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News & Noteworthy: Get a Clue, Fight the Flu!

by Sandra Ude, PharmD Candidate, and Alan Hui, Associate Director of Pharmacy

Current options for preventing influenza infection have evolved to address an evolving virus and patient needs. (See table below.)

Table. 2016-17 Influenza Vaccine Options at SUNY Downstate Medical Center

Flu vaccine (Manufacturer)	Egg Component	Quadrivalent vs Trivalent	Age	Intended Population
Flucelvax® (Novartis)	Yes	Quadrivalent	≥ 4 years	Employees
Fluzone® (Sanofi)	Yes	Quadrivalent	6 - 35 months	Pediatric patients
Fluzone HD® (Sanofi)	Yes	Trivalent	≥ 65 years	Elderly patients
Fluarix® (GSK)	Yes	Quadrivalent	≥ 3 years	Adult/Pediatric patients
Flublok® (Protein Sciences Corp)	No	Trivalent	≥ 18 years	Adult with egg allergy

In previous years, flu vaccines were designed to protect against three strains of influenza virus (trivalent); two type A (H1N1 and H3N2) viruses and one lineage of B virus (either Yamagata or Victoria). Today, quadrivalent influenza vaccines are available to provide protection against both type B viruses along with two type A

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Pharmacy & Therapeutics Committee Updates

by Yanmen Yang, Pharmacy Practice Resident

During the third quarter of the year, several policies and procedures were updated or approved with several new additions to the hospital formulary.

The Pharmacy & Therapeutics committee approved changes to the policies on "Guidelines For Timely Medication Administration" and "High-Alert Medications" to include labeling of tubing to reduce the incidence of tubing mix-up for the infusion pumps. The committee also approved the policy on "Nutrition Related Pending Orders by Dieticians" to allow dieticians to electronically enter orders for nutraceuticals, supplements, and vitamins on behalf of physicians based on therapeutic recommendations. Orders would become activated upon physician approval/endorsement of the entered orders. The measure was requested to reduce delays in patient care.

A pediatric guideline was approved for management of hyperparathyroidism in dialysis patients at Parkside Dialysis Center. An antibiotic weight-based dosing and rounding guideline was approved with the addition of pharmacy ability to round doses of specified antibiotics to aid prescribers in ordering appropriate doses, while minimizing wastage of medications.

Several medications were brought to the P&T Committee for review and approval, including one of the new meningococcal B vaccines, Bexsero®, and a combination HIV medication, Complera® (consisting of emtricitabine, rilpivirine, and tenofovir disoproxil fumarate). Both were discussed and approved by the committee for addition to the hospital formulary.

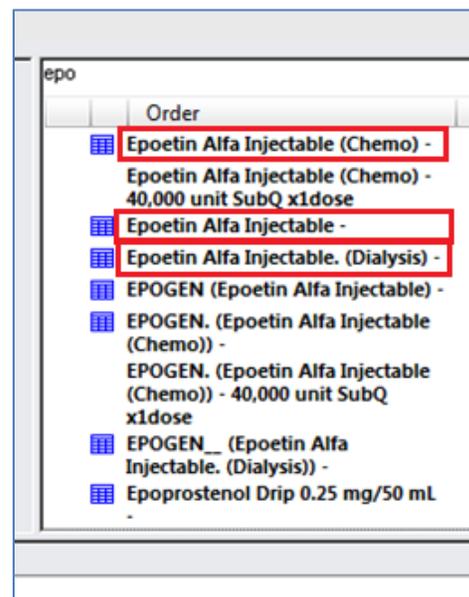
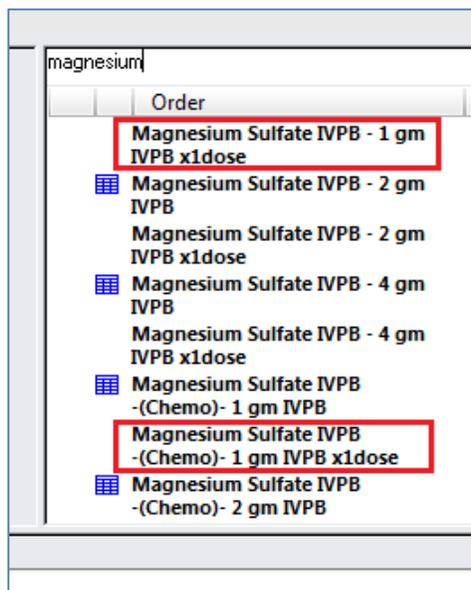
Technology Updates: Reading (Between) the Lines

by Yanmen Yang, Pharmacy Practice Resident, and I. Ian Richards, Pharmacy Supervisor

Have you ever wondered why some medications have an indication in parentheses when entering medication orders? For example, magnesium sulfate IVPB has options with and without (Chemo), while epoetin alfa injectable has options with or without (Chemo) or (Dialysis). These sentences were configured to facilitate dispensing from pharmacy satellite locations (rather than the Main Pharmacy) or to specific Pyxis[®] machines in patient care units.

Orders that specify "(Chemo)" will be directed to the 6th floor chemotherapy satellite pharmacy while orders that specify "(Dialysis)" are directed to the Pyxis[®] machines on the hemodialysis unit. When the incorrect order is

chosen, nurses on patient units may not have access to the medication and thus may experience unintended delays in medication therapy. Orders prepared for patients on the wrong floor cause workflow duplication and can lead to medication wastage. Being aware of indications presented in the parentheses during ordering can aid pharmacy dispensing and nursing workflow for patient care and help avoid medication waste.



Get a Clue, Fight the Flu!

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strains.¹ Flu vaccines were also available only as an injection and were mainly derived from eggs creating some barriers to vaccinations.

Flu vaccines produced from egg-based manufacturing process becomes an issue in patients with egg allergies. Hence, Flublok[®], was developed using recombinant technology (without the use of eggs) to provide an option in these patients.² For the elderly population, a weakened immune system results in a reduced immune response to vaccines providing less protection. Therefore, Fluzone[®] high dose (HD), which has four times the amount of antigen than the regular Fluzone[®] vaccine, is available to generate a stronger immune response and protection.³

As injections of flu vaccine have not always been well received, especially among pediatric patients, an intranasal live attenuated influenza vaccine, Flumist[®], was developed to address this barrier to vaccination. However, recent data from the U.S. Influenza Vaccine Effectiveness Network indicate Flumist[®] had poor efficacy against all influenza strains. Hence, Flumist[®] is not recommended by the Centers of Disease Control for this flu season.^{4,5}

References:

- ¹ <http://www.cdc.gov/flu/protect/vaccine/quadrivalent.htm>
- ² http://www.cdc.gov/flu/protect/vaccine/qa_flublok-vaccine.htm
- ³ http://www.cdc.gov/flu/protect/vaccine/qa_fluzone.htm
- ⁴ <http://www.cdc.gov/media/releases/2016/s0622-laiv-flu.html>
- ⁵ Munoz-Rivas, Flor M., and Henry H. Bernstein. "AAP updates recommendations for flu vaccine in children." *AAP News* (2016)

Formulary Updates

by Laurie Ferguson, Informatics Pharmacy Specialist

Deletions:

Ticarcillin and clavulanate (Timentin[®]) IVPB

Kanamycin vials

Antipyrine and benzocaine (Auralgan[®]) otic solutions

Additions:

Filgrastim-sndz (Zarxio[®]) injections

Sacubitril and valsartan (Entresto[®]) tablets

Ivabradine (Corlanor[®]) tablets

Emtricitabine, rilpivirine, and tenofovir disoproxil fumarate (Complera[®]) tablets

Sugammadex (Bridion[®]) vials
- Restricted to OR and ER use

Pharmacy Focus: Basics of the 340B Drug Pricing Program

by Danay Davis, PharmD Candidate, and Alan Hui, Associate Director of Pharmacy

In 1992, the federal government implemented the Public Health Service Act that included section 340B drug discount pricing program. The 340B program requires participating drug manufacturers to sign an agreement that will provide discounted prices (between 20 – 50%) on outpatient prescription drugs to covered entities. Covered entities include safety net providers such as disproportionate share hospitals, children's and cancer hospitals, and critical access hospitals. Cost savings from the 340B drug program allows covered entities to healthcare services to their local patient populations.

SUNY Downstate Medical Center is considered a covered entity and eligible for the 340B program. In order to participate in the 340B program, covered entities must adhere to program requirements that include maintaining accurate 340B drug purchasing based on eligible outpatient prescriptions, updating certification, preventing duplicate discounts and preventing distribution to ineligible patients. To meet compliance with the 340B program, SUNY Downstate uses a 340B split billing software called *Sentry* to guide 340B drug purchasing based on inpatient and outpatient drug billing records. A covered entity is also allowed to extend the 340B program to contracted outpatient pharmacies if it meets all the 340B rules and regulations.

In 2013, the 340B program accounted for \$7.5 billion of the total drug sales and is projected to increase to \$16 billion by 2019. As drug prices continue to increase, 340B eligible hospitals will become more dependent on the drug discount program to maintain standards of care.

References:

1. Health 340 B. Overview. <http://www.340bhealth.org/340b-resources/340b-program/overview/>. Accessed August 2016.
2. 340B drug pricing program. <http://www.hrsa.gov/opa/>. Accessed August 2016.
3. Coalition 340 B. Resources. <http://340bcoalition.org/resources/>. Accessed August 2016.

Featured
patient-
care
question

Nurses Want To Know ...

Q: Why do some medication orders say to give "after dialysis"?

A: Just as dialysis can remove waste and excess fluid from the blood, drug molecules can also be removed. In particular, hemodialysis tends to remove molecules that are more water soluble, smaller in size, and less protein bound. For hospitalized patients, the potential for removal of antibiotics with hemodialysis, and the resulting subtherapeutic concentrations, may place patients at risk of inadequately treated infections. Notes in medication orders instructing to give doses "after dialysis" identify medications that should be administered after a patient has completed hemodialysis and returns to the inpatient unit. In some cases, supplemental doses may even be needed to maintain drug concentrations.

Spotlight on Safety: Avoiding Missed Medication Doses

by LilyAnn Jeu, Medication Safety/Internal Medicine Clinical Pharmacist

The schedule for medication administration for patients in the hospital is often interrupted by procedures and tests that take patients out of an inpatient unit for up to several hours at a time. Incident reports and medication administration audits have found that in some cases medication doses intended to be given upon patient return were marked as "Not Given/Done: Patient off unit," and the patient missed the dose of medication.

To reduce the potential for missed medications, nurses are encouraged to "Reschedule" the single dose on the Worklist Manager (a.k.a., electronic Medication Administration Record) at the time the patient returns to the unit using the Knowledge-Based Medication Administration (KBMA) module. If the new medication administration time is too close to the next scheduled medication administration time, the dose of medication may need to be held (with a comment that the time is too close to the time of the next dose). When in doubt, a nurse should consult the physician about whether a delayed dose should still be administered. To avoid administering doses too close together, medication doses should be rescheduled only up to 11:59 PM of the same day. Ideally, doses should be rescheduled within the same shift to reduce confusion and prevent errors in hand-off or sign-out from one shift to the next.

In addition, omissions or significant delays of high-alert medications (such as heparin infusions or once-daily insulin glargine) or medications critical to a patient's course of therapy (e.g., intravenous antibiotics) should be discussed with the physician to determine if changes in orders are needed. In some situations, a STAT dose or adjusted dose may need to be ordered to ensure continuity of care.

Clinical Pearls: Use of Beta-Lactams in Patients with Penicillin Allergy

by Jane Ching, Pharmacy Practice Resident

Penicillin allergies are the leading cause of drug-induced type I immunoglobulin E (IgE) mediated reaction with an incidence of 0.01 to 0.04%¹. There has been long-term debate over cross-reactivity with other beta-lactam antibiotics such as cephalosporins, carbapenems, or monobactams. Higher incidences of cross-reactivity found in studies conducted in the 1960s and 1970s may have been due to contamination of penicillin-related compounds with *Cephalosporium* mold^{1,2}. Early cephalosporin compounds also contained trace amounts of penicillin^{1,3}.

Recent studies challenging penicillin-allergic patients with cephalosporins via skin tests suggest cross-reactivity is associated with similarities in the R1 side chain off the beta-lactam ring, rather than the ring itself^{2,3}. In patients with documented true penicillin allergy (defined by anaphylaxis, angioedema, or bronchospasms), cephalosporins with similar side chains should be avoided. These include all first generation (e.g., cefadroxil, cefazolin, cephalexin) and a few second-generation cephalosporins (e.g., cefaclor, cefprozil)³. Incidences of cross-reactivity between penicillins and most of second and all of third and fourth generation cephalosporins are minimal^{3,4}.

Carbapenems (e.g., meropenem, imipenem) share a bicyclic core structure with penicillins; both have a beta-lactam ring attached to a 5-membered ring¹. More recent prospective studies suggest that rate of cross-reactivity in between penicillins and carbapenems is <1%¹. However, these studies have limitations and the consensus is to use carbapenem skin tests when screening for cross-reactivity in patients with penicillin allergy¹. Almost all studies show no cross-reactivity between beta-lactams and aztreonam, the only monobactam available in the United States, with the exception of ceftazidime⁵. This is due to the fact that penicillins and other cephalosporins do not share common side chains with aztreonam^{1,4,5}.

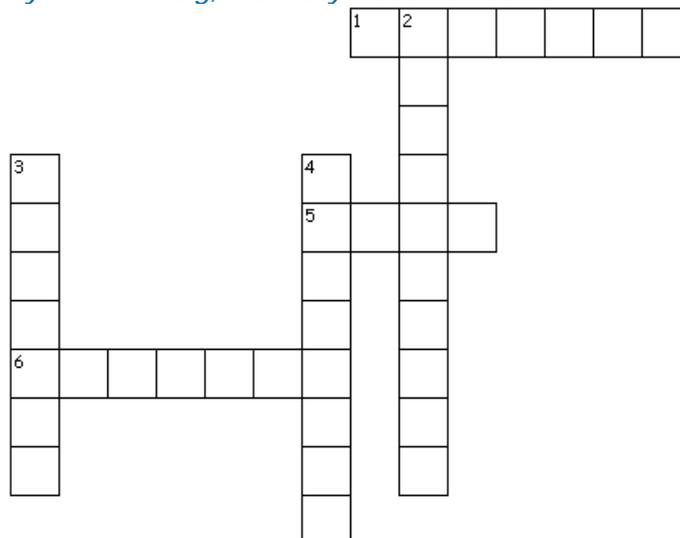
In order to maximize treatment options, it is important to remember that evidence of cross-reactivity between penicillins and cephalosporins occurs only about 1% of the time for non-IgE reactions and about 2.5% of the time for confirmed IgE mediated allergic reactions³. Additional steps such as using skin tests can be utilized for carbapenems. A history should be obtained from patients reporting penicillin allergies as to whether a true IgE-mediated response actually occurred. If not, later-generation cephalosporins and/or carbapenems remain viable treatment options and may be quite effective.

References:

- 1 Terico AT, et al. *DD* 2014;27(6):530-44.
- 2 Pichichero ME, et al. *Otolaryngology* 2007;136:340-7.
- 3 Campagna JD, et al. *J Emer Med* 2012;42(5):612-20.
- 4 Romano A, et al. *J Allergy Clin Immunol* 2016;138:179-86.
- 5 Montanez MI, et al. *Curr Treat Options Allergy* 2015;2:141-154.

Crossword Puzzle: Flu Season

by Yanmen Yang, Pharmacy Practice Resident



Across

1. Flu season often starts in the month of _____.
5. The Centers for Disease Control and Prevention recommends everyone 6 months and older to get a flu vaccine every ____.
6. ____ is the only non-injectable influenza vaccine, although it not available for 2016 due to reports of inefficacy.

Down

2. The flu virus is _____ (easily spread from person to person).
3. _____ is the brand name for oseltamivir.
4. Over-the-counter medications only treat the _____ of the flu and do not cure the flu.

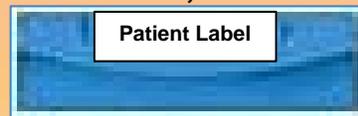
Answers to Crossword Puzzle:

Across: 1. October 5. Year 6. FluMist
Down: 2. Contagious 3. Tamiflu 4. Symptoms



Team Tip of the Day

"Bin" There, Done That



Label medication cassettes with patient labels.

Use cassette bins to transport drugs from Pyxis® to workstations.

Store medications in locked workstations between medication passes.

Store multi-use products (inhalers, eye drops, creams, etc.) in labeled bins between doses.

