

Pharmacy Updates from the 2018 ASHP Midyear Clinical Meeting

Where: Anaheim, CA

When: December 2-6, 2018

The RWJBH pharmacy residents participated in the 2018 ASHP Midyear Clinical Meeting this past year along with more than 25,000 pharmacy professionals. This meeting is one of the largest gatherings of pharmacy professionals in the world, and it took place this past December in Anaheim, CA.

This meeting not only provided a platform for our residency programs to recruit future residents for the next residency year, but it also provided the residents opportunities for professional development. Many of the residents presented posters on the research they conducted this past year and participated in networking events where they advocated for pharmacy system at RWJBarnabas Health.

The residents also attended educational sessions offered at this meeting and summarized the clinical pearls in this newsletter for those unable to attend this year. These educational sessions were designed to update pharmacy practitioners on the latest guidelines used in clinical practice.

Review Articles: Table of Contents

Pharmacist-Led Efforts with Rapid Diagnostic Testing.....	2
Pharmacists in the Emergency Department: Heroes Antimicrobial Stewardship Needs.....	3
Drug Dosing in the Obese ED Patient: How High Can You Go?.....	4
Bridging Pharmacy Silos: Linking Acute and Pharmacy Services....	5
Dual Diagnosis: The Quandary of Chronic Pain, Chronic Opioids, Medication-Assisted Therapy, and Recovery.....	6
Killing Bugs and Saving Drugs Across a Health System: A Multi-Hospital Shared Antimicrobial Stewardship Program.....	7-8
Implementing the Triple Aim to Combat the Opioid Crisis.....	9
Updates in the 2018 Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption (PADIS) Guidelines.....	10
Pharmacy Leader Charge: Strategies to Overcoming Hurdles of Opioid Epidemic.....	11
Direct Oral Anticoagulants in Special Populations.....	12
Emergency Medicine Pearls 2018.....	13
Evidence-Based Decision Making in Selected Pediatric and Neonatal Critical Care Cases.....	14
Navigating Change in Primary Care: The Role of the Patient-Centered Medical Home Pharmacist.....	15
Updates in Transplantation: Current Challenges in Caring for the Hepatitis C Virus Positive Patient.....	16
First You See it, Now You Don't: An Enterprise Approach to Managing Drug Shortages.....	17
Five Stages to Discontinuing Opioids: Having Conversations to De-escalate, Discontinue, or Deprescribe Opioids for Chronic Pain.....	18
Overcoming Barriers to Dose Individualization in the Information Age: Better Prescribing Through Pharmacometrics.....	19
Current Considerations: Supporting LGBTQ Students, Colleagues, and Patients.....	20
What the Cough? Management and Controversies of Common Pediatric Infections.....	21

Pharmacist-Led Efforts With Rapid Diagnostic Testing

Presenter: Lauryl Hanf-Kristufek, PharmD, BCPS, CACP

By: Amer Attaar, PharmD

PGY-1 Pharmacy Resident

Robert Wood Johnson University Hospital Somerset

At ASHP Midyear 2018, I had the pleasure of attending a continuing education (CE) activity in which pharmacists from a health system in Oregon shared their experience with a pharmacy-driven program utilized at their institution which assessed rapid diagnostic markers. The diagnostic markers assessed were namely the methicillin-resistant *Staphylococcus aureus* (MRSA) nasal screen and procalcitonin.

MRSA Nasal Screen

The MRSA polymerase chain reaction (PCR) nasal screen is a relatively inexpensive test, valued at \$20 per swab, with a quick turnaround time. It has a high sensitivity for detecting MRSA in the nares and should only be used in the setting of pneumonia. The reason for this is because this test has a very high negative predictive value of 94-98%. In other words, if the MRSA nasal screen comes back negative in a patient with a suspected bacterial pneumonia, the clinician can effectively rule out MRSA as the cause of the pneumonia. On the other hand, the test has a relatively low positive predictive value. This means that if the MRSA nasal screen is positive in a patient with suspected pneumonia, it may or may not be caused by a MRSA infection. It is also important to realize that treatment with vancomycin has little to no effect on the outcome of the MRSA nasal screen.

At the St. Charles hospital in Oregon, pharmacists were given the authority to order the MRSA PCR nasal screen based on a vancomycin order in patients with pneumonia and report results and recommendations to the covering physician. If the result came back negative, de-escalation of vancomycin was recommended to the physician. Through this pharmacy-driven study, the hospital observed a significant decrease in time on vancomycin and linezolid in patients with pneumonia and a negative nasal MRSA screen.

Procalcitonin

The speakers also touched on the topic of appropriate procalcitonin use in suspected bacterial infections. Procalcitonin is a rapidly released marker specific for bacterial infections. It is released into the bloodstream within 2 to 4 hours and peaks at 14 hours. There are, however, other causes for elevated procalcitonin which include cardiogenic shock, chronic kidney disease, trauma, surgery, and cancer, among others. Due to a recent study published in the New England Journal of Medicine that showed no difference in antibiotic exposure for lower respiratory tract infections with and without the use of procalcitonin, many physicians have been less inclined to use it in this setting. The CE speaker highlighted the fact that this study only had a 64% adherence rate to the procalcitonin protocol implemented within the study and that the acute bronchitis subgroup in the study had a 80% adherence rate which translated into a 14% decrease in overall antibiotic use; although the study was not powered to detect a difference in this smaller population. Subsequently, the pharmacists at this institution have been performing prescriber education on the appropriate use of procalcitonin and a study was currently being conducted at the time of the presentation in the hopes of showcasing lower antibiotic usage.

Conclusion

Attending this CE was an enlightening experience for me as it showed the additional impact pharmacists can have in optimizing patient therapies. This program specifically highlighted the large influence pharmacists have as it relates to antimicrobial stewardship. Limiting the use of inappropriate antimicrobials in a hospital setting not only poses cost savings implications, but more importantly, it limits patient exposure to adverse effects. Through pharmacy-driven protocols involving rapid diagnostic tests such as MRSA nasal screens and procalcitonin, pharmacists can play a vital role in hospital-wide antimicrobial stewardship.

Angela Wang, PharmD
PGY-1 Pharmacy Resident
Monmouth Medical Center

Pharmacists in the Emergency

Department:

Heroes Antimicrobial Stewardship Needs

Speakers: Erin McCreary, PharmD, BCPS; Jenny Koehl, PharmD, BCPS; Meghan Groth, PharmD, BCPS

Antimicrobial Stewardship

Stewardship programs have been established by many healthcare facilities over the years in order to optimize antimicrobial treatment, outcomes, and cost. Antimicrobial stewardship pharmacists on the general medical floors have established effective practices in many institutions to promote the judicious use of antibiotics.

However, for hospitals that have more mature stewardship programs, the Emergency Department (ED) has been identified as a site that may benefit from the implementation of stewardship practices to improve outcomes in both ambulatory patients and patients who are anticipating admission to a hospital.

Emergency department pharmacists are perfectly positioned to make interventions that will optimize antimicrobial use and prevent the development of resistance. Efforts in the ED should be targeted to patients presenting with respiratory, urinary, or skin infections in order to have the most impact.



The American Society of Health-System Pharmacists believes that pharmacists have a responsibility to take prominent roles in antimicrobial stewardship programs and participate in the infection prevention and control programs of health systems.

What roles can pharmacists play in the Emergency Department?

Pharmacists have the ability to participate in the initial patient diagnosis through the monitoring of culture results and laboratory tests such as procalcitonin or respiratory syncytial virus (RSV) and influenza panels. The involvement of a pharmacist in patient care can improve the selection of initial empiric antibiotics as well as the choice of definitive treatment.

By having a pharmacist oversee stewardship activities in the emergency department, facilities will not only experience a benefit in improved patient outcomes, they may also see decreasing times to culture follow-up, provider notification, and evaluation of appropriateness of antimicrobial therapy.

In turn, the pharmacists who choose to participate in such activities may find increasing opportunities for involvement in other aspects of patient care, expanding their role from the antibiotic expert to the medication specialist on all drugs.



Drug Dosing in the Obese ED Patient: How High Can You Go?

Presented by David D. Zimmerman, PharmD, BCCCP, BCPS

Obese patients are considered a special population which requires unique dosing considerations. Obese patients have different pharmacokinetic properties, such as an increased volume of distribution and altered clearance and elimination. Our concern in this population is that insufficient drug exposure can ultimately result in treatment failures. However, trying to compensate for insufficient exposure can create the potential for drug toxicity. This CE lecture discussed how to approach several of our commonly seen medications in the emergency department.

The first drugs covered were our rapid sequence intubation (RSI) agents. These medications require weight-based dosing and practitioners are faced with the challenge of using the total body weight, ideal body weight, adjusted body weight, or lean body weight. In order to come to a decision, the most important thing to do is to think about what would happen if you give too much

versus if you give too little as well as how many doses the patient would receive. The conclusion was that with RSI agents, it is preferred to give the patient too much of the drug rather than the patient being awake and under sedated. Therefore, total body weight is the preferred dosing weight except for rocuronium because it is a longer-acting neuromuscular blocker agent.

Pain medications are also commonly used in the emergency department. Fentanyl, morphine, and hydromorphone are administered at a fixed dose. For these drugs, they can be administered and then the dose can be re-assessed.

These are good rules of thumb to keep in mind when encountering an obese patient who requires these drugs. It will save you the trouble of calculating the different weights and deciding which to use, especially in our more emergent settings and situations.

	Female
Ideal Body Weight	45.5 + 2.3 (Inches above 5 feet - 60)
Adjusted Body Weight	IBW + 0.4 (TBW - IBW)
Lean Body Weight	[1.07 x TBW] - [0.0148 x BMI x TBW]
	Male
Ideal Body Weight	50 + 2.3 (inches above 5 feet - 60)
Adjusted Body Weight	IBW + 0.4 (TBW - IBW)
Lean Body Weight	[1.1 x TBW] - [0.0128 x BMI x TBW]

Rapid Sequence Intubation Agents	
Etomidate	Dosing weight: TBW Dosing: 0.3 mg/kg
Ketamine	Dosing weight: TBW Dosing: 1.5-2 mg/kg
Propofol	Dosing weight: TBW Dosing: 1.5-2 mg/kg
Succinylcholine	Dosing weight: TBW Dosing: 1.5 mg/kg
Rocuronium	Dosing weight: IBW Dosing: 1-1.2 mg/kg
Morphine, Hydromorphone, Fentanyl	Dosing: Fixed, non-weight based



Bridging Pharmacy Silos: Linking Acute and Pharmacy Services

Tara B. Vlasimsky, PharmD, BCPS; Molly Wascher, PharmD, MBA, BCPS

Dana Serao, PharmD
PGY-1 Pharmacy Resident
Newark Beth Israel Medical Center

Optimizing patient outcomes begins with teamwork. While teamwork is needed on various levels and amongst interdisciplinary services, a crucial aspect is bridging pharmacy silos. The speakers provided an overview of the transitions of care models between acute and other pharmacy services that were initiated at their facilities, challenges they identified, and proposed models for other sites.

Two proposed models include integrated care teams and longitudinal care teams. The integrated care teams model involves having various pharmacy teams involved in the care of the patient across different care settings, with transition teams coordinating the care. For example, patients may be seen by different pharmacy teams for chronic disease state management in the outpatient setting, such as for diabetes or anticoagulation. While this model tends to be more realistic for patients and facilities, there are greater risks for error to occur due to increased patient handoff. The longitudinal care teams model involves having interdisciplinary specialized teams following specific patients across different care settings, such as transplant patients. This model has fewer transitions issues since fewer teams are involved in the care of the patient, but this model requires intensive resources to have one team of specialists care for the patient. In terms of reimbursement, both models are limited by not having adequate ways to show the value and cost justification for the services provided.

M. Wascher shared about the pediatric cystic fibrosis pharmacy services at John Hopkins Medicine. Her facility identified a need to create a coordinated care model for pharmacy services in the inpatient, ambulatory care, and community settings. They initiated a longitudinal care team model in 2017. A pharmacist rounds with the pediatric pulmonary team two days a week, sees patients in the ambulatory care clinic the other days while completing a chart review for patients in the acute setting, and is actively involved with discharge medication reconciliation. They found this model to be successful, but noted an additional pharmacist position had to be created for this program.

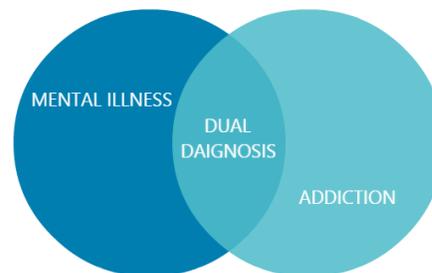
Denver Health recently expanded their transitions of care services after identifying a lack of coordination amongst the Medication Transitions Team (MTT), inpatient pharmacy, and discharge pharmacy workflows. Prior to the change, there was no standard process for admission and discharge medication reconciliation workflow. Their new workflow for medication reconciliation at admission involves having the MTT write a note with recommendations based upon their discussion with the patient, having the pharmacists in the inpatient pharmacy review the note and contacting the admitting physician team if needed, and lastly, creating a progress note to document the process. Denver Health is currently working on optimizing transitions of care at discharge with identifying high-risk patients at admission that would benefit from clinical pharmacist review. Rather than having separate teams manage patient care independently, they aim to bridge pharmacy silos to better achieve the same goal all the teams share.

Many hospitals have some sort of transitions of care process in their facilities. However, most processes are not clearly defined, and often involve various pharmacy teams working independently. As healthcare continues to change and pharmacy services expand, it is imperative for pharmacists to bridge their practice workflows to provide optimal pharmacy service for patients across care services.

Dual Diagnosis: The Quandary of Chronic Pain, Chronic Opioids, Medication- Assisted Therapy, and Recovery

Speaker: Ernest J. Dole, PharmD, PhC, BCPS, FASHP

Edwina Leung, PharmD
PGY-1 Pharmacy Resident
Barnabas Health Behavioral Health Center



Multiple forms of co-occurring disorders are possible. In psychiatry, dual diagnosis is a term used when a patient experiences a mental illness and a substance use disorder simultaneously. It is not a rare phenomenon and some studies indicate that as many as half of those with a drug or alcohol addiction also have some form of mental illness. Unfortunately, most of this patient population does not seek treatment. It was found that only 10% of patients with opioid use disorder receive treatment, and access to appropriate care has been the top issue. By finding the right type of treatment for the patient, even in the early detox stages, can make a huge difference in recovery.

A dual diagnosis typically requires a specialized treatment program that can effectively treat both the patient's mental disorder and the substance abuse disorder concurrently. It is important that their treatment methods complement each other and provide the most beneficial support. There are a few dual-diagnosis detox options available, but we will be reviewing the top two most common programs: Methadone Maintenance Therapy (MMT) and Buprenorphine Maintenance Therapy (BMT).

Methadone is a full agonist that activates the mu opioid receptor, diminishing cravings for opiates and preventing euphoria if the patient abuses opiates. Methadone maintenance treatment has been used to treat opioid dependence since the 1950s. "Methadone maintenance makes possible a first step toward social rehabilitation" because it allows addicts to stave off withdrawal symptoms that result from complete abstinence. Treatment is typically done through a methadone clinic, a place for people seeking treatment for addiction to various opioid drugs. All clinics are state and federally regulated and are certified by the Substance Abuse and Mental Health Services Administration (SAMHSA). When a patient first visits a methadone clinic, they are screened and assessed by the clinic staff. Methadone can become addictive and based on the patient's history of drug use, the clinic may decide to closely monitor the patient's intake.

Unlike methadone treatment, which must be performed in a highly structured clinic, buprenorphine is the first medication to treat opioid dependency that is permitted to be prescribed or dispensed in physician offices, significantly increasing access to treatment. Buprenorphine is an opioid partial agonist with a "ceiling effect" and a lower risk of over dose. It can help lower the potential for misuse, diminish the effects of physical dependency to opioids, such as withdrawal symptoms and cravings, and has shown increased safety in cases of overdose. Patients who are initiated on buprenorphine must be in full withdrawal or they may risk precipitated withdrawal.

Despite whether buprenorphine or methadone is used, the role of Medication Assisted Treatment (MAT) has been significant. Successful patients are commonly maintained on methadone for over 24 months and buprenorphine for over 18 months. Typically, patients with continuous sobriety for more than 1-2 years have the best outcomes. There is no evidence to support stopping MAT. According to Nosyk et al, 95% of methadone patients do not achieve abstinence when attempting to taper off; over 90% of buprenorphine patients relapse within 8 weeks of taper completion. The benefits of MAT have been shown to reduce death, HIV/HCV transmission, illicit drug use, and criminal behavior.

Killing Bugs and Saving Drugs Across a Health System: A Multi-Hospital Shared Antimicrobial Stewardship Program

Presented By: David P. Schmidt, PharmD, BCPS, DPLA

Bryan T. Alexander, PharmD, BCPS, AAHIVP

Dayla M. Boldt, PharmD, BCPS-AQ ID

Written By: Eka Beriashvili, PharmD

PGY-1 Pharmacy Resident

Community Medical Center

Antimicrobial stewardship has been defined by the Infectious Diseases Society of America (IDSA), the Society for Healthcare Epidemiology of America (SHEA), and the Pediatric Infectious Diseases Society (PIDS) as “coordinated interventions designed to improve and measure the appropriate use of antimicrobial agents by promoting the selection of the optimal drug regimen including dosing, duration of therapy, and route of administration.” Some benefits of antimicrobial stewardship include reduced adverse events including *Clostridium difficile* infections (CDI), improvement in rates of antibiotic susceptibilities to targeted antibiotics, and most importantly improved patient outcomes. The Centers of Disease Control and Prevention (CDC) reports that close to 50% of antimicrobials prescribed in acute care hospitals is inappropriate or unnecessary, contributing to growing problem of antibiotic resistance. Recognizing the urgent need to improve the use of these agents, hospitals have been increasingly implementing Antibiotic Stewardship Programs (ASP).

Implementing a successful hospital ASP requires appropriate resources. Its success is tied in pre-defined core elements and is directly proportional to coordinated multidisciplinary approach. Identifying an infectious disease (ID) trained physician leader along with an ID trained clinical pharmacist dedicated to antimicrobial stewardship has shown high success rates in large hospitals and is considered ideal, however not always feasible for smaller institutions with fewer resources. Core elements of hospital ASP are listed below:



Since there is no road map to aide in constructing a successful ASP, it is important to evaluate individual facility needs and areas of improvement as well as resources available to target stewardship activities for maximum results and program effectiveness, whether it's within a single institution or multi-hospital network. There are few general steps towards implementing a successful antimicrobial stewardship practice in hospitals:

Overall workflow:



Antimicrobial pharmacists utilize various resources and methods to identify patients for ASP review, such as clinical decision support software alerts and electronic medical records. Interaction with members of the healthcare team such as microbiology notifications and infection preventionists are crucial in identifying potential interventions as well. Daily stewardship rounds with ID physicians are often imperative to discuss more complicated cases.

Potential alerts that may necessitate review:

- Attempt to target all positive cultures, especially positive *C.difficile* and influenza results since these warrant more timely intervention
- Multi-drug resistant organisms: MRSA, VRE, ESBL, CRE
- Broad-Spectrum antimicrobials and high cost agents
- >72 hour antimicrobial therapy: important step of antimicrobial stewardship shown to decrease resistance rates
- Redundant therapy
- Targeted antimicrobials such as those with established appropriate use criteria (ertapenem, daptomycin, aztreonam)

Workflow example:



Takeaways:

- Dedicated antimicrobial stewardship resources available within a facility or across multiple facilities within a health system can improve program outcomes
- Clinical decision support alerts along with prospective audit with interventions can optimize patients outcomes as well as reduce antimicrobial expenditures
- It is important to determine program effectiveness and specific facility needs through collecting data endpoints

Implementing the Triple Aim to Combat the Opioid Crisis

CE Title: “Focus on Triple Aim Objectives: A Population Health Approach to Opioid Use Improvement”

CE Speakers: Elizabeth D. Bentley, Pharm.D., MSJ, BCPS, William D. Gersch, Pharm.D., and Quan Nguyen, D.O.

Written by: Grace Rhee, PGY-1 Pharmacy Resident, Robert Wood Johnson University Hospital Somerset

So, how did we get here? – This was the question that Dr. Nguyen opened the session with. He gave a brief overview of the different factors and events that have formerly shaped prescribing patterns, and thus, have contributed to the opioid crisis. One of the major issues was the unknown or misinformed safety of opioids. Another was the misguided efforts to objectify all different types of pain into one scale. Pain is not one-dimensional; acute, chronic, and post-operation pain should not be treated the same way.

Opioid Stewardship at Kaiser Permanente

The three speakers – Dr. Nguyen, D.O., Dr. Bentley, Pharm.D. MSJ, BCPS, and Dr. Gersch, Pharm.D. – shared their approach on opioid stewardship at their practice site, Kaiser Permanente (Northwest and Colorado), and the results and outcomes of this systems-based approach which demonstrated improvement in safety and reduction in cost. The IHI Triple Aim framework was developed by the Institute for Healthcare Improvement (IHI) in Cambridge, MA. The triple aim initiative consists of population health, experience of care, and per capita cost. The team at Kaiser Permanente expanded upon the three aims to create an algorithm, which consists of the following steps: stratify patients, engage patients,

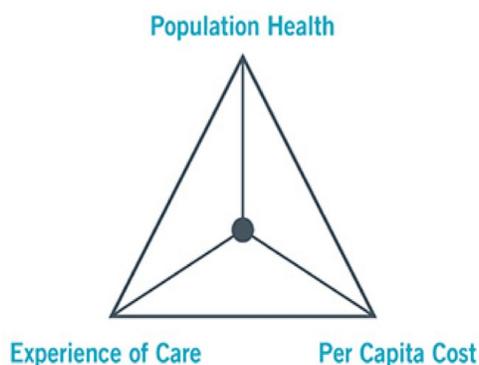
deliver customized care, coordinate across providers, and measure and inflect performance.

The Kaiser Permanente Northwest pain management team is a multidisciplinary team, which includes six full-time pharmacists. Types of pharmacy programs include opioid tapering, clinical management of chronic pain, academic detailing, safety net monitoring, and fraud and abuse monitoring. Through this referral-based Pain Management Pharmacist Program, there was nearly 60% reduction in morphine milligram equivalents (MME) use in participating patients sustained six months after discharge from the program. It was a reflection of improved safety and reduced cost of health care. Specifically, the total MME prescribed decreased by 40% from 2011 to 2017.

At Kaiser Permanente Colorado, a Stepped Care model was applied to meet the triple aim. The Stepped Care model stratifies patients into low, medium, or high risk, which corresponds with the interventions passive population management, pain E-consult, and integrated pain service intensive outpatient management, respectively. Through the pain E-consults provided by physicians and pharmacists, cohort sum of MME reduced by 22.3% by six months and 41.2% by twelve months which yielded to \$630,000 annualized cost reduction of total cohort.

The two approaches to the triple aim demonstrated improvement in pain management, reduction patients’ risk of abuse and addiction, and decrease in per patient cost. The outcomes strongly suggest that a multidisciplinary team approach with pharmacists as core members is more effective in providing personalized care and maximizing pain management strategies.

The IHI Triple Aim



UPDATES IN THE 2018 PAIN, AGITATION/SEDATION, DELIRIUM, IMMOBILITY, AND SLEEP DISRUPTION (PADIS) GUIDELINES

Presenters: Benjamin Hohlfelder, Pharm.D., BCCCP, BCPS; Paul M. Szumita, Pharm.D., BCCCP, BCPS, FASHP, FCCM
Hetty Cheng, PharmD
PGY-1 Pharmacy Resident
Saint Barnabas Medical Center

This CE session focused on the most important aspects of the 2018 Society of Critical Care Medicine Guidelines on Pain, Agitation, and Delirium in comparison to the 2013 guidelines and their impact of patient assessment and pharmacotherapy. New data connecting deeply sedated patients with poor outcomes were discussed, along with updates on the role of specific agents, such as propofol, dexmedetomidine, ketamine, and midazolam.

For pain management, most recommendations regarding pharmacologic adjuvants to opioid therapy are conditional and based on a very low quality of evidence. This includes recommendations on the use of acetaminophen and ketamine. With regards to adjunctive neuropathic pain medications, the panel makes a strong recommendation for their use with opioids for neuropathic pain management based on moderate quality of evidence. Unfortunately, no differences in clinically meaningful outcomes such as intensive care unit (ICU) length of stay or mortality have been found.

Opioids, at the lowest effective dose, are recommended for procedural pain management in critically ill patients. The optimal agent and dosing regimen will depend on many factors, including pharmacokinetic and pharmacodynamic drug properties. The speakers brought up an interesting concept of "opioid rotation", defined as a change in opioid drug or route of administration with the goal of improving outcomes. The strategy aims to establish a drug regimen that is more effective than the previous regimen. The use of such a strategy may be beneficial when a patient experiences intolerable adverse effects during dose titration, persistent pain despite aggressive dose titration, presence of drug interactions, or if the patient requires an opioid with different pharmacokinetic properties due to a change in clinical status.

The panel emphasizes the need for implementation of an assessment-driven, protocol-based, stepwise approach for pain and sedation management in critically ill adults. The management of pain that is guided by routine assessment and treatment of pain before considering the use of a sedative agent is a good practice statement. The panel generally supports the utilization of multimodal pharmacotherapy as a component of analgesia-first approach to minimize both opioids and sedatives. Such a strategy is likely to improve pain control, reduce opioid use, and improve patient outcomes. The key concept of analgosedation takes advantage of certain opioid properties to reduce sedative requirements and their associated adverse drug reactions, improve sedation-agitation scores, as well as dyspnea and respiratory depressant properties.

Moving on to recommendations for sedation, the guidelines suggest using light (versus deep sedation) in critically ill, mechanically ventilated adults. However, no universally accepted definition of light sedation exists and further exploration of the concept of wakefulness and light sedation is required. The effect of depth of sedation on post-ICU, all-cause mortality, cognitive function, physical recovery, PTSD, anxiety, and depressive symptoms has not been well evaluated in randomized clinical trials (RCTs). For choice of sedative agents, cardiac versus non-cardiac surgery patients were separated. In post-cardiac surgery, propofol is recommended over benzodiazepines. In non-cardiac surgery patients, either propofol or dexmedetomidine is recommended over benzodiazepines for sedation. Key takeaway points from the MENDS, SEDCOM, MIDEX, and PRODEX studies include that benzodiazepines may increase the likelihood of coma, increase duration of mechanical ventilation, and increase percentage of patients with delirium. Benzodiazepines have not been shown to increase ICU length of stay, increase overall incidence of delirium, or change time spent within goal sedation range. However, they may still be useful in patients who require deep sedation, amnesia, sedation in the setting of hemodynamic stability, alcohol/drug withdrawal, anxiety or agitation, or other neurologic indications such as seizures and elevated intracranial pressure (ICP).

The guidelines suggest using a multicomponent, nonpharmacologic intervention that is focused on reducing modifiable risk factors for delirium, improving cognition, and optimizing sleep, mobility, hearing, and vision in critically ill adults. They do not support the use of medications to prevent delirium, as the literature remains controversial. No pharmacologic treatment has consistently demonstrated efficacy to treat delirium and routine use of haloperidol, atypical antipsychotics, or statins are not recommended. However, the guidelines do concur that use of haloperidol or atypical antipsychotics may be warranted, despite lack of evidence, for patients who experience significant distress secondary to delirium or agitation that puts them at risk of harming themselves or others. Dexmedetomidine may be an appropriate sedative for the mechanically ventilated patient where agitation is interfering with weaning/extubation.

THE "ABCDEF" ICU CARE BUNDLE

Assess, Prevent, and Manage

Pain

Both Spontaneous Awakening

Trials (SAT) and Spontaneous Breathing Trials (SBT)

Choice of Analgesia and

Sedation

Delirium: Assess, Prevent and

Manage

Early Mobility and Exercise

Family Engagement and

Empowerment

Pharmacy Leader Charge: Strategies to Overcoming Hurdles of Opioid Epidemic

By: Jessica Gerges, PharmD
PGY-1 Pharmacy Resident
Clara Maass Medical Center

With the opioid epidemic nowhere near resolved, it is important to recognize the factors that may be contributing to the epidemic and find solutions for each factor. The ultimate goal is limiting opioids to when they are absolutely necessary.

Red Flags



By law, pharmacists have a corresponding responsibility to that of a prescriber to ensure that a prescription being filled has a legitimate medical purpose.

Where to start?

Create the foundation for change. Using the Joint Commission pain management guidelines, a leadership team can be designated responsible for pain management and safe opioid prescribing. Other clinicians and medical staff can be engaged in creating pain management action plans. Ultimately, standard practices and opioid specific protocols should be created to fight the epidemic.

Conclusion

A strong process and clear role of expectations at all levels of an organization are required for compliant controlled substance management. The team's success depends on the strength of the foundation created by the health-system and staff. All in all, the leadership role of every pharmacist is to create collaboration, empowerment, and clear communication to establish a culture to combat the opioid crisis.

Direct Oral Anticoagulants in Special Populations

Presenters: Tadd Hellwig, PharmD, BCPS & Paul P. Dobesh, PharmD, FCCP, BCPS-AQ Cardiology

Jose Lazo Jr., PharmD
PGY-1 Pharmacy Resident
Robert Wood Johnson University Hospital

Since the approval of direct oral anticoagulants (DOACs), physicians have had the option of choosing DOACs over vitamin K antagonists (VKA), like warfarin, for the treatment of atrial fibrillation or venous thromboembolisms. The attractiveness of DOACs over warfarin relates to simpler dosing schemes without the need for routine bloodwork. However, the question still remains regarding the efficacy and safety of DOACs in populations that were less represented in the clinical trials. In this CE which was presented at ASHP Midyear 2018, Dr. Tadd Hellwig and Dr. Paul P. Dobesh reviewed the literature behind the use of DOACs in patients with end stage renal disease (ESRD), obesity, malignancy, and patients who have undergone gastric bypass surgery.

End Stage Renal Disease

Looking at the use of DOACs in patients with ESRD, the recommendation for use of these agents is based on small pharmacokinetic studies. In the package insert for apixaban, the use in patients on hemodialysis showed a 36% higher systemic exposure as compared to patients with normal renal function after a single 5 mg dose. A study published in the Journal of the American Society of Nephrology demonstrated that an apixaban dose of 5 mg twice daily led to subtherapeutic levels in hemodialysis patients and should be avoided.¹ Similarly, following small pharmacokinetic studies with rivaroxaban, the manufacturer has updated their package insert to recommend a dose of 15 mg daily in patients with ESRD. However, the recommendations for apixaban and rivaroxaban are not based on studies assessing clinical outcomes.

Obesity

Patients who are obese are encountered frequently in clinical practice however none of the DOACs provide specific recommendations for dosing in obesity. In 2016, the International Society on Thrombosis (ISTH) released a statement on the use of DOACs in obese patients and recommended standard dosing in patients with BMI less than 40 kg/m² and weights less than 120 kg.² In patients with BMI over 40 kg/m² and weights greater than 120 kg, the recommendation is to avoid DOACs. If DOACs are to be used in these obese patients, the ISTH recommended checking a drug-specific peak/trough level, however many clinicians may be unfamiliar with target peaks and trough levels for these medications.

Malignancy

In patients with cancer, there is a 4- to 7-fold increased risk of venous thromboembolism (VTE) when compared to the general population.³ The American College of Chest Physicians antithrombotic guidelines recommend the use of low molecular weight heparin (LMWH) over VKA or DOACs for the treatment of deep vein thrombosis of the leg or pulmonary embolism.⁴ The guidelines make no preference for VKA or DOACs for patients who are not amenable to injectable therapy. There have been two trials completed to date that have compared DOACs vs LMWH (dalteparin). The two DOACs studied were edoxaban and rivaroxaban and there was a trend towards better efficacy with the DOACs however there was also an increased risk of major bleeding.^{5,6} At this time, there is insufficient data to adequately recommend DOACs for the treatment or prevention of cancer-associated VTE.

Gastric Bypass Surgery

Lastly, in dealing with patients who have had a gastric bypass surgery, many factors come into play. This includes the type of surgery the patient underwent, the site of absorption of individual DOACs, pH content of the gastrointestinal tract post-surgery, and even changes in body weight weeks to months after the procedure. In general, warfarin may be the preferred agent since INR can be monitored, and there are many variables that can affect the efficacy of anticoagulants after a gastric bypass surgery. This continuing education session highlighted the fact that although many advances in anticoagulant therapy have been made, special populations still require additional considerations and pharmacists have the essential role of prioritizing patient safety.

Citations

1. Mavrakanas TA, Samer CF, Nessim SJ, et al. Apixaban Pharmacokinetics at Steady State in Hemodialysis Patients. *J Am Soc Nephrol*. 2017 Jul;28(7):2241-2248.
2. Martin K, Beyer-Westendorf J, Davidson BL, et al. Use of the direct oral anticoagulants in obese patients: guidance from the SSC of the ISTH. *J Thromb Haemost*. 2016 Jun;14(6):1308-13.
3. Heit JA, Silverstein MD, Mohr DN, et al. Risk factors for deep vein thrombosis and pulmonary embolism: a population-based case-control study. *Arch Intern Med* 2000;160:809–15.
4. Kearon C, Akl EA, Ornelas J, et al. Antithrombotic Therapy for VTE Disease: CHEST Guideline and Expert Panel Report. *Chest*. 2016 Feb;149(2):315-352.
5. Raskob GE, van Es N, Verhamme P, et al. Edoxaban for the Treatment of Cancer-Associated Venous Thromboembolism. *N Engl J Med*. 2018 Feb 15;378(7):615-624.
6. Young AM, Marshall A, Thirlwall J, et al. Comparison of an Oral Factor Xa Inhibitor With Low Molecular Weight Heparin in Patients With Cancer With Venous Thromboembolism: Results of a Randomized Trial (SELECT-D). *J Clin Oncol*. 2018 Jul 10;36(20):2017-2023.

Emergency Medicine Pearls 2018

Moderator: Aimee Mishler, Pharm.D., BCPS



By: Kaliopé Damalas, Pharm.D.
PGY-1 Pharmacy Resident
Community Medical Center

In emergency medicine, there is rarely a patient case that presents with a clear and simple solution. Consequently, the role of an emergency department (ED) pharmacist is to quickly assess the clinical picture and anticipate the therapeutic needs of the patient. There is a necessity for ED pharmacists to demonstrate critical thinking skills and sound clinical judgment in a wide range of disease states. Organizations, such as the American Society of Health-System Pharmacists (ASHP), have recognized this need and provide continuing education (CE) sessions, which enable clinicians to share their experiences and explain their approach to treating patients using evidence-based medicine.

During this year's Midyear Clinical Meeting, I attended a CE course titled, "*Emergency Medicine Pearls 2018*," that was led by the emergency medicine (EM) Pearls Chair and Moderator, Aimee Mishler, Pharm.D., BCPS. ED clinical pharmacists from various institutions presented on topics encountered in every emergency department, regardless of location or practice setting. Sessions like these promote the growth of our profession by allowing pharmacists to learn from their colleagues so that they can be equipped with the knowledge and skills to provide comprehensive patient care.

Haloperidol for Cannabinoid-Induced Hyperemesis, presented by Paris Cook, Pharm.D.

With the increasing use of cannabis, there have been more reports of cannabinoid hyperemesis syndrome (CHS). CHS presents with cyclic vomiting and is generally identified in patients who have been using cannabis for a prolonged period. Interestingly, many of these patients report bathing in hot showers because it provides symptomatic relief. Cannabis effects the cannabinoid receptors, CB1, CB2, and the transient receptor potential vanilloid 1 and ankyrin 1, TRPV1/TRPA1, receptors that potentiate physiological effects on gastric and intestinal motility. Unfortunately, patients with CHS rarely find relief from mainstay treatments, such as antiemetics, but have experienced benefits with the use of capsaicin cream, benzodiazepines and haloperidol. Haloperidol non-selectively blocks pre-synaptic dopaminergic receptors in the brain to produce an anti-emetic effect. A case report from 2013 and a case series from 2017 conducted in the emergency department reported that the use of a single dose of haloperidol 5 mg given intravenously resulted in improvement of symptoms within 1-2 hours. In March of 2018, expert consensus guidelines were published and recommended haloperidol 5 mg IV or IM as a possible therapeutic intervention. In addition, there is an ongoing trial comparing haloperidol vs ondansetron for CHS, which will hopefully provide more evidence for the use of haloperidol upon its completion in July of 2019.

Nitro for SCAPE, presented by Kristi Stemple, Pharm.D., M.B.A.

Sympathetic Crashing Acute Pulmonary Edema, or SCAPE, is a common disease state encountered in the ED. Patients present with an acute increase in afterload and pulmonary edema that result in a stress response. Notable signs and symptoms include shortness of breath, tachycardia, and hypertension. Treatment for SCAPE consists of noninvasive ventilation (NIV) in combination with high doses of nitroglycerin. Doses of nitroglycerin greater than or equal to 100 mcg/min are targeted to reduce afterload for this patient population. The nitroglycerin infusion rate can then be decreased once there is improvement in the patient's status. Important takeaways from this CE course include the early recognition of SCAPE and prompt use of high dose nitroglycerin, which was not shown to cause a greater incidence of hypotension than low dose nitroglycerin in this setting.



EVIDENCE-BASED DECISION MAKING IN SELECTED PEDIATRIC AND NEONATAL CRITICAL CARE CASES

PETE N. JOHNSON, PHARMD, BCPPS, BCPS, FCCM, FPPAG; KAITLIN HUGHES, PHARMD, BCPPS; E. ZACHARY RAMSEY, PHARMD, BCPPS

Komal Nadeem, PharmD
PGY-1 Pharmacy Resident
Clara Maass Medical Center

Shock

Shock is defined as an inadequate perfusion to meet demand. There are three different stages of shock in pediatric patients: (1) compensated, (2) hypotensive, and (3) cardiac arrest. The Sepsis Task Force created criteria for defining septic shock. Since this criteria is not validated for use in pediatric patients, Schlapbach and colleagues adapted the sepsis criteria by combining the SOFA and PELOD criteria. Unlike adult patients who tend to present with warm shock, pediatric patients present with cold shock which is characterized by a decrease in cardiac output and increase in systemic vascular resistance (SVR) leading to vasoconstriction and cold extremities. Fluid resuscitation with a 20-60 mL/kg bolus is the first-line treatment option for patients presenting with shock followed by epinephrine or dopamine for fluid refractory shock.

Adrenal insufficiency can occur in the setting of increased stress of sepsis. In these situations, there is an increase in cortisol levels, but decrease in corticosteroid binding proteins and receptor sensitivity. Pediatric patients have critical illness-related cortical insufficiency. Therefore, steroids are recommended for pediatric patients in septic shock that is not responsive to moderate-high dose vasopressors. The steroid of choice is hydrocortisone due to increased mineralocorticoid activity.

Pulmonary hypertension crisis (PHC)

Pulmonary hypertension is characterized by an increase in pulmonary artery pressure (PAP) resulting in an increase in pulmonary vascular resistance. Management of pulmonary hypertensive crises seeks to maintain pulmonary vasodilation, augment right ventricle function and cardiac output, and avoid systemic hypotension and hypoxia. Initial management focuses on treating the underlying cause such as pain management, anxiety, or hypoxia. If unable to achieve control through initial management, then inhaled prostacyclins may be used to relax pulmonary vascular smooth muscle. Inhaled prostacyclins have demonstrated no difference in reduction of mean PAP, central venous pressure (CVP), heart rate (HR), or adverse events and are more affordable compared to inhaled nitric oxide.

Sedation/Analgesia/Delirium

Pediatric sedation and analgesia guidelines are expected to be released in 2019 by American College of Critical Care Medicine (ACCCM). COMFORT behavioral scale is a pain scale that is validated for use in patients less than 18 years of age. First-line opioids for pain management in pediatric patients include fentanyl, morphine, hydromorphone, and remifentanyl. There is limited data regarding use of continuous hydromorphone infusions in pediatric patients. Tolerance with hydromorphone is less likely as compared to tolerance with fentanyl and remifentanyl. However, there is limited data to make an adequate conclusion.

For sedation, benzodiazepines, such as lorazepam and midazolam, and alpha-2 agonists, such as dexmedetomidine, are first-line. In the RESTORE trial, patients treated with dexmedetomidine required lower doses of opioids, and fewer patients reported inadequate pain control. However, there is decreased efficacy seen with dexmedetomidine as patients treated with this agent were often on 4 or more sedatives.

Delirium is associated with increased PICU length of stay and increased mortality. The first step in managing delirium is optimizing pain control and managing underlying disease states and underlying abnormalities. Decreasing sedation is key to preventing delirium in critically ill patients. Analgo-sedation focuses on maintaining pain and discomfort while providing sedation as well. This can be achieved through opioids to help reduce delirium in these patients. If inadequate control is achieved with analgo-sedation, then atypical antipsychotics are preferred over haloperidol for treatment of delirium in pediatric patients.

Navigating Change in Primary Care: The Role of the Patient-Centered Medical Home Pharmacist

Speakers: Canice Coan, PharmD, BCACP; Margie E. Padilla, PharmD; BCACP; Edward Saito, PharmD, BCACP

Neha Kumar, PharmD
PGY-1 Pharmacy Resident
Monmouth Medical Center

The role of pharmacists is evolving, especially in the outpatient setting. There are many benefits to integrating a pharmacist into the patient-centered medical home (PCMH). Multiple publications have showcased the value of having pharmacists in a PCMH and the improvements that they bring to multiple areas, including hypertension, diabetes, medication use, continuity of care, quality improvement, and reductions in health care costs. Through these efforts, pharmacists can contribute towards the Agency for Healthcare Research & Quality (AHRQ) 5 key functions of medical homes.

AHRQ 5 Functions of Medical Homes

- Comprehensive Care
- Patient-Centered Care
- Coordinated Care
- Accessible Services
- Quality and Safety

Reimbursement is a challenge for pharmacists in a PCMH. There is limited opportunity for direct reimbursement because of lack of credentialing, no provider status, and the fact that productivity goals for clinical pharmacy may be counterproductive or differ from other clinicians' goals. Moreover, with the uncertainty of the Affordable Care Act, and the ever-changing policies of payers, reimbursement remains an issue.

This is why it is especially important for pharmacists in a PCMH to focus on value beyond direct reimbursement. For example, pharmacists can contribute to patient care by identifying, resolving, and preventing medication-related problems. They can also create quality improvement projects within the medical home, and address workflow issues. By reducing hospitalizations and readmissions in transitions of care, pharmacists can assist in cost reduction. Pharmacists can also directly assist prescribers by addressing drug information questions and participating in prescriber education.

Advice for pharmacists within a PCMH entity:

- Look for simple, yet effective ways, such as medication reconciliation, to help the patient population
- Help your providers or nurses with their goals/metrics
- Help your providers or nurses in areas they are struggling, i.e. prior authorizations
- Document/track everything

An efficient way to start a new pharmacist service, or add upon a current pharmacist service, and demonstrate value of these services, is to use the S.M.A.R.T.E.R action plan. This can help tackle goals and also adjust or reevaluate current services.

Goals should be:

S – Specific
M – Meaningful
A – Achievable
R – Relevant
T – Time bound
E – Evaluate
R – Readjust

10 tips to get started in a PCMH

1. Identify a champion(s) (i.e. provider or office manager)
2. Set up a meeting to discuss ways to collaborate (use S.M.A.R.T.E.R . tool)
3. Explore metrics and/or outcomes that help the organization
4. Find or adapt a tracking tool for patient metrics and/or outcome measures
5. Start small - go after the "low hanging fruit"
6. Report outcomes from "low hanging fruit"
7. Re-evaluate metrics and/or outcome measures
8. Re-evaluate tracking tool
9. Go after the next set of metrics and/or outcomes measures

Updates in Transplantation: Current Challenges in Caring for the Hepatitis C Virus Positive Patient

Piao Zhuge, PharmD
PGY-1 Pharmacy Resident
Saint Barnabas Medical Center

Prevalence and Trends of Hepatitis C Virus (HCV)

The prevalence of acute hepatitis C has increased drastically in the United States in the last decade from about 750 reported cases in 2006 to nearly 3000 reported cases in 2016. However, many people may not have symptoms or don't know they are infected. HCV is often not diagnosed or reported. The Center for Disease Control estimated that the actual number of acute hepatitis C cases was almost 41,200 in 2016. Despite the increase in HCV, the percentage of patients on the liver transplant wait-list due to HCV has decreased by 10% over the last decade and the number of liver transplants performed due to HCV has down-trended as well. With more novel HCV therapies approved, patient and graft survival outcomes are expected to greatly improve for transplant recipients. Over the next decade, HCV is expected to no longer be a top indication for liver transplantation.

Advantages and Disadvantages of Treating HCV in Pre-Transplant Candidates

The benefits and risks of initiating treatment for HCV and individual patient factors such as anticipated time to transplant, degree of liver disease, and treatment options all need to be evaluated. Some advantages of pre-transplant treatment are improvement in graft outcomes, reduction in all-cause mortality, alleviation of the need for transplant, and less drug interactions if no immunosuppression is required. However, the disadvantages are patients will have a longer wait time without the HCV donor pool, increased risk of reinfection, treatment failure or resistance, limited HCV treatment options if patients already have renal or hepatic impairments, and potential peri-transplant treatment concerns.

Risks and Benefits of Utilizing HCV Positive Organ Donors

More than 10,000 HCV positive organs were discarded between 2010 and 2014. The concern with utilizing HCV positive organ donors is disease transmission leading to complications such as reduced patient and graft survival, rapid progression of liver fibrosis, increased risk of acute rejection, and HCV treatment failure. However, studies found that the use of HCV positive organs was generally acceptable in liver and renal transplants to HCV positive recipients. Even though further studies are needed to assess the use of HCV positive organs in HCV negative recipients, it can be considered if the patient has risk of clinical deterioration while waiting for a HCV negative organ offer, has been on the waitlist for a long time, and has no substantial risk for liver disease. However, factors such as patient's consent and the ability to obtain direct antiviral agents (DAA) must be evaluated.

HCV Treatment Considerations for Solid Organ Transplant Recipients

Standard immunosuppression should be used post-transplant for patients receiving HCV positive donor organs. However, there are a variety of drug interactions with DAA that require careful consideration of patient-specific factors.

DAA	Genotype	Use in Hepatic Impairment	Use in Renal Impairment	Special Considerations
Elbasvir/Grazoprevir (Zepatier)	1,4	Mild	Yes	CYP3A4 substrate and inhibitor
Glecaprevir/Pibrentasvir (Mavyret)	1-6	Mild	Yes	Take with food CYP3A4 and P-gp substrate and inhibitor
Ledipasvir/Sofosbuvir (Harvoni)	1,4,5,6	Yes	CrCl ≥ 30 mL/min	Space out antacids, H2 blockers, and PPIs P-gp substrate Avoid with amiodarone due to bradycardia
Velpatasvir/Sofosbuvir (Epclusa)	1-6	Yes	CrCl ≥ 30 mL/min	Space out antacids, H2 blockers, and PPIs CYP3A4 and P-gp substrate, P-gp inhibitor Avoid with amiodarone due to bradycardia
Paritaprevir/Ritonavir/ Ombitasvir/Dasabuvir (Viekira Pak)	1	Mild	Yes	Take with food CYP3A4 and P-gp substrate, CYP3A4 inhibitor



First You See It, Now You Don't: An Enterprise Approach to Managing Drug Shortages

Panelists: Scott Knoeler, Angela Yaniv, and Chris Synder

Summarized by: Rahul Jacob PharmD

PGY-1 Pharmacy Resident at Saint Barnabas Medical Center

Drug shortages significantly burden health care providers, health care facility finances, and personnel especially in large integrated health systems. The 3 panelists were from the Cleveland Clinic which is an integrated health system with national and international locations including London and Abu Dhabi and serves over 6 million patients. Their 2018 pharmaceutical budget was close to \$1.05 Billion with 1,248 FTE's within the pharmacy enterprise.

In such a large integrated health system, drug shortages affect so many and it is vital that they have a solid pharmacy infrastructure in place that remains flexible during these times of crisis. The most recent crisis that affected so many institutions was Hurricane Maria that devastated Puerto Rico in 2017. Puerto Rico is a site for manufacturing operations for 12 out of the top 20 biotechnology and pharmaceutical companies including Baxter which were responsible for making many large volume parenteral bags. This shortage led the Cleveland Clinic to adapt and adopt new strategies to administer parenteral medications such as IV push antibiotics and glass bottles. These changes required extensive training to the nursing staff and effective communication was critical. Drug shortages follow the "snowball effect" when one product's absence forces institutions to utilize alternative products which can lead to shortages in those alternatives as well. As an enterprise, Cleveland Clinic had to flex up positions throughout the system and added 16 FTE's during Hurricane Maria. Prior to the disaster, they also had a full-time pharmacist position dedicated to drug shortages and had established weekly shortage calls. Being able to streamline communication between hospitals, make formulary adjustments and leverage inventory management is vital in the management of shortages.

Drug shortages can have practice changing impacts on health-systems and these changes may affect every department in the hospital, however the focus should be to keep these changes invisible to the patient. Wide-spread and unexpected shortages are caused by a variety of factors and cannot be accounted for at the health-system level. It is imperative that health-systems have plans in place for when these shortages happen. Quick and critical management of shortages is necessary to decrease impact to patient care.



Hurricane Maria

FIVE STAGES TO DISCONTINUING OPIOIDS: HAVING CONVERSATIONS TO DE-ESCALATE, DISCONTINUE, OR DEPRESCRIBE OPIOIDS FOR CHRONIC PAIN

Rebecca Andrews, M.D., M.S., FACP
Kevin W. Chamberlin, Pharm.D., FASCP

Summarized By: Regina Deap, Pharm.D.
PGY-1 Pharmacy Resident
Jersey City Medical Center

Chronic pain affects approximately 50 million adults in the United States. When poorly managed, it can lead to restrictions in daily activities, anxiety, depression, and poor quality of life. Opioids are commonly prescribed for chronic pain, and when used appropriately, can be an important component of treatment. However, opioid use is also associated with serious risks, including opioid use disorder, overdoses, and death. Between 1999 and 2017, almost 218,000 overdose related deaths were due to prescription opioids.

Why Difficult Conversations Are Avoided

In order to reduce the risks associated with opioid use, guidelines recommend opioid tapering or discontinuation when the risks outweigh the benefits. However, having these conversations with patients can be very challenging. Because healthcare providers have an inherent desire to help people, it is often difficult to create conflict with patients. Nonetheless, providers need to overcome their fear of conflict and recognize that the de-escalation of opioids is the most appropriate treatment plan for their patients.

How to Engage Patients in Difficult Conversations

Whether the decision to discontinue opioids is due to intolerable side effects or signs of misuse, each patient should be approached in a consistent manner. It's important to recognize that the patient is experiencing pain and is fearful of losing something that decreases that pain.

The Five Stages of Grief

Patients often progress through five stages of grief when informed of the decision to discontinue their opioid therapy. The appropriate response during each stage should be focused on empathy.

Stage	Patient Reaction	Provider Response
Hopelessness	Will try to make the provider understand the severity of their pain Example: "My pain is destroying every aspect of my life"	Listen and respond with empathy
Helplessness	Will try to make excuses for red-flag behaviors Example: "My dog bumped into me and I accidentally spilled my medications into the sink."	Continue to listen with empathy. Be sure to inform the patient that your decision was made for a sound clinical reason and won't change
Demanding/ Impatient	May respond in a threatening manner if their demands aren't met Example: "I will sue you for not treating my pain"	Maintain respectful communication – use empathetic tone and give patients space to cool down if necessary
Bargaining	Will make a last attempt to receive opioids Example: "I just need one more prescription while I find another provider"	Be consistent and lean on policies to support your decision
Resignation/ Acceptance	Accepts decision and new treatment plan Example: "Fine. How do you plan to help me?"	Provide empathetic response and offer continued care. Partner with patient to create a new treatment plan

Overcoming Barriers to Dose Individualization in the Information Age: **Better Prescribing Through Pharmacometrics**

Presenters: Marc H. Scheetz, Pharm.D., M.Sc., FCCP, BCPS-AQ ID, Michael Neely, M.D., M.Sc., FCP, Janel Long-Boyle, Pharm.D., Ph.D., Nikolas J. Onufrak, Pharm.D.

By: Sana Mohayya, PharmD, MHS
PGY-1 Pharmacy Resident
Robert Wood Johnson University Hospital, New Brunswick, NJ

Pharmacometrics: A Brief Introduction

In an ideal world, every patient who is prescribed a medication would receive the optimal dose specially tailored to their unique characteristics. While that may seem like a far-fetched ambition, with the help of technology we are closer to a world of perfectly individualized dosing than you may think. This continuing education program described pharmacometrics, which uses data from the drug, disease, and trial information in order to assist in treatment-related decisions. It does so by using drug models, which describe the relationship between exposure (pharmacokinetics), response (pharmacodynamics) and individual patient characteristics.

The Basics of Bayesian Theory

Pharmacometrics uses Bayesian Theory, which estimates the probability that an event will occur that is calculated based on similar events that have occurred. To put this into perspective, a pilot knows the variability in weather patterns, which he could use with the help of high-level computer algorithms to fly the plane in a safe course. This same technology could be used by clinicians to use what they already know about the patient (labs, vitals, etc.) and these well-validated and vetted approaches to determine optimal drug dosing for patients in real time. Some examples of pharmacometrics relevant to pharmacists include: BestDose, PK-PD Compass, and (as many of the RWJBH staff have heard about) DoseMe.

Applying Pharmacometrics

Any pharmacist who has monitored vancomycin troughs understands the struggle of finding the dose that is not subtherapeutic, won't cause acute kidney injury, and is just right. However, we also know that the trough is just a surrogate for the area under the curve (AUC), with the target the area-under-the-curve to minimum inhibitory concentration (AUC:MIC) of greater than 400. With the help of systems like DoseMe, which uses Bayesian modeling, we can use the population's AUC data to estimate a dose that would have a high probability of achieving the desired AUC. Based on studies assessing prospective AUC compared to trough-guided dosing, the AUC-dosing was associated with lower troughs, lower nephrotoxicity, similar resolution of infection symptoms, and fewer blood samples. They even discovered that trough-guided dosing is error prone and inaccurate, with only 30% of the intended trough concentrations were sampled correctly and 19% of them (compared to 70% in the AUC groups) were therapeutic. Similar technology exists to dose other drugs, including busulfan.

The User Interface is Key

As a side-note, while software and technology can be an incredible tool to elevate patient care, having a system that a user would struggle with would make that technology ineffective. Oftentimes when we struggle with technology, we blame ourselves, but it is actually more likely to be the fault of the design of the technology itself.

"A user interface is like a joke. If you have to explain it, it's not that good."

A Step Towards Individualized Dosing

With the help of pharmacometrics we are moving towards a world of more accurate and individualized medicine. As these tools continue to evolve, we can continue to advance patient care by treating everyone with the (probable) right dose, (almost) every time.

Current Considerations: Supporting LGBTQ Students, Colleagues, and Patients

Speakers: Drs. Cheyenne Newsome Pharm.D., Calvin “Clay” Daniels Pharm.D., and Jessica Conklin Pharm.D.

By: Tim Jacisin, Pharm.D.
PGY-1 Pharmacy Resident
Newark Beth Israel Medical Center

It’s fair to say that no other disclosure slide at the 2018 ASHP Midyear Clinical Meeting begins, “Dr. Newsome is a cis-gender, heterosexual female who uses female pronouns. Dr. Daniels is a cis-gender, gay male who uses male pronouns. Dr. Conklin is a cis-gendered, heterosexual female who uses female pronouns”. That is to say, rather than stating financial conflicts of interest, the speakers of “Current Considerations: Supporting LGBTQ Students, Colleagues, and Patients” disclosed his or her gender identity, sexual identity, and preferred pronoun. This introduction not only informed the audience of the speakers’ background but also set a tone of inclusiveness and transparency – prominent themes throughout the presentation. As the speakers would go on to explain, Lesbian, Gay, Bisexual, Transgender, Queer/Questioning (LGBTQ) individuals experience unique barriers as patients, healthcare students and colleagues.

The topics discussed included definitions of lesbian, gay, bisexual, and transgender as well as “coming out”, implicit bias, privilege, and hidden curriculum. The presenters discussed mechanisms to incorporate LGBT competence into pharmacy practice experiences. Some examples included expanding trainees and clinic staff knowledge about sexual and gender identity, normalizing LGBT language, and utilizing teaching opportunities for pharmacy students. This kind of training can reduce the barriers LGBT individuals may feel when he or she is assumed to be heterosexual or cis-gendered.

Key Takeaways:

- The decision to come out is a personal decision which may deepen relationships and reduce barriers
- Many factors go into someone’s comfort disclosing personal information about themselves
- Everyone has implicit biases based on their experiences that causes unconscious inferences of others
- You can support people by incorporating LGBT competence into pharmacy curriculum and creating LGBT affirming environments for patients, colleagues, and learners



What the Cough? Management and Controversies of Common Pediatric Infections

Presenters: Kyana D. Stewart, Pharm.D.,
M.S., BCPS and Stephanie Weightman,
Pharm.D., BCPPS, BCPS.

By: Andrew Cho, Pharm.D.
PGY-1 Pharmacy Resident
Saint Barnabas Medical Center

Acute otitis media (AOM):

This topic aimed to answer questions about the therapy focused on empiric therapy in acute otitis media with recommended dosing strategies as well as the role of cefdinir in patients presenting with AOMs. Appropriate recommended empiric therapy lies with the use of amoxicillin 80 to 90 mg/kg/day divided twice daily. Dosing amoxicillin in obese patients is dependent upon practice site as the American Academy of Pediatrics does not provide a max dose. The role of cefdinir as empiric therapy for AOM holds limited data due to a markedly decreased effectiveness against *S. pneumoniae* and *H. influenzae*.

Community Acquired Pneumonia (CAP):

This topic aimed to answer questions about the necessity of empiric therapy in patients presenting with CAP, if a macrolide was necessary for empiric coverage, and if alternative dosing regimens for oseltamivir or peramivir played a role in the treatment of influenza. Empiric therapy for common bacterial pathogens should be initiated in patients presenting with CAP once the patients have been assessed for risk factors for possible coinfection even if presenting with viral infections. The use of macrolides for empiric therapy remains controversial and requires more data. The use of oseltamivir alternative dosing aiming for

higher dosing has no place in therapy for treatment with oseltamivir. There is no observed additional benefit with the use of oseltamivir. The use of peramivir should be limited to severe cases of patients who are unable to tolerate oral medications or are unable to take anything orally.

Osteomyelitis:

This topic aimed to answer questions about the use of appropriate empiric therapy in patients presenting with osteomyelitis, dosing concerns about clindamycin in obese patients, and the optimal duration of IV therapy before transitioning to oral therapy. Empiric combination therapy for osteomyelitis is not routinely recommended but is also dependent on specific patient based factors. The use of clindamycin in obese patients has been questioned as well. There was a thought that higher doses may be beneficial in obese patients but the recommendation is to dose clindamycin based off total body weight with a maximum of 2,700mg per day. The transition of patients to oral therapy from IV therapy should be initiated as soon as possible once the patient is able to tolerate oral medications and has a C-reactive protein that is trending down.

Urinary Tract Infection (UTI):

This topic aimed to answer the questions of if parenteral therapy is required in the treatment of UTIs and if cefdinir had a defined role in the treatment of pediatric UTIs. The ultimate takeaway was that parenteral therapy is not required as long as the patient was not presenting as hemodynamically unstable and was able to tolerate oral medications. Cefdinir was also defined to have a role in the treatment of pediatric UTIs.



If anyone would like more information from the presentations we attended or has any questions about the articles that we wrote, please feel free to contact us at the email addresses listed below.

Thank you for reading!

PGY-1 Pharmacy Practice Residents

Aamer Attar
Robert Wood Johnson Somerset
Email: Aamer.Attaar@rwjbh.org

Jose Lazo Jr.
Robert Wood Johnson University Hospital
Email: Jose.LazoJr@rwjbh.org

Angela Wang
Monmouth Medical Center
Email: Angela.Wang@rwjbh.org

Kalioppe Damalas
Community Medical Center
Email: Kalioppe.Damalas@rwjbh.org

Andrew Cho
Saint Barnabas Medical Center
Email: Andrew.Cho@rwjbh.org

Komal Nadeem
Clara Maass Medical Center
Email: Komal.Nadeem@rwjbh.org

Czarina Viduya
Jersey City Medical Center
Email: Czarinaisabelle.Viduya@rwjbh.org

Neha Kumar
Monmouth Medical Center
Email: Neha.Kumar@rwjbh.org

Dana Serao
Newark Beth Israel Medical Center
Email: Dana.Serao@rwjbh.org

Piao Zhuge
Saint Barnabas Medical Center
Email: Piao.Zhuge@rwjbh.org

Edwina Leung
Barnabas Health Behavioral Health Center
Email: Edwina.Leung@rwjbh.org

Rahul Jacob
Saint Barnabas Medical Center
Email: RahulC.Jacob@rwjbh.org

Eka Beriashvili
Community Medical Center
Email: Eka.Beriashvili@rwjbh.org

Regina Deap
Jersey City Medical Center
Email: Regina.Deap@rwjbh.org

Hetty Cheng
Saint Barnabas Medical Center
Email: HettyS.Cheng@rwjbh.org

Sana Mohayya
Robert Wood Johnson University Hospital
Email: Sana.Mohayya@rwjbh.org

Grace Rhee
Robert Wood Johnson Somerset
Email: Grace.Rhee@rwjbh.org

Timothy Jacisin
Newark Beth Israel Medical Center
Email: Timothy.Jacisin@rwjbh.org

Jessica Gerges
Clara Maass Medical Center
Email: Jessica.Gerges@rwjbh.org

RWJBarnabas
HEALTH