PROTOCOL TITLE: INTERFACILITY INTRAVENOUS INFUSIONS

The purpose of the protocols in this section is to authorize paramedics to monitor specified intravenous infusions in adult patients during interfacility transports.

Only those paramedics who have successfully completed a training program approved by the county MPD office for the specified medications will be permitted to monitor them during interfacility transports. Training must include the use of mechanical infusion pumps.

Initiation & Maintenance:

1. Patients that are candidates for paramedic transport will have the infusions initiated by the sending facility staff, prehospital personnel will not initiate the infusions.

2. Paramedics are allowed to transport up to two medication infusions and one maintenance fluid. There may not be more than one vasopressor medication infusing.

3. All effort should be made for the medication to be infused by mechanical intravenous infusion pump. If pump failure occurs and cannot be corrected, the paramedic will stop the infusion and notify the transferring hospital.

4. Paramedics may restart an infusion if there is an interruption due to infiltration or accidental disconnection of the IV line, provided that the IV site is patent.

5. Signed transfer orders from the transferring physician must be obtained prior to initiating transport. Transfer orders must certify that the patient is stable for transfer and orders for maintaining the medication during the transport.

Monitoring:

1. The patient shall be placed on cardiac, blood pressure, and pulse oximetry monitors. Vital signs shall be monitored continuously every 15 - 30 minutes unless otherwise specified

2. The infusion dose, rate, and concentration shall be checked by the paramedic to ensure that the medication is administered in compliance with transferring physician's orders.

3. The infusion rate will be maintained as ordered by the transferring physician. In no case will changes be made to the medication drip rate, except to stop the infusion for the reasons specified within these protocols.

All calls involving the transfer of patients with the infusions listed within these protocols shall be reviewed through the ambulance provider's CQI program to determine compliance with policy and transferring physician orders. Reports of audits will be submitted to the county MPD Office when requested.

PROTOCOL TITLE: INTERFACILITY INTRAVENOUS ACETYLCYSTEINE INFUSIONS

The purpose of this protocol is to authorize paramedics to monitor intravenous acetylcysteine infusions during interfacility transport.

Only those ALS Ambulance providers approved by the county MPD office are permitted to provide the service of monitoring acetylcysteine infusions during interfacility transports from approved hospital(s) within their service area.

1. General information on acetylcysteine:

    a. Acetylcysteine (Mucomyst) is an antioxidant and glutathione inducer used to help prevent or lessen liver damage caused by taking large quantities of acetaminophen. It can also be used as a mucolytic in patients with certain lung conditions.

    b. Indications:
        i. Acetaminophen overdose.
        ii. Thins and loosens mucus in lung diseases such as emphysema, bronchitis, cystic fibrosis, pneumonia.

    c. Contraindications:
        i. Known hypersensitivity to acetylcysteine

    d. Precautions:
        i. May cause bronchospasm in asthmatic patients, monitor asthmatic patients closely and discontinue infusion if bronchospasm occurs, treating symptoms per protocol for asthma.

    e. Interactions:
        i. There are several medications that are known to interact with acetylcysteine including:
            - Activated Charcoal
            - Azithromycin
            - Erythromycin
            - Vancomycin

    f. Standard dosing for IV infusions:
        i. Loading dose: 150 mg/kg infused over one hour.
        ii. Second dose: 50mg/kg infused over four hours.
        iii. Third dose: 100mg/kg infused over sixteen hours.

    g. Indications for discontinuing infusion include but are not limited to:
        i. Infiltration of IV site, may resume infusion through new IV site at same rate.
        ii. Active bleeding
        iii. Mechanical infusion pump failure
        iv. Allergic reaction

PROTOCOL TITLE: INTERFACILITY INTRAVENOUS ANTIBIOTIC INFUSIONS

The purpose of this protocol is to authorize paramedics to monitor intravenous antibiotic infusions during interfacility transport.

Only those ALS Ambulance providers approved by the county MPD office are permitted to provide the service of monitoring antibiotic infusions during interfacility transports from approved hospital(s) within their service area.

1. General Information on Antibiotics

    a. Beta-Lactams: The beta-lactams include penicillins and cephalosporins. The mode of actions (MOA) of all beta-lactams is to bind to and inactivate enzymes required for bacterial wall synthesis.
        i. Penicillins: Penicillins are used for disease due to gram-positive organisms and some gram-negative cocci. These medications are inexpensive but can cause a life-threatening anaphylactic reaction in those who are allergic.
            1. Examples of Penicillins:penicillin, ampicillin, piperacillin and tazobactam (Zosyn) and ampicillin and sulbactam (Unasyn)
            2. Indications: Bacterial infections such as syphilis, endocarditis, respiratory tract infections, bacterial meningitis, urinary tract infections and gastrointestinal infections.
            3. Dose Range: Dose is influenced by patient weight, but for ampicillin is typically 500 mg every 6 hours. Administered in 10-15 minutes.
            4. Medication interaction: Ampicillin is **incompatible** with D5W, dopamine, diphenhydramine, lorazepam, midazolam, ondansetron, and sodium bicarb.
            5. Side Effects: Nausea, vomiting, diarrhea, and rash.
            6. Reasons to stop infusion: Allergic reaction, infiltration, cardiac arrest

        ii. Cephalosporins: Cephalosporins are used with both gram-positive and gram-negative activity. They typically do not produce an anaphylactic reason, but people can be allergic to it.
            1. Examples: cephalexin (Keflex), cefazolin (Ancef), ceftriaxone (Rocephin)
            2. Indications: Cholecyctitis, urinary tract infection, and cellulitis
            3. Dose Range: ceftriaxone (Rocephin) dose is 1 to 2 Gms IV over 30 minutes
            4. Medication Interaction: ceftriaxone is **incompatible** with amiodarone, diltiazem, morphine, and sodium bicarbonate
            5. Side Effects: pain at injection site, headache, nausea, vomiting, and seizures
            6. Reasons to stop infusion: allergic reaction, infiltration, cardiac arrest, seizure.

NOTE: Cross-reactivity of allergic reactions to cephalosporins in patients allergic to PCN is <15%

b. Quinolones: broad-spectrum antibiotics (effective for both Gram-negative and Gram-positive bacteria) that play an important role in treatment of serious bacterial infections, especially hospital-acquired infections and others in which resistance to older antibacterial classes is suspected.
   i. Examples: ciprofloxacin (Cipro), Levaquin, Avelox
   ii. Indications: hospital acquired pneumonia, UTI, pyelonephritis
   iii. Typical Doses: *ciprofloxacin* (Cipro) – 400 mg, *levofloxacin* (Levaquin) – 500 mg, *moxifloxacin* (Avelox) – 400 mg all over 60 minutes
   iv. Medication Interaction: Can cause QT prolongation, use caution with other medications that prolong QT interval
   v. Side Effects: Nausea, diarrhea, abdominal pain, headache, dizziness, tendonitis and tendon rupture
   vi. Reasons to stop infusion: allergic reaction, infiltration, cardiac arrest, pump failure, administration/completion of full dose

c. Sulfonamides: One of a group of drugs derived from sulphanilamide that prevents the growth of bacteria.
   i. Examples: sulfamethoxazole and trimethoprim (Bactrim)(Septra)
   ii. Indications: Severe UTI, Prophylaxis for immunosuppressed, MRSA and other skin infections
   iii. Dose Range: 10-20 mg/kg/24 hours spread over 6, or 12 hours. Administered in 60-90 minutes.
   iv. Medication Interaction: incompatible with diltiazem, lorazepam, magnesium sulfate and morphine
   v. Side Effects: Nausea, vomiting, and rash are most frequent
   vi. Reasons to stop infusion: allergic reaction, infiltration, cardiac arrest, pump failure, administration/completion of full dose. Treat symptoms of nausea and vomiting with ondansetron.

d. Macrolides: Action is primarily bacteriostatic but may be bactericidal at high concentrations, or depending on the type of microorganism.
   i. Examples: azithromycin (Zithromax)
   ii. Indications: Community-acquired pneumonia, Pelvic Inflammatory Disease (P.I.D.)
   iii. Dose Range: 500 mg over at least 1 hour
   iv. Medication Interaction: **Incompatible** with amiodarone and midazolam
   v. Side effects: Usually mild to moderate in severity and reversible after discontinuation – abdominal pain, arrhythmias, cough, dizziness, dyspnea, facial edema, hypotension, injection site pain, rash, and vomiting.
   vi. Reasons to stop: Allergic reaction, infiltration, cardiac arrest

e. Atypical:
   i. Vancomycin: Vancomycin is primarily used to treat serious infections caused by gram-positive bacteria which are known or suspected to be resistant to other antibiotics.

1. Example: Vancomycin
2. Indications: Complicated skin infections, bloodstream infections, endocarditis, bone and joint infections, and meningitis
3. Dose Range: 7.5 mg/kg up to 500 mg at a rate of 10 mg/min or 60 minutes, whichever is longer
4. Medication Interaction: **Incompatible** with amiodarone, diltiazem, lorazepam, magnesium sulfate, midazolam, morphine, ondansetron and sodium bicarbonate
5. Side Effects: Severe hypotension with or without red blotching of the face, neck, chest, and extremities, and cardiac arrest can occur with too-rapid administration. Chills, dizziness, fever, rashes, pain at infection site, anaphylaxis, dyspnea, Stevens-Johnson Syndrome, and wheezing.
6. Reasons to stop infusion: Allergic reaction, infiltration, cardiac arrest, pump failure, administration/completion of full does. If minor side effects are progressive or any major side effect occur, discontinue the drug

ii. Flagyl: Works by stopping the growth of bacteria and protozoa

1. Example: metronidazole (Flagyl)
2. Indications: Used to treat bacterial infections of the vagina, GI tract, skin, joints, and respiratory tract.
3. Dose Range: 15 mg/kg over 1 hour
4. Medication Interaction: **Incompatible** with diltiazem, dopamine, lorazepam, magnesium sulfate, methylprednisolone, midazolam, morphine, and vasopressin.
5. Side Effects: Most serious include – aseptic meningitis, encephalopathy, and optic and peripheral neuropathy. Others include – abdominal cramping, dizziness, dry mouth, epigastric distress, fever, flushing, metallic taste (expected), nausea, rash, seizures and Stevens-Johnson Syndrome.

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PROTOCOL TITLE: INTERFACILITY INTRAVENOUS BLOOD PRODUCT INFUSIONS

The purpose of this protocol is to authorize paramedics to monitor blood product infusions during interfacility transport.

Only those ALS ambulance providers approved by the county MPD office will be permitted to provide the service of monitoring blood product infusions during interfacility transports from approved hospital(s) within their service area.

The following parameters shall apply in all cases where paramedics transport patients with preexisting infusions of blood products:

1. Blood Product Administration:
    a. Signed transfer orders from the transferring physician must be obtained prior to transport. Transfer orders must certify that the patient is stable for transfer and provide orders for number of units to be infused, as well as any parameters for additional units expected to be infused during transport.
    b. The paramedic shall confirm that blood products are within 4 hours from their removal from the blood bank.
    c. Paramedics will verify blood compatibility by performing cross-checks including patient information, blood product type, Rh factor, and expiration date prior to administration.
    d. Additional units may be initiated as infusions complete, as ordered by the transferring physician.
    e. Blood products should only be administered through large bore (18g or greater) IV, central line, or intraosseous needle. Smaller bore is acceptable in children or if approved by physician.
    f. Blood product infusions should only be administered through blood-specific tubing with an in-line filter, primed with normal saline. Associated fluid must be normal saline, blood products must not be infused alongside Lactated Ringers.
    g. Blood products may be infused via infusion pump, provided the pump is has been tested and approved as safe for use with the product being infused.
    h. No medication shall be administered through the same line as blood products.

2. Patient Monitoring:
    a. Baseline vital signs, including an initial temperature reading will be obtained, as close to the initiation of the infusion as possible.
    b. A follow-up temperature will be obtained 15 minutes later, with the infusion being discontinued if the patient reaches a temperature of >38C or an increase of 1C above the starting temperature. This process should be repeated for each additional unit administered.
    c. Vital signs shall be monitored and documented at a minimum of every 5-15 minutes while blood products are being infused.

INTRAVENOUS BLOOD PRODUCT INFUSIONS

d. If signs of a transfusion reaction develop, (fever, chills, hives, dyspnea, pain at the transfusion site) the transfusion should be immediately discontinued.

PROTOCOL TITLE: INTERFACILITY INTRAVENOUS HEPARIN INFUSIONS

The purpose of this protocol is to authorize paramedics to monitor intravenous heparin infusions during interfacility transport.

Only those ALS ambulance providers approved by the county MPD office will be permitted to provide the service of monitoring heparin infusions during interfacility transports from approved hospital(s) within their service area.

1. General Information on Heparin:

    a. Heparin is an anticoagulant which acts to: prevent the conversion of fibrinogen to fibrin, prevent the conversion of prothrombin to thrombin, inactivate Factor X and enhance the inhibitory effects of antithrombin III.

    b. Pharmocokinetics:
        i. SC: Onset 20-60 minutes; duration 8-12 hours
        ii. IV: Onset immediate; peak 5 minutes; duration 2-6 hours
        iii. Metabolized in the liver and the reticuloendothelial system
        iv. Excreted in urine
        v. Half-life of 1.5 hours.

    c. Indications for the use of Heparin:
        i. In preventing additional clot formation or growth in DVT, MI, Pulmonary embolism, DIC, stroke or arterial thrombosis
        ii. Prophylactically to keep IV lines open (i.e. heparin flushes and locks);
        iii. Prophylactically before open heart surgery
        iv. Post DVT, PE and MI to prevent clotting
        v. Atrial fibrillation to prevent embolization
        vi. As an anticoagulant in transfusion and dialysis

    d. Contraindications:
        i. Allergy to heparin
        ii. Bleeding disorders – hemophilia, etc.
        iii. Blood dyscrasias such as leukemia with bleeding
        iv. Peptic ulcer disease
        v. Severe hypertension
        vi. Severe hepatic disease
        vii. Subacute bacterial endocarditis
        viii. Active bleeding from any site.

    e. Precautions:
        i. Pregnancy (class C);
        ii. Alcoholism (due to decreased liver function)
        iii. Elderly (due to decrease liver and renal function and increased injury capability).
        iv. Severe renal disease

    f. Adverse Effects:
        i. Hemorrhage from any site. May manifest as easy bruising, petechiae, epistaxis, bleeding gums, hemoptysis, hematuria, melena

ii. Fever, chills (due to allergy)
iii. Abdominal cramps, nausea, vomiting, diarrhea (due to allergy)
iv. Anorexia (secondary to above)
v. Rash, uticaria (due to allergy)

g. Interactions:
   i. Oral anticoagulants warfarin (Coumadin) – increase the actions of heparin
   ii. Salicylates (aspirin) – increase the actions of heparin
   iii. Corticosteriods – increase the actions of heparin
   iv. Corticosteriods – actions are decreased by heparin
   v. Dextran – increase the action of heparin
   vi. Nonsteriodan anti-inflammatory drugs ibuprofen, naproxen (Aleve, Naprosyn) (Midol), *ketorolac (*Toradol), piroxicam (Feldene), indomethacin (Indocin) – increase the actions of heparin
   vii. Diazepam – action increase by heparin

h. Standard Dosages and Routes:
   i. Paramedics may not transport heparin infusions if dose exceeds 2000 units per hour.
   ii. DVT/PE prophylaxis: 5,000 units subcutaneous every 8-12 hours
   iii. Active clot suppression:
      1. Loading Dose (1) Adult: 5000 -7000 units IVP. (2) Child: 50-100 units/kg IVP.
      2. Maintenance (1) Adult: 1000-2000 units per hour IV titrated to a PTT level. (2) Child 15-25 units per hour IV titrated to a PTT level.

i. Special Considerations:
   i. Avoid IM infections of other procedures, which may cause bleeding.
   ii. Overdoses are treated in hospital with protamine sulfate 1:1 solution (protamine is not authorized for paramedic use.)

j. Indications for discontinuing infusion include but are not limited to:
   i. Infiltration of IV site, may resume infusion through new IV site at same rate.
   ii. Active bleeding
   iii. Mechanical infusion pump failure
   iv. Allergic reaction

PROTOCOL TITLE: INTRAVENOUS INSULIN INFUSIONS

The purpose of this protocol is to authorize paramedics to monitor intravenous insulin infusions in **adult** patients during interfacility transport.

Only those ALS ambulance providers approved by the county MPD office will be permitted to provide the service of monitoring insulin infusions during interfacility transports from approved hospital(s) within their service area.

1. Insulin Infusions:
    a. Blood Sugar shall be checked at a minimum of twice per transport – once when assuming patient care as well as just prior to arrival at receiving facility. Additional blood-sugar readings should be obtained at least once per hour.

    b. Insulin infusion concentrations are generally 1 unit per 1ml, confirm any variations with sending healthcare personnel.

2. General Information on Insulin:

    a. Hypoglycemia is associated with worse outcomes than hyperglycemia. The danger of both hyperglycemia and hypoglycemia is related to the level and duration of the glucose abnormality. The aim is to reduce such glucose variability. Important considerations include allowing 6-8 hours to safely lower glucose to target, reducing the risk of hypoglycemia, accounting for patient insulin sensitivity and resistance. Hyperglycemia may result from stress, infection, steroid therapy, decreased physical activity, discontinuation of outpatient regimens, and nutrition.

    b. Pharmacokinetics:
        i. Onset 5-10 minutes
        ii. Half-life of 5-10 minutes

    c. Indications for the use of Insulin:
        i. Hyperglycemia >200mg/dl
        ii. Diabetic Ketoacidosis
        iii. Hyperkalemia

    d. Contraindications:
        i. Hypoglycemia
        ii. Known Hypersensitivity. Bovine / Porcine

    e. Precautions:
        i. Hypoglycemia
        ii. Hypokalemia
        iii. Due to unpredictable sugar metabolism and uptake, patients on an insulin drip should be NPO

PROTOCOL TITLE: INTRAVENOUS INSULIN INFUSIONS

f. Adverse Effects:
   i. Headache
   ii. Nausea
   iii. Rhinitis
   iv. Diarrhea
   v. Local allergic reaction

g. Standard Dosages for Insulin drips:
   i. Continuous IV Infusion: Insulin infusions are generally set up with a concentration of 1 unit per 1ml, confirm and variations with sending healthcare personnel. Insulin should be administered at rate dictated by sending physician and is typically 0.1 units/kg/hr.

h. Stoppage of drip / medication
   i. If complications develop, consult online medical control and notify receiving facility of change in condition – if hypoglycemia develops, do not discontinue infusion, instead administer 25g D50 and initiate D5drip at 150-250ml/hr.

PROTOCOL TITLE: INTRAVENOUS INTERFACILITY NITROGLYCERIN INFUSIONS

The purpose of this protocol is to authorize paramedics to monitor intravenous nitroglycerin infusions during interfacility transport.

Only those ALS ambulance providers approved by the county MPD office will be permitted to provide the service of monitoring nitroglycerin infusions during interfacility transports from approved hospital(s) within their service area.

1. Nitroglycerin (Tridil) Infusions:
    a. Infusion fluid shall be D5W or NS
    b. Nitroglycerin infusion concentration shall be 25 mg/250 ml or 50 mg/250ml.
    c. In cases hypotension (SBP < 90), the medication drip will be discontinued, and the transferring hospital and base hospital will be notified.

2. General Information on Nitroglycerin
    a. Nitroglycerin is a vasodilating agent that belongs to a group of drugs referred to as nitrates. Nitroglycerin acts to: relax vascular smooth muscle; vasodilate both arteries and veins (especially veins); increase venous pooling; decrease venous return to the heart; increase arterial relaxation; decrease systemic vascular resistance; decrease cardiac workload; decrease cardiac oxygen consumption; dilate the large epicardial arteries; and lower diastolic more than systolic blood pressure.

    b. Pharmacokinetics:
        i. SL: Onset 1 - 3 minutes; duration 30 minutes
        ii. Transdermal (patch): Onset 0.5 - 1 hour; duration 12 - 24 hours
        iii. Transdermal (ointment): Onset 0.5 - 1 hour; duration 2 - 12 hours
        iv. PO (sustained release): Onset 20 - 40 minutes; duration 3 - 8 hours
        v. IV: Onset usually immediate; duration is variable
        vi. Metabolized by the liver
        vii. Excreted in urine
        viii. Half-life of 1 - 4 minutes.

    c. Indications for the use Nitroglycerin:
        i. Sublingual:
            1. Relief of acute anginal pain or related ischemic symptoms
            2. Congestive Heart Failure (CHF) to decrease preload, reducing myocardial workload.

        ii. Intravenous:
            1. Diagnosed MI or unstable angina pectoris, even in the absence of chest pain, to decrease
            2. Relief of persistent ischemic chest pain that does not respond to other medications;
            3. Hypertension when associated with diagnosed MI of unstable angina pectoris (not used solely for blood pressure control).
            4. Congestive Heart Failure (CHF) to decrease preload, reducing myocardial workload.

    d. Contraindications:
        i. Allergy to nitrates;

ii. Increased intracerebral pressure such as in cases of stroke, head trauma or intracerebral bleeding;
iii. Hypotension;
iv. Hypovolemia;
v. Treatment of hypertension without progressively worsening signs of organ damage, ischemia or neurologic deficit.

e. Precautions:
i. Pregnancy (class C);
ii. Glaucoma patients (can increase intraocular pressure);
iii. Lactation (fetal effects in animal studies);
iv. May require decreased dosing in patients with liver disease.
v. Patient taking erectile dysfunction medications (e.g. Cialis, Viagra)

f. Adverse Effects:
i. Hypotension;
ii. Headache (from vasodilation);
iii. Dizziness and syncope (from hypotension)
iv. Nausea / Vomiting;
v. Tachycardia (in response to hypotension);
vi. Paradoxical bradycardia (in rare instances);
vii. Pallor, sweating (from hypotension);
viii. Flushing, sweating (from vasodilation);
ix. Rash, if allergic to nitrates.

g. Interactions:
i. Alcohol – combined with nitroglycerin can worsen hypotension;
ii. Aspirin – can increase serum nitrate concentrations;
iii. Calcium channel blockers – combined with nitroglycerin can worsen orthostatic hypotension;
iv. B-blockers, diuretics, anti-hypertensives – can increase actions of nitroglycerin.

h. Standard Dosages for nitroglycerin drips:
i. For diagnosed patients with ischemic symptoms:
1. Continuous IV Infusion: Starting 10 - 20 mcg/min and increased by 5 or 10 mcg/min every 5 -10 minutes until the desired hemodynamic or clinical response is achieved. Most patients respond to 50 - 200 mcg/min and the lowest possible dose should be used. When indicated, rates should be decreased in 10 minute intervals.

i. Special Considerations:
i. Glass infusion bottles and non-polyvinyl tubing must be used, as plastics will absorb nitroglycerin and alter the dose administered.
ii. Do not use in-line filters.
iii. Attach drip to port closest to catheter insertion.

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PROTOCOL TITLE: INTRAVENOUS INTERFACILITY OCTREOTIDE INFUSIONS

The purpose of this protocol is to authorize paramedics to monitor intravenous octreotide infusions during interfacility transport.

Only those ALS ambulance providers approved by the county MPD office will be permitted to provide the service of monitoring octreotide infusions during interfacility transports from approved hospital(s) within their service area.

1. General information on Octreotide:

    a. Octreotide is a peptide drug that decreases the secretion of gastroenterohepatic peptides. Octreotide-potent inhibitor of GH, insulin, and glucagon secretion. Also decreases splanchnic blood flow and inhibits release of serotonin, gastrin, vasoactive intestinal peptide.

    b. Indications:
        i. Short bowel syndrome
        ii. GI fistulas
        iii. GI bleeding
        iv. Variceal bleeding
        v. AIDS related diarrhea
        vi. Diarrhea due to chemotherapy

    c. Contraindications:
        i. Known hypersensitivity to acetylcysteine

    d. Precautions:
        i. Use with caution in patients with hepatic disease.

    e. Interactions:
        i. Beta blockers
        ii. Bromocriptine
        iii. Cyclosporine
        iv. Insulin
        v. Oral hypoglycemic agents

    f. Standard dosing for IV infusions:
        i. 25-50 mcg/hr

    g. Indications for discontinuing infusion include but are not limited to:
        i. Infiltration of IV site, may resume infusion through new IV site at same rate.
        ii. Active bleeding
        iii. Mechanical infusion pump failure
        iv. Allergic reaction

PROTOCOL TITLE: INTRAVENOUS INTERFACILITY PANTOPRAZOLE INFUSIONS

The purpose of this protocol is to authorize paramedics to monitor intravenous pantoprazole infusions during interfacility transport.

Only those ALS ambulance providers approved by the county MPD office will be permitted to provide the service of monitoring pantoprazole infusions during interfacility transports from approved hospital(s) within their service area.

1. Pantoprazole (Protonix) is a proton pump inhibitor that decreases the amount of acid produced in the stomach. Pantoprazole is used to treat erosive esophagitis.

    a. Indications:
        i. Peptic ulcer bleeding
        ii. Erosive esophagitis
        iii. Zollinger-Ellison syndrome
        iv. Stress ulcer prophylaxis

    b. Contraindications:
        i. Known hypersensitivity to pantoprazole or similar medations (lansoprazole, omeprazole, Nexium, prevacid, Prilosec)
        ii. Medications containing rilpivirine (Edurant, Complera, Juluca, Odefsey)

    c. Precautions:
        i. May cause new or worsening symptoms of lupus.
        ii. Osteoporosis
        iii. Hypomagnesemia

    d. Interactions:
        i. There are several medications that are known to interact with pantoprazole including:
            - Aspirin
            - Digoxin
            - Furosemide
            - Gentamicin
            - Hydrochlorothiazide
            - Levothyroxine
            - Lovastatin
            - Simvastatin
            - Warfarin

    e. Standard dosing for IV infusions:
        i. 80mg doses, administered at 8 mg/hr.

    f. Indications for discontinuing infusion include but are not limited to:
        i. Infiltration of IV site, may resume infusion through new IV site at same rate.
        ii. Active bleeding
        iii. Mechanical infusion pump failure
        iv. Allergic reaction

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PROTOCOL TITLE: INTRAVENOUS INTERFACILITY PANTOPRAZOLE INFUSIONS

The purpose of this protocol is to authorize paramedics to monitor intravenous nitroglycerin (NTG) infusions in adult patients during interfacility transport.

Only those ALS Ambulance providers approved by the Adams/Benton/Franklin/Yakima County MPD Office are permitted to provide the service of monitoring nitroglycerin infusions during interfacility transports from approved hospital(s) within their service area.

INTRAVENOUS INTERFACILITY PANTOPRAZOLE INFUSIONS

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PROTOCOL TITLE: INTRAVENOUS INTERFACILITY POTASSIUM INFUSIONS

The purpose of this protocol is to authorize paramedics to monitor intravenous potassium infusions during interfacility transport.

Only those ALS ambulance providers approved by the county MPD office will be permitted to provide the service of monitoring potassium infusions during interfacility transports from approved hospital(s) within their service area.

1. Potassium Infusions:
    a. KCl infusion concentration will not exceed 40 mEq / liter administered at a mechanically controlled rate not to exceed 10 mEq / hour through a peripheral line.

    b. If fluid bolus or IV medications are needed, they should be administered through an alternate IV site. If no other site is available, the KCl infusion shall be discontinued and a new IV solution without KCl shall be used as replacement. DO NOT BOLUS FLUIDS CONTAINING KCl.

2. Monitor patient for adverse effects during transport including:
    a. Cardiovascular: Dysrhythmias, cardiac arrest
    b. Respiratory: depression / arrest
    c. Gastrointestinal: nausea / vomiting, diarrhea, abdominal pain
    d. Neurological: paresthesia of extremities, muscular paralysis, confusion
    e. IV infiltration: monitor IV site as infiltration may cause necrosis. If patient complains of burning or irritation at the insertion site, the IV should be checked for patency and the infusion rate slowed or discontinued.

3. General Information on potassium chloride
    a. Potassium is an essential macromineral in human nutrition with a wide range of biochemical and physiological roles. Among other things, it is important in the transmission of nerve impulses, the contraction of cardiac, skeletal and smooth muscle, the production of energy, the synthesis of nucleic acids, the maintenance of intracellular tonicity and the maintenance of normal blood pressure.

    b. Indications for the use potassium chloride
        i. The treatment of potassium depletion in patients with hypokalemia when oral replacement is not feasible.
        ii. Treatment of digitalis intoxication.

    c. Contraindications:
        i. Renal impairment with oliguria or azotemia
        ii. Untreated Addison's Disease
        iii. Hyperadrenalism associated with adrenogenital syndrome
        iv. Extensive tissue breakdown as in severe burns
        v. Adynamia episodica hereditaria
        vi. Hyperkalemia of any etiology

    d. Precautions:
        i. Pregnancy Category C
        ii. Chronic renal disease

iii. Adrenal insufficiency
iv. Any other condition which impairs potassium excretion
v. Potassium should be used with caution in diseases associated with heart block

e. Adverse Effects:
i. Fever
ii. Venous thrombosis, infection at injection site
iii. Extravasation, phlebitis, pain at infection site
iv. Hypervolemia
v. Hyperkalemia
vi. Abdominal Pain
vii. Nausea / vomiting
viii. Paresthesias of the extremities
ix. ECG abnormalities, heart block
x. Mental confusion
xi. Hypotension

f. Interactions:
i. Cardiac arrest can occur with high potassium conditions, such as chronic renal failure, burns, acidosis, dehydration, and potassium sparing diuretic usage such as spironolactone.
ii. Drug interactions causing elevation of potassium can occur with ACE inhibitors (used to treat high blood pressure) and certain diuretics (aldactone and triamterene)

g. Standard Dosages for Potassium Chloride Infusions:
i. For serum potassium level >2.5mEq/L
1. Continuous IV Infusion: 10mEq/hour in a concentration up to 40mEq/L. Max dose of 200mEq/day
ii. For serum potassium level < 2.0 with electrocardiographic changes and/or muscle paralysis, potassium chloride may be administered at a rate up to 40mEq/hour. (This rate is not approved for EMS personnel).

h. Special Considerations:
i. Potassium must be diluted prior to administration.
ii. Administer at a rate not to exceed 10mEq/hour through peripheral line.
iii. Infusion rate may not exceed 20mEq/hour via central line or MedPort.
iv. Monitor electrolyte, fluid and acid-base balances

i. Indications for discontinuing infusion include but are not limited to:
i. Infiltration of IV site, though the paramedic may resume infusion through new IV site at same rate
ii. Widening QRS
iii. Ventricular dysrhythmias not caused by hypokalemia
iv. Mechanical infusion pump failure
v. Allergic reaction