MAINTENANCE
OF
PERIPHERAL INTRAVENOUS THERAPY
FOR
EMERGENCY MEDICAL TECHNICIANS

Washington State Department of Health
Office of Emergency Medical Services and Trauma Service
Education, Training, and Regional Support Section

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This document is available (excluding examinations) on the OEMSTS Web page located at: www.doh.wa.gov/hsqa/emtp
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NOTE: Examinations will not be included in the version available on the internet. Examinations will only be provided to County Medical Program Directors on request.

Course Description:

A three hour course for EMTs designed to provide basic knowledge and skills necessary to transport a patient with a pre-existing peripheral intravenous infusion.

Equipment:

- IV Administration Sets - micro and macro drip
- IV Fluids
- Tape
- Armboards
- IV Practice Arm
- IV Catheters
- 2x2's

Course Objectives: At the completion of the course the EMT will:

1. Maintain a continuous peripheral intravenous infusion at the ordered rate using aseptic techniques.
2. Monitor vital signs and patient condition to prevent complications.
3. Adequately stabilize tubing and venipuncture site for safe transport.
4. Properly adjust infusion at the ordered rate.
5. Change bag with aseptic techniques when 50cc's remain in existing bag.
6. Discontinue peripheral intravenous infusion when circumstances indicate
7. Record all procedures, assessments, patient condition and intake/output at regular intervals.

LESSON PLANS

I. Role of EMT with IV maintenance training - **15 minutes**.
   A. Transport of STABLE patient with peripheral IV.
      1. **NO MEDICATIONS** in IV or to be given enroute, **NO BLOOD PRODUCTS**
      2. IV should be heparin locked by hospital staff before transport if this will not be harmful to the patient.
      3. Ask the staff to hang a full bag before departure.
   B. Goals:
      1. Keep IV patent and infusing at ordered rate
      2. Prevent/monitor for complications:
         a) Infiltration
         b) Clot occlusion
         c) Empty bag
         d) Overhydration
      3. Stable patient status (documented)
   C. Body Substance Isolation/Universal Precautions
      1. Avoid contact with blood (hepatitis, AIDS)
      2. WASH HANDS before and after contact with blood.
      3. Needle stick injury from metal needle infusion device
         a) Wash injury well
         b) Report stick injury
         c) May need gamma globulin injection.

II. Fluid administration - **15 minutes**
   A. Purpose of IV fluids:
      1. Replacement of fluid losses
         a) Vomiting
         b) Diarrhea
         c) Dehydration
      2. Maintenance of fluid and electrolyte balance
         a) Patients who are NPO
         b) Patient is unable to take enough orally to meet their needs
   B. Major complications of IV fluid administration:
      1. Overhydration-pulmonary edema and congestive heart failure
         a) Rales in lungs, S.O.B. and tachypnea, dependent edema, irregular pulse and/or tachycardia, J.V.D., possible hyper or hypotension
            (1) Keep infusion open but reduce rate to 30cc/hr
            (2) Contact medical assistance
            (3) Keep patient in sitting position.
      2. Clot occlusion
         a) If IV not infusing, catheter will clot over and occlude flow
            (1) DO NOT FLUSH LINE
            (2) Stop infusion
            (3) Discontinue the IV

3. Infiltration of IV fluid to the tissues
    a) Extravasation at site appears cold, puffy and painful
    b) IV does not infuse properly, no blood return
    c) Stop infusion and discontinue the IV.
4. Positional IV
    a) Reposition limb, tubing and/or catheter/tubing connection
    b) Restabilize when flowing smoothly.

III. Demonstration of equipment and techniques - **45 minutes**. The instructor will demonstrate the following:

A. Stabilization of site and tubing
    a) Cannula must be stabilized and the site covered (usually by hospital staff)
    b) Two stress loops in tubing taped to avoid accidental extravasation
    c) Armboard if indicated.

B. Adjusting rate of infusion (flow rate)
1. Flow rate is influenced by:
    a) The height of the bag
    b) Amount of fluid in the bag
    c) Altitude during transport
    d) Position of limb below level of the heart
2. Calculate flow rate:
    a) Review Metrics - 1 liter = 1000cc or 1000ml, 1cc = 1ml
    b) Micro or macro administration sets - know drip factor (gtts/cc)
    c) Formula to calculate flow rate in drops per minute (gtt/min):
        (1) gtts/min = vol. to be infused (in cc's) X drip factor (in gtts per cc) ÷ total time of infusion (in minutes)
        (2) Example: IV D51/2NS to run at 100cc/hr with tubing drip factor at 15 gtts/cc:

$$\frac{100\text{ cc} \times 15\text{gtts/cc}}{60\text{ min}} = \frac{1500\text{ cc}}{60\text{ min}} = 25\text{ gtts/minute}$$

    d) Adjust roller clamp
        (1) Count drops for 15 seconds initially while adjusting
        (2) Then count for full minute when ready to check
        (3) May be 1-2 drops off for full minute and still be acceptable.
        (4) Check the flow rate periodically.

C. Changing bag with aseptic technique when 50cc's remain in existing bag.
1. Select solution
    a) The proper solution
    b) Clarity of fluid
2. Check expiration date
3. Clamp tubing before removing bag

4. Remove bag
    a) Keep tubing spike sterile
    b) Keep solution bag access port sterile
5. Replace bag
    a) Keep tubing spike sterile
    b) Keep solution bag access port sterile
6. Readjust flow rate
7. Note solution, rate and time hung

D. Discontinuing of IV if extravasated or clot occluded using aseptic technique
1. Have sterile 2x2 and tape ready
2. Remove IV catheter and quickly place 2x2 over puncture site
3. Hold direct pressure over site for a minute or two until bleeding stops
4. Tape 2x2 in place
5. **CHECK** that the removed IV catheter is intact
    a) If catheter is not intact
        (1) Tourniquet limb above site to impede venous return
        (2) Call for medical assistance. (Catheter embolus is a potentially fatal complication).
6. Dispose of catheter/needle in proper container

IV. Recording and documentation - **15 minutes**
A. Record the following at least hourly:
1. Vital signs
2. Lung sounds
3. Condition of IV site
4. Amount of fluid infused
5. Amount of fluid remaining in the bag (L.I.B.)

B. Record amount of cc's of any urine output or emesis
C. Record any oral intake of fluid in cc's
D. Record solution and time when hanging a new bag
E. Record time IV catheter removed and length of catheter if IV discontinued

V. Practice - **50 minutes**
A. Stabilization of site and tubing
B. Infusion rate
1. Calculation of flow rate - micro- and macro-drip
2. Adjust flow rate - micro- and macro-drip

C. Changing bag with sterile technique
D. Discontinuing IV with aseptic technique
E. Record and document

VI. Testing - **40 minutes**
A. Written test - to include flow rate calculations as well as other didactic material.
B. Practical skills
1. Stabilize site and tubing
2. Adjust flow to specified rate - both micro and macro
3. Change bag using aseptic technique, record
4. Discontinue IV and record

MAINTENANCE OF PERIPHERAL INTRAVENOUS THERAPY

Student: _____ **Evaluator:** _____

Date: _____ **Signature:** _____

Time Start: _____ **Time End:** _____

	Points Possible	Points Awarded
Takes/verbalizes Body Substance Isolation precautions	1	
Stabilizing infusion site and tubing		
• Catheter well secured	1	
• Sterile dressing over insertion site	1	
• Catheter /tubing connection secure	1	
• Two stress loops in place	1	
• Proper use of armboard	1	
• Absence of circumferential taping or occlusion of vein or catheter	1	
Adjusting flow rate of micro and macro-drip infusion sets		
Micro administration set		
• Accurately calculates specified rate	1	
• Adequately positions solution bag, roller clamp and infusion site	1	
• Accurately adjusts flow rate (in drops per minute)	1	
• Notes time, fluid infused and fluid remaining in bag	1	
Macro administration set		
• Accurately calculates specified rate	1	
• Adequately positions solution bag, roller clamp and infusion site	1	
• Accurately adjusts flow rate (in drops per minute)	1	
• Notes time, fluid infused and fluid remaining in bag	1	
Replacing solution bag		
• Changes bag with aseptic techniques when 50cc's remain in existing bag.	1	
Selects solution • The proper solution • Clarity of fluid	2	
• Checks expiration date	1	
• Clamps tubing before removing bag	1	
Removing bag • Keeps tubing spike sterile • Keeps solution bag access port sterile	2	
Replacing bag • Keeps tubing spike sterile • Keeps solution bag access port sterile	2	
• Readjusts flow rate as appropriate	1	
• Notes solution, rate and time hung	1	

Discontinuing IV		
• Identifies reason to discontinue	1	
• Clamps off infusion	1	
• Removes tape gently and systematically	1	
Prepared to remove catheter with 2x2 and tape ready	1	
• Removes catheter safely and smoothly	1	
• Covers site with 2x2	1	
• Applies pressure 1-2 minutes at site until bleeding stopped.	1	
• Inspects catheter immediately for integrity, notifies Medical control if appropriate	1	
• Secures sterile dressing at infusion site	1	
• Disposes/verbalizes disposal of needle in proper container	1	
• Notes time and amount of fluid remaining in the bag, catheter integrity	1	
TOTAL:	37	

CRITICAL CRITERIA

____ Failed to take or verbalize body substance isolation precautions

____ Contaminates equipment or site without appropriately correcting situation

____ Selected improper, contaminated or expired replacement fluid

____ Failed to inspect catheter immediately for integrity or notify medical control if appropriate

____ Failed to recognize appropriate reason for discontinuing infusion

____ Failure to dispose/verbalize disposal of needle in proper container

You must factually document your rationale for checking any of the above critical items on the bottom of this form.

EVALUATION NOTES

STUDENT SURVEY

Name _____

Employer _____

Full-time, Part-time, on call _____

Number of runs/week (average) _____

Number of runs expected with IV Maintenance _____

Past experience. List all health care related experience as well as length of time as an EMT:

_____

_____

_____

_____

_____

Past experience and exposure to IV Therapy - please describe:

_____

_____

_____

_____

_____

The Pre-Test and Final Examination are not included in the curriculum provided on the Internet. The examinations that include examinations will only be provided to County Medical Program Directors on request.

BASIC LIFE SUPPORT FIELD PROTOCOLS FOR PERIPHERAL INTRAVENOUS INFUSION MAINTENANCE

1. Body Substance Isolation
2. Check patency and type of infusion solution.
3. Stabilization:
   a) Dressing over insertion site
   b) Stabilize limb on armboard if necessary
   c) Stabilize tubing with two stress loops
4. Fluids:
   a) Start with full bag of prescribed solution hung by hospital staff.
   b) Adjust flow rate to prescribed rate
   c) Replace bag with sterile technique when 50cc's remain in current bag and readjust flow rate
   d) Adjust flow rate as needed and at least hourly
5. Patency:
   a) Observe for patency as necessary and record
   b) Avoid kinks in tubing, pressure over or near insertion site
   c) Observe insertion site for infiltration and extravasation
   d) Consider possibility of clot occlusion if not patent and no other reason for lack of flow
6. Discontinuing an infiltrated or occluded IV:
   a) Turn infusion off via roller clamp
   b) Gently and systematically remove tape
   c) Remove catheter and quickly cover with sterile 2x2
   d) Immediately observe for intact catheter
   e) Hold direct pressure over insertion site for 1-2 minutes until bleeding stops
   f) Secure 2x2 over site with tape or bandaid
   g) If catheter is not intact and a portion is missing, assume catheter embolus and immediately tourniquet limb well above insertion site, keep limb in dependent position and immediately seek medical intervention
7. Patient assessment:
   a) Respiratory and cardiovascular status assessed at start and as necessary throughout transport
   b) Fluids in and out, fluid remaining in bag checked and recorded hourly
   c) Condition of infusion site checked frequently and recorded at least hourly

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