INTERFACILITY TRANSFER PROTOCOL

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a. Introduction

The decision to transfer a patient rests with the transferring physician (or other care provider, such as a physician assistant). This physician bears responsibility for the transfer decisions. It is the transferring physician who must:

1) Determine whether the benefits of transfer outweigh the risks.
2) Ensure that the patient is properly stabilized prior to departure.
3) Be responsible for complying with currently accepted community standards of practice regarding interfacility transfer.

The Paramedics/CCs and Medical Control Physician (MC) assume responsibility for management of the patient, given the circumstances of the patient’s condition, while en route between facilities.

This protocol recognizes there will be situations where potentially unstable patients will require transfer to another facility to obtain a higher level of care.

It should be noted that the Interfacility Transfer Protocol is a supplement to the Regional 911 Protocols and requires additional training. In this light, patient care during transport can be defaulted to that delineated by the Regional 911 Protocols.

b. Documentation

It is the responsibility of the transferring hospital/physician to provide appropriate documentation which includes a transfer form or other documentation indicating compliance with current statutes or laws regarding patient transfers. Included should be patient identifying information (name, address, date of birth, etc.), treatments, test results, preliminary diagnosis, reason for transfer, names of transferring/accepting physicians/institutions, pertinent medical records and orders.

c. Transport Crew Levels

The following is a description of which levels of care may transport what drugs and devices.

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMT</td>
<td>Saline lock</td>
</tr>
<tr>
<td></td>
<td>Patients with PCA pumps with settings unchanged for &gt; 6 hours</td>
</tr>
<tr>
<td></td>
<td>Stable patient with no anticipation of further interventions en route</td>
</tr>
<tr>
<td>EMT-I</td>
<td>Above listed plus:</td>
</tr>
<tr>
<td></td>
<td>Peripheral IV lines with no added drugs</td>
</tr>
<tr>
<td></td>
<td>Stable, intubated patients with no anticipation of further interventions en route</td>
</tr>
</tbody>
</table>
EMT-CC  
Above listed plus:
Peripheral IV lines
Indwelling Lines /PICC lines that are already accessed and running
Central venous lines that are running
Cardiac monitor/defibrillator
Intubated patients with stable ventilator settings
Up to 3 IV drips and drugs except for those excluded from the list
Only may transport patients on drugs SPECIFICALLY listed in the protocol

EMT-P  
Above listed plus:
All Intubated patients
Arterial and Swann-Ganz lines- not to be used for monitoring by paramedic

The medical director of the transporting service shall insure that all transporting providers are credentialed and trained for interfacility transfer and may transport drugs in the so-called categories at their discretion.

d. Contacting Medical Control by Paramedics/CCs

Medical Control MUST be contacted in the following circumstances:

1. Ongoing administration of blood products or resuscitative medications
2. Intubated patients
3. Patients with chest tubes
4. Patients with temporary pacemakers
5. Changes in symptoms/signs/conditions potentially indicating deterioration
6. Unstable vital signs
7. Medications not specifically listed in the protocol

Patients with the first four listed items should be contacted before arrival, and preferably before the patient leaves the sending facility. Patients with the 5th and 6th listed items should have MC called en route as these occur.

Patients on medications not specifically listed in the protocol may be transported by EMT-Ps ONLY. These medications will need to be reviewed by MC and must fall into a similar category as other drugs ALREADY LISTED in the protocol. A patient receiving a completely new category of drug may not be transported without further personnel trained in the use of that drug.

Medical Control (MC) may be defined as either the transporting service agency Medical Director, the transferring or receiving MD and as a last resort the ED physician of the transferring or receiving hospital.
The Medical Director of the transporting service may set additional standards regarding contacting MC.

e. Transferring Patients with Drugs and Devices

During interhospital transfer crew members shall follow all regionally approved BLS/ALS protocols. In addition, the patients on the stated drugs and devices may only be transported if the respective drugs have been initiated at the transferring hospital by the transferring physician/care provider. None of these may be initiated en route. At the discretion of MC, the drug rates/doses may be altered or discontinued depending on the patient’s clinical condition. Where indicated, EMT-Ps may titrate a drug up or down once depending on parameters delineated in the specific protocol.

The following precautions should be kept in mind by transferring providers:

1. All medications have potential to cause allergic reactions.
2. Some medications cause local irritation around the IV site. Several may even cause tissue necrosis if there is infiltration. If there is infiltration of any line, the IV should be immediately discontinued.
3. Many of the listed drugs are incompatible with other medications. Therefore, additional medication should be given through a separate IV line, or, if one is not established, the infusion should be stopped and the line flushed before administering a second medication. This should only be done under direct MC guidance.
4. Most require infusion pumps and/or cardiac monitoring.
5. MC should be contacted if there is any change in patient condition or if any medication needs to be emergently discontinued during transport.
6. If the need arises for emergency medications to be given, infusions may need to be discontinued; contact MC.
7. The MC physician may determine that the number or types of drugs/devices may require the presence of additional personnel (such as a second paramedic, nurse or physician).
8. Transfer of patients with ongoing infusion of medication outside the scope of practice and training of the transporting crew (either because of lack of credentialling or medication not listed in the protocol) can not be accomplished without additional personnel who possess a higher level of training.

f. Requesting Additional Personnel

When the EMS provider anticipates that they will require more assistance to appropriately care for the patient during transfer, they shall request the transferring
physician/health care provider to provide appropriately trained hospital staff to accompany the patient and assist.

The EMS provider must contact MC for medical direction in all situations where they are not comfortable with the circumstances of the transfer. The transfer will not occur unless the EMS provider and MC are confident the personnel and equipment are appropriate for transfer.
II. **Drugs**
   a. *Cardiovascular Drugs*
   b. *Sedation and Paralytic Agents*
   c. *CNS Drugs*
   d. *HAL/TPN, Insulin and Electrolytes*
   e. *Obstetric Drugs*
   f. *Anti-infective Therapy*
   g. *Pain Control*
   h. *Antidotes*
   i. *GI Drugs*
a. Cardiovascular Drugs

i. Antiarrythmic Drugs
ii. Beta Blockers
iii. Blood Pressure Lowering Drugs
iv. Calcium Channel Blockers
v. Glycoprotein IIb/IIIa Inhibitors
vi. Heparin Drip
vii. Inotropes
viii. Nitroglycerine Drip
ix. Thrombolytic Therapy
Cardiovascular Drugs

Antiarrythmics

Use: Treatment and cardioversion of Atrial Fibrillation or Atrial Flutter
Treatement and prophylaxis of refractory Ventricular Tachycardia

Adverse Effects:
- Hypotension,
- QT prolongation, Torsades, Ventricular Tachycardia
- AV Block

Dosing:

**Flecainide (Tambocor)**
Infuse: 2 mg/kg over 20 minutes

**Ibutilide (Corvert)**
Infuse: 1 mg IV over 10 minutes

**Magnesium Sulfate**
Bolus: 1-2 grams over 5 minutes
Infusion: 6-12 grams over 24 hours

**Propafenone (Rhythmol)**
Bolus: 2 mg/kg in 15-20 minutes; followed by
Infusion: 0.0067 - 0.0078 mg/kg/minute

Special Considerations:
- Use infusion pump for drips
- May not be compatible with heparin, lidocaine, amiodarone or bicarb
- Frequent BP checks for hypotension
- Increased risk for ventricular dysrhythmias if on certain antihistamines or anti-nausea medications

**Transport by EMT-Ps only**
(with exception of Magnesium Sulfate: may be transported by EMT-CC)
**Cardiovascular Drugs**

**Beta- Blockers**

**Uses:** Slow ventricular response in SVT, Atrial Fibrillation and Atrial Flutter
Slow sinus node rate

**Adverse Effects:**
- Hypotension, bradycardia
- Hypoglycemia (diabetics on medications); usual signs and symptoms are masked
- Bronchospasm
- Sinus node arrest

**Dosing:**

**Atenolol (Tenormin)**

Infuse: 5 mg over 5 minutes
May be repeated in 10 minutes

**Esmolol (Brevibloc)**

Bolus: 500 mcg/kg (0.5 mg/kg) over one minute
Infusion: 50 mcg/kg/minute for 4 minutes

If inadequate response, repeat bolus and increase drip rate by 50 mcg/kg/minute up to 3 times
*(total dose of 2000 mcg bolus and infusion @ 200 mcg/kg/minute)*

Drug comes in a 100 mg (10 mg/ml) vial or 2500 mg ampule into 250 ml (10 mg/ml) or 500 ml (5 mg/ml) NS or D5W

**Labetalol (Normodyne)**

Infusion: 2 mg/minute (concentration 1mg/ml; 2ml/min)
duration from 25 minutes to 2.5 hours

**Metoprolol (Lopressor)**

Inject: 2.5 mg IV slow push over 2 minutes
May repeat dose up to 5 times every 5 minutes for a **total dose of 15 mg**

**Sotolol (Betapace)**

Bolus: 1-1.5 mg/kg; followed by
Infusion: 0.008 mg/kg/minute = 8 mcg/kg/min

**Special Considerations:**
- Use infusion pump
- Check BP frequently; monitor heart rate
- Carefully monitor for hypotension, excessive bradycardia or new AV blocks
- Patient with DIABETES may have symptoms of hypoglycemia masked; watch carefully
for mental status changes  
Contact MC if develop adverse reaction  

Cardiovascular Drugs  

Blood Pressure Lowering Agents  

Uses: Short term parenteral treatment when oral treatment is not feasible  
Nitroprusside may be used in CHF to reduce both preload and afterload (reduces work of the heart)  

Adverse Effects:  
Hypotension, bradycardia, dysrhythmias  
Palpitations, flushing, angina  
Headache, restlessness, drowsiness, confusion or slurred speech  

Dosing:  
Hydralazine  
5-40 mg IV push over 1-2 minutes  
Usually given as repeat bolus doses every 20-30 min  
Rarely given as drip: 1-10 mg/hour  

Nicardipene(Cardene)  
Dilute to: 0.1 mg/ml  
Infusion: Start @ 50 ml/hr (5 mg/hr)  
May increase rate by 2.5 mg/hr every 15 minutes until desired  
BP is reached for a maximum dose of 15 mg/hr  

Nitroprusside  
Infusion: Continuous to maintain BP  
See dosage chart below; amount listed is in mL/hr  

Nesiritide(Natrecor)  
2 mcg/kg IV push over 60 seconds  
0.01 mcg/kg/min maintenance infusion  

Special Considerations:  
Use infusion pump  
Dedicated IV line- should not administer in same IV line as other meds  
Nicardipene:  
If hypotensive (BP<60) or tachycardic (HR>140), discontinue drip.  
May resume when stable @ 3-5 mg/hr  
Infusion site must be changed after 12 hours  
Use with caution in patients with liver failure, since it is metabolized in the liver.  
May be contraindicated in severe Aortic Stenosis as may decrease preload.  
Nitroprusside:  
Small boluses or slight increases in infusion rate may produce profound hypotension  
Solution must be wrapped in foil to protect it from light
Do not mix other medications in the same line
Check BP and heart rate every 5 minutes
Hypotension can be alleviated by decreasing the infusion rate

Nesiritide:
Caution in pregnant or lactating patients
Contact MC for worsening signs/symptoms, significant BP change or if BP<90

**NITROPRUSSIDE DOSING CHART**

**CONCENTRATION 200MCG/ML**

<table>
<thead>
<tr>
<th>Pat Wt in Kg</th>
<th>100MG/500ML MCG/KG/MINUTE</th>
<th>50MG/250ML</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>5 11 21 32 42 53 63 74 84 95 105 116 126 137 147 158</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>6 12 24 36 48 60 72 84 96 108 120 132 144 156 168 180</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>7 14 27 41 54 68 81 95 108 122 135 149 162 176 189 203</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>8 15 30 45 60 75 90 105 120 135 150 165 180 195 210 225</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>8 17 33 50 66 83 99 116 132 149 165 182 198 215 231 248</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>9 18 36 54 72 90 108 126 144 162 180 198 216 234 252 270</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>10 20 39 59 78 98 117 137 156 176 195 215 234 254 273 293</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>11 21 42 53 84 105 126 147 168 189 210 231 252 273 294 315</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>11 23 45 68 90 113 135 158 180 203 225 248 270 293 315 338</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>12 24 48 72 96 120 144 168 192 216 240 264 288 315 336 360</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>13 26 51 77 102 128 153 179 204 230 255 281 306 332 357 383</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>14 27 54 81 108 135 162 189 216 243 270 297 324 351 378 405</td>
<td></td>
</tr>
<tr>
<td>95</td>
<td>14 29 57 86 114 143 171 200 228 257 285 314 342 371 399 428</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>15 30 60 90 120 150 180 210 240 270 300 330 360 390 420 450</td>
<td></td>
</tr>
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<td>105</td>
<td>16 32 63 95 156 158 189 221 252 284 315 347 378 410 441 473</td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>17 33 66 99 132 168 198 231 264 297 330 363 396 429 462 495</td>
<td></td>
</tr>
<tr>
<td>115</td>
<td>17 35 69 104 138 173 207 242 276 311 345 380 414 449 483 518</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>18 36 72 108 144 180 216 252 288 324 360 396 432 468 504 540</td>
<td></td>
</tr>
</tbody>
</table>

**Blood Pressure Lowering Drugs should be transported by EMT-Ps only.**
**Cardiovascular Drugs**

**Calcium Channel Blockers**

**Uses:** Ventricular Rate Control in A Fib, Atrial Flutter, MAT or SVT

**Adverse Effects:**
May cause Atrial Flutter, AV Block, Bradycardia, Chest Pain, CHF, Ventricular Arrhythmias, nausea/vomiting, dyspnea or hypotension

**Dosing:**

**Diltiazem (Cardizem)**
- **Bolus:** 0.25 mg/kg over 2 minutes (20 mg for average patient)
  
  If needed may repeat bolus in 15 minutes @ 0.35 mg/kg
  
  (25 mg in the average patient) over 2 – 5 minutes

- **Infusion:** Dilute 125 mg (25ml) in 100 ml NS/D5W
  
  Drip @ 5 – 15 mg/hour titrated to heart rate

**Nicardipene (Cardene)**
- **Dilute to:** 0.1 mg/ml

- **Infusion:** Start @ 50 ml/hr (5 mg/hr)
  
  May increase rate by 2.5 mg/hr every 15 minutes until desired
  
  BP is reached for a **maximum dose of 15 mg/hr**

**Special Considerations:**
Carefully monitor for hypotension/excessive bradycardia/new A/V block
PVC’s can occur with conversion to NSR
Don’t use in the presence of a WIDE COMPLEX TACHYCARDIA

Nicardipene:
- If hypotensive or tachycardic, discontinue drip.
  
  May resume when stable @ 3-5 mg/hr

- Infusion site must be changed after 12 hours

- Use with caution in patients with liver failure, since it is metabolized in the liver.

May be contraindicated in severe Aortic Stenosis as may decrease preload.
Should not be infused in same IV with other drugs
Cardiovascular Drugs

Glycoprotein IIb/IIIa Inhibitors

Use: Unstable Angina
Non Q-wave MI
Percutaneous Coronary Intervention

Adverse Effects:
Bleeding (usually at cath sites)
Possible allergic reactions to ReoPro

Dosing: Abciximab (ReoPro)
Loading bolus: 0.25 mg/kg over 10-60 minutes
Maintenance infusion: 0.125 mcg/kg/min for 12 hours following PCI
or 18-24 hours for unstable angina

Should be administered through a 0.2 or 0.22 micron filter
Drip rates will vary depending on concentration that was mixed. Verify drip
rates/dosage calculations with the transferring facility staff prior to transport.

Tirofiban (Aggrastat)
Loading infusion: 0.4 mcg/kg/min for 30 minutes
Maintenance infusion: 0.1 mcg/kg/min

Rate will be halved for patients with renal insufficiency
Dosing table for Tirofiban HCl (concentration 50 mcg/ml)

<table>
<thead>
<tr>
<th>Patient Weight</th>
<th>30 Minute Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance Infusion</td>
<td>(lb)</td>
</tr>
<tr>
<td>66-82</td>
<td>30-37</td>
</tr>
<tr>
<td>83-100</td>
<td>38-45</td>
</tr>
<tr>
<td>101-119</td>
<td>46-54</td>
</tr>
<tr>
<td>120-137</td>
<td>55-62</td>
</tr>
<tr>
<td>138-155</td>
<td>63-70</td>
</tr>
<tr>
<td>156-174</td>
<td>71-79</td>
</tr>
<tr>
<td>175-192</td>
<td>80-87</td>
</tr>
</tbody>
</table>
Eptifibatide (Integrilin)

Loading bolus: 180 mcg/kg over 1-2 minutes

Maintenance infusion: 2 mcg/kg/min up to 72 hours

Dosing table for Eptifibatide

Bolus drawn directly from “bolus-vial” (2 mg/ml)

Maintenance given directly from “infusion vial” (0.75 mcg/ml)

<table>
<thead>
<tr>
<th>Patient Weight (kg)</th>
<th>Bolus Volume (mL)</th>
<th>Infusion Rate (mL/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>37-41</td>
<td>3.4 ml</td>
<td>6 ml/hr</td>
</tr>
<tr>
<td>42-46</td>
<td>4.0 ml</td>
<td>7 ml/hr</td>
</tr>
<tr>
<td>47-53</td>
<td>4.5 ml</td>
<td>8 ml/hr</td>
</tr>
<tr>
<td>54-59</td>
<td>5.0 ml</td>
<td>9 ml/hr</td>
</tr>
<tr>
<td>60-65</td>
<td>5.6 ml</td>
<td>10 ml/hr</td>
</tr>
<tr>
<td>66-71</td>
<td>6.2 ml</td>
<td>11 ml/hr</td>
</tr>
<tr>
<td>72-78</td>
<td>6.8 ml</td>
<td>12 ml/hr</td>
</tr>
<tr>
<td>79-84</td>
<td>7.3 ml</td>
<td>13 ml/hr</td>
</tr>
<tr>
<td>85-90</td>
<td>7.9 ml</td>
<td>14 ml/hr</td>
</tr>
<tr>
<td>91-96</td>
<td>8.5 ml</td>
<td>15 ml/hr</td>
</tr>
<tr>
<td>97-103</td>
<td>9.0 ml</td>
<td>16 ml/hr</td>
</tr>
<tr>
<td>104-109</td>
<td>9.5 ml</td>
<td>17 ml/hr</td>
</tr>
<tr>
<td>110-115</td>
<td>10.2 ml</td>
<td>18 ml/hr</td>
</tr>
<tr>
<td>116-121</td>
<td>10.7 ml</td>
<td>19 ml/hr</td>
</tr>
<tr>
<td>&gt;121</td>
<td>11.3 ml</td>
<td>20 ml/hr</td>
</tr>
</tbody>
</table>

Special Considerations:

Use infusion pump

Should always be given WITH heparin; if bleeding occurs, need to turn off heparin as well as the GPIIb/IIIa drug

Eptifibatide dose will be decreased in patients with impaired renal function; settings to be determined by the patient’s ordering physician
Cardiovascular Drugs

Heparin Drip

Uses: Prevents blood clotting, especially in the following situations:
    Acute MI, Pulmonary Embolus, Deep Vein Thrombosis

Adverse Effects:
    Hemorrhage from various sites including needle sticks, GI tract, CNS bleeds

Dosing:
    Bolus: 15-18mg/kg
    Infusion: 800-1600 mg/hour
    Infusion rates may be outside this range and should not require adjustment during transport

Special Considerations:
    Use infusion pump
    D/C immediately for onset of major bleeding or acute mental status change
    Contact MC for any bleeding such as IV sites or gums
**Cardiovascular Drugs**

**Inotropes**

**Uses:**
Short term intravenous treatment of patients with acute decompensated heart failure
Severe CHF/Cardiogenic Shock
To increase cardiac output by increasing myocardial contractility and stroke volume
Hemodynamically significant hypotension not resulting from hypovolemia

**Adverse Effects:**
May develop hypokalemia resulting from increased cardiac output and/or diuresis
May have tachycardia, ventricular dysrhythmias or ectopy, hypertension, angina or ischemic chest pain
Dobutamine may also cause hypotension
Dopamine may cause nervousness, headache, palpitations, dyspnea, nausea or vomiting

**Dosing:**

**Inamrinone (Inocor):** Loading dose over 2-3 minutes: 0.75 mcg/kg
Maintenance infusion: 5-10 mcg/kg/min

**Milrinone (Primacor):** Loading dose over 10 minutes: 50 mcg/kg

<table>
<thead>
<tr>
<th>Patient Weight (kg)</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
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<tbody>
<tr>
<td>Loading Dose (mg)</td>
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<td>2.0</td>
<td>2.5</td>
<td>3.0</td>
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<td>4.0</td>
<td>4.5</td>
<td>5.0</td>
<td>5.5</td>
<td>6.0</td>
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<tr>
<td>Maintenance dose (mL/hr)</td>
<td>200 mcg/mL concentration</td>
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<td>5.6</td>
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<td>7.9</td>
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<td>mcg/kg/min</td>
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<td>4.5</td>
<td>6.0</td>
<td>7.5</td>
<td>9.0</td>
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<td>15.8</td>
<td>18.0</td>
<td>20.3</td>
<td>22.5</td>
<td>24.8</td>
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</table>
Dobutamine: 2.5 – 20 mcg/kg/min continuous infusion; onset may be 10 minutes
See dosing chart below for different concentration solutions

<table>
<thead>
<tr>
<th>PAT WT</th>
<th>IN KG</th>
<th>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 30 35 40</th>
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<td>2 3</td>
<td>5 6 8 9 11 12 14 15 17 18 20 21 23 24 26 27 29 30 38 45 53 60</td>
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<tr>
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<td>2 4</td>
<td>5 7 8 10 13 14 15 17 18 20 21 23 25 26 28 30 31 33 41 50 58 66</td>
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<td>2 4</td>
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<tr>
<td>65</td>
<td>2 4</td>
<td>6 8 10 12 14 16 18 20 21 23 25 27 29 31 33 35 37 39 49 59 68 78</td>
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<td>2 4</td>
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<tr>
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<td>2 5</td>
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<td>3 5</td>
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<td>3 6</td>
<td>9 11 14 17 20 23 26 29 31 34 37 40 43 46 48 51 54 71 88 100 114</td>
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<td>3 6</td>
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<tr>
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<td>120</td>
<td>4 7</td>
<td>11 14 18 22 25 29 32 36 40 43 47 50 54 58 81 65 96 72 90 108 126 144</td>
</tr>
</tbody>
</table>

ml / hr or drops/min. using minidrip tubing = 60 drops / ml
Dopamine:

1-20 mcg/kg/min continuous infusion
Onset may be 10 minutes
See dosing chart below for different concentration solutions

<table>
<thead>
<tr>
<th>PAT WT</th>
<th>MCG/KG/MINUTE</th>
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<tbody>
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<tr>
<td>120</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

ml/hr or drops/min. using minidrip tubing = 60 drops/ml
Epinephrine: 1-10 mcg/min titrated to desired effect

Norepinephrine: 0.5-1.0 mcg/min
(Levophed)  Titrated up to 30 mcg/min to desired hemodynamic effect

Special Considerations:
- Use infusion pump
- For Inamrinone/Milrinone:
  - do not mix with Lasix or dextrose-containing solutions
  - should be transported by EMT-Ps only
- Monitor for cardiac dysrhythmias; these may be caused by hypokalemia, pre-existing arrhythmias, abnormal drug levels, catheter placement, etc.
- Check blood pressure and heart rate frequently. Discontinue briefly if develop hypotension secondary to vasodilatation
- EMT-Ps may titrate up/down one increment without calling MC
- Contact MC for any adverse affects

Cardiovascular Drugs
Nitroglycerine Drip
Uses:   Acute Coronary Syndrome, CHF, Hypertension 
Decreases preload, and to a lesser extent, afterload 

Adverse Effects:   Excessive hypotension which can provoke angina, headache, restlessness, palpitations, tachycardia or dizziness 

Dosing:    Continuous infusion titrated to maintain therapeutic effect while avoiding hypotension. Usual range 10-200 mcg/min. May be higher in treatment of pulmonary edema.

<table>
<thead>
<tr>
<th>NITROGLYCERIN DOSING CHART</th>
<th>DOUBLE CONCENTRATION NITROGLYCERIN DOSING CHART</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONCENTRATION 200MCG/ML</strong></td>
<td><strong>CONCENTRATION 400MCG/ML</strong></td>
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<td>100 MG/500 ML</td>
<td>100 MG/250 ML</td>
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<td>50 MG/250 ML</td>
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<tr>
<td>MCG/MIN</td>
<td>MCG/MIN</td>
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<td>PUMP SETTING</td>
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<td>140</td>
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<td>150</td>
<td>290</td>
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</table>

Special Considerations:    Use Infusion pump 
Monitor heart rhythm 
Check BP and HR frequently (every 5 minutes); may decrease to every 10 minutes if at the same rate for >1 hour 
Do not mix other medications in the same line 
Hypotension can be alleviated by decreasing the rate of infusion 
D/C infusion if BP systolic is <60mm Hg and contact MC 
Contact MC for worsening or persisting adverse signs/symptoms or for persisting BP < 90 mmHg 

*EMT-CCs may transport patients with a MAXIMUM rate of 100 mcg/min* 
*EMTs may perform one titration of 10 mcg for escalating chest pain without contacting MC*
**Cardiovascular Drugs**

**Thrombolytic Therapy**

**Uses:**
D Dissolves clots in blood vessels
Generally used in the setting of Acute MI or CVA; occasionally used Pulmonary Embolus

**Adverse Effects:**
- Minor hemorrhages from IV sites and gums
- Major hemorrhage from GI and intracranial or spinal sites
- Reperfusion dysrhythmias often occur about 30-60 minutes after starting infusion
- Allergic reactions including anaphylaxis may occur with Streptokinase or APSAC

**Dosing:**

**Streptokinase, APSAC or TPA:**
Dose to be determined by transferring physician
(determined by patient weight and indication for therapy)
Rate should not require adjusting en route

**Tenecteplase (TNK):**
- weight-based one time dose, administered over 5 seconds
- Pt weight: ≤60 kg Dose: 30 mg
  >60 - <70 kg 35 mg
  ≥70 - <80 40 mg
  ≥80 - <90 45 mg
  ≥90 50 mg

Occasionally used as continuous infusion for peripheral arterial thrombus
0.25-0.5 mg/hour up to 48 hours

**Retevase:**
- Given in 2 doses of 10 mg each, 30 minutes apart
- Given as a 2 minute IV push

**Special Considerations:**
- Use infusion pump
- Monitor heart rhythm
- Check BP and HR frequently
- Do not mix with other medications in the same line
- D/C infusion immediately if there is cardiac arrest, major hemorrhage, anaphylaxis or change in mental status AND call MC.
b. Sedation and Paralytic Agents

i. Benzodiazepine Drips

ii. Moderate Sedation Agents

iii. Opioid Drips

iv. Paralytic Agents
Sedation and Paralytic Agents

Benzodiazepine Drips

**Uses:** Sedation for patients who are intubated (and often concurrently on a paralytic drip)

May be used to treat Status Epilepticus

**Adverse Effects:**

- May be more prone to hypotension if used with an opioid drug
- Can cause paradoxical agitation, hypertension or tachycardia

**Dosing:**

**Lorazepam (Ativan):**

- Loading dose: 0.5-4.0 mg IV bolus; may be repeated in 10 min
- Infusion: 0.02-0.1 mg/kg/hour

**Midazolam (Versed):**

- Loading dose: 0.01-0.1 mg/kg IV bolus
- Infusion 0.02-0.1 mg/kg/hour

**Special Considerations:**

- Only to be used in intubated patients
**Sedation and Paralytic Agents**

**Moderate Sedation Agents**

**Uses:**
Sedation for patients who are intubated (and often concurrently on a paralytic drip)
May also be used for refractory seizures or therapeutic coma

**Adverse Effects:**
May be more prone to hypotension if used with an opioid drug
Can cause paradoxical agitation, hypertension or tachycardia

**Dosing:**

**Propofol:**
Loading dose: 0.5-5 mg/kg
Maintenance infusion: 2-10 mg/kg/hour

**Barbiturates:** *Pentobarbital* is most commonly used
Loading dose: 10 mg/kg; infuse up to 25 mg/min
Maintenance: 1-2 mg/kg/hour

**Ketamine:**
Loading dose: 1-5 mg/kg
Maintenance infusion: 0.01-0.05 mg/kg/hour

**Special Considerations:**
Only to be used in intubated patients
Sedation and Paralytic Agents

Opioid Drugs/Drips

**Uses:** Typically part of a sedation combination for patients who are intubated
Occasionally for pain control

**Adverse Effects:**
May cause hypotension, especially in volume depleted patients or those with right-sided heart failure

**Dosing:**

**Morphine:**
- Loading dose: 2 mg increments given every 5-10 minutes until adequate pain control; typically max dose is 10 mg - may be higher in patients on chronic pain therapy
- Infusion: 1-10 mg/hour

**Fentanyl:**
- Loading dose: 1-5 mcg/kg given IV push
- Infusion: 1-5 mcg/kg/hour

**Special Considerations:**
Not advisable to give patients on narcotic drips Naloxone, as this may precipitate acute withdrawal
Antihistamines (both H1 and H2) may counteract hypotension; this is an MCO
**Sedation and Paralytic Agents**

**Paralytic Agents**

**Uses:** Total muscular paralysis when patient movement may:
1. Compromise airway control (e.g. causing unwanted extubation)
2. Exacerbate a real or potential illness or injury (e.g. spinal cord injury from a spine fracture)
3. Endanger the patient, EMS care provider or others

**Adverse Effects:**
Bronchospasm, flushing, hypotension and tachycardia have been rarely reported

**Dosing:**

**Pancuronium:** Loading dose: 10 mg/kg
May repeat dose every 1-2 hours as needed

**Vecuronium:** Initial dose 10 mg IV push
Repeat dose of 10 mg IV push every 20-40 minutes as needed
Maintenance infusion may be an alternative:
1.1 mg/kg/min

**Rocuronium:** Loading dose 0.6 mg/kg
May rebolus 0.2 mg/kg every 30-45 minutes
Maintenance infusion may be an alternative:
1.1 – 0.15 mg/kg/min

**Special Considerations:**
Produces COMPLETE APNEA; therefore an intact airway (e.g. endotracheal intubation), and adequate ventilation/oxygenation MUST BE ESTABLISHED PRIOR TO ADMINISTRATION. Likewise, personnel and equipment with the ability to restore an airway, ventilation and oxygenation must be available during transport.

Causes paralysis only; **therefore concomitant use of a sedative/hypnotic is indicated**

Note: Paralysis may alter the clinical exam. For example, motor seizure activity will not
be seen, but the brain will continue to undergo seizure activity, and this must be treated! Also, conditions such as shock, hypoxia, pain, intracranial injury, hypoglycemia, etc. maybe the cause of this unwanted, spontaneous patient movement in the first place. These conditions must be addressed but may be masked by the paralytic agent!

c. **CNS Drugs**

i. *Anticonvulsants*

ii. *Mannitol*

iii. *Steroids*
CNS Drugs

Anticonvulsants

Uses: Prevention and treatment of seizures

Adverse Effects:
If intravenous phenytoin is given too rapidly, may result in:
1) Cardiac dysrhythmias including ventricular fibrillation or asystole
2) Hypotension
Subcutaneous extravasation of intravenous phenytoin may cause tissue necrosis or pain at the IV site

Dosing: Phenytoin: 100-1200mg IV piggy back in normal saline;
Rate not to exceed 50 mg/min

Fosphenytoin: dose expressed in phenytoin equivalents (PE)
15-20 PE/kg ; rate up to 100-150 PE/min

Valproic Acid: 40-60 mg/kg
Rate up to 3 mg/kg/min

Special Considerations:
Use infusion pump
Monitor heart rhythm
Check BP frequently; vital sign monitor recommended
D/C infusion and contact MC for any adverse effects
**CNS Drugs**

**Mannitol**

**Uses:** Treatment of increased intracranial pressure or selected fluid overload states

**Adverse Effects:**
- Hypernatremia
- Volume Depletion

**Dosing:** 25-50 grams IV push or bolus infusion (in 50cc D5W over 20 minutes)

**Special Considerations:**
- Patients receiving mannitol should have a Foley to monitor fluid status
**CNS Drugs**

**Steroids**

**Uses:**
- Spinal cord injury to decrease edema
- Cerebral edema due to injury or CNS mass or lesion

**Adverse Effects:**
- GI Bleed
- Electrolyte disturbance and hyperglycemia
- Hypertension or Acute CHF
- Agitation
- Corticosteroid hormonal suppression (hypoglycemia, hypotension, hypothermia)
- Higher risk for infection or masking symptoms of infection

**Dosing:**

- **Methylprednisolone (Solumedrol):**
  - Initial bolus: 30 mg/kg over 15 minutes
  - Start infusion 45 minutes later: 5.4 mg/kg/hour for 23 hours

- **Dexamethasone (Decadron):**
  - 0.1-0.6 mg/kg day
  - May be given as IV drip of 2 mg/kg over 2 hours

**Special Considerations:**
- Contact MC for question of adverse effects
d. Hyperalimentation/TPN, Insulin and Electrolytes

i. Hyperalimentation/TPN

ii. Insulin Drip

iii. Potassium Chloride
Hyperalimentation/TPN, Insulin, Electrolyte solutions

Hyperalimentation/TPN

Uses: Intravenous nutrition

Adverse Effects:
- Catheter related sepsis
- Air embolism if central venous IV tubing becomes disconnected
- Subcutaneous extravasation of solution can cause tissue necrosis
- Discontinuation of infusion may cause hypoglycemia

Dosage:
Continuous infusion usually through central venous catheter but occasionally through a peripheral IV line.
Rate should not require adjustment enroute.

Special Considerations:
- Use infusion pump.
- Do not administer any other medication through the same IV line.
- Contact MC for any adverse effects listed above
- Consider use of a cardiac monitor
**Insulin**

**Uses:**
Lowers blood glucose
Used in diabetics especially with ketoacidosis or hyperosmolar nonketonic coma.

**Adverse Effects:**
Hypoglycemia related (tachycardia, diaphoresis, mental status changes, and seizures)

**Dosage:**
5-15 units per hour but dosages outside this range may be used.

**Special Considerations:**
Use infusion pump
Do not administer medications in the same IV line except D50.
If symptoms of hypoglycemia develop:
- turn off infusion,
- perform a D-Stick
- administer 25 grams, (one AMP) D50) if glucose <80,
- contact MC.

Monitor blood sugar every 30 minutes during transport
Cardiac monitoring required

**EMT-CCs may manage isolated insulin drip or with one additional drip**
**Hyperalimentation/TPN, Insulin, Electrolyte solutions**

**Potassium Chloride**

**Uses:** Replacement therapy for hypokalemia

**Adverse Effects:**
- Cardiac dysrhythmias (prolonged PR interval; wide QRS complex; depressed ST segment; tall, peaked T-waves; heart block; cardiac arrest)
- Subcutaneous extravasation of solution can cause tissue necrosis

**Dosage:** Usual range is up to 20 mEq / hr., continuous infusion. May be mixed with various IV solutions in various sized bags including “piggy back” solutions. Rate should not require adjustment en route.

**Special Considerations:**
- Monitor heart rhythm
- Often causes burning during infusion; contact MC if this is problematic
- Contact MC for changes in EKG configuration and/or dysrhythmias.
e. Obstetric Drugs
   i. Magnesium Sulfate
   ii. Oxytocin
Obstetric Drugs

Magnesium Sulfate

Uses: Treatment of pre-eclampsia and eclamptic seizures
Premature rupture of membranes

Adverse Effects:
Lethargy, nausea, vomiting, hypotonia, respiratory depression, dysrythmia

Dosing: Loading dose: 2-6 grams IV over 15 minutes
(may give 2 grams over 5 minutes)
Followed by either: 5 grams IM in each buttock
Maintenance infusion: 1-2 grams/hr

Special Considerations:
Monitor reflexes
For symptomatic toxicity: 10 mLs of 10% Calcium Chloride and contact MC
MC may also request furosemide and/or NS bolus as MCO
In renal failure, patient may require emergency dialysis
Obstetric Drugs

Oxytocin (Pitocin)

Uses: Stimulates post-partum contraction of the uterus to control bleeding

Adverse Effects:
Hypertension, tachycardia, dysrhythmias

Dosing:
10-40 units added to 1000 mL IV fluid to control hemorrhage
Usual rate is 10-20 milliunits/min

Special Considerations:
Use infusion pump
Monitor heart rhythm
Check BP frequently; vital sign monitor recommended
Contact MC for any adverse effects
f. Anti-Infective Therapy
   i. Antibiotics
   ii. Antifungals
Anti-Infective Therapy

Antibiotics and Antivirals

Uses: Bacterial or Viral infections (treatment and prophylaxis)

Adverse Effects: Allergic signs and symptoms, including anaphylaxis

Dosage: Vary depending on the antibiotic
Generally given as a “piggyback” solution
Rate should not require adjustment en route

Special Consideration: D/C infusions if there are any allergic signs or symptoms, then contact MC.

Most Commonly used: Acyclovir
Azithromycin (Zithromax)
Cefazolin (Ancef)
Ceftriaxone (Rocephin)
Gentamicin
Levofloxacin (Levaquin)
Metronidazole (Flagyl)
Piperacillin/Tazobactam (Zosyn)
Vancomycin
Anti-Infective Therapy

Antifungals

Uses: Fungal infections
      Often in immune-compromised patients, those on chemotherapy or chronic antibiotics

Adverse Effects:
      Nausea or diarrhea
      Amphotericin- fever, rigors, chills

Dosing: Amphotericin B, Azoles or “Fungins”:
        Usually given as bolus dosing once daily to TID
        May be given as continuous bladder irrigation: 50 mg/liter
        Over 24 hours @ 42 ml/hour

Special Considerations:
        Drug interactions may occur with statins, coumadin, antivirals, benzodiazepines,
        oral hypoglycemic drugs and transplant anti-rejection drugs
        Side effects can be pre-treated with Acetaminophen or Diphenhydramine
g. **Pain Control**

i. *Opioid Drips*

ii. *PCA Pumps and Subcutaneous Pumps*

iii. *Anesthetic Sprays or Topical Gels*
**Pain Control**

**Opioid Drips**

**Uses:** Control of pain

**Adverse Effects:**
May cause hypotension, especially in volume depleted patients or those with right-sided heart failure
Respiratory Depression

**Dosing:**

**Morphine:** Loading dose: 2 mg increments given every 5-10 minutes until adequate pain control; typically max dose is 10 mg - may be higher in patients on chronic pain therapy
Infusion: 1-10 mg/hour

**Fentanyl:** Loading dose: 1-5 mcg/kg given IV push
Infusion: 1-5 mcg/kg/hour

**Hydromorphone (Dilaudid):** Loading dose: 0.5-4 mg IV slow push
Continuous infusion: 1-10 mg/hour

**Special Considerations:**
Avoid Naloxone as this could precipitate acute withdrawal
Pump malfunction could precipitate withdrawal
Antihistamines (both H1 and H2) may counteract hypotension; this is an MC option
Pain Control
PCA (Patient Controlled Anesthesia) Pumps and Subcutaneous Pumps

Uses: Treatment for patients with palliative care or chronic pain conditions
       Often PO analgesia is not feasible

Adverse Effects:
   Hypotension
   Respiratory depression
   Catheter site infection or irritation

Dosing:
PCA (Patient Controlled Analgesia) Pumps
   Morphine, Fentanyl and Hydromorphone are most commonly used.
   Pre-programmed settings for patient
   Patient may require assistance to “self-administer” medication

Subcutaneous Catheter Pumps
   Morphine most commonly used.
   Up to 2 mLs volume at a time regardless of concentration
   May also give IV fluids at a usual rate of 1-10 mLs/hour; MAX of 25 mLs/hr

Special Considerations:
   Encourage patient to use medication as needed
   Avoid Naloxone as this could precipitate acute withdrawal
   Pump malfunction could precipitate withdrawal
   Subcutaneous catheter sites need to be changed every 7 days
Pain Control

Sprays and Gels

**Uses:**
Topical pain control- usually prior to a procedure

**Adverse Effects:**
- Allergy to medication
- Depressed gag reflex if used orally

**Dosing:**
- **Sprays:** Usually 2-3 sprays to desired area
- **Topical gels:** Enough to thinly cover area

  Duration can be minutes to hours

**Special Considerations:**
Some can induce *Methemoglobinemia*. Watch for hypoxia
h. **Antidotes**
   i. *NAC*
   ii. *Sodium Thiosulfate*
   iii. *Thiamine*
   iv. *Bicarbonate Drip*
   v. *Pyridoxine*
   vi. *Atropine/2-PAM*
Antidotes

N-Acetyl Cysteine or NAC (Acetadote)

Uses: Acetaminophen overdose- toxic quantities

Adverse Effects:
Anaphylactoid type reactions (urticaria, flushing, hypotension and bronchospasm)

Dosing:
Loading dose: 150 mg/kg over 15-20 minutes
Maintenance infusion: 50 mg/kg over 4 hours
then 100 mg/kg over 16 hours

Special Considerations:
Ideal time of onset of treatment is within 8-10 hours of ingestion
Anaphylactoid reactions may be treated with IV diphenhydramine
Maintenance infusion must be doubled at the 4 hour period
Antidotes
Cyanide Antidote Kit
(Amyl Nitrate, Sodium Nitrate, Sodium Thiosulfate)

Uses: Cyanide poisoning

Adverse Effects: May cause methemoglobinemia

Dosing: Dosing as described in kit; weight based for children

Special Considerations: Not to be used with Carbon Monoxide poisoning
Antidotes

Thiamine

Uses: Wernicke’s Encephalopathy

Adverse Effects:
Possible anaphylactic reactions

Dosing: 100 mg IV over 15-30 minutes

Special Considerations:
Glucose administration in nutritionally depleted patients should be accompanied by thiamine
**Antidotes**

**Bicarbonate Drip**

**Uses:**
- Tricyclic, aspirin or other acidotic overdoses
- Renal protection after IV contrast or severe muscle breakdown (rhabdomyolysis)

**Adverse Effects:**
- Sodium load

**Dosing:**
- Titrated to urine pH >7 by hospital staff

**Special Considerations:**
- Usually will have a Foley to check urine pH and output
- May be associated with hypokalemia
Antidotes

Pyridoxine (Vitamin B6)

Uses: Isoniazide (INH) Overdose

Adverse Effects:
- GI upset
- Headache or sleepiness
- Tingling or burning of hands/feet

Dosing: 5 grams IV over 3 – 5 minutes; repeat every 5-20 minutes until seizures resolve

Special Considerations:
- Often patient is in status epilepticus; seizures may respond to benzodiazepines
Antidotes

Atropine/2-PAM

Uses: For SEVERE Cholinesterase Inhibitor poisoning (e.g. pesticides, nerve agent)

Adverse Effects: Blurry vision, dry mouth

Dosing: Atropine: 2-4 mg given every 5 minutes until signs of atropinization (this may take 25-50 mg)

2-PAM (2-pyridinealdoxime)
1 gram slow IV injection; if muscle weakness persists, give additional 500 mg after 30 minutes

Special Considerations:
2-PAM should be given WITH Atropine
i. GI Drugs
   i. Antiemetic Agents
   ii. Acid Reduction
   iii. GI Bleed Related Medications
GI Drugs

Antiemetic Agents

Uses: For control of severe nausea and vomiting

Adverse Reactions:
- Drowsiness, dizziness, blurred vision, skin reactions, hypotension
- Extrapyramidal symptoms (EPS) – motor restlessness, dystonic reactions, pseudo-parkinsonism, tardive dyskinesia with metaclopramide, prochlorperazine, or promethazine
- Headache or dizziness may occur with ondansetron

Dose:

- **Metaclopramide (Reglan)**
  10 mg IV over 2 minutes
  If needed, dose may be repeated once in 10 minutes

- **Prochlorperazine (Compazine)**
  5 mg IV over 2 minutes
  If needed, dose may be repeated once in 10 minutes

- **Promethazine (Phenergan)**
  25 mg IV over 2 minutes
  If needed, dose may be repeated once in 10 minutes

- **Ondansetron (Zofran)**
  4 mg slow IV over 2 minutes or IM
  If needed, dose may be repeated once in 10 minutes

Special Considerations:
- Extra-pyramidal symptoms may be treated by administering Diphenhydramine (Benadryl) 50 mg IV over 2 minutes
- Confirm with MD regarding IV administration of Promethazine due to “black box warning”
GI Drugs

Acid Reduction

Uses: Decrease secretion of gastric acid or chronic reflux
Patients with UGI Bleed

Adverse Effects: (all rare)
Occasional CNS symptoms- more so in the elderly
Jaundice
GI upset

Dosing:

**Pantoprazole (Protonix)**
- Bolus: 80 mg over 5 minutes;
- Infusion: 8 mg/hour

**Lansoprazole (Prevacid)**
- Bolus: 30-60 mg over 30 minutes
- Infusion: 6 mg/hour

**Ranitidine (Zantac)**
- Bolus: 50 mg over 20-30 minutes
- Infusion: 150 mg over 24 hours

Special Considerations:
May be used for antihistamine effects
GI Drugs

GI Bleed Related Medications

Uses: Variceal Upper GI Bleed

Adverse Effects:
- Gall Bladder sludging or stones
- Diarrhea and GI Upset
- Hypoglycemia

Dosing: Octreotide: 50 mcg IV bolus, then 50 mcg/hour

Special Considerations:
- Alters the balance between insulin/glucagon; could result in either hypoglycemia or hyperglycemia
- Vasopressin is presently rarely used due to its potent vasoconstrictive and catecholamine inducing properties
III. Devices

a. Temporary Cardiac Pacing
b. Chest Tubes
c. VADs
d. Trachetosomy Care
e. BiPap Machines
f. Invasive Cardiovascular Monitoring
g. ICP Monitors
i. Insulin Pumps
j. Central Vascular Access
Devices

Temporary Cardiac Pacing

**Uses:**

To ensure adequate heart rate; Most common use is for symptomatic bradycardia or heart block

**Adverse Effects:**

Problems related to transvenous/transthoracic insertion: pericardial tamponade, pneumothorax, myocardial perforation, air embolus sepsis and thrombophlebitis

Failure to pace due to: displacement of pacing electrode (most common complication), loose connection, faulty generator, myocardial ischemia

Failure to sense due to: patient’s native beats not sensed by the pacemaker and the output pulse may occur after a spontaneous beat which may induce dysrhythmias

Catheter induced dysrhythmias

**Pacer Box Settings:**

- **Rate control:** usually between 60-100 beats/minute
- **Output** (electric current used to stimulate myocardium): usually between 5-20 mAmps
- **Sensitivity control:** used to sense heart’s native electric activity (QRS deflection)

**Special Considerations:**

Monitor heart rhythm. A functioning pacemaker usually reveals a pacer spike followed by a bundle branch pattern on the monitor strip

Contact MC if develops a bradycardia with no pacer spikes or non capturing of the QRS;

consider initiating transthoracic pacing if patient is unstable
Devices

Thoracostomy Tubes (Chest Tubes)

**Uses:** To evacuate an abnormal collection of air (pneumothorax), blood (hemothorax) or fluid (pleural effusion) from the pleural space

**Complications:**
- Mechanical problems: tube dislodgement from the wall, air leaks from tubing, drainage site or skin site
- Blocked drainage: kinked tube or clots
- Bleeding: local incision hematoma, artery or vein laceration
- Visceral perforation
- Re-expansion pulmonary edema

**Procedure:** Usually placed in the midaxillary line at the fifth-seventh intercostal space, or in the midclavicular line at the second intercostal space. Tube is sutured to the chest wall and Vaseline gauze and an adhesive bandage are placed over the site. The distal part of the chest tube is connected to a chest drainage system (under a water seal) which includes an air seal, a drainage reservoir and suction capability.

**Special Considerations:**
- Avoid traction on the chest tube; this could dislodge the tube
- The chest tube drainage system should remain below the chest level
- Avoid kinking or clamping the drainage system
- Contact MC if any of the above complications develop, or if the patient develops shortness of breath or change in vital signs.
Devices

Ventricular Assist Devices (VADs)

Uses: Implantable external heart pump used to treat patients with debilitating heart failure
May be used in patients who are not candidates for transplant as well as those awaiting transplant

FAQs: There are many types of VAD units; some have pulses (usually pulse will not be in sync with the patient’s rhythm) and some are continuous flow units resulting in no pulse

Complications:

VAD Pump Failure: Need to initiate hand pumping at a rate of 60-90 strokes/min; may be a Bi-VAD with two pumps
Disconnect power source first; prime pump with a purge valve before use

VAD Working- Blood Flow Low- ECG Abnormal:
Usually with a single VAD device; patient’s function is influenced by arrhythmia-
may need to treat the rhythm if patient is symptomatic
LVAD (Left-sided VAD) patient may require large amounts of IV fluids
RVAD (Right-sided VAD) patient should not get IV fluids

VAD Working- Blood Flow Low- ECG Normal:
Hypovolemia; could be internal bleeding. If symptomatic initiate appropriate therapy to treat cause of hypovolemia

Procedures: If need to transport a STABLE patient…
Heart monitor: ECG may not match pulse
Large bore IV should be started
Bring companion with patient if available who is able to hand pump the VAD if needed

Bring backup equipment: Hand pumps, extra batteries, primary and backup drivers, if available

Special Considerations:

Need to ask patient:
1. Can I perform CPR on you?
2. IF not- is there a hand pump?
3. If the device slows down- will alarms go off for low flow state?
4. How can I speed up the device?
5. Does patient need heparin if the device slows down?
6. Can patient be defibrillated while connected to the device?
7. If can be defibrillated, do I need to disconnect anything first?
8. Does the patient usually have a pulse with the device?
9. What are acceptable vital sign parameters?
10. Can patient be externally paced?

Contact Patient’s Cardiac Care Team ASAP for problems and prior to transfer

Unstable VAD patients should be transferred with a higher level of care

Devices

Tracheostomy Care

Uses: Inadequate airway
Respiratory Insufficiency
Excessive secretions
Need for prolonged mechanical ventilation

Adverse Effects:
Dislodgement of tracheostomy tube
Obstruction of tube or stoma
Malfunction of mechanical ventilator or loss of O2 supply

Procedures: Suctioning:
Sterile gloves
Suction with 120-150mmHg (adults); 80-100mm Hg (pediatric)
Hyperventilate with 100% O2
Suction up to 10 seconds (adult); up to 3-4 seconds (pediatric)
If mucus plugs/thick secretions- may instill 3-5cc sterile saline

Bronchodilator Administration:
Assemble nebulizer assembly as usual
Attach trach collar to reservoir tubing
Connect to oxygen source at a flow rate sufficient to produce misting
Fit trach collar over stoma and have patient breathe slowly and deeply
**Stoma Intubation:**
Select largest tube able to fit in stoma without force; cuffed for adult, uncuffed for pediatric
Sterile gloves
Hyperventilate with 100% O2
Suction, if necessary.
Pass the ET tube and inflate the cuff. The tube will protrude several inches.
Hold the tube and watch for chest rise with ventilation; secure the tube.
Auscultate the lung fields. Check for subcutaneous emphysema.
Allow no longer than 30 seconds for the procedure.

**Special Considerations:**
Avoid oral intubation if possible
DO NOT USE DEMAND VALVE WITH BVM!

**Devices**

**BiPap Machines**

**Uses:** Obstructive Apnea
Respiratory Insufficiency

**Adverse Effects:**
Chance of Pneumothorax
Mechanical failure
Disconnected tubing
Misfit of facial/nasal mask
Drying of mouth/nasal passages

**Special Considerations:**
Usually will not involve intervention by EMS- should be pre-set
If fails, may need to switch to CPAP or supplemental O2; contact MC
Devices

Invasive Cardiovascular Monitoring

Uses: Usually used to monitor Cardiac Output
Used in ICU setting with ICU monitors- not for EMS use

Complications:

Arterial Line Pressure Monitor:
- Hematomas
- Distal ischemia/ thrombosis
- Disconnection and hemorrhage
- Inadvertent drug injection

Swan-Ganz catheter:
- Arrhythmias
- Knotting and displacement
- Cardiac Valve trauma
- Pulmonary Artery Rupture
- Balloon Rupture
- Catheter thrombosis or embolism

Monitor components:

Arterial Line Pressure Monitor:
Arterial cannula
Monitoring line
Transducer
Monitoring system

Swan-Ganz catheter:
Balloon tipped catheter through central vein; floated through right side of heart
into pulmonary artery
Monitoring line
Transducer
Monitoring System

Special Considerations:
Require prolonged pressure if lines are pulled out
Devices

Intracranial Pressure (ICP) Monitors

Uses: Measurement of Intracranial Pressure in ICU setting
May also be used to relieve pressure as well

Adverse Effects:
Infection at skin site into brain
Dislodgement of catheter

Special Considerations:
If pulls out- apply sterile dressing; may have CSF leaking from site
**Devices**

**Insulin Pumps**

**Uses:** Computerized device delivering a steady dose of insulin (basal rate) through a flexible subcutaneous catheter

**Adverse Effects:** Hypoglycemia can occur

**Dosing:** Patient has a pre-set basal rate and pre-programmed corrections

**Special Considerations:**
- If hypoglycemic, treat as per protocol
- If seemingly in DKA (Diabetic Ketoacidosis), make sure the pump is working or the catheter is intact

**SHOULD NOT REQUIRE ANY DIRECT INTERVENTION BY TRANSPORTING CREW UNLESS**
- **PATIENT BECOMES HYPOGLYCEMIC; IN THAT SCENARIO, TURN OFF THE PUMP**
Devices

Central Vascular Access

**Uses:** Specialty vascular access in patient with problematic access or requiring frequent infusion of medication or parenteral nutrition

**Adverse Effects:**
- Line infection can cause bacteremia/sepsis
- Complications can be related to insertion of line such as pneumothorax, hematomas, vascular rupture

**Different Types:**

**Triple Lumen Central Venous Catheter:**
- Can be in Femoral, Internal Jugular or Subclavian location
- Usually red hub is for blood draws- it is typically the most certain line of the three ports in emergency situations

**Indwelling Catheter**

**External Access (Broviac, Hickmann, Groshung) catheters:**
- Usually placed in Subclavian region
- Usually contains heparin; draw 10 mL waste before infusions

**Implanted ports (Part-a-cath, Bard Port):**
- Require Huber needle to access

**Shiley:** Usually used for dialysis
- Usually contains heparin; draw 10 mL waste before infusions, then flush with saline if needed in emergency situations

**Peripherally Inserted Central Catheter (PICC) line:**
- Location usually in the antcubital regions
- Usually contains heparin; draw 10 mL waste before infusions

**Special Considerations:**
- STERILE TECHNIQUE is imperative!
- **Only to be accessed in emergency situations**
IV. Pediatric Transfer Protocols

a. Anticonvulsants

b. Continuous Albuterol Nebulization

c. Insulin Drip

d. IV Antibiotics

Pediatric Transfers

Anticonvulsants

Uses: Prevention and treatment of seizures

Adverse Effects:
Ventricular dysrhythmias or hypotension if phenytoin given too rapidly
Respiratory depression, especially with benzodiazepines or phenobarbital
Subcutaneous extravasation may cause tissue necrosis

Dosing: Phenytoin: 10-20 mg/kg; IV piggy back in NS
Rate not to exceed 50 mg/min
Fosphenytoin: 15-20 PE/kg (phenytoin Equivalents)
Up to 150 PE/min

Propofol: Loading dose: 3 mg/kg
Maintenance infusion: 50 mcg/kg/min
May increase up to 250 mcg/kg/min

Special Considerations:
Monitor heart rhythm
Use infusion pump
Check BP frequently; vital sign monitor if available
D/C Infusion and contact MC for adverse reactions
**Pediatric Transfers**

**Continuous Albuterol Nebulization**

**Uses:** Treatment of status asthmaticus

**Adverse Effects:**
- Tachycardia
- Nervousness, headache, shakiness
- Nausea/vomiting
- Hypokalemia

**Dosing:** 0.5 mg/kg/hour or otherwise directed by MC

**Special Considerations:**
- Need to use a special large volume nebulizer designed for continuous administration
- Cardiac monitor
- Should have IV running concurrently
**Pediatric Transfers**

**Insulin Drip**

**Uses:** Lower blood glucose and treat diabetic ketoacidosis

**Adverse Effects:**
- Hypoglycemia (tachycardia, diaphoresis, mental status change, seizure)
- Hypokalemia (occurs as acidosis improves)

**Dosing:** 0.05-0.1 units/kg/hour; may be varied depending on glucose response by patient

**Special Considerations:**
- Glucose must be checked every hour
- If hypoglycemia occurs, D/C insulin drip and administer D25 (2-4 mL/kg)
Pediatric Transfers

IV Antibiotics

**Uses:** Treat infections and prophylaxis

**Adverse Effects:**
- Allergic signs and symptoms, including anaphylaxis

**Dosing:**
- Varies depending on antibiotic and patient weight/size
- Generally given as a piggyback infusion
- Rate should not require change en route

**Special Considerations:**
- D/C infusion if allergic signs and symptoms
- Contact MC
V. Special Situations

a. The Hospice Patient

b. The Pediatric Patient and Consent Issues

c. The Psychiatric Patient

d. The Therapeutically Cooled Patient
Special Situations

The Hospice Patient

I. **Introduction**

The Hospice patient presents a unique situation in regards to care and transport. These patients have often been deemed to be in the terminal stages of a disease process, for which treatment is no longer effective in reversing or arresting the progress of the disease. Care becomes focused on patient and family comfort, which often flies in the face of usual resuscitative care. What might be considered as an unstable patient might well be in line with the course as planned by the patient’s caregivers. Family members are often torn between sticking with the recognized treatment plan versus emotion as they see their loved one approach their end.

It is important to keep in mind that these patients do not have a situation that can be fixed. It is often up to us to gently encourage the family to adhere to the goal of patient comfort. The Hospice patient truly has needs that are not those of the usual prehospital patient and special considerations need to be made in the response of the prehospital provider.

II. **Assessment**

The assessment of the Hospice patient requires a redefinition of what is considered an “unstable” vital sign requiring action. A terminal patient might have either lower or higher parameters in temperature, heart rate, respiratory rate or blood pressure. The ABC’s might also be altered. This is not unexpected.

An important part of the assessment is evaluation of the DNR status. IF the patient or family do not have a copy of the DNR or MOLST form, Hospice staff is often able to fax a copy, or at least confirm the existence of the DNR status if necessary.

III. **Treatment**

In general, the only measures that should be implemented are oxygen or stretcher positioning. Narcotic administration might be in order; however, medical control should be contacted if there are questions regarding administration.

Typically, Hospice patients should not receive an IV or be placed on a cardiac monitor, unless there has been direction by Hospice to do so. Their medications are usually given orally (e.g. Roxanol), transcutaneously (e.g. opioid drug patch) or subcutaneously per Hospice. Morphine may be given as per ALS Pain Protocol if this has been approved in the patient’s Hospice care plan.

IV. **Medical Direction**

The Hospice patient is still under Medical Control by a Base Station medical physician. However, since these patients are in a situation that is more similar to an “Interfacility Transport”, input may be made by the Hospice physician. The patient’s plan of care may be confirmed with them.

V. **Transport**

If the decision is made for the patient to be transported to the Hospice Inpatient Unit either for an acute intervention or for an inpatient bed, then there are considerations to be made.

The destination of the patient should be as directed by Hospice. This might include direct transport to an inpatient unit at a hospital, bypassing the Emergency Dept.
The medications that the patient is on should accompany the patient to the Hospice Inpatient Unit. However, if the patient is being brought to a Hospice Unit in a hospital, family members should bring the medications (a list is adequate). In keeping with the goal of patient comfort, lights and sirens should not be used during transport. If the patient expires in the ambulance anytime during transport, the patient should be taken to the previously instructed facility. **DO NOT** take the patient back home.

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**Special Situations**

**The Pediatric Patient and Consent Issues**

I. **Introduction**

Transport and treatment of a pediatric patient is met with unique issues. The pediatric patient is unable to give consent/refusal as they are a minor. Usually, the patient’s parent or guardian will be available to give consent. However, there are times when either the legal guardian is not available or does not have legal ability to consent.

In New York State a pediatric patient is considered a minor until the day that they reach 18 years of age.

The following is a review of situations where consent might be given by someone other than the child’s legal guardian.

II. **The Emancipated Minor**
New York’s case law defines the status of an **emancipated minor** as being characterized by renunciation of parental rights.

Also, a minor is considered emancipated if the following events have occurred:
- He or she is married.
- He or she is in the armed services.
- He or she has established a home and is financially independent.
- His or her parent has failed to fulfill parental support obligations and the minor seeks emancipation.

### III. The CPS patient

Occasionally a child presents with a picture of abuse or negligence, and the suspected perpetrator is the legal guardian. Mandated reporters must make a report to New York State Child Protective Services (CPS). After a preliminary investigation, CPS might decide to take custody of the child. There should be documentation of the CPS custody with the patient’s chart. This will allow care of the child to proceed.

### IV. The Guardian is Unavailable

In situations where a child’s guardian is unable to be reached or are incapacitated, administrative consent might be obtained. This can be confirmed with the transferring facility.

### Special Situations

#### The Psychiatric Patient

1. **Introduction**

Psychiatric patients often present to facilities where there is no ability to perform a psychiatric assessment or offer treatment for psychiatric illness. In these situations, patients need to be transported to a facility able to offer psychiatric intervention.

Needless to say, these patients are often not desirous of such intervention. New York State Mental Hygiene law makes provision to allow caregivers the ability to hold a patient against their will until they are psychiatrically evaluated or treated and deemed safe for discharge with no lethality or risk of harm to self or others. However, in order to assure that a patient’s rights are not violated, there exist various NYS forms which must be filled out by a physician or designated peace officer. The
following is a review of what forms are required for which situation. They are required for a transporting agency to transport a patient against their will.

II. Section 9.27

This form is called the Application for Involuntary Admission of Medical Certification. This form is filled out by a physician who must certify that a patient requires in-patient psychiatric admission. In order for this to be effected, there must be TWO physicians in agreement of the need for admission. Thus, there will be two physicians having signed the form accompanying the patient.

III. Section 9.37

This form is titled Application for Involuntary Admission on Certificate of a Director of Community Services or Designee. This form can be filled out when a patient is transferred from a facility with staff able to make an initial psychiatric assessment and deem that the patient requires inpatient psychiatric admission. The originating facility, however, is unable to provide inpatient treatment and has the patient transferred to a facility that is able to provide the inpatient services. This form is completed by the sending facility to apply to send the patient to the inpatient facility.

IV. Section 9.55 and 9.57

This form is for Custody/Transport of a Person Alleged to be Mentally Ill to a Hospital Approved to Receive Emergency Admissions. The 9.55 portion is to be filled out by a psychiatrist directing transport of a patient to a facility able to offer Emergency Psychiatric care. The 9.57 portion is to be filled out by an Emergency physician requesting similarly.

Special Situations

The Therapeutically Cooled Patient

I. Introduction

There has been a recent resurgence of therapeutic cooling used in patient care scenarios. These require maintenance of specific hypothermic target temperature. The current two most likely indications are those of the post cardiac arrest patient, the stroke patient and the traumatic brain or spinal cord injury patient.

The theory behind therapeutic hypothermia is to decrease circulation of ischemic and injury mediators. Further, metabolism is decreased thus preventing further inflammatory response. The balance that must be maintained is to provide adequate
The hypothermia is achieved by surface and internal cooling. Surface cooling is achieved with ice (applied at head, neck, axillae and groin), cooling blankets and/or heat exchange surface cooling devices. Internal cooling is achieved either by cooled fluids or by endovascular heat exchange catheters. These usually involve a femoral line placement.

II. Clinical Uses of Therapeutic Hypothermia

a. The Post Cardiac Arrest Patient
   In 2005 the American Heart Association offered guidelines regarding the use of hypothermia in unconscious patients with return of spontaneous circulation after out-of-hospital cardiac arrest. It is recommended that these patients be cooled to 32-34°C for 12-24 hours. The cooling should occur within 6 hours post cardiac arrest. They should have a systolic blood pressure of >90mm Hg.

b. The Acute Stroke Patient
   There is evidence that hypothermia reduces the volume of infarct and may preserve brain tissue. However, a large study has yet to be done showing clear benefit.

c. The Traumatic Brain Injury (TBI) Patient
   Mild therapeutic hypothermia has been shown to be effective in TBI with high intracranial pressure. These patients have better outcomes with longer hypothermia (5 days).

d. The Traumatic Spinal Cord Injury (SCI) Patient
   There have not been large scale reviews or studies to demonstrate benefit of hypothermia with SCI. However, case reports suggest that there may in fact be some advantage in using hypothermia to treat patients with SCI.

III. Transporting the Therapeutically Cooled Patient

These patients are often critical and may require additional personnel. Not only must the cooling apparatus be kept in attention, but the patient must be carefully watched with frequent vital signs (every 10-15 minutes during transport). Consideration should be given for backup cooling alternatives should there be device failure.
IV. *Glossary and Abbreviations*
ALS Provider (Advanced Life Support Provider)  Includes EMT-I, EMT-CC and EMT-P

BiPAP  Bi-phasic Positive Airway Pressure

BP  Blood Pressure

BVM  Bag-Valve Mask

CHF  Congestive Heart Failure

CNS  Central Nervous System

COPD  Chronic Obstructive Pulmonary Disease

CPAP  Continuous Positive Airway Pressure

D/C  Discontinue

DKA  Diabetic Ketoacidosis

DNR  Do Not Resuscitate
EMT-D (Emergency Medical Technician-Defibrillation)  An individual trained to perform patient assessment, handle emergencies using Basic Life Support equipment, perform CPR, control hemorrhage, provide non-invasive shock treatment, fracture and spinal stabilization, manage environmental emergencies, emergency childbirth and use a defibrillator.

EMT-I (Emergency Medical Technician-Intermediate)  An individual trained to use all EMT-D skills and utilize Basic Life Support equipment. In addition, may supply Advanced Life Support, using IV therapy and ET or other advanced airway for airway control.

EMT-CC (Emergency Medical Technician-Critical Care Technician)  An individual trained to perform all EMT-I skills and utilization of equipment. In addition, is trained to supply Advanced Life Support, using the EMT-I skills and equipment, and administer appropriate medications.

EMT-P (Emergency Medical Technician-Paramedic)  an individual trained to perform all EMT-I skills and utilization of equipment. In addition, is able to perform under Advanced Cardiac Life Support (ACLS) and Advanced Trauma Life Support Standards (ATLS), is knowledgeable and competent in the use of cardiac monitor/defibrillator, IV drugs and fluids. The EMT-P has reached the highest level of pre-hospital certification.

EPS (Extrapyramidal Symptoms)  A variety of motor and sensory nervous system disorders related to medications or disease processes.

ETA  Estimated Time of Arrival

ET tube  Endotracheal tube

FB  Foreign Body

GI  Gastrointestinal

H/O  History of

HR  Heart rate

Huber needle  A needle designed to access an indwelling vascular port. It has a ninety-degree bend.

IM  Intramuscular

IV  Intravenous

JVD  Jugular Venous Distention

KVO  Keep Vein Open; usually indicates an IV rate of 20-60mL/hour
**Large Bore IV** 14 or 16 gauge IV

**Loading dose** Initial amount of medication required to establish a therapeutic effect

**LR** Lactated Ringers Solution

**MC (Medical Control or Medical Command)** 1. A physician (Medical Director or designee) responsible for the care of a patient who is being served by an EMS provider. 2. (aka Medical direction) The process of providing responsibility for the care of a patient who is being served by an EMS provider.

**MCO** Medical Control Option

**Medical Director** The physician who has authority and responsibility over all clinical and patient care aspects of the EMS provider. This includes responsibility for off-line MC

**Methemoglobinemia** A condition where the hemoglobin is altered in a way which decreases its ability to carry and release oxygen to tissues

**mg** milligram

**MI** Myocardial Infarction

**mL** milliliter

**NS** Normal Saline; usually refers to 0.9 normal saline

**OD** Overdose

**Off-line Medical Control** Provision of care in accordance with patient care protocols developed and promulgated by physicians. This also includes training, testing, certifications, continuing education, operational policy and procedures development and continuous quality improvement.

**On-line Medical Control** Provision of care via direct voice communication with a physician

**PO** Orally

**PRN** As needed

**PVC** Premature ventricular contraction

**Q** Every

**SL** Sublingual

**SQ** Subcutaneous
Standing Orders  Treatment algorithms for the ALS provider to follow prior to comatating MC

Status Epilepticus  Ongoing seizure activity or a series of seizures with separation of less than or equal to one hour

Syst  Systolic

TID  Three times per day

VS  Vital signs
VII. Interfacility Transfer Checklist
(May be used as a resource)
WESTERN NEW YORK EMERGENCY MEDICAL SERVICES
INTERFACILITY TRANSFER CHECKLIST

Patient Name: ___________________________ Date of Birth __/__/__
Diagnosis: _____________________________________________

Condition: STABLE / UNSTABLE  Weight: ___kg  Date of
Transfer __/__/__
Transporting
Agency: _____________________________________________
Hospital Origin: ____________________ Hospital
Destination: _______________________
Receiving physician: ____________ Bed/Unit location: ____________
Check all that apply.

___ Intravenous Fluids: Fluid: _______ Infusion Rate: _______

___ Medication- Continuous Infusion
Medication Ordered: ______________________________________
Infusion Rate: __________________________________________
Parameters:
   Vital Signs: Maintain: BP HR
                Above: _______ and Below: _______
   Other: ___________________________________________

___ Medication- PRN
Medication Ordered: _____________________________________
Dose: __________ Frequency: ___________________________
Route:  IV push  IM  SQ  Other: _______________
Parameters:
   Vital Signs: Maintain: BP HR
                Above: _______ and Below: _______
   Other: ___________________________________________

Ordering Physician: _______________________________________

 Date: __/__/__      Time: ________________
VIII. **Interfacility Crew Capabilities**

**EMT**
- Saline lock
- Patients with PCA pumps with settings unchanged for > 6 hours
- Stable patient with no anticipation of further interventions en route

**EMT-I**
- Above listed plus:
- Peripheral IV lines with no added drugs
- Stable, intubated patients with no anticipation of further interventions en route

**EMT-CC**
- Above listed plus:
- Peripheral IV lines
- Cardiac monitor/defibrillator
- Intubated patients
- Up to 3 IV drips and drugs except for those excluded from the list:
  - Antiarrythmic agents as listed
  - Blood Pressure Lowering Drugs
  - Inamnirone and Milranone

Specific drug limitations:
- Nitroglycerine *up to MAX rate of 100 mcg/minute*
- Insulin drip *can be accompanied by any only ONE other drip*

Only may transport patients on drugs SPECIFICALLY listed in the protocol

**EMT-P**
- Above listed plus:
- Central venous lines/PICC lines that are running
- Permanent Lines that are already accessed and running
- Arterial and Swann-Ganz lines- not to be used for monitoring by paramedic