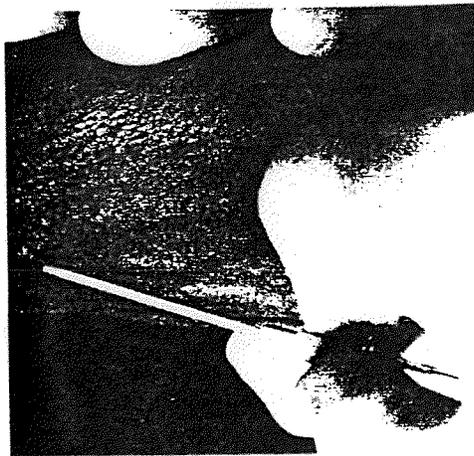
FOURTH EDITION

It is recommended that EMTs wear protective gloves whenever there is a possibility of coming in contact with a patient's blood, body fluids, mucous membranes, traumatic wounds, or sores. See Chapter 31.

- Explain what IV therapy is and why it is used in prehospital medicine.
- Describe the equipment and supplies needed to provide IV therapy.
- Learn the steps of and demonstrate proficiency in starting an IV infusion.
- Discuss the importance of proper maintenance and monitoring of the IV patient.
- Demonstrate how to transport the IV patient properly.
- Describe the possible complications of IV therapy.

**\* OBJECTIVES**

# Intravenous Fluid Therapy



# appendix 2

- To add fluid volume to the circulatory system when there is an imbalance or depletion of normal body fluids, as in hemorrhage, burns, and dehydration.
- To establish and maintain a life support or access line for fluid or medication in a patient whose condition is questionable. It is difficult to get into a vein and start an IV after hypovolemia or circulatory collapse.
- To provide access for the administration of medications in a myocardial infarction or cardiac arrest, diabetic emergencies, drug overdose, etc.

IVs are started in the field for four major reasons:

### □ WHY INFUSION?

Body fluids bathe each cell and are involved in all bodily chemical reactions. Without the proper amounts of body fluids, cells dehydrate and die. Body fluid consists of water (60 percent of the volume of adult bodies and 75 percent of infant bodies) and electrolytes (sodium and potassium). These fluids are found both inside and outside the cell. Extracellular fluid includes the interstitial fluid between the cells and the capillary walls, and blood plasma within the vascular system.

### □ BODY FLUID COMPOSITION

Intravenous therapy, commonly called IV, refers to the administration of fluids, drugs, or blood directly into the circulatory system by way of a vein. When blood is administered, the technique is called transfusion. When sterile fluids other than blood or blood products are administered through which fluids and medications are administered to a patient. The fluid container can empty its reserve in minutes. A dropper, or drip chamber, placed below the container, regulates the flow of the fluid.

### □ WHAT IS INTRAVENOUS INFUSION?

In many states, EMTs are being taught the basics of venipuncture and intravenous (IV) therapy for use in the field to expand the level of life support care given. IV therapy should only be administered by IV-certified EMTs; follow local protocol.

- The equipment used by EMTs is usually disposable. Some medical facilities provide reusable, sterile infusion sets. In any case, the equipment will basically be the same, consisting of:
- The fluid to be infused.
- The IV set (Figure A2-2 shows micro drip and macro drip sets), consisting of the connector (to the fluid bottle or bag), drip chamber, screw clamp or flow adjustment valve, Y injection site (for medications), needle adapter, and needle and catheter.

### □ SETTING UP AN IV

- N.S., or normal saline, which is 0.9 percent sodium chloride in sterile water.
- Lactated Ringer's, an isotonic, buffered solution of electrolytes (sodium, chloride, potassium, calcium, and lactate) that closely approximates normal blood electrolyte contents (Figure A2-1).
- D<sub>5</sub>W, which is 5 percent dextrose and sterile water. It is used in cases where an IV is established as a lifeline or a medication route.

Body fluids bathe each cell and are involved in all bodily chemical reactions. Without the proper amounts of body fluids, cells dehydrate and die. Body fluid consists of water (60 percent of the volume of adult bodies and 75 percent of infant bodies) and electrolytes (sodium and potassium). These fluids are found both inside and outside the cell. Extracellular fluid includes the interstitial fluid between the cells and the capillary walls, and blood plasma within the vascular system.

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### □ ADDING FLUID VOLUME

- To maintain electrolyte, fluid, and nutrient balances for those unable to eat or with problems of severe nausea, vomiting, and/or diarrhea.
- Be sure to get specific instructions from the physician and document the orders.

Two types of IV sets are commonly used — macro drip and micro drip. The macro drip sets are used for rapid fluid replacement by large drops of fluid through a large-bore tube. This macro drip, or standard, infusion set is typically used for adults to give large amounts of

### Choosing the IV Set, Needles, and Catheters

It is important that all equipment be sterile. If the equipment is contaminated, germs may be introduced into the body and cause infection. If you do not know that the equipment is sterile, consider it contaminated. A sterile object remains sterile only if touched by another sterile object. It is very important that you be honest and make it known if a piece of equipment becomes contaminated — it needs to be replaced.

- Auxiliary equipment (Figure A2-3), such as an arm board, antiseptic solution, tape to secure the IV tubing to the patient's arm and the arm to the board, a tourniquet to aid in selection of the insertion site, gauze pads or a sterile dressing such as Opsite to cover the insertion site, materials to log or write down any necessary records concerning the procedure, and IV extension tubing to give added length to the IV while transporting.
- Several gloves and possibly a face mask and eye protector to be worn by the EMT.

FIGURE A2-2 Comparison of macrodrip and microdrip IV administration sets.

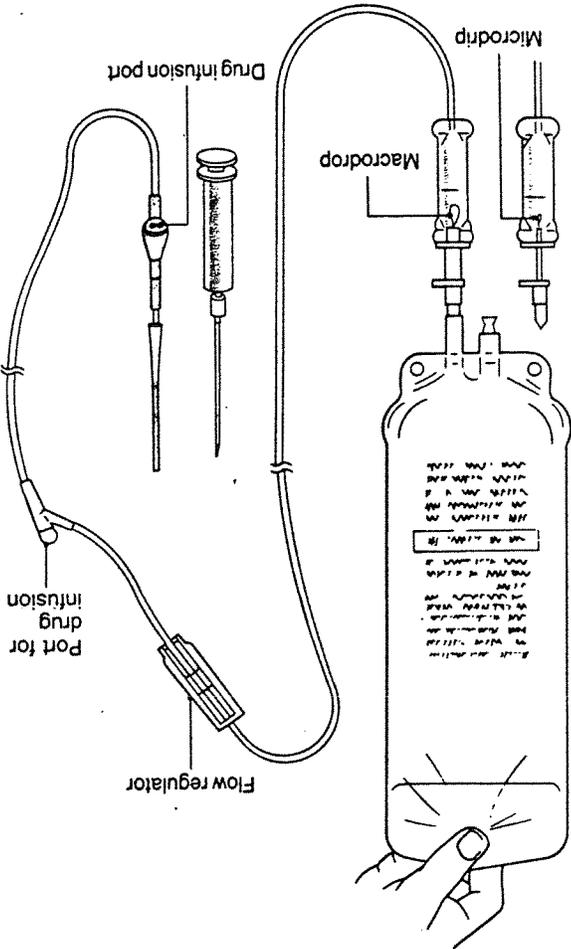
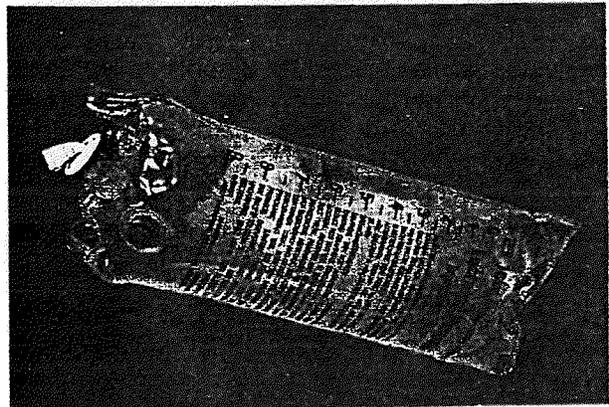


FIGURE A2-1 Lactated Ringer's, a solution commonly used in IV administration.



Note: D5 or D10 as a prefix indicates the solution is made containing dextrose. For example, Lactated Ringer's in 5% dextrose would be abbreviated D5LR.

SOLUTION	ABBREVIATION	COMPONENT ELECTROLYTES
Lactated Ringer's	LR	NaCl, potassium chloride (KCl), calcium chloride (CaCl), sodium lactate
Quarter-normal saline	1/4 NS	0.2 NaCl
Half-normal saline	1/2 NS	0.45% NaCl
Normal saline	NS	0.9% sodium chloride (NaCl)
5% dextrose	D5W	5% dextrose
10% dextrose	D10W	10% dextrose

TABLE A2-1 Common Intravenous Fluids

## Assembling the Equipment

Following these procedures, and using only the type of fluid ordered by the physician, perform the following steps.

1. Check the container to make sure that the expiration date has not passed.

2. Plastic bag infusion sets are preferable to glass in the field. If a glass bottle is used, inspect it for cracks.

3. Remove the sterile seal from the end of the tubing closest to the drip chamber and insert the tubing into the container. The tubing also has a sterile seal on it. You may have to loosen this seal to allow the liquid to flow, but you should not remove it.

4. With either container, check for seal leakage, cloudiness, discoloration, or contamination. Do not use any fluid that is colored or cloudy or that contains floating particles. Save the bag and report the problem to your equipment manager so that he or she can inspect other supplies in the same lot.

5. As you open the packages to assemble the infusion set, keep all necessary items sterile by *not* touching areas that will come in contact with the fluid. Do *not* use your teeth to rip open the coverings on the bags and tubes. It is a good idea to have extra alcohol wipes and a spare catheter near. Tear the tape to the right size for securing the catheter and tubing.

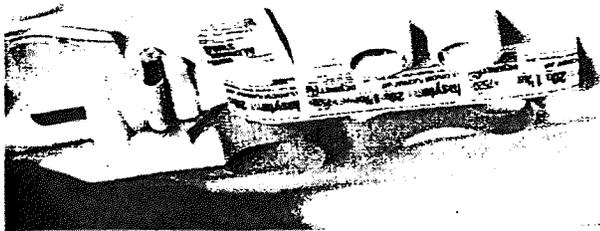
6. Connect the infusion set to the fluid container by holding the drip chamber, removing any protective coverings (do not touch the spike tip), then inserting the piercing pin into the fluid container with a twisting motion (Figure A2-5).

7. Attach the extension tubing, then squeeze and release the drip chamber or reservoir on the infusion set until it is about half full.

8. Remove the protective cover from the needle adapter. Inspect the needle and cannula for irregularities. If the needle is not sharp and without burrs and if the cannula is not smooth, discard them.

9. Open wide the flow adjustment valve, and flush any air from the tubing. No air should be left in the line, or it may enter the patient's vein, causing an air embolus or blockage. Some EMTs save time and eliminate this step by prehangging IV fluids. If you use this procedure, label the bag with the time, date, and your initials. Fluids and tubing should be discarded after a maximum of twelve hours.

FIGURE A2-3 Auxiliary equipment.



fluid. The micro drip set has a small-bore tube, allowing a smaller drop, and is used for children, for maintaining a lifeline, or for other situations where control of the IV rate is critical.

The primary type of needle used to enter the vein in the field is an over-the-needle catheter (a plastic catheter inserted over a hollow needle). Other types of needles are a butterfly or winged hollow needle, or a plastic catheter inserted through a hollow needle. (Figure A2-4). In general, a short, large-bore needle is best for IV therapy. One- or two-inch-length catheters are the most commonly used in the field, with needle sizes of 14, 16, and 18 gauge (the lower the gauge, the larger the bore of the needle) for fluid replacement. An 18 gauge is generally the smallest used in any adult and most children, but a 20 gauge may be used for small children or older adults with fragile veins that will not accommodate a lot of fluid.

The other variable that should be considered when selecting an intravenous cannula is its length. The longer the cannula, the less the flow rate will be. The flow rate through a 14 gauge, 5 cm catheter (approximately 125 mL/minute), is twice the flow rate through a longer, 16 gauge, 20 cm catheter. For cannulation of a peripheral vein, a needle and catheter length of 5 cm is adequate while the cannulation of a central line requires a needle length of 6–7 cm and catheter length of at least 15–20 cm.

Other needed equipment includes alcohol swabs, povidone-iodine solution, tape, and sterile dressings.

FIGURE A2-4 The IV needles most commonly used to administer IV fluids in the prehospital setting.

