P&T Update

Formulary Additions
1. Meningococcal conjugate vaccine (Menveo®) line extension – Approved.
2. Sodium Chloride 7% nebulization solution - formulary addition of hypertonic saline 7% nebulization solution with restriction to Pulmonary Division – Approved.
3. Morphine Sulfate preservative free (Infumorph®) 200 mg/20 mL and 500 mg/20 mL formulary addition – Approved.
4. CAPS D5W neonatal starter TPN 250 mL bag formulation change – Approved.
5. CAPS D10W neonatal starter TPN 250 mL bag formulation change – Approved.
6. HPV-9 valent vaccine (Gardasil® 9) Line extension – Approved

Formulary Deletions
1. Diphenhydramine-zinc 1% cream – no longer available – Formulary deletion approved. (Diphenhydramine – zinc 2% cream available)
2. Meningococcal conjugate vaccine (Menactra®) – Formulary deletion approved.
3. HPV-4 valent vaccine (Gardasil®) – Formulary deletion approved.
4. Ticarcillin/clavunate (Timentin®) – Formulary deletion approved.
5. Pancuronium bromide solution for injection – Formulary deletion approved. (Rocuronium and vecuronium are the preferred formulary neuromuscular blocking agents.)

Policies & Procedures/Floor Stock Update
707-70-105A IV Medication Administration Guideline revision
Revision to the IV Medication Administration Guideline to remove ketamine infusion allowed in med-surg units was approved

707-600-176 Restricted anti-infective policy revision
Changes include updated list of restricted anti-infectives to include fosfomycin and non-formulary use of newer cephalosporin/beta-lactamase inhibitor combinations

707-400-112 Standing Medication Orders Newborn – New policy approved
707-800-103 Multi-Dose Vial Policy Revised – Approved
707-400-113 Drug Shortages Policy Revised – Approved
707-400-111 Malignant Hyperthermia Policy Revised – Approved
707-500-119 Clozapine REMS Policy Revised – Approved
707-600-166 Labeling Medication Containers Policy Revised – Approved

The 2016 policy and procedure table of content and signature cover sheet were submitted for review and approval – Approved

(Continued on page 2)
Disseminated Intravascular Coagulation

Introduction
Disseminated intravascular coagulation (DIC) is characterized by systemic activation of blood coagulation, resulting in generation and deposition of fibrin in blood vessels. Patients with disseminated intravascular coagulation have microvascular thrombi in various organs and are at risk for developing multiple organ dysfunction syndrome (MODS). There is a dysfunction of the fibrinolytic system and a global deficiency of coagulation factors in DIC. Patients at high-risk for both thrombosis and bleeding, such as patients with arterial or venous thromboembolism, are treated with continuous infusion of unfractionated heparin due to its half-life and reversibility. Transfusion of platelets is considered in patients with DIC, at risk of bleeding, and with low platelet counts (less than 50 x 10⁹/L). In patients with active bleeding, DIC, and prolonged prothrombin time (PT) and activated partial thromboplastin time (aPTT), fresh frozen plasma is considered. Critically ill patients with DIC receive heparin or a low molecular weight heparin for VTE and PE prophylaxis. DIC is estimated to develop in about 1% of all hospitalized patients and may occur in 30-50% of patients with sepsis.²

DIC
DIC generally develops from two pathways: a systemic inflammatory response or exposure to procoagulant material in the blood. Infections, malignancy, trauma, and surgical events could all activate one of these two pathways and cause coagulation. The symptoms seen are often from the underlying condition, but the main features of DIC are bleeding, renal dysfunction, hepatic dysfunction, respiratory dysfunction, and shock.³

Laboratory tests to assess for DIC include prothrombin time (PT), fibrinogen, platelet count, D- dimer, and fibrin-relate markers (FRMs). These markers help evaluate the degree of coagulation factor activation and consumption. It is important to note that even though these markers are not a clear cut indication of DIC, PT is often prolonged in about 60% of patients with DIC. A prolonged PT is also associated with concomitant liver disease or warfarin treatment. A downward trend of platelet count could indicate DIC as well. A reduction of fibrinogen and increase in FRMs may reflect thrombin formation, however many conditions already show these values without DIC.

The cornerstone of DIC treatment is to treat the underlying condition that has precipitated DIC. It will spontaneously resolve in many cases, when the underlying disorder is properly managed.⁴ Some randomized clinical trials showed benefit in cases where additional supportive treatment was needed.

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Zika Virus Disease Outbreak in the Americas

Introduction

Zika virus is a mosquito-borne flavivirus related to the dengue, yellow fever, and West Nile viruses. It was first isolated in Uganda in 1947 in rhesus monkeys from the Zika Forest and was first reported in humans in 1952.¹ Outbreaks of Zika infection have been reported in Brazil, Colombia, Costa Rica, Mexico, El Salvador and several other South American and Central American countries. Cases of Zika infections have been reported in the United States in pregnant and non-pregnant individuals who have recently traveled to any of these areas. Although it is still not proven, Zika virus may be linked to reported increases in both microcephaly and Guillain-Barre Syndrome in Brazil. Currently, there is no cure or vaccine against Zika virus disease.¹,²

Zika Virus Disease

Zika virus is an enveloped, positive-sense, single-stranded RNA virus belonging to the Flaviviridae family. It is transmitted to humans by the Aedes family of mosquitoes. Aedes aegypti is the most important vector in South America while Aedes albopictus is more widespread in the United States and can potentially spread the disease. The incubation period between the mosquito bite and onset of clinical symptoms is between 2 to 14 days.¹

Symptoms are similar to dengue and include fever, skin rashes, conjunctivitis, muscle and joint pain, malaise, and headache. They are usually mild and last for 2-7 days, and no specific antiviral treatment is available. Patients showing signs of Zika receive supportive care: rest, hydration, and acetaminophen for pain and fever.¹

Diagnosis is based on symptoms and travel history to areas where Zika virus is known to be spreading.¹ Diagnosis is confirmed via reverse transcriptase PCR or Zika virus serology. Viral RNA can be found in the blood or body fluids including urine, semen, saliva, amniotic fluid, and breast milk. There is no

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Zika Virus Disease Outbreak in the Americas
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commercially available test and it is only done by World Health Organization, the CDC, and some state health departments.\(^1\)

The best preventive measures against Zika are to empty, clean or cover mosquito breeding sites (open water storages/containers) and to take personal protective measures. Repellents containing DEET (N, N-diethyl-3-methylbenzamide) should be used regularly and clothes that cover as much of the body as possible should be worn.\(^1,2\)

The CDC has developed guidelines for US health care providers caring for pregnant women and women of reproductive age.\(^3\) Health care providers should ask all pregnant women if they have recently traveled to infected areas. Pregnant women with travel history and who have had two or more symptoms consistent with Zika virus disease within 2 weeks of travel, or pregnant women with ultrasounds that show signs of microcephaly or intracranial calcifications, should be tested for Zika. The CDC advises pregnant women to postpone travel to areas with active outbreaks or to take personal protective measures if traveling cannot be avoided.\(^3\)

Zika, Microcephaly, and Guillain-Barre Syndrome

There is a serious concern that the Zika virus is teratogenic and may cause microcephaly if pregnant women are infected during the first trimester. Zika virus disease may also be associated with Guillain-Barre Syndrome (GBS). Not much is known about the Zika virus because it had not been known to cause severe disease until an outbreak in French Polynesia in 2013-2014.\(^1\) Neurological and auto-immune complications, such as GBS, were reported in patients who tested positive for Zika virus infection. Microcephaly is a rare neurological condition in which a baby’s head is smaller than normal. Children with microcephaly have seizures, developmental delays, and mental retardation. Guillain-Barré is a rare condition in which a person’s immune system attacks his/her own peripheral nerves leading to inflammation and demyelination.\(^5\) Symptoms include weakness or tingling sensations starting in the legs and spreading to the arms and face. Some people may experience paralysis of the legs, arms, or muscles of the face. In 20-25% of patients, chest muscles are affected and respiratory failure occur.\(^5\) There is often an event that precipitates GBS such as pregnancy, surgery, upper respiratory infection, viral infections (such as dengue, CMV, HIV) or vaccination. GBS patients are usually hospitalized and treated with supportive care and immunotherapy including plasma exchange, plasmapheresis or intravenous immunoglobulin (IVIG).\(^2,5\)

Current Zika Virus Disease Epidemic

Brazil’s Ministry of Health has reported a significant increase in babies born with microcephaly, mostly in northeast Brazil, and of cases of Guillain-Barre syndrome during the current Zika epidemic.\(^5\) Brazil confirmed its first Zika infection in March 2015, and an estimated 500,000 to 1.5 million Brazilians were infected last year. Brazil’s annual rate of microcephaly climbed from 5.7 per 100,000 births in 2014 to 99.7 per 100,000 live births in 2015.\(^8\) 5,640 cases of microcephaly have been reported as of February 2016. There are ongoing studies examining whether there is an association between Zika virus infection and microcephaly, and Brazil’s Ministry of Health is investigating other possible agents that may lead to microcephaly or GBS such as syphilis, toxoplasmosis, rubella, cytomegalovirus, and herpes.\(^2,7\)

References:


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Centers for Disease Control and Prevention Release Guidelines for Prescribing Opioids for Chronic Pain

by: Roxinne Templonuevo, PHARM D, BCPS

OPIOIDS DRIVE CONTINUED INCREASE IN DRUG OVERDOSE DEATHS –
CDC PRESS RELEASE, FEBRUARY 2013

OPIOID EPIDEMIC FUELING HOSPITALIZATIONS, HOSPITAL COSTS –
KAISER HEALTH NEWS, MAY 2016

WHY WE NEED MORE RESOURCES FOR THE PRESCRIPTION OPIOID AND HEROIN EPIDEMIC –
THE WHITE HOUSE BLOG, MAY 2016

These are just some of the recent headlines appearing in the news about the nation’s opioid epidemic. According to data from the CDC, the number of people who died from prescription opioid overdose has quadrupled over the last 15 years, and the opioid epidemic has claimed the lives of over 165,000 people between 1999 and 2014. This increase in deaths from opioid overdose corresponded to an increase in sales of opioid prescriptions. In addition, an estimated 1.9 million people abused or were dependent on prescription opioids in 2013, and over 420,000 emergency department visits in 2011 were related to misuse or abuse of narcotic pain relievers.

In an effort to address the opioid epidemic, the CDC published a Guideline for Prescribing Opioids for Chronic Pain in March 2016. The guideline is intended to improve the safety and effectiveness of pain treatment and reduce the number of patients who develop adverse events related to opioid therapy, such as opioid use disorders (abuse or dependence), overdose, and death. These recommendations only apply to primary care physicians in outpatient settings who prescribe opioids for adults with chronic pain; they do not apply to patients receiving treatment for active cancer, palliative care, or end-of-life care.

The guideline contains 12 recommendations for prescribers that address three main topics: 1) determining when to initiate or continue opioids for chronic pain 2) opioid selection, dosage, duration, follow-up, and discontinuation, and 3) assessing risk and addressing harms of opioid use. All of the recommendations are Category A (except Recommendation 10 regarding urine drug testing), indicating that they apply to all patients. However, the CDC notes that the clinical scientific evidence behind the recommendations is low in quality, and ranges from Type 2 (evidence from randomized clinical trials with important limitations) to Type 4 (clinical experience and observations).

Chronic pain is defined as pain that lasts greater than three months or past the time of normal tissue healing. Prescribers should maximize treatment with non-opioid and non-pharmacologic therapies first and only consider using opioids for chronic pain if benefits outweigh risks. If opioids are used, they should be combined with non-opioid and non-pharmacologic therapies because of their synergistic effects. Examples of non-pharmacologic therapies include: physical therapy, weight loss, and cognitive behavioral therapy.

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Examples of non-opioid therapies include: NSAIDs, acetaminophen, and pregabalin, as well as gabapentin and carbamazepine for neuropathic pain.

Clinicians should establish treatment goals with all patients before starting them on opioids for chronic pain. Opioids should only be continued if they produce clinically meaningful improvement in pain and function that outweigh risks to the patient. If at any time a clinician determines that the benefits of continued therapy do not outweigh the risks, they should consider how opioid therapy will be discontinued and should maximize non-pharmacologic and non-opioid therapy. Patients should be educated about the risks and benefits of opioids before initiating treatment and at least every three months while they continue on opioid therapy to determine if their treatment goals are being met. Clinicians should counsel patients on the side effects of opioids, including respiratory depression, constipation, drowsiness, tolerance, and the risk of opioid use disorders such as addiction and dependence.

Opioid therapy should be initiated with immediate-release formulations instead of long-acting formulations, because there is a higher risk of overdose among patients who are started on treatment with long-acting formulations. Some long-acting formulations are only appropriate for opioid-tolerant patients who have received 60mg/day of oral morphine, 30mg/day of oral oxycodone, or equivalent analgesic doses of other opioids for at least one week. According to expert opinion, using immediate release and long-acting formulations together should be avoided because there is not enough evidence to determine whether this practice is safe to treat chronic pain outside of active cancer, palliative care, or end-of-life care. Long-acting opioids might be indicated in certain subgroups of patients who would be expected to have significant pain for a prolonged period of time (months). Examples include patients undergoing knee or hip surgery or those with rib fractures. In these patients, pain may interfere with sleep if only immediate-release opioids are used, because their short duration of action does not allow for analgesic effects to last throughout the night. Vigilance in continual dose reduction while the patient recovers from injury is paramount in preventing addiction and overdose. Only clinicians who are familiar with the unique pharmacokinetic and pharmacodynamic properties of methadone and transdermal fentanyl should prescribe these long-acting formulations for chronic pain.

Clinicians should start patients on the lowest possible dose of opioids and should avoid increasing doses to greater than 90 MME (morphine milligram equivalents) per day because there is a dose-dependent increase in the risk of adverse events; higher opioid dosages are associated with increased risks of overdose and death. If a patient is not meeting their treatment goals with doses $\geq 90$ MME/day, prescribers should consider tapering to a lower dose, tapering to discontinue the opioid, maximizing non-opioid and non-pharmacologic therapy, or consulting a pain specialist. Studies show that when opioids are used for acute pain, a greater amount of early opioid exposure is associated with greater risk for long-term use. Therefore, acute pain should be treated with immediate release formulations at the lowest effective dose for 3 days or less, and more than 7 days of treatment is rarely needed.

Prescribers should assess patients for benefits and harms within the first 4 weeks of starting opioid therapy and after every dose increase. Clinicians should evaluate patients for signs of opioid use disorder such as craving or difficulty controlling use. If a patient experiences an overdose or a serious adverse event leading to hospitalization, clinicians should reduce opioid dosage or discontinue opioids when possible. Experts note that clinicians can offer to taper or discontinue opioids for patients with problematic

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Centers for Disease Control and Prevention
Release Guidelines for Prescribing Opioids for Chronic Pain  (Continued from page 6)

opioid use that does not meet criteria for opioid use disorder. For patients who do meet criteria for opioid use disorder, clinicians are advised to offer or arrange medication-assisted treatment with methadone or buprenorphine in combination with behavioral therapies, and should consider offering naloxone for overdose prevention.

Clinicians should identify patient populations who are at risk for opioid-related harms, including: patients with sleep apnea, pregnant women, patients with renal and hepatic insufficiency who are susceptible to accumulation of opioids, elderly patients with cognitive impairment and who are at risk for falls, patients who have mental health conditions such as depression (possible suicide/overdose risk) or anxiety (concurrent use of benzodiazepines), and patients with drug or alcohol use disorders. Prescribers should review patients’ prescription drug monitoring program (PDMP) data when initiating and periodically during opioid therapy to ensure that they are not receiving doses or combinations that increase their risk for overdose. Prescribers should also consider urine drug testing to assess for prescribed medications and other controlled or illicit substances when initiating and periodically during opioid therapy.

Due to the increased risk of central nervous system depression and overdose, clinicians should avoid prescribing benzodiazepines and opioids whenever possible. If patients on opioid therapy require treatment for anxiety, clinicians should offer them behavioral therapy or non-benzodiazepines approved for anxiety, and communicate with the mental health professionals managing the patient to coordinate their care.

In summary, the CDC guideline aims to improve the safety and effectiveness of opioid therapy for chronic pain by emphasizing the importance of periodically monitoring and assessing patients for benefits and harms, as well as educating patients about the risks of opioid therapy. If treatment goals are not being met or if the risks of continued therapy outweigh the benefits, prescribers should consider strategies such as tapering or discontinuing opioids in order to prevent opioid use disorder, overdose, and death. This CDC guideline is just one aspect of the many federal efforts focused on addressing the nation’s problem with painkillers. The recent news that opioid prescriptions have fallen for the first time in 20 years is a positive indicator that these efforts are making an impact. Hopefully this will represent the first of many steps in the right direction toward reducing the negative consequences that have come to characterize the nation’s opioid epidemic.

References:
Continuity of care is a team-based concept that entails coordination of all aspects of patient care throughout all transitions of care. Just as new diagnoses, procedures and lab results should be updated with each patient encounter, so should changes in a patient’s medication regimen. This process is called medication reconciliation, and was incorporated into the Joint Commission’s third National Patient Safety Goal in 2011. It is further defined as “obtaining and documenting a complete list of the patient’s current medications.”1 This can be done in both inpatient and outpatient settings.

In 2013, the American Society of Health-System Pharmacists (ASHP) published a statement advocating the hospital pharmacist’s role in medication reconciliation, but also encourages expanding involvement of pharmacy technicians, student pharmacists, and pharmacy residents.2 Since then, institutions have been putting pharmacists and pharmacy technicians in the Emergency Department (ED). A study comparing pharmacists and technicians demonstrated there were no significant differences in mean number of discrepancies with both prescription and over-the-counter drugs.3

Pharmacy technicians performing medication reconciliation usually work under the supervision of an ED pharmacist, who should review the list before it is entered into the chart. In addition, the technician can also inquire if the patient has any medication-related questions for the pharmacist, as this encounter is an excellent opportunity for counseling. Designating pharmacy technicians or students to perform medication reconciliation allows the ED pharmacist to focus on clinical tasks such as prospective review of medication orders and participation in medical emergencies.

Traditionally, a patient’s medication history is taken by a nurse in the ED and entered into the patient’s chart. This is then reviewed by the admitting physician, who makes the decision to continue or hold individual medications on the list. Upon discharge, any changes that have been made to the patient’s medication regimen are documented in the medical record. When done correctly, medication reconciliation allows for continuity of care and decreases the risk of medication errors. However, studies have shown that 30% to 70% of medication histories obtained by non-pharmacy personnel have at least one discrepancy.4,5,6,7 Examples of discrepancies include incorrect or missing dose, frequency or drug, as well as listing a drug the patient no longer takes. Presence of high-risk medications and increased age is associated with a higher risk of error.8 The latter is likely due to an increase in average number of medications taken as age increases. Errors in documentation lead to unnecessary adverse drug events (ADEs), ultimately increasing cost. Research has shown that the cost of each preventable ADE is approximately $8,750.9

The main cause of the error rate in non-pharmacy personnel-led reconciliation is likely a lack of time to perform this important task. Getting an accurate list may require multiple sources (the patient, caregiver, outside pharmacy, and/or long-term care facility) and is time consuming to perform. Because of the complexity of medication reconciliation, missing elements is possible or the incorrect list from the last admission is copied into the current one. Other important steps such as inquiring about over-the-counter medications can be skipped if the medication reconciliation is rushed or if the individual performing the reconciliation is not trained properly.

Pharmacy-led medication reconciliation programs are better equipped to recognize inappropriate dosing and can dedicate more time to checking the patient’s medication regimen against multiple sources. Studies have shown that pharmacy-led medication reconciliation yields more accurate histories, leading to fewer ADE’s and decreased cost.6,10 In a recent study at a large acute care hospital, the number of discrepancies per medication was significantly lower when medication reconciliation was performed by pharmacists and pharmacy technicians in comparison to non-pharmacy personnel (0.16 vs 0.36 vs 0.59, P < 0.001). Estimated monthly savings from prevented ADE’s was $294,872.6 Dedicating pharmacy staff to medication reconciliation not only decreases medication errors and associated costs, but also...
allows other patient care providers to focus on their patient care duties.

In conclusion, medication reconciliation is one of the many items on the growing list of clinical responsibilities of hospital pharmacists and pharmacy technicians. Its importance should not be underestimated, as inaccurate medication histories compromise patient safety. As pharmacy professionals get more involved in patient care, there is no doubt that others will see them as valuable members of the multidisciplinary team.

References:
Welcome New Pharmacy Technician

Hong Thai
Hong’s undergraduate studies at Long Island University were centered on a biology major, with a concentration in molecular biology. This concentration proved to be eclectic, having an overlap of biology, genetics, biochemistry, and chemistry. The coursework has given her a foundation for health sciences and piqued her interests for the focused curriculum that is required to earn a Doctor of Pharmacy Degree at Fairleigh Dickinson University. She has extensive experience in the pharmaceutical field, including retail, long term care, and hospital pharmacy. A career in pharmacy combines her interest in the health sciences, as well as her desire to help people. With modern medicine compartmentalizing patient care, the niche that pharmacists fill is highly appealing. As a life motto, she follows a straight path by taking care of her mind, body, and soul.

Welcome New Pharmacist

Dr. Betty Luor
Dr. Betty Luor received her Doctor of Pharmacy degree (Magna Cum Laude) from the Ernest Mario School of Pharmacy at Rutgers University in 2011. She was highly involved in pharmacy activities, having an active role in pharmacy organizations such as Pharmacy Governing Council, American Pharmacists Association, and National Community Pharmacists Association. During her time in pharmacy school, she was working for a community pharmacy. Upon graduation, she continued to work there as a staff pharmacist and later was promoted to a pharmacy manager. Dr. Luor implemented several practices that expedited workflow and increased the pharmacy’s key performance metrics, built a strong and efficient team, and further developed her patient service and counseling skills. While she was in school, she did an introductory rotation at University Hospital. She is excited to utilize her skills here at UH and contribute to the team and impact healthcare. Outside of work, she is involved in many church activities.