Our Lady of the Lake Regional Medical Center

INPHARMATION

The official publication of the Pharmacy Department

IN THIS **ISSUE**

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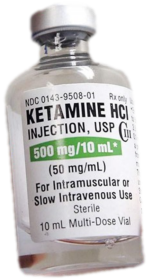
Resident Seminars

Looking Through the K-Hole: A Review of Ketamine Use in Clinical Practice

By Lynn Hoang, PharmD



Since ketamine's approval by the FDA in 1970 as an anesthetic agent, a wide array of off-label indications have been discovered including: severe agitation, analgesia, complex regional pain syndrome, refractory depressive mood, refractory status asthmaticus, and refractory status epilepticus. The primary mechanism for its anesthetic and analgesic effects is inhibition of the NMDA glutamate receptor and activation of inhibitory pain pathways.

Other off-label uses as well as its side effect profile may be explained by its effect on opioid, monoamine, adenosine, and other purinergic receptors. Some noteworthy psychomimetic effects of ketamine are collectively known as emergence reaction, and its cardiovascular effects present as tachycardia, hypertension, and arrhythmias. Currently, there is limited high-level evidence for ketamine's off-label indications, but the benefit found in the literature for status epilepticus, status asthmaticus, and major depressive disorder may make it viable as a last line option.

Evacuation of Intracerebral Hemorrhage Using Tissue Plasminogen Activator

By Caroline Heider, PharmD

Standard treatment for intracerebral hemorrhages (ICH) include minimally invasive surgical (MIS) techniques and pharmacological interventions with tissue plasminogen activator (tPA). Literature surrounding the use of the MIS procedure plus tPA has shown mixed data regarding efficacy. The procedure and tPA administration have shown to be safe in patients with ICH; however, efficacy based on functional outcomes defined as modified Rankin Score (mRS) outcomes of 3 or less have not been consistently shown.

The most recent study, MISTIE III, was published in 2019 by Hanley, et al. and compared MIS plus tPA versus standard medical care according to the 2010 AHA/ASA Guidelines for Management of Spontaneous ICH. The primary efficacy outcome was mRS score of 3 or less at 365 days. The study showed no significant difference in the primary outcome. An exploratory analysis of the treatment group showed improvement in functional outcomes when patients had 15 milliliters of hematoma volume remaining at the end of treatment, compared to the medically managed group. Overall, the procedure has not shown to improve functional outcomes in patient with ICH. A potential area for future studies would include examining implementation of goal hematoma volume removal.

Resident Seminars Cont.

Stirring the Pot: Is There a Role for Medical Marijuana in Therapy?

By Alexandra Grezaffi, PharmD

Medical marijuana has recently been made available to patients with debilitating medical conditions in the state of Louisiana. Endogenous cannabinoids and phytocannabinoids act on cannabinoid receptors type 1 and 2. Tetrahydrocannabinol (THC) and synthetic compounds similar to THC reduce nausea and vomiting, reduce pain and inflammation, and stimulate appetite; and cannabidiol (CBD) has antiepileptic, anxiolytic, antipsychotic, and anti-inflammatory activity.

Literature surrounding medical marijuana is limited due to its status as a schedule I controlled substance and restrictive policies and regulations enforced by the federal government on research into the health effects of cannabis products. Small studies have suggested decreased chemotherapy-induced nausea and vomiting and increased weight gain in patients with cachexia with THC, as well as decreased number of seizures in patients with Lennox-Gastaut Syndrome or Dravet Syndrome with CBD. Although these results are promising, further high-quality research is warranted to determine the benefits or risks associated with the use of medical marijuana. At present, medical marijuana should only be used as last-line salvage therapy.

Recent FDA Approvals

Lasmiditan (Reyvow)
Indication: Migraine with or without aura in adults (Oct. 2019)

Cenobamate (Xcopri)
Indication: Partial onset seizures (Nov. 2019)

Voxelotor (Oxbryta™)
Indication: Sickle cell disease (Nov. 2019)

The ESKAPE from Resistance: Novel Agents Used in the Management of Multidrug Resistant Gram-Negative Rods in the Critically Ill

By Kellie Cooley, PharmD

Multidrug-resistant (MDR) gram-negative rods have presented challenges for intensivists and infectious disease consultants for years. The most common organisms found in critically ill patients are carbapenem-resistant *Pseudomonas aeruginosa* (CRPA), carbapenem-resistant Enterobacteriaceae (CRE), and carbapenem-resistant *Acinetobacter baumannii* (CRAB). The selection of novel agents approved for MDR gram-negative infections discussed were ceftolozane/tazobactam (Zerbaxa), ceftazidime/avibactam (Avycaz), and eravacycline (Xerava).

Ceftolozane/tazobactam covers *P. aeruginosa* and has variable activity against *A. baumannii*. It is indicated for patients ≥18 years for hospital-acquired pneumonia (HAP), ventilator-associated pneumonia (VAP), complicated urinary tract infections (cUTI), and complicated intra-abdominal infections (cIAI) in combination with metronidazole. Ceftazidime/avibactam has activity against CRE-KPC and *P. aeruginosa*. It is indicated for patients ≥3 months with cIAIs and cUTIs and patients ≥18 years with HAP or VAP. Eravacycline is a novel tetracycline with activity against CRAB and CRE, and is indicated for patients ≥18 years with cIAIs. Based on the literature, these agents should be considered for the treatment of MDR gram-negative infections in critically ill patients, but initiation should be multifactorial based on patient, hospital, antibiotic, and pathogen.

At OLOLRMC, ceftolozane/tazobactam and ceftazidime/avibactam are restricted to ID consult services for the treatment of MDR gram-negative rods, and eravacycline is non-formulary. Please see FormWeb for further information.

Formulary Additions

Synthetic human secretin

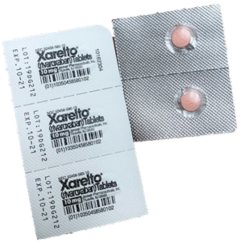
Bevacizumab-awwb [Mvasi™]

Trastuzumab-anns [Kanjinti™]

Crotalidae immune F(ab')2 (Equine) [ANAVIP®]

Policy Changes

IVIG dosing based on IBW or adjusted BW if ABW is >20% above IBW has been approved system wide



Clinical Pearl

Direct Oral Anticoagulants and CYP3A4 Inducers

Drugs that induce CYP3A4, such as rifampin, phenytoin, carbamazepine, and phenobarbital, can significantly decrease DOAC plasma concentrations and increase a patient's risk for thromboembolic events. Pharmacokinetic studies in healthy volunteers have shown 34-67% reductions in DOAC area under the curve, and there are multiple case reports of thrombotic events in patients taking dabigatran and rivaroxaban caused by interactions with inducers. Manufacturer labeling recommends against concomitant use of CYP3A4 inducers with DOACs due to concern for decreased efficacy. It is crucial to be mindful of this drug interaction when verifying DOACs and CYP3A4 inducers, as this may put patients at higher risk for thromboembolic events.

Patient Safety Corner

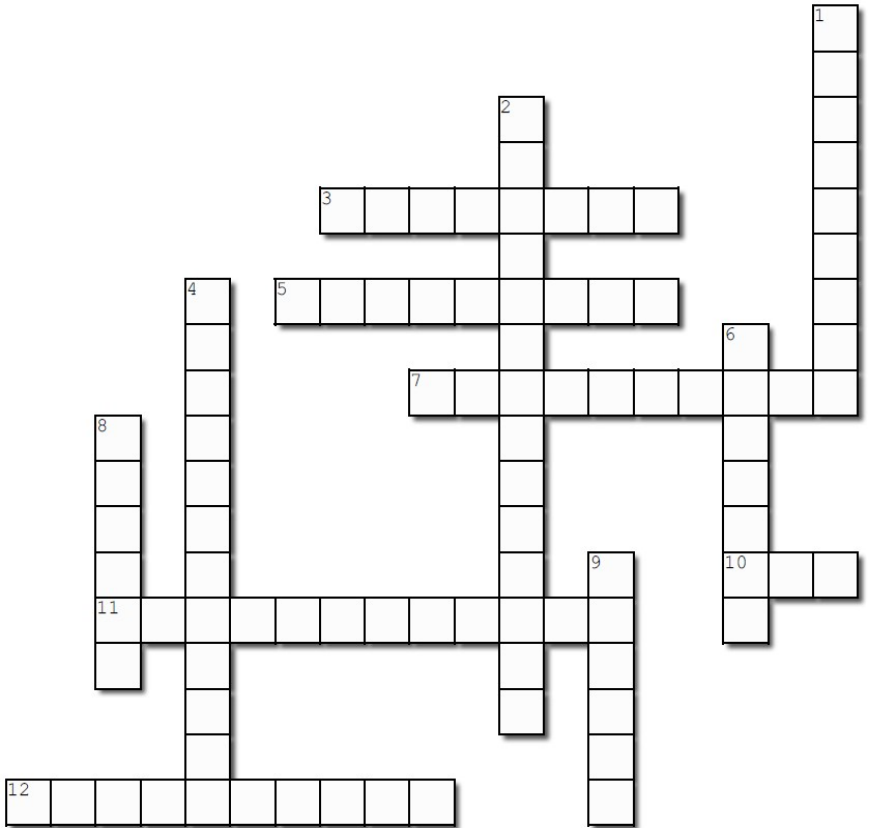
The Break Up: Errors when Altering Solid Oral Dosage Forms

Altering solid oral dosage forms is often required to meet patient-specific doses and the needs of patients who have swallowing issues or require administration through enteral feeding tubes. However, altering these doses can lead to increased risk of errors and adverse events One analysis identified 621 events involving solid dosage forms of medications that were altered showing that nearly three-quarters (73.9%, n=459) of events were associated with splitting tablets, crushing tablets was associated with around 24.3% (n= 151) of errors, and opening capsules accounted for the remainder (1.8%, n= 11).

General Risk Reduction Strategies:

- Limit altering oral dosage forms to cases in which commercially available alternatives are unavailable.
- Develop and implement procedures for handling, crushing, splitting, and opening oral dosage forms.
- Identify ways of alerting practitioners during prescribing, transcribing, verifying, dispensing, and administering medications that should not be altered.
- Increase patient monitoring when switching dosage forms.
- Provide training and periodic competency review regarding procedures for safe alteration of oral solid dosage.
- Educate patients on their medication therapy, including medications that should not be altered.

AKI and CRRT Crossword Puzzle



Across

3. 'A' component of the AEIOU mnemonic
5. Pathophysiology category that describes AKI due to urinary tract obstruction
7. Method of filtration for continuous venovenous hemofiltration
10. Stage of KDIGO that is defined as increase of 1.5—2-fold above baseline over 7 days or by 0.3 mg/dL within 48 hours
11. 'I' component of the AEIOU mnemonic
12. Biomarker used to asses kidney function

Down

1. Method of filtration for continuous venovenous hemodialysis
2. Characteristic of drug removal that is inversely proportional to percent bound (2 words)
4. Type of hemodialysis which runs for 3—4 hours per day as tolerated by the patient
6. Recommended anticoagulant in CRRT
8. 'U' component of the AEIOU mnemonic
9. RIFLE stage defined by increase to 2-fold or GFR >50% from baseline or urine output <0.5 mL/kg/hr for 12 hours

Answers will be sent out a week from today!