MEDICATION MATTERS
Pharmacy Newsletter

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News & Noteworthy: Rising Drug Costs

by Michele Vigliotti, PharmD Candidate

Prescription drugs have repeatedly come into focus of media outlets in regard to rising costs. Overall, drug costs increased about 6.8% in 2015,[1] with increases of 10% or more for a number of brand name drugs for large pharmaceutical companies.[2] Recently, the *New York Times* reported that the cost of pyrimethamine (brand name Daraprim®) increased from $13.50 per tablet to $750 per tablet seemingly overnight after the acquisition of its marketing rights by the firm Turing.[3] As shown in the table, previously generic-only drugs may now be expensive brand products. The buyout of marketing rights is just one mechanism by which drug prices seem to have skyrocketed.

Increases in Drug Cost Per Unit

Medication	Typical Use	Previous	Current
Colchicine (Colcrys®) tablets[5]	Gout	$0.23	$4.85
Cycloserine capsules[3]	Tuberculosis	$16.67	$360.00
Isoproterenol (Isuprel®) ampules	Cardiac	$8.00	$1346.62
Neostigmine (Bloxiverz®) vials[5]	OR reversal agent	$3.30	$1000.00
Vasopressin (Vasostrict®) vials[5]	Cardiac	$1.15	$96.84

In 2006, the Food and Drug Administration (FDA) implemented a new initiative to

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Pharmacy & Therapeutics Committee Updates

by Eric Ocheretyaner, Pharmacy Practice Resident

In October, cangrelor (Kengreal®) was added to formulary and some policies were updated. Cangrelor is an intravenous antiplatelet agent that will be used only during cardiac catheterization for patients who are unable to swallow, are vomiting, or have an extremely high-risk cardiac history. Housestaff are now able to order oral contrast media for radiology/imaging studies directly in HealthBridge. Controlled substance policies were also updated as follows: 1) Nurses may pick up only sufficient quantity of manually dispensed controlled drugs from the pharmacy for one shift at a time. 2) Controlled drug discrepancies must be escalated to a supervisor within one hour for investigation. Discrepancies without resolution within 24 hours shall be escalated to hospital leadership in an incident report.

During the November meeting, Adult Parenteral Nutrition Support policies and procedures were updated to allow members of the Parenteral Nutrition Team to enter orders directly into a web-based order system (CAPS Link®). Eliminating paper-based orders reduces the potential for transcription errors. The antiretroviral drug formulary was also reviewed with recommendations to add a number of new agents and to remove enfurvitide (Fuzeon®), indinavir (Crixivan®), fosamprenavir (Lexiva®), and maraviroc (Selzentry®) from formulary.

The December meeting highlights include extending the duration of enoxaparin (Lovenox®) orders in HealthBridge for treating venous thromboembolism (VTE) to 7 days, which aids bridging initiation of warfarin (Coumadin®). The default duration of orders for subcutaneous enoxaparin or heparin for VTE prevention has been extended to 30 days. Also, as part of the hospital's quality improvement program, moving forward only reports of adverse drug reactions and medication errors resulting from providers affiliated with University Hospital of Brooklyn will be included in the committee's reports. Finally, idarucizumab (Praxbind®) was added to formulary. For details on this new drug, please refer to page 2.

New Drug Primer: Idarucizumab (Praxbind®)

by Eric Ocheretyaner, Pharmacy Practice Resident

Idarucizumab is a humanized antibody fragment, or Fab, designed as a specific reversal agent to the direct thrombin inhibitor, dabigatran (Pradaxa®). Idarucizumab binds specifically to dabigatran and some of its metabolites, neutralizing their anticoagulant effect without interfering with the coagulation cascade.

Indications and Dose:

- Idarucizumab is indicated in patients treated with dabigatran when reversal is needed:
  - For emergency surgery/urgent procedures
  - In life-threatening or uncontrolled bleeding
- Total of 5 grams administered as two 2.5-gram IV boluses given no more than 15 minutes apart

Contraindications and Precautions:

- Reversing dabigatran therapy exposes patients to thrombotic risk of their underlying disease
- Patients with hereditary fructose intolerance may be at risk of serious and fatal reactions due to sorbitol content

Adverse Reactions:

- Common: Delirium, headache, hypokalemia, constipation, pneumonia, fever
- Serious: Cardiac arrest, deep venous thrombosis, pulmonary embolism, acute ischemic stroke, intracardiac thrombus, respiratory failure, right heart failure

Restrictions:

- None

Rising Drug Costs

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require drug companies to strengthen the evidence for the safety and efficacy of drugs marketed prior to this requirement.[4,5] Not until passage of the 1938 Federal Food, Drug and Cosmetic Act (and subsequent 1962 Kefauver-Harris Amendment) did all drugs need to be proven safe and effective before marketing. Drugs with an "unapproved" status would need to be vetted or face potential removal from the market.[5] While research and development costs have contributed to the rise in cost for some previously "grandfathered" drugs, the exclusive acquisition of marketing rights for some "newly" FDA-approved drugs has also been felt by hospitals. For example, when the FDA granted approval for the brand product Vasostrict® to Par Sterile Product in 2014,[1] the cost of vasopressin increased from $16/mL to $116/mL.

Regardless of the mechanism behind price increases, hospitals and healthcare providers now need to find strategies to mitigate costs while still providing excellent care to patients. Strategies in place at our hospital include intensifying restrictions on usage (e.g., intravenous acetaminophen), eliminating or reducing quantities of non-first line medications in code carts (e.g., vasopressin and isoproterenol), and streamlining formulary options within a drug class (e.g, topical corticosteroids).

References:

[1]Rockoff J, et al. *WSJ.* April 26, 2015. Accessed November 10, 2015
[2]Loftus O. *WSJ.* January 10, 2016. Accessed January 13, 2016.
[3]Pollack A. *New York Times.* September 20, 2015. Accessed October 29, 2015.
[4]Kesselheim A, Solomon D. *N Engl J Med.* 2010;362(22):2045-2047.
[5]Larkin WR. *GNYHA Services News Capsule.* Summer 2015:9-11.

Technology Updates: Kit Check®

by Laurie Ferguson, Informatics Pharmacy Specialist

Have you noticed anything new on the crash carts?

The Pharmacy Department is happy to announce the implementation of Kit Check® for our code cart trays. Kit Check® is a pharmacy kit processing and medication tracking software system based on radio waves or radio-frequency identification (RFID). All medications in code carts, as well as the trays themselves, have been labeled with RFID tags. Each tag is programmed to identify the medication type (size and strength), lot number, and the expiration date for each unit of medication.

These tags can serve many functions. By programming Kit Check® software with par levels of the different types of medications expected in each type of code cart tray, reports can be generated to identify items to be restocked for each tray. This new system has cut down the time to restock and check a tray from 15-20 minutes to 3-5 minutes per tray. RFID tags also allow associating the medications with a particular tray and cart. Kit Check® will allow for recalls and expiring medications to be more efficiently managed and tracked. Kit Check® is welcomed here as well as at other institutions as a method to improve efficiency and to ensure process consistency, safety and medication visibility throughout the hospital. In some institutions, Kit Check® has reduced tray processing time by 90% and increased accuracy by over 99.5%.

Pharmacy Focus: TheraDoc®

by Stanley Moy, Antimicrobial Stewardship Pharmacist

TheraDoc®, a clinical decision support system, was recently implemented and is currently being utilized by our clinical pharmacists, antimicrobial stewardship program, and infection control department. It provides clinicians with a comprehensive set of surveillance tools and aggregates data from various hospital departments such as pharmacy, radiology, and laboratory all in one place. Overall, it is anticipated this integrative system will result in better clinical team collaboration and improve patient care.

TheraDoc® alerts allow clinicians to receive real-time information to help identify targeted clinical intervention opportunities. Personalized alerts facilitate identifying patients with prolonged antimicrobial therapy, positive microbiological cultures, abnormal lab values, drug-bug mismatches, and potential adverse drug reactions within minutes upon generating a request rather than after several hours of searching through patient profiles in the electronic medical record.

When verifying medication orders, TheraDoc® will alert pharmacists to laboratory results that may be contraindicated or incompatible with a medication, such as low magnesium or potassium in patients receiving digoxin or an elevated INR in a patient receiving warfarin. For medication orders that are already active, these same alerts will be triggered as new laboratory results become available. For example, if a patient develops acute renal failure, the reduced creatinine clearance will trigger an alert to check for renal dosing of an existing order for sulfamethoxazole-trimethoprim (Bactrim®). With alert notifications, pharmacists may communicate concerns with physicians as soon as new results are posted, and they can play a proactive role in reducing the risk of potential adverse drug events.

Featured patient-care question

Nurses Want To Know …

Q: My patient's fingerstick blood glucose at bedtime is 95 mg/dL. Is it safe to give insulin?

A: *Maybe. The decision depends on the type of insulin and the patient's eating status, insulin sensitivity and risk for hypoglycemia. In general, a long- or intermediate-acting insulin, such as glargine (Lantus®) or NPH insulin may be given if the patient has been eating and the dose has not resulted in hypoglycemic events overnight or in the early morning. If the patient is NPO for procedure, physicians may reduce the dose by 30-50%.* ***NEVER*** *hold a dose without consulting the physician, especially in patients with type 1 diabetes mellitus who would then be at risk of diabetic ketoacidosis. Check the pattern of fingerstick results and ask if a dose reduction may be safer if you are concerned.*

Spotlight on Safety: KBMA Confusion

by LilyAnn Jeu, Medication Safety/Internal Medicine Clinical Pharmacist

Knowledge-based medication administration (KBMA) has been an electronic safety feature at the bedside at University Hospital of Brooklyn since September 2014. Using the bar-code medication administration (BCMA) module in HealthBridge, the nurse scans the bar code on the patient wristband and the medication packaging to "match" the order, the patient and the medication. However, when multiple bar codes exist, even technology requires a watchful eye.

Earlier this year, fluticasone oral inhaler (Flovent HFA®) 44 mcg/puff was ordered for a patient with asthma. Available in multiple strengths, an inhaler containing 220 mcg/puff was dispensed from the pharmacy. On day 4, a nurse realized the dose on the hospital label did not match the dose on the box even though 4 out of 5 doses had been charted using BCMA. It turns out nurses were scanning the HealthBridge (hospital) label, which only matches the order to the patient rather than scanning the manufacturer's bar code on the box, which validates the identity of the medication with the order.

As a reminder, for multi-dose products dispensed for individual patients (such as inhalers, dropper bottles, or tubes), always choose to scan the manufacturer's bar code on the box or immediate container before scanning the hospital label in KBMA.

Clinical Pearls: For Vancomycin, *Dose* Does Matter

Sarah Ullman, PharmD Candidate, and
Densley Francois, Pediatric Clinical Pharmacist

Currently, adult guidelines for vancomycin therapeutic drug monitoring suggest that troughs be maintained above 10 mg/L to prevent the development of drug resistance. Additionally, for complicated infections such as meningitis, serum trough levels should be maintained at 15-20 mg/L.[1] Due to limited available data in children, clinicians often rely on the adult guidelines. However, renal elimination of vancomycin in children is generally more efficient than in adults. Thus, current dosing strategies include using the upper limit of the recommended pediatric dosage range (60 mg/kg/day) and more frequent dosing (every 6 hours) in order to attain these levels.

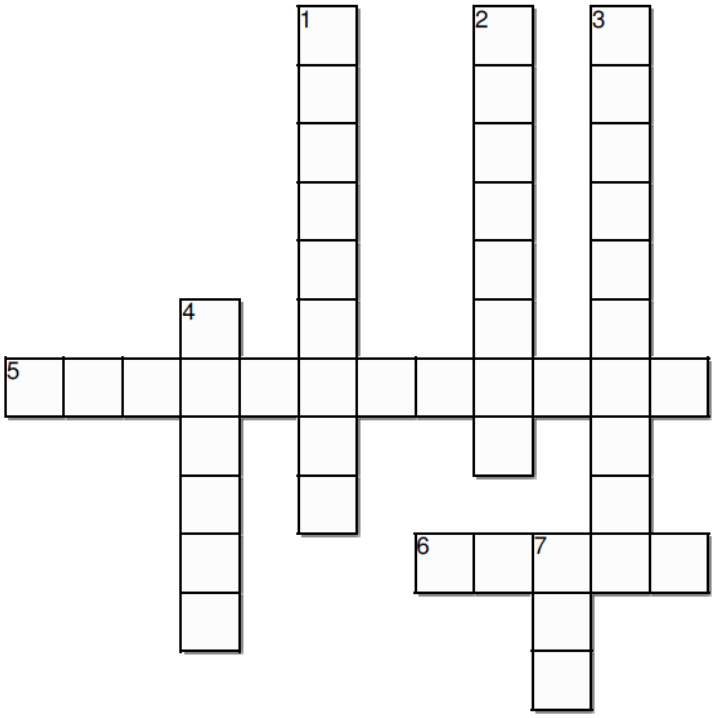
In many pediatric institutions, starting vancomycin doses range from 40-60 mg/kg/day divided every 6-8 hours. However, doses on the lower end of the range are less likely to achieve the specified targets and often require frequent dose adjustments. Frymoyer et al.[2] compared vancomycin regimens of 15 mg/kg/dose every 8 hours to the same dose every 6 hours. Twice as many children (37%) dosed with the more frequent regimen achieved levels of 10-20 mg/L, with no significant difference in the incidence of supratherapeutic levels. Hwang et al.[3] compared dosing regimens of 10 mg/kg every 6 hours and 15 mg/kg every 6 hours. Significantly more patients who received the higher dose (13% vs 5.6%, p<0.001) achieved target trough levels between 15 and 20 mg/L.

Based on the available data, pediatric regimens should at least be started at the higher end of the currently recommended regimen **(60 mg/kg/day divided every 6 hours)**. This is particularly important in patients with complicated infections where trough levels of 15-20 mg/L are targeted. This will provide the greatest chance of achieving therapeutic levels and minimize the risk of resistance.

References:
[1] Rybak M et al. *Am J Health-Syst Pharm.* 2009;66:82-98.
[2] Frymoyer A, et al. *Pharmacotherapy.* 2011;31(9):871-876.
[3] Hwang D, et al. *J Microbiol Immunol Infect.* 2015; In press. http://dx.doi.org/10.1016/j.jmii.2015.08.027

Crossword Puzzle: Warfarin

by Hieu Boulom, PharmD Candidate



Across

5. An antidote for warfarin is _____.
6. _____ is the color of the 10-mg warfarin tablets. (*Hint:* Check Lexicomp® for pill description)

Down

1. Warfarin is contraindicated in _____.
2. _____ is the most common brand name.
3. Warfarin is a vitamin K _____.
4. Warfarin can be used for _____ prevention in high-risk patients with atrial fibrillation.
7. Patients should have their _____ monitored.

Answers to Crossword Puzzle:
Across: 5. Phytonadione 6. White
Down: 1. Pregnancy 2. Coumadin 3. Antagonist 4. Stroke 7. INR

Team Tip of the Day

WHERE IS MY PATIENT'S MEDICATION?

When looking for medications that are not in Pyxis® and require delivery from the pharmacy, look in the ***BLUE*** bins or refrigerators in the medication room of each unit. Deliveries are made every 1 - 2 hours.

Keep bins neat and clutter free to find new medications more easily.

Look for the "Check Refrigerator" reminder on eMAR for selected medications.

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