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Medical University of South Carolina

Paul Bush

Medical University of South Carolina

Kelli Garrison

Medical University of South Carolina

Jason Cooper

Medical University of South Carolina

Chris Wisniewski

Medical University of South Carolina

See next page for additional authors

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Authors

Medical University of South Carolina, Paul Bush, Kelli Garrison, Jason Cooper, Chris Wisniewski, and Ashley Lewis

Drug Information Center
Department of Pharmacy Services
RT Annex, Room 604
Phone: 792-3896
E-mail: druginfo@muscd.edu

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Editorial Staff

Paul Bush, PharmD, MBA, FASHP
Director, Department of Pharmacy Services
Editor

Kelli Garrison, PharmD, BCPS
Manager, Medication Use Policy and Informatics
Editor and Newsletter Layout

Jason Cooper, PharmD
Drug Information Specialist
Associate Editor

Chris Wisniewski, PharmD, BCPS
Drug Information Specialist
Associate Editor

Ashley Lewis, PharmD
Resident (PGY2), Drug Information Practice
Assistant Editor

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Pharmacy & Therapeutics

Update

Drug Information for Health Care Professionals

November/December 2008

Appropriate Management of Catheter Obstruction

*By: Jessica Mercer, PharmD
PGY1 Pharmacy Resident*

Central venous lines (CVLs) are catheters placed into a large vein with the distal tip extending to a large vein near the heart. They can be used to administer medication, obtain blood for laboratory sampling, or to directly measure certain hemodynamic parameters. An advantage of CVLs is that they can have multiple ports, which many medications can be administered through simultaneously. There are also medications that are too caustic to be administered through peripheral veins and must be administered through a CVL. There are complications associated with CVLs, including complications during line placement, increased rates of infection, and obstruction of the catheter.

Catheter obstruction may be due to a multitude of factors. Common causes include mechanical obstruction from kinks or torquing, venous obstruction, occlusion of the injection cap, deposits from medications, or blood clots. The best recommendation is to take steps to prevent occlusion of CVLs. Catheters should

be maintained and flushed according to the IV Flush order set forth by the physician*. All heparin flushes should be scheduled and documented on the medication administration record (MAR).

Even with proper maintenance of CVLs, there is still the potential for occlusion to occur and the occlusion may be so severe that it can only be resolved by removing the catheter. One option is to insert a new line; however, insertion of CVLs may be associated with other complications. To decrease the need to reinsert a new CVL, there are options for assessing and managing occluded CVLs.

Occlusion should first be verified using the flowsheet detailed in policy C-75 (Figure 1). Other causes of obstruction besides a blood clot, fibrin sheath, or medication deposit should be evaluated and ruled out before proceeding. The patient should be repositioned or the Valsalva maneuver should be performed to see if there is a mechanical obstruction to the catheter. To further evaluate for mechanical obstruction, the dressing can be removed to better

* <http://www.musc.edu/cce/ORDFRMS/pdf/adultIVflush.PDF>

assess the catheter. The patients should also be assessed for venous obstruction and, if found, the physician should be notified immediately. If removal of the injection cap still does not produce blood, then the possible cause of the obstruction should be evaluated. Collaboration with a licensed independent practitioner and a clinical pharmacist can assist in determining the possible occlusion.

Once the probable cause of the obstruction is determined, a specific pharmacological agent can be administered to clear the occlusion; however, a physician's order is necessary. Only staff that have documented competency with clearing occluded catheters may perform this procedure (Tables 1 and 2).

Figure 1. Venous Access Device Occlusion Verification Flowsheet

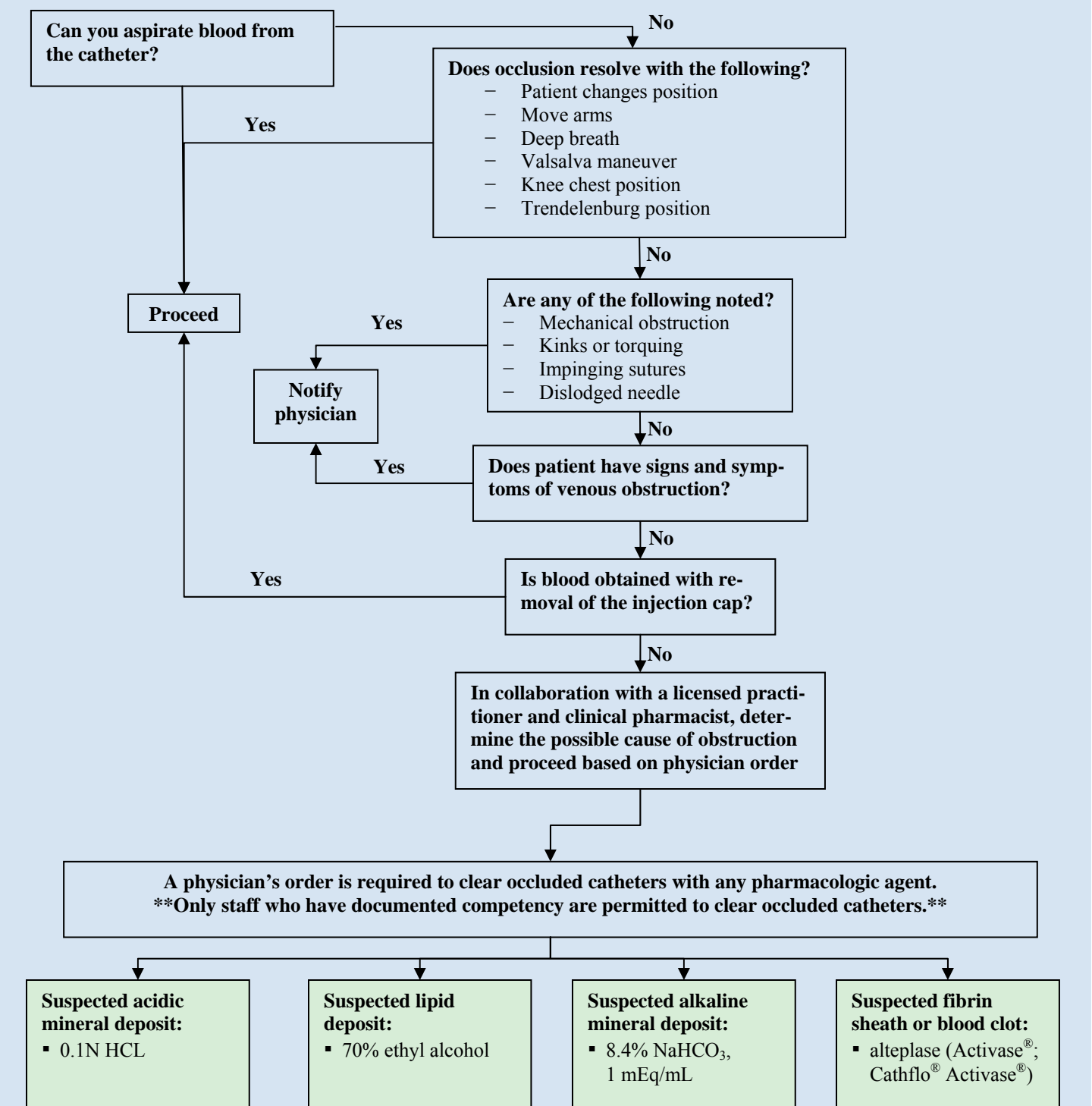


Table 1. Management of a Totally Occluded Catheter

**** To be performed only by staff that have documented competency ****

Definition – absence of blood flow when aspirating or flushing catheter port(s)

1. Equipment needed

- Pair of gloves
- One three-way stopcock
- One 30-mL vial 0.9% sodium chloride
- Two 10-mL syringes
- One injection cap
- Alcohol prep pads
- Pharmacologic agent ordered to restore patency (volume of agent equal to the internal volume of the catheter) for the following suspected causes:

Fibrin sheath or blood clot: alteplase (Activase[®], Cathflo[®] Activase[®]) 2 mg/2 mL in a 3-mL syringe

Acidic mineral deposits (eg, Ca²⁺, PO₄, mineral salts, ampicillin, amikacin, vancomycin): 0.1 N HCL in a 3-mL syringe

Alkaline mineral deposits (eg, phenytoin): sodium bicarbonate 1 mEq/mL, 8.4% in a 3-mL syringe

Lipid deposits: 70% ethyl alcohol in a 3-mL syringe

2. Procedure

- Verify occlusion (Figure 1)
- Clamp occluded catheter lumen
- Using aseptic technique, remove catheter injection cap and attach three-way stopcock directly to the occluded catheter lumen.
- Withdraw 1 to 2 mL of 0.9% sodium chloride into a 10-mL syringe, label, and attach to the most distal port on the stopcock.
- Withdraw 10 mL of 0.9% sodium chloride into the second 10-mL syringe, label, and set aside for future flushing of port.
- Attach syringe containing the pharmacologic agent to the most proximal port on the stopcock.
- Turn stopcock off to the syringe with the pharmacologic agent and open the syringe with 1 to 2 mL of 0.9% sodium chloride.
- Unclamp occluded catheter lumen.

- Gently pull plunger of the 10-mL syringe back to the 10-mL mark and allow any remaining fluid in the catheter to be cleared. Once this is complete, turn stopcock off to the 10-mL syringe and on to the syringe containing the pharmacologic agent. This process creates negative pressure inside the catheter. Opening the stopcock to the syringe containing the pharmacologic agent allows the medication to be gently pulled into the catheter. If medication does not flow in, gentle pressure may be applied to the syringe to instill the pharmacologic agent.
 - **In pediatrics patients:**
 - Patients 10 - 30 kg, the volume of the pharmacologic agent should be 110% of the internal lumen volume of the catheter, not to exceed 2 mg/2 mL for alteplase.
 - Patients < 10 kg, the amount of pharmacologic agent should equal the internal volume of the catheter. Do not force the pharmacologic agent into the catheter.
- Allow the pharmacologic agent to dwell undisturbed for 1 hour
- After 1 hour, turn stopcock off to the syringe of the pharmacologic agent and open to 10-mL syringe and attempt to aspirate. If blood return is noted, aspirate 5 mL of blood, discard, attach second syringe containing 10 mL of 0.9% sodium chloride and flush.
 - **In neonates:** aspirate 0.5 mL, discard, and flush with 1 mL 0.9% sodium chloride
 - **In pediatric patients:** aspirate 1 mL of blood, discard, and flush with 3 mL 0.9% sodium chloride
- If catheter lumen remains occluded, repeat above procedure.
- Notify the medical team if catheter remains occluded after 2 attempts.

- Once catheter patency has been restored, clamp the catheter, remove the stopcock system, and aseptically attach new injection cap to the catheter. Lastly, the catheter should be unclamped. If the catheter is not in use, heparinize catheter according to institutional policies and procedures.

- Patients receiving alteplase should remain in the patient care setting for 2 to 4 hours; however, they do not have to be confined to bed. Instruct patient/caregiver to report any signs of allergic reaction, bleeding, fever, or shortness of breath. The stopcock system is the recommended standard. If the patient needs to be off of the patient care unit, or is likely to tamper with the system, the syringes can be removed and the aseptically stopcock capped.

Table 2. Management of a Partially Occluded Catheter

**** To be performed only by staff that have documented competency ****

Definition - Decreased blood flow when aspirating or flushing catheter port(s) or the catheter flushes but will not aspirate blood.

1. Equipment needed

- Pair of gloves
- One 30-mL vial 0.9% sodium chloride
- Two 10-mL syringes
- Three injection caps
- Alcohol prep pads
- Pharmacologic agent ordered to restore patency (volume of agent equal to the internal volume of the catheter) for the following suspected causes:

Fibrin sheath or blood clot: alteplase (Activase[®], Cathflo[®] Activase[®]) 2 mg/2 mL in a 3-mL syringe

Acidic mineral deposits (eg, Ca²⁺, PO₄, mineral salts, ampicillin, amikacin, vancomycin): 0.1 N HCl in a 3-mL syringe

Alkaline mineral deposits (eg, phenytoin): sodium bicarbonate 1 mEq/mL, 8.4% in a 3-mL syringe

Lipid deposits: 70% ethyl alcohol in a 3-mL syringe

2. Procedure

- Verify occlusion (Figure 1)
- Clamp partially occluded catheter lumen.
- Using aseptic technique, remove catheter injection cap and attach 3-mL syringe containing the pharmacologic agent to the external hub of the catheter.
- Unclamp the catheter, and slowly instill the pharmacologic agent to fill the lumen of the catheter.
- Reclamp the catheter, remove the syringe, and aseptically attach new catheter injection cap.

- Allow the pharmacologic agent to dwell undisturbed for 1 hour.
- Withdraw 1 to 2 mL of 0.9% sodium chloride into a 10-mL syringe and label.
- Withdraw 10 mL of 0.9% sodium chloride into the second 10-mL syringe and label.
- Using aseptic technique, remove catheter injection cap and attach the 10-mL syringe containing 1 to 2 mL 0.9% sodium chloride to external hub of the catheter.

- Attempt to aspirate. If blood return is noted, aspirate 5 mL of blood, discard, attach second syringe containing 10 mL of 0.9% sodium chloride and flush.
 - **In neonates:** aspirate 0.5 mL, discard, and flush with 1 mL 0.9% sodium chloride
 - **In pediatric patients:** aspirate 1 mL of blood, discard, and flush with 3 mL 0.9% sodium chloride

- If catheter lumen remains partially occluded, repeat above procedure. A second dose of the pharmacologic agent will have to be ordered.
- Notify the medical team if catheter remains occluded after 2 attempts.
- Once catheter patency has been restored, clamp the catheter and aseptically attach new injection cap to the catheter. Lastly, the catheter should be unclamped. If the catheter is not in use, heparinize catheter according to institutional policies and procedures.
- Patients receiving alteplase should remain in the patient care setting for 2 to 4 hours; however, they do not have to be confined to bed. Instruct patient/caregiver to report any signs of allergic reaction, bleeding, fever, or shortness-of-breath.

Did You Know...

FDA Warning for Oral Sodium Phosphate Products for Bowel Cleansing

FDA has become aware of reports of acute phosphate nephropathy, a type of acute kidney injury, associated with the use of oral sodium phosphate products (OSP) for bowel cleansing prior to colonoscopy or other procedures. These products include the prescription products, Visicol[®] and OsmoPrep[®], and OSPs available over-the-counter without a prescription as laxatives (eg, Fleet[®] Phospho-soda). In some cases when used for bowel cleansing, these serious adverse events have occurred in patients without identifiable factors that would put them at risk for developing acute kidney injury. FDA cannot rule out, however, that some of these patients were dehydrated prior to ingestion of OSPs or they did not drink sufficient fluids after ingesting OSP.

Acute phosphate nephropathy is a form of acute kidney injury that is associated with deposits of calcium-phosphate crystals in the renal tubules that may result in permanent renal function impairment. Acute phosphate nephropathy is a rare, serious adverse event that has been associated with the use of OSPs.

Patients who have an increased risk of acute phosphate nephropathy include the following: age greater 55; hypovolemic or decreased intravascular volume; baseline kidney disease, bowel obstruction, or active colitis; or concomitant medications that affect renal perfusion or function (such as diuretics, angiotensin converting enzyme [ACE] inhibitors, angiotensin receptor blockers [ARBs], and possibly nonsteroidal anti-inflammatory drugs [NSAIDs]).

As a result of new safety information received, FDA is requiring the manufacturer of Visicol[®] and Osmo-Prep[®], the two OSPs available by prescription only, to add a Boxed Warning to the labeling for these products. FDA is also requiring that the manufacturer develop and implement a risk evaluation and mitigation strategy (REMS), which will include a *Medication Guide*, to ensure that the benefits of these products outweigh the risk of acute phosphate nephropathy, and to conduct a postmarketing clinical trial to further assess the risk of acute kidney injury with use of these products.

FDA acknowledges that OSP products, in addition to use for bowel preparation, have a long history of safe use as non-prescription products as laxatives (ie, for relief of constipation) and accordingly, they will continue to be available over-the-counter for this use. However, in light of the risk of acute phosphate nephropathy, over-the-counter laxative OSP products should not be used for bowel cleansing. Consumers should only use OSPs for bowel cleansing pursuant to a prescription from a healthcare professional. FDA intends to amend the labeling conditions for OSP products available in the OTC setting to address this concern with bowel cleansing use and to improve the safe use of OSPs that are available over-the counter. FDA's amendment to remove the professional labeling for bowel cleansing for these OSPs available over-the-counter will be published in a future *Federal Register* notice.

FDA Warns Consumers About Tainted Weight Loss Pills

FDA is alerting consumers not to purchase or consume more than 25 different products marketed for weight loss because they contain undeclared, active pharmaceutical ingredients that may put consumers' health at risk. An analysis found that the undeclared active pharmaceutical ingredients in some of these products include sibutramine (a controlled substance), rimonabant (a drug not approved for marketing in the United States), phenytoin (an anti-seizure medication), and phenolphthalein (a solution used in chemical experiments and a suspected cancer-causing agent). Some of the amounts of active pharmaceutical ingredients far exceeded the FDA-recommended levels, putting consumers' health at risk. These weight loss products (listed below), some of which are marketed as "dietary supplements," are promoted and sold on various Web sites and in some retail stores. Some of the products claim to be "natural" or to contain only "herbal" ingredients, but actually contain potentially harmful ingredients not listed on the product labels or in promotional advertisements. These products have not been approved by the FDA.

Fatloss Slimming	2 Day Diet	3x Slimming Power
Japan Lingzhi 24 Hours Diet	5x Imelda Perfect Slimming	3 Day Diet
7 Day Herbal Slim	8 Factor Diet	7 Diet Day/Night Formula
999 Fitness Essence	Extrim Plus	GMP
Imelda Perfect Slim	Lida DaiDaihua	Miaozi Slim Capsules
Perfect Slim	Perfect Slim 5x	Phyto Shape
ProSlim Plus	Royal Slimming Formula	Slim 3 in 1
Slim Express 360	Slimtech	Somotrim
Superslim	TripleSlim	Zhen de Shou
Venom Hyperdrive 3.0		

FORMULARY UPDATE FOR OCTOBER 2008

The Pharmacy and Therapeutics Committee recently approved the actions listed below. The formulary effective date was November 17, 2008, unless otherwise stated.

Added:

Temsirolimus (Torisel®)

Temsirolimus is a mammalian target of rapamycin (mTOR) inhibitor used in the treatment of advanced renal cell cancer. Data from clinical trials demonstrate that temsirolimus improves overall survival and progression-free survival compared with interferon alone in patients with extensive metastatic disease and poor prognosis. Temsirolimus lengthens time to progression and is associated with promising results regarding response rates with the 25-mg weekly dose. Temsirolimus and its active metabolite, sirolimus, are metabolized by the CYP 450 3A4 enzyme; therefore, drug interactions with agents that either induce or inhibit this enzyme are possible. Live vaccines should be avoided in patients receiving temsirolimus because temsirolimus produces a decreased immune response in patients and increases the risk of infection. At this time, temsirolimus is recommended in patients with refractory disease or a poor-risk prognosis.

25 mg/mL vials

SMOG Enema

A standardized SMOG enema formulation was added to the formulary. The formulation has a smaller volume than other formulations and contains equal parts. This formulation will be dispensed for any orders written for SMOG. The stan-

dardized formulation is composed of the following:

- sodium chloride 0.9% (50 mL)
- magnesium sulfate 50% (50 mL)
- mineral oil USP (50 mL)
- glycerin USP (50 mL)

Change in Restriction:

Intravenous Immune Globulin (IVIG)

Orders for IVIG will require the use of the pre-printed order form for both inpatient and outpatient orders. The order form requires that the indication be documented. For inpatient orders, IVIG must be reordered daily to reduce potential waste. The restriction of attending physician and service (ie, cardiothoracic surgery, dermatology, immunology, infectious disease, general pediatrics, hematology/oncology, neurology, rheumatology, and transplant) will remain. *The form is awaiting approval by the Forms Committee.*

Line Extensions:

- Ipratropium (Atrovent® HFA) 17-microgram aerosol solution
- Intravenous immune globulin (Gammagard Liquid) 5-, 10-, 20-g vials
- Benzocaine/butamben/ tetracaine (Exactacaine™) 2%-14%-2% spray

Deletions:

- Ipratropium (Atrovent®) 118-microgram aerosol solution

- Intravenous immune globulin (Gammagard S/D) 5-, 10-, 20-g vials
- Benzocaine, butamben, and tetracaine (Cetacaine®) 2%-14%-2% spray

Policy C61: Medication And Intravenous Administration

The AdminRx addendum for policy C61 was updated to change the wording from "should scan" to "must scan" patient armbands and all medications prior to administration. Additionally, the medication resolution process section of the policy has been updated for units using AdminRx. Nurses will do chart checks every 12 hours at a minimum. Discrepancies will be reported through RxComm. The pharmacist will be contacted via phone or pager if omissions are noted. The current 24-hour chart checks and Pharmacy Discrepancy Database will remain for units not using AdminRx. *Posting is still pending on the Policy Web site.*

Drug Information Service

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- Patient-specific pharmacotherapy consultations
- Medication inservices
- Adverse drug reaction surveillance and management
- Medication use evaluations

FORMULARY UPDATE FOR NOVEMBER 2008

The Pharmacy and Therapeutics Committee recently approved the actions listed below. The formulary effective date was December 15, 2008, unless otherwise stated.

Not Added:

Hyaluronidase (Hylenex®)

Hylenex® is indicated as an adjunct to increase absorption and dispersion of other injected drugs and in subcutaneous urography to improve the resorption of radiopaque agents. In addition, Hylenex® is also approved for hypodermolysis. Hylenex® is a purified preparation of the human enzyme hyaluronidase produced by genetically engineered hamster cells. Hyaluronidase injection is currently available on our formulary from bovine and ovine sources (ie, Amphadase® and Vitrase®). These products cost significantly less than Hylenex®. With limited data in pediatric patients, similar side effect profiles (even with the recombinant formulation), and a higher cost, it was decided that Hylenex® would not be added to the formulary.

Change in Restriction:

Bevacizumab (Avastin®)

Bevacizumab is indicated for use as a chemotherapeutic agent in treat-

ing certain forms of cancer. It was originally restricted to Hematology/Oncology physicians. However, bevacizumab is also useful in the treatment of neovascular (wet) age-related macular degeneration (AMD) and other ocular conditions. Based on stability and sterility studies, small doses of bevacizumab may be stored in the refrigerator for up to 3 weeks. The FDA-approved product for neovascular AMD, ranibizumab (Lucentis®), costs approximately \$2000 for one vial. Compounding single dose syringes of bevacizumab would result in a significant cost savings to the institution and patients. Therefore, the restriction for bevacizumab was expanded to include use as an ocular agent by Ophthalmology.

Line Extensions

- Meclizine 12.5-mg tablets
- Morphine 0.2-mg/mL extemporaneous oral solution
- Oxytocin 30 units/500-mL premix solution [NS]
- Propofol 10-mg/mL injection (50-mL vial)

- Sodium chloride (Hyper-Sal™) 7% nebulization solution
- Triamcinolone acetonide (Triesence®) 40-mg/mL ophthalmic injection

Deletions:

- Oxytocin 30 units/500-mL premix solution [D5LR]
- Triamcinolone acetonide (Kenalog®) extemporaneous ophthalmic injection

Anticoagulation Management and Treatment Adult Policy and Preprinted Order Forms

The organization is in the process of developing an adult anticoagulation management program. Ultimately, preprinted order forms will contain comprehensive guidelines and treatment options for dosing of warfarin, low molecular weight heparin, fondaparinux, and unfractionated heparin, as well as orders for anticoagulant reversal. These protocols, forms, and guidelines will be finalized and in place by **January 1, 2009** in accordance with the Joint Commission National Patient Safety Goal 3E: Implementation of an Inpatient Anticoagulation Program.

Happy Holidays!

