Cooper University Health Care

Cooper Bridges

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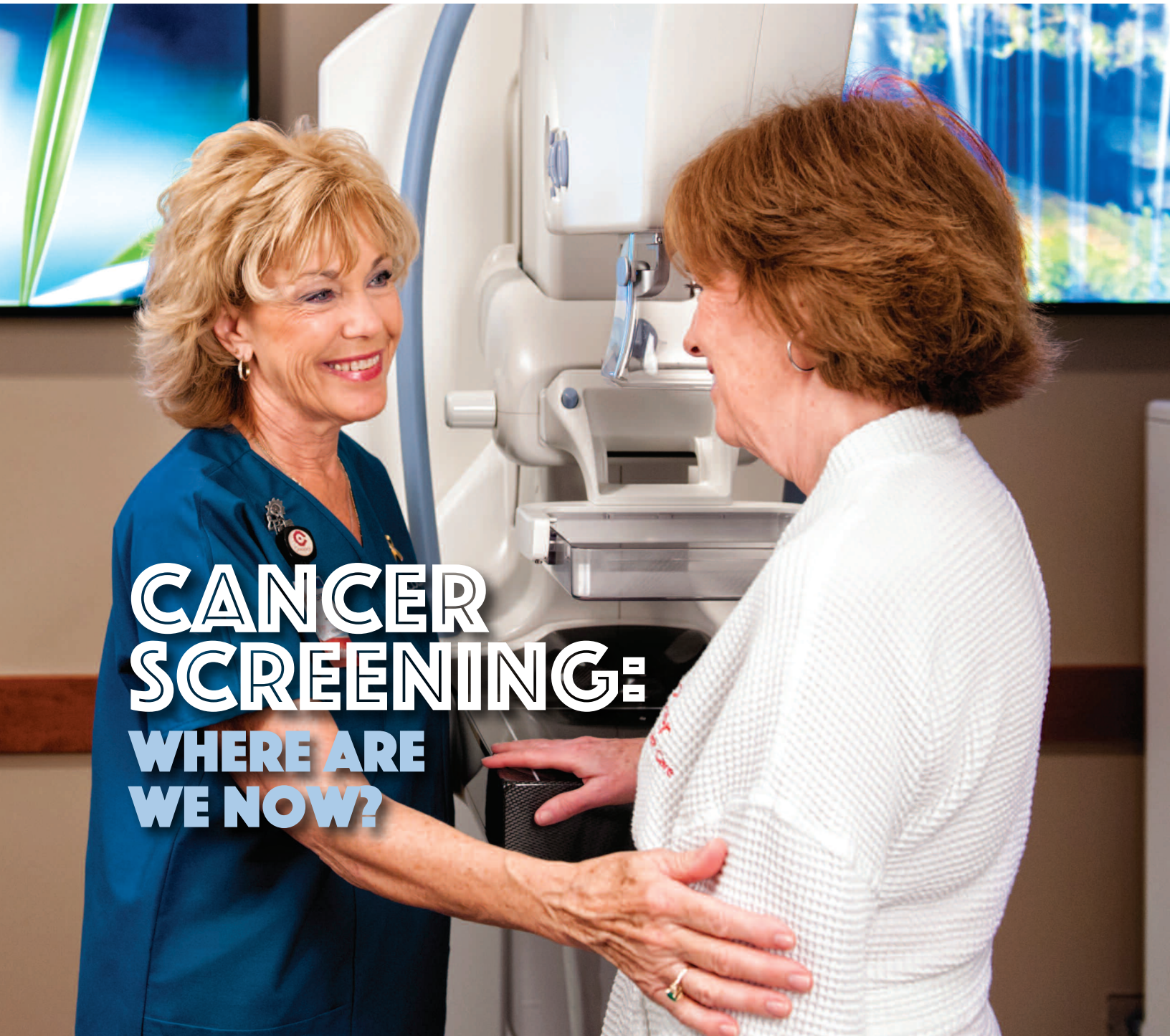

CANCER SCREENING: WHERE ARE WE NOW?

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'Just a Nurse'…..I don't think so!

Each month, I have the wonderful opportunity to meet with a group of our nurses. These meetings may be formal as in orientation, the residency program, senior leader rounds or during a breakfast to discuss what inspires us as nurses. The meetings are also informal like talking with a nurse when I visit a patient or joining a group of colleagues in the cafeteria for lunch. Formal or informal, I enjoy our conversations because one thing consistently resonates within me…not one of you are 'just a nurse.'

Walking through our campus, nurses are seen everywhere assisting and caring for our patients. Seeing this makes quite an impression on a person. Although you hold the title of "Nurse," each one of you is unique in the way you provide compassionate care to our patients. This unique style allows you to make a connection with another person and positively impact their life. When you arrive to work, you begin a selfless journey that starts with a commitment to care for others.

The role of the nurse is multifaceted. Traditionally, the nurse cares for those that are sick. However, as we are well aware the role of the nurse is much more than a person completing tasks to provide care for those who are ill. Nurses are educated in health and science with a focus on critical thinking. The nurse is highly skilled in assessing a person's physical and emotional needs, implementing a plan of care and evaluating the response to the interventions. The nurse not only focuses on helping patients meet their physical and emotional needs, but also identifies and addresses cognitive, social and spiritual needs.

Throughout Cooper University Health Care patients encounter outstanding nurses along their journey. Nurse navigators assist our patients with appointments and follow up testing immediately upon entering our system. We have nurses in our ambulatory practices providing education to our patients on preventative care and health maintenance.Our nurses are observed as highly skilled care providers in various health care settings. We are beyond the bedside and into the patient's world working collaboratively as advocates, educators and counselors.

No matter the role, the nurse is a trusted confidant. Patients entrust their care to us because we are a knowledgeable, caring group of professionals who have taken an oath, which represents a sacred bond between caregiver and patient, to do no harm.

Lisa Laphan-Morad

Email comments to **Laphan-Lisa@cooperhealth.edu** or **Conners-Stephanie@cooperhealth.edu**

Cooper Bridges Mission:

"To communicate and educate nurses and healthcare professionals to foster excellence in the delivery of patient care."

Cooper Nurses interested in authoring an article for a future edition of *Cooper Bridges* may obtain submission guidelines by contacting: **Staman-stacey@cooperhealth.edu**

Zika Virus

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Zika virus (Zika) has been on the forefront of the news since its identification in Brazil in early 2015. Although the Zika virus was first isolated in 1947, the World Health Organization declared it a public health emergency of international concern on February 1, 2016. Zika emerged in the Region of the Americas in early 2015, and Health Departments have observed and detected imported cases since that time. Zika is primarily spread through an infected Aedes mosquito bite. Other modes of transmission include pregnant mother to child in utero, sexual contact, blood transfusion and laboratory exposure.

Fever, rash, joint pain and conjunctivitis are the most common symptoms. Typically, people do not become ill enough to go to the hospital and may not even realize they have been infected. The most at risk population is pregnant women because the Zika virus can result in spontaneous abortion and birth defects such as microcephaly in an unborn fetus.

Suspected or at risk individuals may be tested for the diagnosis of Zika Virus. Testing may include serum (blood) test or urine sampling. Tissue can be obtained from fetal or infant tissues after appropriate consent is obtained from the parents.

Although there are no vaccines for the prevention of Zika, there are many ways to prevent acquiring this infection: decrease the risk for mosquito bites by wearing long-sleeved shirts and pants, use Environmental Protection Agency registered insect repellent (but not on children younger than 2 months old), treat clothing with permethrin, remove standing water around your home. Travelers returning from areas that are infected with Zika should take preventive measures to decrease the risk of transmission especially if they have been bitten by mosquitos. Since sexual transmission of Zika has occurred, the use of condoms during sexual activity is recommended. The Centers for Disease Control (CDC) is currently studying how long Zika can be spread in semen and other body fluids. Pregnant women should avoid travel to areas with known Zika virus.

If you do become infected the management is to treat the symptoms. Get plenty of rest, drink fluids, take a fever and pain reducer and take precautions to prevent mosquito bites.

If you are planning to travel you can visit the CDC's Travelers' Health website, where you will find health information regarding the area of intended travel.

Email comments to **Wallace-margo@cooperhealth.edu**

References:

http://www.cdc.gov/zika/about/index.html. Morbidity and Mortality Weekly Report (MMWR) – Possible Zika Virus Infection Among Pregnant Women-United States and Territories, May 27, 2016/65(20)

Cancer Screening – Where are we now?

Evelyn Robles-Rodríguez, RN, MSN, APN, AOCN

Cancer screenings are recommended to decrease the morbidity and mortality of cancers as well as to help diagnose cancers at earlier stages when they are more treatable (Reintgen & Clark, 1996). The past few years, have led to many debates about which cancers to screen for, when screenings should begin and stop, how often to screenings should be performed, which screening tools are best and the pros and cons of screenings. Successful cancer screenings include the following criteria: the disease is common and screening will lead to improved morbidity and mortality; there must be an effective treatment once the disease is detected; the screening test is valid as measured by sensitivity (true positive), specificity (true negative) and positive predictive value (if the test is positive, probability that the person actually has the disease); and the test should be easily replicated and cost friendly in order to screen a large number of persons (Champion, Rawl and Skinner, 2003). This article reviews commonly screened cancers and two top organizations' recommendations for screenings.

> Although debates still surround the recommendations for cancer screening, the decision whether or not to screen needs to be part of the discussion that health care providers have with their patients.

Breast cancer screening was one of the first previously approved cancer screenings to come under scrutiny. Since 2009, the varying guidelines among national organizations, contradictive research and arguments for and against screenings have led to confusion among the public and health professionals (Odle, 2016). Most notably, the appropriate age for screening, time interval between screenings, harms vs. benefits and the value of mammography, breast self-examination (BSE) and clinical breast exams (CBE) have all come into question (Odle, 2016). The debate began in November 2009 when the United States Preventive Services Task Force (USPSTF) recommended changing the age of screening mammography from 40 to 50 years and from annual to biennial and stopping at 75 for women at average risk. These recommendations were mainly guided by data that they believed showed that the benefits of screening were outweighed by harm due to high false-positive mammography tests leading to unnecessary biopsies, over diagnosis and overtreatment of breast cancers (USPSTF, 2009). Based on these guidelines,

women aged 40 to 49 were urged to individually discuss with their providers the harms vs. benefits of screening and whether or not to screen. The USPSTF also recommended against teaching BSE and that there was insufficient evidence for or against CBE. An update in 2016, kept these similar recommendations. In 2015, the American Cancer Society (ACS) recommended women start screening mammography at age 45 rather than 40, change to biennial screening at age 55, stop screening in those women who have a life expectancy of less than 10 years, and stop obtaining CBE in all women (Oeffinger et al, 2015).

In 2012, the USPSTF tackled prostate cancer screening and recommended against screening with prostate specific antigen or PSA (Moyer, 2012). This was largely due to evidence noting high false-positive results leading to over diagnosis, overtreatment and no reduction in all-cause mortality (Moyer, 2012). The ACS currently recommends that men should be informed and discuss with their health care provider whether to screen or not. Those who decide to undergo screening after education and counseling should begin screening at age 50 if at average risk, at age 45 if high risk (such as African-American men and those with one first degree relative with the disease), and at 40 if they have even higher risk such as men with more than one first degree relative (ACS, 2016).

For cervical screening, the Pap smear has been the focus of screenings for over 60 years and led to a dramatic decrease in cervical cancer incidence and mortality (Tambouret, 2013). As the Human Papilloma Virus (HPV) became recognized as the cause of most, if not all, cervical cancers, HPV testing was added to cervical screening (Snijders, Steenbergen, Heideman, and Meijer, 2006). In 2012, the USPSTF recommended discontinuing screening in average risk women under the age of 21, screening those 21-65 with Pap Smear alone or in those between the ages of 30-65 with Pap smear in combination with HPV testing every 5 years, and stopping screening after the age of 65 (Moyer, 2012). Also, for women who had their cervix removed for non-cancerous or pre-cancerous lesions, screenings should stop. The evidence pointed that women under the age of 21 who were screened did not have a reduced incidence or mortality and that screening for women over 65 and those post-cervical removal with no history of cancer or high-grade cancer lesions yielded little to no benefit from screening (Moyer, 2012). The ACS, in that same year, had similar recommendations (Simon, 2012). The reason for the longer interval between screenings is the understanding that it takes cervical cancers 12 to 15 years to develop from HPV lesions, therefore this interval still allows time for recognition and treatment of precancerous lesions and HPV related changes (Snijders, Steenbergen, Heideman, and Meijer, 2006). Yearly screening, outside of the recommendations lead to over diagnosis, overtreatment and provides little benefit from the screening (Saslow et al, 2012).

Like cervical cancer, screening for colorectal cancer can assist in finding precancerous changes thus preventing the disease, as it takes 10 years or longer for precursor lesions to develop into cancers (Bretthauer, 2011). In June 2016, the USPSTF updated its colorectal cancer screening recommendations. They recommend that adults between the ages of 50 and 75 screen for colorectal cancer with either fecal occult blood testing or fecal immunochemical testing (FIT) annually, FIT-DNA every one to three years, sigmoidoscopy with FIT every 10 years plus FIT yearly, sigmoidoscopy every 5 years alone, CT colonography every 5 years, or colonoscopy every 10 years (USPSTF, 2016). The ACS had previously made these same recommendations for individuals with average risk with the only difference being no recommendation for FIT plus sigmoidoscopy, recommending stool DNA every three years and double-contrast barium enema every 5 years (ACS, 2016).

The final cancer screening recommendation is lung cancer. Lung cancer screening with low dose computed tomography (LDCT) has been shown to save about 8,100 lives annually (Goulart, Bensink, Mummy and Ramsey, 2012). Smoking is related to more than 87% of lung cancers (US Department of Health and Human Services, 2014). As such, screening strategies for lung cancer are directed to smokers or former smokers. The USPSTF, in December 2013, provided recommendations for lung cancer screening. These included adults aged 55 to 80 with a history of smoking (USPSTF, 2013). Those with a 30 pack-year smoking history and currently smokers or who have quit within the past 15 years should be screened with annual LDCT. They noted screening should be stopped in those who have not smoked for 15 years, those who have a limited life expectancy or individuals unwilling to obtain lung surgery to treat their disease. This recommendation was due to expected moderate benefit for screening in these individuals and the high sensitivity and acceptable specificity of this screening test (USPSTF, 2013). The ACS agrees with these criteria, which are based on the National Lung Screening Trial, stressing the importance of discussion regarding the screening decision with each individual patient, with notation that there is a significant chance of false-positive results (Wender, R., Fontham, E.T.H., Barrera, E., Colditz, G.A., Church, T.R., Ettinger,D.S., …Smith, R.A., 2013).

Although debates still surround the recommendations for cancer screening, the decision whether or not to screen needs to be part of the discussion that health care providers have with their patients. As well as the organizations discussed above, there are additional organizations with varying guidelines and the choice of which to follow is left to each individual healthcare provider and patient. It is important to educate our patients so that they can make an informed decision based on the current literature and national guidelines. Keep in mind that the recommendations described above are for patients at average risk, or the general population. Patients at high risk for any of these cancers require individualized plans of care.

MD Anderson Cancer Center at Cooper has several resources for the community for cancer screenings. Insured patients should be referred to their primary care providers and/or gynecologists for referrals for screenings. The Camden County Cancer Screening Project provides free screenings for breast, cervical, prostate and colorectal cancers for uninsured individuals, who are New Jersey residents and meet income criteria of 250% or below the poverty level. Immigration status does not affect eligibility in this program. Interested patients can be referred to 856-968-7092 where a bilingual (English/Spanish) outreach worker can assess eligibility. This program has been providing services since 1993 and has screened over 15,000 uninsured individuals, identifying and treating close to 300 cancers. As well, MD Anderson Cooper has low cost lung cancer screening with low-dose spiral CT for those patients who meet the eligibility outlined above. Interested persons can call 856-735-6235 to speak with the program coordinator.

Email comments to **Robles-Evelyn@CooperHealth.edu**

References:

American Cancer Society. (2016). *American Cancer Society recommendations for prostate cancer early detection.* Retrieved from http://www.cancer.org/cancer/prostatecancer/moreinformation/prostatecancerearlydetection/prostate-cancer-early-detection-acs-recommendations. Accessed July 1, 2016.

American Cancer Society. (2016). *American Cancer Society recommendations for colorectal cancer early detection*. Retrieved from http://www.cancer.org/cancer/colonandrectumcancer/moreinformation/colonandrectumcancerearlydetection/colorectal-cancer-early-detection-acs-recommendations. Accessed July 1, 2016.

Barclay, L. (2009). Given, C.W., Given, B., Champion, V.L., Kozachik, S., DeVoss, D.N. (eds.) (2003). Evidence-based cancer care and prevention: Behavioral interventions. Chapter 3. Champion, V.L., Rawl, S.M., Skinner, C.S. *Cancer Screening*. New York, Springer Publishing Company, pp 63-106.

Berger, B.M, Parton, M.A. and Levin, B. (2016). USPSTF colorectal cancer screening guidelines: An extended look at multi-year interval testing. *Am J Manag Care*, 22(2), ce77-ce81.

Bretthauer, M. (2011). Colorectal cancer screening. *J Intern Med*, 270, 87-98.

Goulart, B.H., Bensink, M.E., Mummy, D.G., and Ramsey, S.D. (2012). Lung cancer screening with low-dose computed tomography. Costs, national expenditures, and cost-effectiveness. *J of Natl Comprehen Ca Network*, 20, 267-275.

Moyer, V.A. (2012). US Preventive Services Task Force. Screening for prostate cancer: US Preventive Services Task Force recommendation statement. *Ann Intern Me*d, 157, 12-134.

Moyer, V.A. (2016). Screening for Cervical Cancer: U.S. Preventive Services Task Force Recommendation Statement. *Ann Intern Med*. 2012;156(12):880-891

Odle, T.G. (2016). Breast cancer screening benefits: Research and controversies. *Radiologic Technology*, 87(5), 529M-546M.

Oeffinger, K.C., Fontham, E., Etzioni, R., Herzig, A., Michaelson, J.S., Shih, Y.,… Wender, R. (2015). Breast Cancer Screening for Women at Average Risk2015 Guideline Update From the American Cancer Society. *JAMA*, 314(15), 1599-1614.

Reintgen, D.S. and Clark, R.A. (1996). *Cancer screening*. St. Louis, MO: Mosby.

Saslow, D., Solomon, D., Lawson, H.W., Killackey, M., Kulasingam, S.L, Cain, J.,… Myers, E.R. (2012). American Cancer Society, American Society for Colposcopy and Cervical Pathology and American Society for Clinical Pathology screening guidelines for the prevention and early detection of cervical cancer. *CA: A Cancer Journal for Clinicians*, 62(3), 147-172.

Simon, S. (2012). *New screening guidelines for cervical cancer*. Retrieved from http://www.cancer.org/cancer/news/new-screening-guidelines-for-cervical-cancer. Accessed July 1, 2016.

Snijders, P.J., Steenbergen, R.D., Heidernan, D.A., and Meijer, C.J. (2006). HPV-mediated cervical carcionogenesis: concepts and clinical implications. *J Pathol*, 208(2), 152-164.

Tambouret, R.H. (2013). The evolution of the Papanicolaou smear. *Clin Obstet Gynecol*. 53, 3-9.

US Department of Health and Human Services. (2014). *The health consequences of smoking-50 years of progress. A report of the Surgeon General. Executive Summary*. Retrieved from http://www.surgeongeneral.gov/library/reports/50-years-of-progress/exec-summary.pdf. Accessed July 1, 2016.

U.S. Preventive Services Task Force. (2013). *Lung Cancer Screening*. Retrieved from http://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/lung-cancer-screening. Accessed July 1, 2016.

U.S. Preventive Services Task Force. (2009). Screening for breast cancer U. S. Preventive Services Task Force recommendation statement. *Ann Intern Med*, 151:716–726.

U.S. Preventive Services Task Force.(2016). *Final recommendation statement: Colorectal cancer screening*. Retrieved from http://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/colorectal-cancer-screening2#tab. Accessed July 1, 2016.

Wender, R., Fontham, E.T.H., Barrera, E., Colditz, G.A., Church, T.R., Ettinger,D.S., …Smith, R.A. (2013). American Cancer Society lung cancer screening guidelines. *CA: A Cancer Journal for Clinicians*, 63(2), 106-117.

Considerations for a Nurse Driven Pediatric Pain and Sedation Protocol

Jena Quinn, PharmD, BCPS, BCPPS; Gina Brouster, RN, BSN

Management of pain and sedation in children is difficult because pain, fear and anxiety are interwoven. The cause of acute pain can be a result of diagnostic or therapeutic procedures. Separation from caregivers, fear of procedures, disruptions in sleep and noises are common causes of anxiety in children (Johnson et. al., 2012). Children range from neonates to adolescents, therefore when implementing a pain and sedation regimen, it must be tailored to the specific population kinetics.

Pain is recognized as "the fifth vital sign". Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage (World Health Organization, 2012). Barriers to effective pain management include: respondent's ability to assess pain, pain management being a low priority by nursing and medical staff, delays in the availability of medications, insufficient physician medication orders, insufficient time allowed to pre-medicate patients before procedures, concerns regarding addiction and reluctance or inability to get the pain service involved (Czarnecki et. al, 2014). The four most commonly used systems are pathophysiological mechanism of pain (nociceptive or neuropathic pain), the duration of pain (chronic or acute, breakthrough pain), the etiology (malignant or non-malignant) and the anatomic location of pain.

Analgesic and sedative agents have a narrow therapeutic window and are among the primary classes implicated in medication errors in children (Johnson et. al, 2012). For this reason, appropriate assessment and treatment of pain and sedation is vital. The development of a standard Pediatric Intensive Care Unit (PICU) algorithm to manage pain and sedation in mechanically ventilated patients results in decreased exposure to opioids and benzodiazepines, decreased length of intubation and a decrease in unplanned extubations (Curley et. al, 2015) Algorithms also result in improvement in interdisciplinary communication during all stages of pain and sedation.

Assessing pain in children who are non-verbal is a frequent challenge. A portion of this population is unable to report the location and degree of their pain due to age or cognitive status. The Face, Legs, Activity, Cry, and Consolability (FLACC) score has been validated for measuring pain in children between the ages of 2 months and 7 years or individuals that are unable to communicate. This scale has been validated for the assessment of pain secondary to surgery, trauma, cancer or other painful diseases for all pre-verbal children. In the diagram below are the categories for scoring. Zero, one or two points are assigned to each of the five categories shown in the table: Face, Legs, Activity, Cry, and Consolability (see Table 1). Total points assigned range from zero (no pain) to ten (worst pain). The Wong-Baker FACES® Pain Rating Scale was developed for children ages 3 years and older, to help them communicate their pain, thereby, improving assessment and pain management treatment plans (see Figure 1) (World Health Organization, 2012).

Nonpharmacological interventions used to manage pain in children are most effective when adapted to the developmental level of the child. Distraction techniques may help in pain alleviation. Non-pharmacological cognitive interventions include counting, listening to music, non-procedure-related talk, imagery, preparation/education/information, coping statements, video games and television. Non-pharmacological behavioral interventions include breathing exercises, modeling, positive coping, desensitization, positive reinforcement and coaching (Srouji et. al, 2010).

Pharmacologic interventions utilize a two-step strategy according to the child's level of pain severity. Mild pain is usually managed with non-opioids such as acetaminophen and ibuprofen, while moderate to severe pain is managed with opioids. The Joint Commission mandates the categories of pain medications as mild, moderate or severe with no overlapping indications (Baudendistel et. al, 2011).

Nurses must be familiar with medication kinetics such as peak effect, duration of action, half-life, bioavailability and optimal route of administration. The peak effect of a medication will determine if the as-needed rescue dose administered for breakthrough pain was effective via reassessment of the pain scores. The duration of action, determined by the half-life, is the amount of time that the medication will have activity in the body and will allow the nurse to gauge when another rescue dose should be administered. Bioavailability refers to the extent and rate at which the active form of the drug enters systemic circulation. Orally administered drugs must pass through the first pass metabolism via the intestinal wall and then the portal circulation before a drug reaches systemic circulation. Many oral drugs may be metabolized before adequate plasma concentrations are reached. Low bioavailability is most common with oral dosage forms of poorly water-soluble, slowly absorbed drugs. Intravenously (IV) administered medications are

TABLE 1 Face, Legs, Activity, Cry, and Consolability Scale

FLACC Scale	0	1	2
1 Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant frown, clenched jaw, quivering chin
2 Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
3 Activity	Lying quietly , normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid or jerking
4 Cry	No crying (awake or asleep)	Moans or whimpers; occasional compliant	Crying steadily, screams or sobs, frequent complaints
5 Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to, distractible	Difficult to console or comfort

100% bioavailable. Referring to bioavailability allows for extrapolation of oral to IV equivalency conversion. For example, first pass metabolism decreases the bioavailability of morphine to 30% therefore oral morphine must be three times the intravenous or intramuscular dose for equivalent analgesic relief. Oral administration is always preferred due to ease of administration and cost effectiveness. The choice of alternative routes of administration when the oral route is not medically appropriate should be based on clinical judgement, availability and feasibility. The intramuscular (IM) route of administration is to be avoided in children unless emergent due to decreased muscle mass, reduced overall muscular perfusion, and decreased contractility resulting in slower rates of IM drug absorption and lower peak concentrations (Ku et. al, 2014).

FIGURE 1 Wong-Baker FACES® Pain Rating Scale

Score 1-3: Mild Pain | Score 4-6: Moderate Pain
Score 7-10: Severe Pain

Acetaminophen is the most commonly used analgesic agent in pediatric practice. It inhibits the synthesis of prostaglandins in the central nervous system (CNS) and works peripherally to block pain impulse generation. The pharmacokinetic considerations are the duration of action of IV/oral (4-6) hours, the half-life (longer in neonates), and the time to peak: oral is 10-60 minutes while in IV is 15 minutes. The effectiveness of IV acetaminophen has not been studied in patients less than 2 years of age and should be used cautiously for the minimum amount of time necessary. Acetaminophen IV has only been evaluated in a perioperative setting and has not shown clinical superiority to the oral or rectal route. However, adult studies found IV acetaminophen decreases opioid use (Haddadi et. al, 2013). The increased cost of IV acetaminophen may outweigh any benefit it offers, but the subject is controversial. Common side effects consist of nausea, vomiting, headache and hepatotoxicity with chronic use or overdose.

Nonsteroidal analgesics, such as ibuprofen and ketorolac have antipyretic, analgesic and anti-inflammatory properties by reversibly inhibiting COX-1 and 2 enzymes resulting in decreased formation of prostaglandin precursor. The pharmacokinetic considerations for oral ibuprofen are the duration of action is 6-8 hours and the time to peak is 1-2 hours. Ibuprofen is contraindicated in patients less than 6 months of age due to increased risk of side effects particularly necrotizing enterocolitis, renal toxicity and gastric bleeds. Safety and effectiveness of the IV formulation is not established in pediatric patients. Oral ketorolac is not approved in children under 16 years old or those under 50 kg.

Table 2. Pharmacokinetic Considerations of Opioids

Drug	Pharmacokinetic Considerations	Pearls
Oxycodone	• Duration of action: 4-5 hours IR, 12 hours ER • Half-life: Shorter in children	• No recommended in infants < 6 months • Renal adjustment needed
Morphine	• Duration of action: Oral, IV: 3-5 hours • Half-life: longer in neonates • Time to peak: Oral: 1 hour, IV: 20 minutes	• Neonates have decreased elimination, increased CNS sensitivity and therefore more adverse effects • Oral to IV conversion: Start with a ratio of 6:1 for a single or intermittent; use a ratio of 3:1 for chronic dosing • Rapid IV administration increase adverse effects due to histamine release • Renal adjustment needed • Administration: IV push: 4-5 minutes; intermittent: 15-30 mins
Fentanyl	• Duration of action: IV: 0.5-1 hour • Half-life: Shorter in neonates • Time to peak: 1-2 minutes	• Drug of choice in extreme premature neonates • Tachyphylaxis occurs so may not be good for long term continuous infusions • Chest wall rigidity is more common in pediatrics than adults • Renal adjustment needed • Administration: SLOW IV push3-5 mins; > 5 mcg/kg: 5-10 mins to avoid chest wall rigidity
Hydromorphone	• Duration of action: Oral, IV 3-4 hours • Time to peak: Oral <1 hour; IV 10-20 minutes	• High Alert Medication • Extremely potent opioid • Do not recommend for use in neonates unless under the guidance of a pharmacist • Infusions should be titrated no greater than 20% of the current rate (can be as small of an increment as 0.0006 mg/kg/hr) • Oral to IV conversion: Start with ratio of 5:1, ratios of 2:1 may be needed in patient with long term chronic therapy • Renal/Hepatic adjustment needed • Administration: IV 2-3 mins
Methadone	• Duration of action: Oral: 6-8h, after repeated administrations 22-48h • Half-life: Shorter in children • Time to peak: Oral: 1-2 hours	• Side effect: QTc prolongation • Long half life • Not used on an as needed basis • Dosing interval may range from 4-12 hours for initial therapy but decrease in dose and frequency may be required in 2-5 days when steady state is reached • Renal adjustment needed • If using for opioid withdrawal/detoxification only certain approved doctors can prescribe

The pharmacokinetic considerations for IV ketorolac are the duration of action is 4-6 hours, half-life is faster in neonates and the time to peak is 1-3 minutes. Ketorolac IV should be avoided in neonates postmenstrual age (gestational age + postnatal age) less than 44 weeks, children with serum Creatinine less than 1 mg/dL, renal anomalies or patients predisposed to bleeding. Ketorolac should be limited to 5 days due to potential of gastrointestinal ulcers and nephrotoxicity. Common side effects consist of rash, heartburn, nausea, vomiting, dizziness and headache. Use of ketorolac should be cautioned in patients awaiting surgery and those with renal anomalies or bleeding abnormalities.

Opioids as a class bind to opiate receptors in the CNS causing inhibition of ascending pain pathways and alter the perception of and response to pain. Pharmacokinetics and clinical pearls for each opioid are listed below in Table 2. Opioids have no upper dosage limit. Large opioid doses given at frequent intervals may be necessary to control pain. An alternative opioid (an opioid rotation) should be tried if patients experience undesirable side-effects or not achieving treatment goal. Other pain regimens for atypical pain or resilient pain are highlighted in Table 3.

Common side effects of opioids consist of constipation, drowsiness, dizziness and respiratory depression. Constipation should be anticipated and stimulant laxatives such as senna should be prescribed to increase delayed peristalsis caused by opioids. Docusate or polyethylene glycol (PEG) is often utilized in conjunction with the stimulant laxative. Docusate reduces the surface tension of the oil and water interface of the stool resulting in an enhanced incorporation of water and fat allowing the stool to soften. PEG creates osmotic-water retention therefore increasing stool frequency. For refractory constipation, subcutaneous methylnaltrexone, a derivative of naltrexone with restricted ability to cross the brain-brain barrier, can be utilized. Methylnaltrexone works as a peripheral acting opioid antagonist reversing opioid induced decreased GI motility and gastric transit time without significant effects on pain scores (Tabbers et. al, 2014).

Table 3. Treatment Options for Various Types of Pain

PAIN	TREATMENT OPTIONS
Procedural/Post Op	Local anesthetics Acetaminophen NSAIDS (if not contraindicated) Opioids Dexmedetomidine/Clonidine If Refractory: Ketamine
Trauma	Local anesthetics Acetaminophen NSAIDS (if not contraindicated) Opioids Dexmedetomidine/Clonidine
Sickle Cell	NSAIDS Opioids
Headache	NSAIDS Metoclopramide If Refractory: Valproic Acid Methylprednisolone Ranitidine
Neuropathic	Gabapentin Opioids If Refractory: Trazodone Amitriptyline
Muscle Spasms	Diazepam Baclofen Cyclobenzaprine

One concern with a specific opiate is the reports of children who developed serious adverse effects including death after taking codeine for pain relief after tonsillectomy and/or adenoidectomy (Kuehn 2011). The deceased children received doses of codeine that were within the typical dose range. Codeine is converted to morphine in the liver by an enzyme cytochrome P450 2D6. Children have an inherited genetic ability to convert codeine into life-threatening or fatal amounts of morphine in the body. DNA variations in some children make this enzyme more active, causing codeine to be converted to morphine faster. High levels of morphine can result in breathing difficulty. An estimated number of "ultra-rapid metabolizers" is generally 1 to 7 per 100 people. Therefore, administration of codeine should be avoided with children less than 18 years of age.

Sedation allows for the depression of patients' awareness of the environment, reduces patient's response to external stimulation, facilitates endotracheal tube tolerance and eases ventilator synchronization. Sedation reduces anxiety and agitation that occurs in 71% of patients in a medical-surgical ICU (Jr, 2001). Adversely, sedatives have side effects, such as respiratory depression that could lead to a prolonged hospital stay and/or prolonged mechanical ventilation. Increased exposure to sedation and pain medications prolong the amount of time it takes to wean patients, which can delay discharge from the hospital. Nurses are key to ensuring sedation is therapeutic.

The State Behavioral Scale (SBS) is a reliable tool that standardizes the description of a pediatric patient's behavioral state while supported on mechanical ventilation (Table 4) (Curley et. al, 2006). The SBS tool enhances systematic assessment and documentation of a patient's response to sedation and allows patient-specific alterations in the therapeutic regimen therefore, avoiding inadequate or excessive sedative use. It is recommended that SBS scores are obtained every 4 hours (or as per physician order) while intubated and on continuous sedatives, with a goal score of -1 or -2. As the patient approaches extubation the goal will shift to 0. The RN should titrate the infusion to obtain goal SBS scores.

To perform the SBS assessment, the nurse will observe the patient undisturbed for 1 minute. Then the nurse will provide progressive stimuli, as necessary, to elicit a patient's response. Specifically, the RN should first speak the patient's name using a calm voice, then, if there is no response, speak the patient's name and gently touch the patient's body. If there is still no response, a planned noxious stimulus should be assessed such as endotracheal suctioning or less than 5 seconds of nail bed pressure. Finally, the

patient should be repositioned, and then consoled by the nurse and/or parent. After 2 minutes of consoling, the RN should complete the state behavioral assessment (Curley et. al, 2006).

Benzodiazepines are the mainstay of sedation management providing sedation, hypnosis, anxiolysis, muscle relaxation, anticonvulsant activity and anterograde amnesia; but no analgesic benefits are provided. Benzodiazepines bind to the benzodiazepine receptors on the postsynaptic GABA neuron at sites within the CNS. Common side effects are hypotension, over sedation, nausea, vomiting, nystagmus, apnea, hiccups, paradoxical reaction and dependence. Pharmacokinetics and clinical pearls for each benzodiazepine are in Table 5. Another agent commonly used for its sedative and analgesic properties is dexmedetomidine. With the selective alpha 2 adrenoceptor agonist properties, dexmedetomidine decreases sympathetic tone and reduces anesthetic and opioid requirements. Side effects consist of mild to moderate cardiovascular depression, with slight decreases in blood pressure and heart rate. This agent should be weaned to avoid rebound hypertension. Dexmedetomidine can be transitioned to clonidine, which has the same mechanism of action, when approaching weaning and extubation.

Physical signs & symptoms can manifest when opioid or benzodiazepine administration is abruptly discontinued and usually appears up to 2-3 days after decreasing/stopping medications. Symptoms mimic many clinical conditions and are a diagnosis of exclusion. The Withdrawal Assessment Tool - Version 1 (WAT-1) is used for monitoring opioid and benzodiazepine withdrawal symptoms in pediatric patients (Table 6). Recommendations include performing this assessment every 4 hours with pain and vital assessments. The WAT-1 shows excellent preliminary psychometric performance when used to assess clinically important withdrawal symptoms in the PICU setting (Franck et. al, 2008). A goal score less than or equal to 3 indicates no concerns for withdraw while a score greater than 3 indicates concerns for withdraw and a rescue dose should be administered. The RN should administer a PRN benzodiazepine dose equivalent to 50-100% of the current standing dose (PO or IV). Benzodiazepines can treat the symptoms of both opioid and benzodiazepine withdrawal, hence, the recommendation is to start with a benzodiazepine PRN when withdrawal is suspected. If the patient remains agitated one hour after the rescue dose of benzodiazepine, it is recommended to administer a rescue dose of opioid equivalent to 50-100% of the current PO or IV dosage. If more than more than 3 rescue doses are required in a 24-hour period the weaning plan must be modified to better fit the patient.

Weaning is practitioner specific and may vary as there is limited literature available with specific weaning plans. For example, pediatric patients at high risk for withdraw include those with seizure disorder, hemodynamically significant congenital heart disease, pulmonary hypertension, prior history of weaning difficulty or complications from withdrawal. Children will require a weaning plan if they have received 5 days of continuous infusions of opioids/benzodiazepines or dexmedetomidine and are low risk or if they have received 3 days of continuous opioid and are high risk. The time of wean should be greater than or equal to half the duration of sedation. Calculate 10-20% of the max opioid doses (Day 0) and use this as the increment for stepwise dose weaning. Once the patient reaches the lowest starting

Table 4. State Behavioral Scale

-3	Unresponsive	• No spontaneous respiratory effort • No cough or coughs only with suctioning • No response to noxious stimuli • Unable to pay attention to care provider • Does not distress with any procedure (including noxious) • Does not move
-2	Response to noxious stimuli	• Spontaneous yet supported breathing • Coughs with suctioning/repositioning • Responds to noxious stimuli • Unable to pay attention to care provider • Will distress with a noxious procedure • Does not move/occasional movements of extremities or shifting of position
-1	Responsive to gentle touch	• Spontaneous but ineffective nonsupported breathes • Coughs with suctioning/repositioning • Responds to touch/voice • Able to pay attention but drifts off after stimulation • Distresses with procedures • Able to calm with comforting touch or voice when stimulus removed
0	Awake and able to calm	• Spontaneous and effective breathing • Coughs when repositioned/Occasional spontaneous cough • Responds to voice/No external stimulus is required to elicit response • Spontaneously pays attention to care provider • Distresses with procedures • Able to calm with comforting touch or voice when stimulus removed • Occasional movement of extremities or shifting of position/increased movement (restless, squirming)
+1	Restless and difficult to calm	• Spontaneous effective breathing/Having difficulty breathing with ventilator • Occasional spontaneous cough • Responds to voice/No external stimulus is required to elicit response • Drifts off/Spontaneously pays attention to care provider • Intermittently unsafe • Does not consistently calm despite 5 minute attempt/unable to console • Increased movement (restless, squirming)
+2	Agitated	• May have difficulty breathing with ventilator • Coughing spontaneously • No external stimulus required to elicit response • Spontaneously pays attention to care provider • Unsafe (biting ETT, pulling at lines, cannot be left alone) • Unable to console • Increased movement (restless, squirming or thrashing side-to-side, kicking legs)

dose, schedule the medication frequency in a daily stepwise fashion until off (i.e. q4h → q6h → q8h → q12h → OFF). However, dexmedetomidine does not require the same conservative wean and can be weaned over 2-3 days.

Pain and sedation management are multifactorial and patient dependent and should be a number one priority in patient care. The philosophy of the Children's Regional Hospital at Cooper University Hospital is all pediatric patients have a right to pain relief and sedation. This philosophy supports patient and parent satisfaction. The Children's Regional Hospital at Cooper University Hospital is working toward a nurse driven pain and sedation protocol in which the RN can titrate the medications in approved increments to provide the desired therapeutic effect (SBS and pain level goals).

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References

Baudendistel, Thomas E., Stephen Schmaltz P., Scott Williams C., Mark Chassin R., Jerod Loeb M., and Robert Wachter M. "Hospital Performance Trends on National Quality Measures and the Association with Joint Commission Accreditation." *J. Hosp. Med. Journal of Hospital Medicine* 6.8 (2011

Curley MQ, Wypij D, Watson R, et al. Protocolized Sedation vs Usual Care in Pediatric Patients Mechanically Ventilated for Acute Respiratory Failure: A Randomized Clinical Trial. *JAMA*. 2015;313(4):379-389.

Curley, M. A., Harris, S. K., & Fraser, K. (2006). State Behavioral Scale (Sbs) A Sedation Assessment Instrument For Infants And Young Children Supported On Mechanical Ventilation. *Pediatric Critical Care Medicine*, 7(2), 195.

Czarnecki, M. L., Salamon, K. S., Thompson, J. J., & Hainsworth, K. R. (2014). Do Barriers to Pediatric Pain Management as Perceived by Nurses Change over Time? *Pain Management Nursing*, 15(1), 292-305

Franck, L. S., Harris, S. K., Soetenga, D. J., Amling, J. K., & Curley, M. A. (2008). The Withdrawal Assessment Tool–1 (WAT–1): An assessment instrument for monitoring opioid and benzodiazepine withdrawal symptoms in pediatric patients*. *Pediatric Critical Care Medicine*, 9(6), 573-580.

Haddadi, S., Marzban, S., Karami, M. S., Heidarzadeh, A., Parvizi, A., & Nabi, B. N. (2013). Comparing the Duration of the Analgesic Effects of Intravenous and Rectal Acetaminophen Following Tonsillectomy in Children. *Anesthesiology and Pain Medicine Anesth Pain Med, 3*(3).

Johnson, P. N., Miller, J. L., & Hagemann, T. M. (2012). Sedation and Analgesia in Critically Ill Children. *AACN Advanced Critical Care, 23*(4), 415-434.

Jr., S. A. (2001). Use of Sedative Medications in the Intensive Care Unit. *Seminars in Respiratory and Critical Care Medicine, 22*(02), 165-174.

Ku, Lawrence C., and P. Smith Brian. "Dosing in Neonates: Special Considerations in Physiology and Trial Design." *Pediatr Res Pediatric Research* 77.1-1 (2014): 2-9

Kuehn, B. M. (2013). FDA: No Codeine After Tonsillectomy for Children. *Jama,309*(11), 1100. Analgesics for the Treatment of Pain in Children. (2002). *New England Journal of Medicine N Engl J Med, 347*(19), 1542-1542.

Srouji, R., Ratnapalan, S., & Schneeweiss, S. (2010). Pain in Children: Assessment and Nonpharmacological Management. *International Journal of Pediatrics, 2010*, 1-11.

Tabbers, M., Dilorenzo, C., Berger, M., Faure, C., Langendam, M., Nurko, S.,… Benninga, M. (2014). Evaluation and Treatment of Functional Constipation in Infants and Children. *Journal of Pediatric Gastroenterology and Nutrition, 58*(2), 265-281.

WHO guidelines on the pharmacological treatment of persisting pain in children with medical illnesses. (2012). Geneva, Switzerland: World Health Organization.

Table 5. Pharmacokinetic Considerations of Benzodiazepines

Drug	Pharmacokinetic Considerations	Pearls
Midazolam	Onset of action: Oral: 10-20 mins IV: 1-5 mins Intranasal: 5 mins Duration: IV: 20-30 mins Intranasal: 30-60 mins Half Life: Neonates: 6.5-12 hrs Children: 2.2-6.8 hrs	• Oral to IV conversion: 3:1 • Intranasal administration nasal atomizer needed using IV 5 mg/ml formulation • Renal adjustment needed • Administration: 2-5 mins • No rapid IV injection in neonates severe hypotension and seizures have been reported
Lorazepam	Onset of action: IV: within 10 mins Duration: IV/oral: 8 hrs Half Life: Neonates: 15.8-17.8 hrs Time to peak: Oral: 2 hours	• Oral: IV 1:1 • Renal adjustment needed • Contains polyethene glycol that can accumulate > 48 hours of continuous infusion resulting in: acute renal toxicity, lactic acidosis and an osmol gap • Administration: Diluent with equal volume of diluent: infuse each 0.1 mg/kg over 1-2 mins to a max of 2 mg/min
Diazepam	Onset of action: IV: 4-5 mins Duration: IV/oral: 60 to 120 mins Half Life: IV: 33-45 hours Oral: 44-48 hours Time to peak: IV: 1 min: Oral: 1-1.5 hours	• Used for muscle spasms • Oral: IV 1:1. Oral longer acting and dosed less frequently • Administration: Do not exceed 1-2 mg/min • Continuous infusion NOT recommended because of precipitation and adsorption of drug into bag and tubing
Dexmedetomidine/ Clonidine	Dexmedetomidine Onset of action: IV: 5-10 mins Duration: IV/oral: 60 to 120 mins Half Life: IV: 3 hours Clonidine Onset of action: IV: 0.5-1 hour Duration: IV/oral: 6-10 hours Bioavailability: 70-80% Half Life: IV: 8-12 hours	• Dexmedetomidine – Not studied longer than 72 hrs. – Rapid IV boluses can cause vasoconstriction and hypertension – Hepatic adjustment necessary • Clonidine – Indicated in ADHD as well – Analgesia via the patch may not begin for 2-3 days after application – Renal adjustment necessary

Table 6. The Withdrawal Assessment Tool–1 (WAT–1)

Any loose /watery stools	No = 0 Yes = 1
Any vomiting/wretching/gagging	No = 0 Yes = 1
Temperature > 37.8°C	No = 0 Yes = 1
2 minute pre-stimulus observation	
State	SBS1≤ 0 or asleep/awake/calm = 0 SBS1≥ +1 or awake/distressed = 1
Tremor	None/mild = 0Moderate/severe = 1
Any sweating	No = 0 Yes = 1
Uncoordinated/repetitive movement	None/mild = 0 Moderate/severe = 1
Yawning or sneezing	None or 1 = 0 ≥2 = 1
1 minute stimulus observation	
Startle to touch	None/mild = 0 Moderate/severe = 1
Muscle tone	Normal = 0 Increased = 1
Post-stimulus recovery	
Time to gain calm state (SBS1≤ 0)	< 2min = 0 2 - 5min = 1 > 5 min = 2
Total Score (0-12)	

Post-Traumatic Stress Disorder

Sally French, APN, BC

Since the beginning of time, people's lives have been changed by un-foreseen traumatic experiences, altering their biological stress response and how they react to and live in life. Post-Traumatic Stress Disorder (PTSD) is defined as "a person that has been exposed to a catastrophic event, involving actual or threatened death or serious injury, sexual violation or a threat to the physical integrity of him or others" (DSM-5, 2016). The exposure must result from one or more of the following triggers:

1. directly experiences the traumatic event
2. witnesses the traumatic event in person
3. learns that the traumatic event occurred to a close family member or close friend (with the actual or threatened death being either violent or accidental)
4. experiences first-hand repeated or extreme exposure to aversive details of the traumatic event (not through media, pictures, television or movies unless work-related)

PTSD diagnosis is appropriate when the distressing symptoms arise secondarily to a horrific external experience and fails to resolve after 1 month. The intense stress response causes a myriad of changes in hormones, endocrine and autonomic nervous systems where the internal stress responses react to the external insult. These systems are designed to modulate biological responses associated with the unexpected experience and re-set them to pre-event levels. However, when the residue of the trauma has overwhelmed the system, it sets up a non-normative script, which lies outside the normal processing schema. This is referred to as a dissociative experience and is instead mapped as visceral sensations (anxiety or panic) and visual images (nightmares or flashbacks). This re-wiring now governs the traumatized individual's life by superimposing itself on the old wiring by changing the neuronal makeup, known as bimodal processing. A person will now have a non-normative script super imposed over the normative process causing symptoms of hyper-reactivity, arousal with traumatic re-experiencing, psychic numbing, avoidance, amnesia and anhedonia. Additional signs of PTSD include hyperarousal of the sympathetic nervous system, heightened acoustic and startle reflex, increase in eye blink reflex, memory distortion and sleep abnormalities.

The footprint of trauma does not reside in the conscious, verbal, literate part of the brain, but in much deeper unconscious regions, which are only marginally affected by thinking, speaking and intellectualizing. With trauma, there is an increase in the amygdala's response and a reduction in size and activation of the hippocampus and cortex. Additionally, the hypothalamus and brain stem are physically and chemically altered, impacting the ability for the system to accurately interpret and respond to stress. Concurrent reaction by the body's neuro-adrenergic, hypothalamic-pituitary-adrenocortical, serotonergic, glutamatergic, thyroid, endogenous opioid and other systems are rallied to rapidly respond and ensure that there is enough energy to deal with the apparent stressor. There is evidence that this alteration in the brains structure and function is why there are challenges in the treatment process.

Figure 1. Criteria within each cluster as defined by DSM-5:

- **"A"** stressor criterion specifies that a person has been exposed to a catastrophic event involving actual or threatened death or injury, or a threat to the physical integrity of him/herself or others (such as sexual violence). Indirect exposure includes learning about the violent or accidental death or perpetration of sexual violence to a loved one.
- **"B"** intrusive recollection criterion the traumatic event remains, sometimes for decades or a lifetime, a dominating psychological experience that retains its power to evoke panic, terror, dread, grief, or despair. These emotions manifest during intrusive daytime images of the event, traumatic nightmares, and vivid reenactments known as PTSD flashbacks (which are dissociative episodes). Furthermore, trauma-related stimuli that trigger recollections of the original event have the power to evoke mental images, emotional responses, and physiological reactions associated with the trauma.
- **"C"** avoidance criterion consists of behavioral strategies PTSD patients use in an attempt to reduce the likelihood that they will expose themselves to trauma-related stimuli. Behavioral strategies include avoiding any thought or situation which is likely to elicit distressing traumatic memories. In its extreme manifestation, avoidance behavior may superficially resemble agoraphobia because the PTSD individual is afraid to leave the house for fear of confronting reminders of the traumatic event(s).
- **"D"** negative cognitions and mood criterion reflect persistent alterations in beliefs or mood that have developed after exposure to the traumatic event. People with PTSD often have erroneous cognitions about the causes or consequences of the traumatic event which leads them to blame themselves or others. A related erroneous appraisal is the common belief that one is inadequate, weak, or permanently changed for the worse since exposure to the traumatic event or that one's expectations about the future have been permanently altered because of the event (e.g., "nothing good can happen to me," "nobody can be trusted," "the world is entirely dangerous," "people will always try to control me"). In addition to negative appraisals about past, present and future, people with PTSD have a wide variety of negative emotional states such as anger, guilt, or shame. Dissociative psychogenic amnesia is included in this symptom cluster and involves cutting off the conscious experience of trauma-based memories and feelings. Other symptoms include diminished interest in significant activities and feeling detached or estranged from others. Finally, although individuals with PTSD suffer from persistent negative emotions, they are unable to experience positive feelings such as love, pleasure or enjoyment. Such constricted affect makes it extremely difficult to sustain a close marital or otherwise meaningful interpersonal relationship.
- **"E"** alterations in arousal or reactivity criterion most closely resemble those seen in panic and generalized anxiety disorders. While symptoms such as insomnia and cognitive impairment are generic anxiety symptoms, hypervigilance and startle are more characteristic of PTSD. The hypervigilance in PTSD may sometimes become so intense as to appear like frank paranoia. The startle response has a unique neurobiological substrate and may actually be the most pathognomonic PTSD symptom. DSM-IV's Criterion D2, irritability or outbursts of anger, has been separated into emotional (e.g., D4) and behavioral (e.g., E1) components in DSM-5. Irritable and angry outbursts may sometimes be expressed as aggressive behavior. Finally reckless and self-destructive behavior such as impulsive acts, unsafe sex, reckless driving and suicidal behavior are newly included in DSM-5.
- **"F"** duration criterion specifies that symptoms must persist for at least one month before PTSD may be diagnosed.
- **"G"** functional significance criterion specifies that the survivor must experience significant social, occupational, or other distress as a result of these symptoms.
- **"H"** or exclusion criterion specifies that the symptoms are not due to medication, substance use, or other illness.

NOTE: DSM-5 requires that all of these symptoms must have had their onset or been significantly exacerbated after exposure to the traumatic event.

Today, the American Psychiatric Association in their 5th Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) has removed PTSD from the umbrella of Anxiety Disorders and reclassified it as a Trauma and Stressor-Related Disorders. This change was based on the number of clinical presentations found within PTSD (See Figure 1). Additionally, there are two new subtypes have been included in the DSM-5:

1. Dissociative Subtype includes individuals who meet full PTSD criteria but also exhibit either depersonalization or derealization (e.g. alterations in the experience of one's self and the world, respectively).
2. Preschool Subtype applies to children six years old and younger; it has fewer symptoms; especially in the "D" cluster because it is difficult for young children to report on their inner thoughts and feelings and also has lower symptom thresholds to meet full PTSD criteria.

Many co-morbid conditions such as major affective disorders, dysthymia, alcohol or substance abuse disorders, anxiety disorders or personality disorders commonly generate one or more additional diagnoses with those individuals carrying a diagnosis of PTSD. The disturbance, regardless of its trigger, must cause clinically significant distress or impairment in the individual's social interactions, capacity to work, or other important areas of functioning. These impairments cannot be in the context of other medical problems or substance abuse.

It is important to understand the intensity of a symptom, where it resides, and what therapeutic approach would be most effective before selecting the intervention. For example, if trauma is housed in these subcortical areas, then to provide effective therapy, practioners need to do things that change the way people regulate these core functions rather than employ talk therapy. As a result, it is important to understand what areas of the brain are involved and how to access them when selecting a therapy or treatment plan.

From a treatment perspective, the brain stem is at the core of involuntary responses, therefore use of talk therapy will not be helpful. As safety and trust is paramount, the clinician needs to address this first. As a result, basic involuntary acts, like fear, controlled arousal, heart rate, sleep, breathing, elimination and self-compassion requires focused attention.

The Limbic system develops from birth to age 6 and controls right brain development including affect regulation, interpersonal skills and development of self. When trauma occurs there is a shift to the right brain function, inclusive of the amygdala and anterior temporal lobe. Concurrently, the dorsal lateral prefrontal cortex goes offline. This is where working memory and integration of past, present and future occur causing a person to feel stuck within the trauma schema.

The insula is active in the development of self and acts as a junction between lower and higher level functions. Talk therapy can help here, as seen in prolonged exposure, with repetitive accounts of the details of the experience in present time, inclusive of all sensory information.

In the past, "talk therapy" was used. However, the current standard of care for the treatment of PTSD is the following:

Prolonged exposure: This is a protocol driven process where the patient systematically recounts the traumatic event in the present tense using imaginal, in vivo, written, verbal and taped modalities to process the trauma. The premise is that the client activates the feelings associated with the trauma and the therapist acts in a supported role. The patient learns to tolerate the anxiety (desensitization) and gain control of the reaction in increments over time.

Virtual reality: Virtual reality is the use of 3-D 360 degree immersive environment (headset, ear phones, smell, and tactile) in which the therapist programs an environment similar to the trauma experience which then evokes the response. The therapist guides the patient through the same protocol as prolonged exposure. This assists the patient in confronting and tolerating the traumatic memory. As with prolonged exposure, there is a specific protocol that incorporates the sequence of events. Virtual reality is an especially helpful modality for those individuals who believe that therapy is a weakness. The use of the "gaming" equipment makes this a good modality for the returning soldiers.

Cognitive processing therapy (CPT): CPT is an evidenced-based manualized treatment protocol that focuses on how the traumatic event is construed and coped with while trying to regain a sense of mastery and control.

Somatic therapies: Types of somatic therapies are useful in conjunction with talk therapy with or without medication include Reiki, massage, exercise and meditation. The following somatic therapies are frequently used:

Eye Movement Desensitization and Reprocessing (EMDR): This type of somatic therapy integrates elements of other affective therapy such as cognitive behavioral experiential body centered therapies. It is done in a very structured manner using a protocol that has 8 phases. Their focus is directed on the past and the present experiences internally while externally focusing on an object or stimuli.

Thought field therapy: Thought field therapy uses specific protocols where sequential tapping patterns are utilized to relieve somatic anxieties and help consolidate the memories.

Additionally, current and cutting edge research is being performed using mindfulness with ketamine. Dr Basant Prahdan, a psychiatrist and researcher at Cooper University Hospital is the architect of the Trauma Interventions using Mindfulness Based Extinction and Reconsolidation (TIMBER©) protocol. The methodology of TIMBER integrates principles of mindfulness based graded exposure therapy with neurobiological understanding of trauma memories including the interplay between the memory extinction and memory reconsolidation mechanisms that lead to formation and maintenance of the trauma memories in a dynamic way. TIMBER uses combined extinction and reconsolidation approaches, whereby reappraisal and modification of the trauma experiences are done via cognitive-emotive restructuring.

PTSD affects 50-60 % of the population. Because of the enormity of this disabling emotional problem, the treatment of PTSD continues to be researched and refined by thought leaders. The need for direct treatment in a multi-modal manner will and does require a combination of modalities.

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References:

American Psychiatric Association (2013) Diagnostic and Statistical Manual of Mental Disorders, 5th Ed.

Insulin: History and Current Standards of Care

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The number of Americans with diagnosed diabetes has increased fourfold between 1980 through 2014 exploding from 5.5 million to 22.0 million. Increasingly more patients will require assistance managing their diabetes in the coming years and nurses need a broader understanding of the medications used to maintain glycemic control (CDC, 2015). This offering will provide you with a brief history of insulin from discovery through recombinant DNA technology; current practice based on American Diabetic Association (ADA) guidelines; as well as a brief overview of the different insulins available.

How would you manage the following situations? Are you able to make the appropriate decisions to maintain the safety of your patient?

Scenario A: Your patient is scheduled to receive 15 units of aspart insulin with their AM meal. You have checked their morning fasting blood sugar and it is 83 mg/dL, and now you are making sure your patient is going to eat the breakfast tray they just received and administer the aspart. Five minutes after the insulin has been administered and the patient is just starting to take their first mouthful of food, a physician orders the patient to be NPO for an upper GI series later in the day. The patient tells you they are concerned with becoming hypoglycemic.

1) When do you have your biggest concern for the patient to become hypoglycemic?
2) How will you manage the patient if their blood sugar falls below 70 mg/dL?
3) How long do you need to monitor your patient's blood sugars?

Scenario B: A patient recently discharged from the hospital calls the nursing station with a question about their lispro insulin. They would like to know if it is okay to use their insulin, even though it is slightly cloudy. They report that they just opened the bottle 2 days before coming to the hospital, which was 8 days ago.

1) Will you tell the patient it is acceptable to administer the lispro?

Scenario C: Your patient has a serum blood sugar of 398 mg/dL. You call the medical resident to report this finding and obtain orders on how to manage the blood sugar. The resident gives you a verbal order to administer 22 units of NPH insulin intravenously, followed by 10 units of Regular insulin intravenously, and then check a finger stick in 1 hour.

1) Do you have concerns with this order?
2) Are the doses of insulin correct?
3) How will you address your concerns, if any?
4) What important facts support your decision?

History

Insulin, a mainstay of diabetes mellitus management, will celebrate its one hundredth birthday in 2021. Over these nearly one hundred years it has gone through a number of transformations to become what we now know as insulin in its different variations.

In 1869, the German medical student Paul Langerhans, first described the islets in the pancreas, but could not suggest their function (Laguesse, 1896). Then, as early as 1890, experiments done by Mering and Minkowski demonstrated the importance of the

pancreas in carbohydrate metabolism when dogs, who had their pancreas' removed, developed the symptoms of hyperglycemia, glycosuria and death from ketosis and coma within 2-3 weeks (Von Mering, Minkowski 1890). In 1900, Eugene Opie through his work revealed that the pancreatic islets were the probable source of an internal substance necessary for normal sugar metabolism (Opie, 1900). In 1905, Starling devised the term "hormone" from the Greek hormaein, meaning to set in motion. Then the term "insuline" was suggested by Jean de Meyer as a name for the still hypothetical substance (de Mayer, 1909). Finally on January 19, 1922, James Collip, a biochemist working with pancreatic extracts produced by Banting and Best, developed a process to produce a purer form of insulin suitable for testing in humans (Bliss, 1982). This led to the first successful clinical trial on a 14-year old diabetic patient that reduced the blood sugar from 520 down to 120 by the next day. It was also noted that the patient's glycosuria decreased from 71 grams to 8.7 grams and acetone disappeared from the urine. Within the next few years, insulin was being mass produced using pork and beef pancreases as the base substance.

In 1978, Genentech, Incorporated and City of Hope National Medical Center announced successful production of human insulin using recombinant DNA technology. The process to produce these insulin analogs was accomplished by using a method similar to the fermentation technique used for making antibiotics. Scientists inserted a synthetic code for human insulin, along with necessary control mechanisms, into a strain of E. coli bacteria found in the human intestine. The genes were "switched-on" to translate the code into "A" or "B" protein chains found in insulin once inside the bacteria. The A and B chains were then joined to complete the insulin molecule. The advantage to producing chemically identical insulin through recombinant technology helps to eliminate certain allergic reactions formally seen with animal derived insulins.

Insulin Therapy

Current insulin therapy is meant to mimic normal physiologic insulin secretion and release as closely as possible (ADA, 2015). Previously it was called intensive insulin therapy but is now referred as "multiple dose injection" (MDI) therapy and is considered the standard of care. MDI has provided clear evidence of providing better glycemic control, as well as reducing the incidence of diabetes-associated morbidities in comparison to traditional insulin therapy. Current recommendations are to use insulin analogs with MDI or an insulin pump. The basic premise of MDI is:

> The patient injects an intermediate/long-acting insulin subcutaneously once or twice daily to provide a basal level of insulin. They also use a short/rapid-acting insulin before or with each meal. Dosing is based on pre-prandial blood glucose readings, the amount of carbohydrates in the meal and physical activity levels (Nathan, Cleary, Backlund, et al., 2005).

Answers to Questions

SCENARIO A

1) When do you have your biggest concern for the patient to become hypoglycemic?

Aspart begins to work in 12 to 18 minutes from administration of dose with a peak effect in 1 to 3 hours. It has a duration of action of 3 to 5 hours and a half-life of 81 minutes.

2) How will you manage the patient if their blood sugar falls below 70 mg/dL?

Standardized hospital hypoglycemia protocols should be utilized when hypoglycemia is managed by use of glucose gel or measured intravenous doses of dextrose. Administration of intravenous dextrose is most appropriate since this patient is now NPO. *NOTE: Obtaining an order from the prescribing provider for an intravenous maintenance fluid containing Dextrose, such as D5 ½ NSS, when the patient becomes NPO could help prevent a hypoglycemic episode.*

3) How long do you need to monitor your patient's blood sugars?

Since the patient is NPO and the duration of action is 3 to 5 hours, the patient's blood sugars should be monitored for 3-5 hours if the patient remains NPO.

SCENARIO B

1) Will you tell the patient it is acceptable to administer the lispro?

The patient should be told to NOT USE the lispro. Lispro should be a colorless fluid. It should not be used if it is cloudy or viscous.

SCENARIO C

1) What are your concerns with this order?

2) Are the doses of insulin correct?

3) How will you address your concerns, if any?

4) What important facts support your decision?

There are multiple concerns with this order. The first is that NPH is for subcutaneous injection only; it is not to be administrated by intravenous route. NPH is also a longer acting insulin. Prior to administration of a longer acting insulin like NPH, more information than provided is needed such as diet restrictions, reason for medical admission, medications prior to admission and medical history. If the patient is not a known diabetic or the patient is in diabetic ketoacidosis, NPH administration is completely inappropriate. The NPH dose may be appropriate following initial treatment of the high blood sugar of 398 mg/dL if a pre-admission dose of NPH were missed. Additionally, these questions must be considered especially in the setting of a verbal order. The prescriber could have made a mistake in giving the order, the nurse could have also misunderstood the order, or they could have transcribed the order incorrectly. The prescriber should be called back with concerns about the NPH order and they should place an order in the medical record.

Administration of 10 units of Regular insulin is appropriate for the treatment of blood glucose of 398 mg/dL. However, whether this dose of regular insulin is administered intravenously or subcutaneously largely depends on the location of the patient within in the hospital. Hospital policy must allow for the administration of intravenous insulin in the patient's care location.

Rapid-Acting Insulin Analogs:

Three insulins are considered rapid acting: lispro, aspart and glulisine. These insulins offer prandial coverage that mimics endogenous secretion from the pancreas. This provides the benefit of being able to take the insulin immediately before or after a meal. They have an onset of approximately 5-15 minutes, peak around 1 hour, with duration of action between 4 and 5 hours. Due to the rapid action, there is a decreased risk of late post-prandial hypoglycemia. These insulins are clear solutions that should not be mixed with the long-acting insulins glargine or detemir (Nolte, 2009).

Short-Acting Insulin:

Regular insulin is a recombinant DNA produced insulin that is identical to human insulin. In comparison to the rapid-acting insulins, effects of regular insulins begin approximately 30 minutes after subcutaneous injection, peak at 2-3 hours, and can have lasting effects for 5 to 8 hours. Blood glucose levels rise faster than the insulin when regular insulin is administered at mealtime. This results in an early postprandial increase in blood sugar and a possible late postprandial hypoglycemia. Therefore, it is important that the insulin be injected 30-45 minutes prior to a meal. Regular insulin can also be administered intravenously with an onset within 10-30 minutes. This makes the insulin useful for treating Diabetes Ketoacidosis, or when insulin dose requirements change rapidly, such as after surgery or during an acute infection event (Nolte, 2009).

Intermediate-Acting Insulin:

NPH (neutral protamine Hagedorn) insulin has a delayed absorption and onset of action by combining with protamine, which must be removed enzymatically in order for the insulin to be absorbed. Therefore it has an approximate action onset of 2-5 hours and duration of action over 4-12 hours. The dose impacts the action, with lower doses having shorter durations of action, and larger doses having longer durations of action. This insulin is frequently mixed with lispro, aspart, glulisine or regular insulin and may be given 2-4 times per day. Providing a pre-mixed insulin combination allows for less frequent injections as compared to injecting the insulins separately. Because of its unpredictable action and variability of absorption, NPH is not being utilized with the arrival of the long-acting analog insulins.

Long-Acting Insulin:

There are currently two long-acting insulins available: glargine and detemir. These insulin analogs were developed to mimic the basal insulin activity of the pancreas. Insulin glargine has a slow onset of action, usually from 1 to 1.5 hours. It achieves its maximum effect within 4 to 6 hours after subcutaneous injection, and remains active from 11-24 hours. While usually given once daily, some patients who are insulin resistant may require twice a day dosing. Insulin glargine cannot be mixed with any other insulin because it is soluble in a lower pH (4). Patients must be instructed to administer two separate injections when taking a short-acting insulin simultaneously as glargine. Insulin detemir has a dose-dependent onset of action at 1-2 hours, and duration of more than 24 hours. It is given twice daily, and provides a smooth basal insulin level (Nolte 2009).

Email comments to **strayer-robert@cooperhealth.edu**

References:

American Diabetes Association. (2015). Approaches to glycemic treatment. [Supplement 1]. *Diabetes Care*, 38, S41-48.

Bliss, M. (1982). *The story of the discoverer of insulin*. Chicago, IL: University of Chicago Press, 84-103.

Centers for Disease Control and Prevention. National Diabetes Statistics Report, (2015). Estimates of diabetes and its burden in the United States. June 2, 2014. Retrieved from http://www.cdc.gov/diabetes/statistics/incidence/fig1.htm.

De Meyer, J. (1909). Action de la secretion interne du pancreas sur differents organs et en particulier sur la secretion renale. *Arch Fisiol*, 7, 96-9.

Genentech, Inc., & City of Hope National Medical Center. (1978). First successful laboratory production of human insulin announced. Retrieved from http://www.gene.com/media/press-releases/4160/1978-09-06/first-successful-laboratory-production-o.

Laguesse, E. (1896). Sur la formation des ilots de Langerhans dans le pancreas. Comptes rendus hebdomadaires des séances et memoires de la societe de biologies, 5, 819-820.

Nathan, D.M., Cleary, P.A. Backlund, J.y., Genuth, S.M., Lachin, J.M., et al. (2005). Intensive diabetes treatment and cardiovascular disease in patients with type 1 diabetes. *New England Journal of Medicine*, 353(25): 2643-2653.

Nolte, M.S. (2009). *Basic and clinical pharmacology*, 11th ed. In B. G. Katzung, S.B. Masters & A. J. Trevor (Eds.). McGraw-Hill.

Opie, E.L. (1900). The relation of diabetes mellitus to lesions of the pancreas. Hyaline degeneration of the islands of Langerhans. *Journal of Experimental Medicine*, 5, 527-540.

Von Mering & Minkowski, O. (1890) Diabetes mellitus nach Pankreasexstirpation. *Archiv fur experiementelle Pathologie und Pharmakologie*, 26, 371-387.

Cooper in the Community

Patients, family members and staff at the Pediatric Trauma "Celebration of Life" event. Children's Garden, September, 2016.

Cooper Digestive Health staff at the Mt. Laurel Fall Festival, Laurel Acres Park.

Guyana Reflection

Jeffrey Salvatore RN, BSN, PCCN

In my junior year of college at Misericordia University, following an application and interview process, I was selected for an international month long Service-Learning course to Guyana, South America. To give you a quick snapshot, Guyana is the third smallest country in South America and the third poorest country in Latin America and the Caribbean.

Upon arriving to Guyana, our first two days consisted of touring seven different work sites. Of those, we were to choose two, one site we would work Monday, Wednesday, Friday and the second we would work Tuesday and Thursday. Being a nursing student, the clear choice for my main job site was Mercy Hospital. The hospitals, as well as my college, were both founded by the Sisters of Mercy. The Sisters are a religious community of nuns founded by Catherine McAuley in Ireland. Their focus is to live out the four charisms of Mercy, Service, Justice, and Hospitality. My secondary job site was at St. John Bosco Orphanage (also a Mercy run institute), an all-boys orphanage with children ranging from 3-17 years.

This being my first job in healthcare, as well as my first time traveling outside of the United States, it is safe to say I was a little in shock. The hospital consisted of a four bed ER, a two bed ICU, one OR, and a male and female open floor plan ward. When I say open, I truly mean open. Each ward had an outside balcony equaling the same length of the ward, with no doors or windows acting as a barrier between the patients and the outside. Although it was nice for patients with the ability to be put in a wheelchair or ambulate outside, it allowed for insects and the elements to become a part of everyday obstacles that nurses had to manage.

One of the biggest obstacles in providing care to patients is the lack of supplies. Something as simple as the use of a pair of gloves, which we take for granted, has to be considered more carefully there due to their limited supplies. It is not an uncommon event to observe nurses bathing their patients, cleaning up bedpans and even performing simple dressing changes bare handed. The need for gloves is much more apparent when coming into contact with blood, due to the high rate of HIV infections in the country. Starting my job at Cooper after following that experience, learning to throw out all unused supplies from an isolation room and just seeing daily supplies wasted became a difficult reality for me to accept. However, this has made me much more conscious in my practice to decrease waste as much as possible.

Although patient privacy is a drive in health care these days, it remains nonexistent at Mercy Hospital; with curtains barely big enough to separate and cover patients from each other. Working in the OR was probably the most eye-opening experience as far as the reality of healthcare in a third world country. The anesthesiologist, who was raised, schooled and trained in Cuba spoke to me about everyday happenings and struggles of healthcare in a third world country. He began by telling me a story of when he was in training in the US. In the OR, the American Anesthesiologist opened 2 endotracheal tubes (ETT) identified that they were the incorrect size and nonchalantly threw them away. This led to the Mercy Hospital Anesthesiologist to remove them from the trashcan. When asked by the staff what he was doing, the Mercy Anesthesiologist stated he was going to take them back to work with him, explaining ETT are reused multiple times after being "sterilized" before being thrown out and these tubes are perfectly fine. At the shock of hearing this, the staff from the American hospital packed a suitcase full of ETTs for the Anesthesiologist to take back to Guyana with him.

Although my experience in the hospital was extremely educational and eye opening, the most rewarding experience was at St. John Bosco Orphanage. The orphanage has an on-campus primary school on the ground floor of the convent for the boys in Kindergarten-6th grade. I was assigned to teach the 3rd grade class consisting of four students. My days were spent working at the hospital or teaching. During the afternoon, I would return to the orphanage and play soccer with the youth. This experience led me to return for the last 4 years after my initial trip. Now when I go back, I stay full-time at the orphanage, with the majority of my time teaching in Bosco Primary Academy.

I have been sponsoring drives to raise donations over the past 5 years. Through these drives, we have been able to provide a watch, a pair of pajamas, a pair of shoes and a special occasion outfit for each boy. Proudly, I can say, four out of those five drives have been primarily funded by my coworkers on the PCU, Pavilion 9 and CCU/ICU. Last year I opened up the drive to the entire Cooper Community by advertising outside of the cafeteria and hopefully I can continue to do so annually.

Anytime you immerse yourself in a culture different from one you are familiar with or surround yourself by a group of people different from you, it helps you to grow. Through interacting in foreign places with strangers it gives one the chance to internalize their own thoughts, feelings and beliefs. Referencing the Nightingale pledge, "I will do all in my power to maintain and elevate the standard of my profession, and will hold in confidence all personal matters committed to my keeping and all family affairs coming to my knowledge in the practice of my calling." This experience has given me a chance to reflect and affirm my personal thoughts and beliefs on delivering care to those who may lead very different lives than me. I can spend more time delivering high quality patient centered care no matter who is lying in the bed and less time battling an internal confliction. By having a better sense of myself and where I stand, this in return has truly made a positive impact, not only in my career with patients, but with who I encounter in my personal life as well.

Email comments to **Salvatore-jeffrey@cooperhealth.edu**

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Professional News

DEGREES:

Melissa Trinidad, MSN, RN-BC, graduated with her Master's Degree from Immaculata University in May.

Brenda Wagner, BSN, RN, received her BSN.

Sadie Gonzalez, BSN, RN, received her BSN.

Charlene Orfe, BSN, RN, received her BSN from LaSalle University in August.

Joanne Moffitt, MSN, RN, received her MSN from Wilmington University in May.

Debra Cosenza MSN, RN, received her MSN from Wilmington University in May.

Lisa Passero, MSN, RN, received her MSN from Wilmington University in May.

Marcy Chojnacki, MSN, RN, received her MSN from Drexel University.

Chawla Manmohit, BSN, RN, received her BSN from Thomas Jefferson University.

Jaykumar Maradia, BSN, RN, received her BSN from University of Rochester in May.

Debra Cosenza, MSN, RN, received her MSN from Wilmington University in May.

Lisa Ferguson, BSN, RN, received her BSN from Excelsior College in May.

Jackie Bockarie, MSN, RN, received her MSN from Immaculata University.

Mary Jane Durkin, MSN, RN, received her MSN from Immaculata University.

Sue Breslin, MSN, RN, received her MSN from Immaculata University.

Nancy DeBerardinis, MSN, RN, received her MSN from Immaculata University.

Stephen Shulman, BSN, RN, received his BSN from Penn State University.

CERTIFICATIONS:

Elizabeth Blaker Kirby, BSN, RN, CMSRN, received her certification in Health and Hospital Law from Seton University School of Law in August.

Mary Volpe, BSN, RN, CCDS, received her certification in Clinical Documentation Specialist.

Helen Polimeni, RN, CNOR, received her CNOR certification in May.

Melissa Rosenberg, RN, CBC, received her certification as a Breastfeeding Counselor.

Donna Conrey, BSN, RN, CCRN, CEN, TCRN, received her Trauma Nursing Certification.

Diane Harkins, BSN, RN, CDE, received her certification as a Diabetes Educator.

PRESENTATIONS:

Molly Hammond, APN, CORLN, presented "HPV Related Head and Neck Cancers" at the Southern Pennsylvania Chapter of the Society of Otolaryngology Head-Neck Nurses ENT Conference on October 15, 2016 in Philadelphia.

Mary LaChant, RN, BSN, MPA; Lori Lodge, RN, MSN; Stacey Staman, RN, MSN, TCRN, and **Patricia Tomlinson** presented the poster "Data Validation: Seeking the Truth" at the American College of Surgeons – TQIP Annual Conference, Orlando FL, November 2016.

Drs. N. Fox and J. Hazelton, and **Stacey Staman, RN, MSN,** presented the poster "Narrowing the Focus: Autopsy Reports Provide Clarity in Pediatric Trauma Deaths" at the Pediatric Trauma Society's 3rd Annual Meeting. Nashville, TN, November 2016.