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Pharmacy Newsletter Now Available Via Email!

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Newsletter’s Mission

RxNews is a newsletter written by pharmacy residents, staff, and students. The goal of this newsletter is to provide new and up to date clinical information to all Sky Lakes Medical Center employees. If there is anything you would like to see included in future issues, please feel free to share your suggestions. We will do our best to include your ideas!

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Thank you for reading! - Sky Lakes Pharmacy Staff



Bexagliflozin (Brenzavvy)

FDA Approved:

- January 2023

Mechanism of Action:

- Sodium-Glucose Cotransporter 2 (SGLT2) inhibitor; lowers blood sugar renal excretion through the kidneys.

Clinical Trials:

- Total of 23 clinical trials with 5000 participants with Type 2 Diabetes.
- Phase 3 studies showed significant reduction in A1C and fasting blood sugar after 24 weeks. Studies showed significance as monotherapy and combination therapy.
- Not approved for weight loss or blood pressure management due to minimal impact with clinical trial participants.
- CHF and CKD are currently being studied.

Contraindications:

- End renal stage or dialysis patients

Brenzavvy™
(bexagliflozin)

Brenzavvy is a new medication that has been approved by the U.S. Food and Drug Administration.



Vancomycin with Zosyn: Medication Use Evaluation

Katy Scott, PharmD

FDA Approved Indications:

- Vancomycin:
 - IV Formulation: empiric or specific treatment for Methicillin-Resistant Staphylococcus aureus (MRSA) and Staphylococcus epidermidis (MRSE) infections
 - Septicemia, Infective Endocarditis, Skin and Skin Structure Infections, Bone Infections, Lower Respiratory Tract Infections
 - Oral Formulation: C. difficile colitis
- Zosyn:
 - Combination of the expanded spectrum antipseudomonal antibiotic piperacillin with the beta lactamase inhibitor, tazobactam

Pharmacology:

- Vancomycin:
 - Inhibits bacterial cell wall synthesis by blocking glycopeptide polymerization through the binding of D-alanyl-D-alanine portion of cell wall precursor
- Zosyn:
 - Piperacillin inhibits bacterial cell wall synthesis by binding to one or more of the penicillin-binding proteins (PBPs) which inhibits the final step in the synthesis of the bacterial cell wall. Bacteria cells eventually lyse due to decreased activity in the cell wall assembly.
 - Tazobactam protects piperacillin from degradation by the beta-lactamases of MSSA, H. influenza, M. catarrhalis, and B. fragilis

Major Concern for Therapeutic Combination: Increased Nephrotoxicity

Data: Vancomycin and Zosyn combination use at Sky Lakes Medical Center between 8/2022-12/2022.

Data Excludes:

- Patients who received Vancomycin and Zosyn combination at other medical facilities.
- Medication orders that were not administered.
- Patients who only received one dose of Vancomycin or Zosyn.
- Patients who did not have SCr results after 24-hours of antibiotic administration.

Objectives:

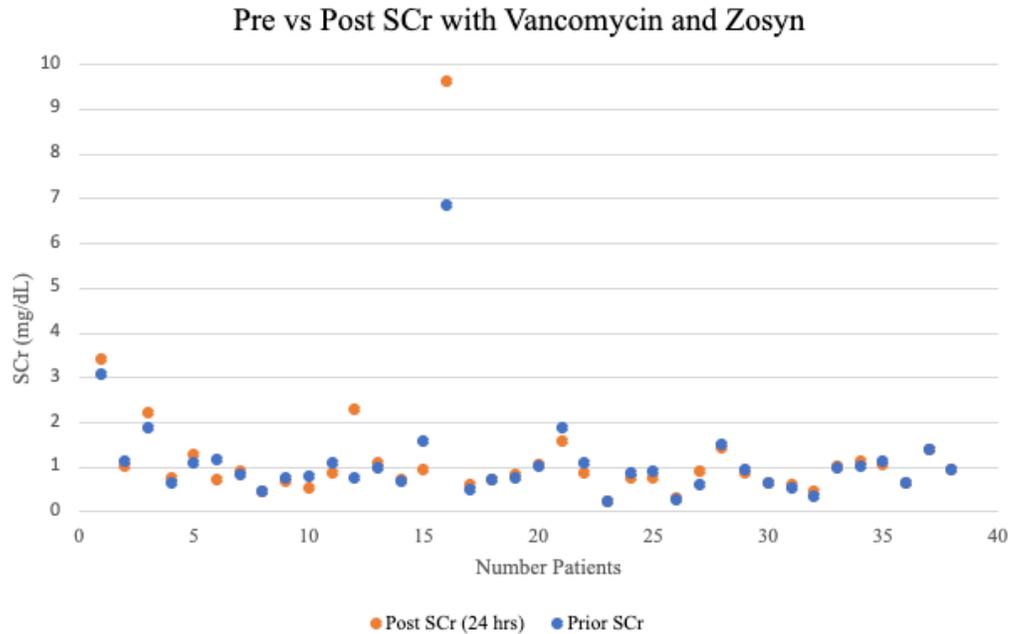
- To analyze Vancomycin with Zosyn usage at Sky Lakes Medical Center
- Measure 24-hour change in SCr between pre and post doses of Vancomycin and Zosyn
- Assess indication for combination initiation

Methods:

- Report generated from component IDs (Vancomycin and Zosyn) that is generated from EPIC within the designated time frame.
- Chart review was performed in patients meeting objective criteria. Patient charts were analyzed for admission SCr, administration of antibiotics, indication for antibiotics, and post 24-hour SCr.

Results:

- Between 8/2022-12/2022, 71 patients were identified as receiving Vancomycin and Zosyn during their hospitalization. Of these 71 patients, 38 patients met criteria and were analyzed.
- The most common indication for use of both antibiotics was Sepsis/Septic Shock.
- Patient SCr increased by 0.09 mg/dL average after 24 hours of administration.



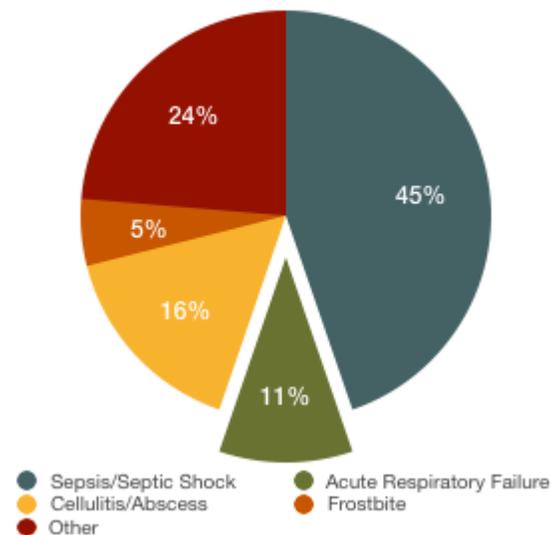
Recommendations:

- Consider usage of past antibiotics and cultures
 - Risk factors can lead to the necessity of MRSA or Pseudomonas coverage
- Comorbidities may indicate different treatment options
 - Vancomycin and Cefepime with AKI
- Patient specific therapy

Discussion:

The initiation of Vancomycin and Zosyn were appropriate based on indications and pending cultures. Some patients were started on the combination of antibiotics despite current AKI or other comorbidities relating to an increase in SCr. Roughly 61% of the studied patients had an increase in the baseline SCr 24 hours post antimicrobial doses. Patients should have antimicrobial coverage based on their individual situation. Patient specific medication selection can decrease adverse effects and create safer patient outcomes.

Vancomycin with Zosyn Indication



References:

- Epic Generated Sky Lakes Medical Center Report
- Lexicomp Inc
- The Sanford guide to antimicrobial therapy 2022 / editors David N. Gilbert, Henry F. Chambers, Michael S. Saag, Andrew T. Pavia, Helen W Boucher, et al.

Commonly Prescribed Pediatric Medications

Fernando Amaya, PharmD

Antibiotics, ADHD, asthma and over the counter drugs are among the most used by children in the US. Because of differences in physiology and size, pediatric patients may be at higher risk of adverse drug reactions and interactions than adults, calling for great care when dosing medication in this population. While not comprehensive, the table below may be useful in the dosing and appropriate use of prescription drugs commonly used in pediatric patients.

<u>Drug</u>	<u>Class</u>	<u>Common uses</u>	<u>Dosing</u>	<u>Notes</u>
Amoxicillin	Aminopenicillin antibiotic	Otitis media and other bacterial infections	80 – 90 mg/kg/ day , up to a max of 4000 mg/day. This is usually in 2 – 3 divided doses.	Preferred for otitis given low rates of resistance.
Azithromycin	Macrolide antibiotic	Typically, pulmonary or gastrointestinal bacterial infections	10 mg/kg/ dose once daily for 3 days for most indications Can also consider 12 mg/kg/dose on day one followed by 5 mg/kg/dose on days 2 - 4	Higher doses may be appropriate in immunocompromised individuals
Amoxicillin-clavulanate	Aminopenicillin with beta-lactamase combo antibiotic	Used for broader coverage in some types of infections	Many formulations exist. Generally, the standard ratio (7:1 of amoxicillin: clavulanate) is used due to this providing 125 mg of clavulanate. For the max tolerated dose of amoxicillin, see above.	Amoxicillin-clavulanate 250-125 mg is only recommended in patients weighing more than 40 kg
Cephalexin	1 st generation cephalosporin	Alternative agent for those who may have a penicillin allergy	25 – 100 mg/kg/day in 3 – 4 divided doses. Maximum recommended is 500 mg/dose.	For MSSA infections, the higher end of the range should be targeted.
Methylphenidate	Central nervous system stimulant	Commonly used in the treatment of ADHD	2.5 - 5 mg twice daily administered before breakfast and lunch; increase by 5 to 10 mg/day at weekly intervals. Maximum recommended dose is 60 mg/ day (or 2 mg/kg/ day).	Extended-release dosing options are also available, but tolerance of short-acting agent should be established first.
Montelukast	Leukotriene receptor antagonist	Can be used in the treatment of asthma and seasonal allergies	Children 2 to 5 years: Oral: 4 mg once daily. Children ≥6 years and Adolescents <15 years: Oral: 5 mg once daily. Adolescents ≥15 years: Oral: 10 mg once daily.	Recent evidence has associated montelukast with neuropsychiatric events (including suicide).
Prednisone	Corticosteroid	Has anti-inflammatory properties like other corticosteroids	1 - 2 mg/kg/ day in 2 divided doses, usually, up to a maximum of 60 mg/day.	Dosing is highly variable and indication dependent. Higher doses may be appropriate.
Clindamycin	Lincosamide antibiotic	Preferred antibiotic for anaerobic infections or when MRSA is a concern	30 - 40 mg/kg/ day in 3 divided doses, up to a max of 450 mg/dose. Max doses of 600 mg/dose are acceptable when administered IV in hospitalized patients.	Max doses of 900 mg/dose are acceptable when treating necrotizing fasciitis.
Fluoxetine	Selective serotonin reuptake inhibitor	One of few antidepressants FDA approved for treatment of depression in pediatrics	Children aged 8 – 11: 5 – 10 mg once daily, with weekly titration up to a max of 40 mg/ day . Adolescents (aged 12 and older): 10 – 20 mg once daily, with weekly titration up to a max of 60 mg/ day .	Approved for use in children 8 years and older for major depressive disorder. Increases the risk of suicidal ideation in younger patients.

Hyperemesis Gravidarum: Pharmacologic Interventions

Fernando Amaya, PharmD

While nausea and vomiting in pregnancy are common, hyperemesis gravidarum (HG) is defined as severe nausea and vomiting associated with severe impairment of oral intake. Hypovolemia as determined by electrolyte abnormalities and changes in weight may also be present. Typical onset is between the 4th and 10th week of pregnancy, and most cases resolve at 20 weeks of gestation. Complications of HG include:

- Wernicke’s encephalopathy
- Hypocoagulability (increased susceptibility to bruising/bleeding)
- AKI
- Low birth weight in infant
- Pre-term preeclampsia
- Placental abruption
- Damage to esophageal epithelium, including rupture

Treating the underlying cause of the hyperemesis is essential. The differential for a patient that presents with severe nausea and vomiting is consequently very broad.

POTENTIAL CAUSES OF SEVERE NAUSEA/VOMITING

- Infectious gastroenteritis
- Pyelonephritis/urosepsis
- Poisoning
- Drug use, prescription/OTC or otherwise (particularly cannabis or other type of withdrawal)
- DKA
- Migraine and vestibular pathologies (vertigo)

Work up for nausea and vomiting should attempt to rule out other likely causes of the symptoms. These etiologies should be appropriately treated along with providing pharmacotherapy for the N/V as anti-emetics are the mainstay of treatment.

TREATMENT

When choosing an anti-emetic, consider that there is a baseline risk of congenital anomalies (“birth defects”) estimated to be ~3% in the United States, and that this risk increases when patients are unable to receive proper nutrition or are having severe nausea/vomiting. As such, the benefits of treatment may outweigh the risks of not treating, even if the treatments themselves may be inherently risky. Keeping in mind the population that would benefit most from these interventions, the recommendations below assume that strategies such as trigger avoidance, dietary changes and doxylamine-pyridoxine have been tried.

<u>First Line</u>	<u>Second Line</u>	<u>Adjunctive</u>
Diphenhydramine	Ondansetron	Antacids (calcium carbonate)
Metoclopramide	Droperidol	Famotidine
Promethazine	Corticosteroids (for refractory cases)	Omeprazole
Prochlorperazine		Pantoprazole

DISCUSSION

Antihistamines are known to be generally safe in pregnancy, so they are often used as “first line” agents. However, in a patient with HG, it is likely they have trialed doxylamine-pyridoxine without appropriate symptom control. In patients that present to the ER with dehydration and electrolyte abnormalities, it would be more appropriate to instead initiate a dopamine antagonist such as metoclopramide or promethazine. These agents can cause extrapyramidal side effects, although this risk is relatively low.

Ondansetron has been weakly associated with cardiovascular birth defects and cleft palate in some studies, but other studies have not found this same link. It is generally not recommended in the first trimester but can be considered based on risk-benefit discussions with each patient.

Droperidol has strong evidence showing its efficacy in controlling symptoms of nausea and vomiting, but can lead to pronounced QT prolongation and, subsequently, torsades. This risk should be carefully weighed in patients with HG, who may already be presenting with electrolyte aberrations.

While not discussed here in detail, IV fluids and electrolyte replacement should generally be the first intervention ordered for these patients. Patients who have refractory N/V after 4 hours of appropriate fluids and pharmacotherapy in the emergency department should be admitted for further management given the risks and potential complications associated with refractory HG.

References:

1. Committee on Practice Bulletins-Obstetrics. ACOG Practice Bulletin No. 189: Nausea And Vomiting Of Pregnancy. Obstet Gynecol 2018; 131:e15. Reaffirmed 2020.
2. Lowe, S.A. and Steinweg, K.E. (2022), Review article: Management of hyperemesis gravidarum and nausea and vomiting in pregnancy. Emergency Medicine Australasia, 34: 9-15. <https://doi.org/10.1111/1742-6723.13909>.

Drug Shortages

- **Amoxicillin (ALL including Augmentin)**
- **Albuterol .5%/5 ml Inhaled solution**
- **Albuterol sulfate and Ipratropium Bromide (DuoNeb)**
- **Alfenta 5ml ampules**
- **Acetazolamide (Injection)**
- **Bupivacaine and Bupivacaine/Epi .25% and .5% all sizes**
- **Clindamycin (IV)**
- **Dextrose 50% syringes**
- **Diltiazem (ALL)**
- **Dobutamine piggybacks**
- **Epinephrine Emergency syringes**
- **Eptifibatide all vials**
- **Famotidine injection**
- **Fentanyl Inj (various sizes) 5 ml and 10 ml**
- **Gentamycin 80/2 ml vials**
- **Indigo Carmine**
- **Iron Dextran Injection**
- **Lidocaine and Licocaine w/epi all concentrations**
- **2% Lidocaine HCL topical jelly**
- **Lorazepam Inj 2 mg/ml**
- **Potassium Chloride (All)**
- **Rocuronium Injection**
- **Ropivacaine Inj all sizes and strengths**
- **Sodium Bicarb syringes**
- **Sodium Phosphates**
- **Sterile Water – 100 ml**
- **Tylenol (Pediatric Suppositories)**