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# August 31, 2019 (10)

## Experience

Today I was able to sit in on a meeting with the doctor and his resident during rounds.

There was a patient admitted due to acute kidney failure. And a 12mm obstructing mid-ureteral stone. Her CT scan showed multiple other stones that were larger than one centimeter in size. She had a chronic Foley catheter secondary to neurogenic bladder. The patient has been on Eliquis once a day due to history of atrial fibrillation. The patient is at risk of damaged ureter, of infection, bleeding, and urosepsis. The plan was to insert stent in left ureter to open the blocked ureter and allow the urine to flow. Stent placement could not take place and dye could not be injected. Puss was coming out near Foley; therefore, it was changed, and no further discharge was found. Patient was given Lasix for fluid overload which then caused rapid atrial fibrillation. The discussion between the doctor and his resident regarding this patient had to do with slowing down the heart rate of this patient. The goal is to have the medication be safe for the kidneys and not reduce the blood pressure of the patient because it is already low. Some of the further things discussed were:

* The patient is already on sotalol at home, should this medication be continued?
* Beta blockers are safe for the kidneys but can cause patient to become hypotensive.
* Digoxin toxicity
* Amiodarone contraindicated
* Diltiazem

There are two types of rounds done at St. Anthony’s North Health Campus.

1. Critical care
   1. most robust, all disciplines there. Critical care doctor is there providing information and changing treatment as they speak, right then and there
   2. pharmacist there to make suggestions. There is a back and forth discussion between doctors
      1. I’m worried about this-so what about this-
      2. Team driven effort
2. Family medicine rounds
   1. Sitting at a table with family medicine doctors
   2. The pharmacist is more of a sideline reference that they sometimes listen to
   3. Residents in morning (first year) see the patient and come to rounds prepared to say what is going on with the patient, as well as, a treatment plan.
   4. Senior residents with attending ask if they thought about all multiple different things and there is a back and forth discussion to ensure the right decisions are being made for the patient.
   5. The discussion in these rounds are more of a discussion between the doctors and residents as a learning situation versus a collaboration, the pharmacists are present and do occasionally make corrections, recommendations and suggestions.

## Terms

**Hydronephrosis** - excessive fluid in the kidney due to backup of urine

**Foley Catheter** – flexible tube passed through urethra into the bladder to drain urine.

**Neurogenic bladder** – lack of bladder control due to neurological problem.

**Atrial Fibrillation** – The atria beats out of coordination with the ventricles. This is an irregular heartbeat that can cause poor blood flow.

**Urosepsis** – sepsis caused by an infection in the urinary tract.

**Digoxin toxicity** – from too much ingestion of digoxin, this poisoning presents life threatening symptoms in the form of cardiac manifestations, as well as, gastrointestinal symptoms.

**Contraindication** – when a drug, procedure, or surgery should not be used in the treatment of a patient, it is inadvisable.

## Take away

I really appreciated the insight and application of the materials I have learned during my undergrad. Pharmacology is highly important for the treatment of each patient. It is important to look at the entire history of a patient because in it lies the information that can help diagnose and treat. This information can give the insight into possible treatment outcomes and which would best suit the patient’s needs. Many patients have multiple intermingled morbidities, because of this treatment can be more difficult and needs to be carefully organized. This also makes collaboration especially significant because it is the pharmacist’s job to know which medications would be best in such a situation. It is important, as a doctor, to know pharmacology and what the goal of treatment is, but it is important to turn to specialists for further education and betterment of treatment.

# September 7-8, 2019 (20)

## Experience

This weekend I was able to learn about and attend the emergency codes with the pharmacist. Pharmacists do not attend all codes, but they do attend code blues and stroke alerts. They also have their roles in other codes, but the two codes stated are the primary two and are of utmost importance. It is noted that these protocols are St. Anthony’s North Health Campus specific and that protocols are different in other hospitals. Pharmacists do not assess patients; they are present at codes to treat. This is the reason that pharmacists do not attend rapid response codes. Rapid response codes indicate a change in the patient and the patient, therefore, needs to be assessed, but if a pharmacist is available to attend, they will. While at an emergency code the emergency department (ED) doctor is in charge. They have a fairly routine protocol; however, it is up to the doctor’s discretion and the doctor can choose to deviate from this. The ED doctor gives orders directly to the pharmacist and the pharmacist makes sure that the correct medication is being given with the proper indication and dose. The ED doctor is specifically in charge of the codes in the emergency department, on the floor it will be the critical care doctor or CHIP doctor, if the critical care doctor is not present, that will be in charge. When attending a code in the emergency room the first thing the pharmacist does is check in at the desk, it is recorded who all is present at the code. When a stroke alert is called on a patient, the patient is immediately taken for a CT scan to evaluate whether there is evidence of ischemia or a hemorrhage. If there is evidence of a hemorrhagic stroke the patient is stabilized and flown out to St. Anthony’s Central. If it is ischemic the patient is admitted to the hospital and treated, however, treatment varies per patient.

## Terms

**FAST** – acronym used with the intention to increase response time to an individual having a stroke. It stands for face, arm, speech, and time.

**Code blue** – Cardiac arrest

**Code black** – Bomb threat

**Code green** – Security assist

**Code pink** – Infant/child abduction

**Code red** – Fire

**RACE** – acronym used for what to do in case of a fire; Rescue anyone from danger, Alarm: pull the pull station Dial “55” to report location, Contain: close all doors and clear hallways, Extinguish/Evacuate.

**Code orange** – HazMat incident

**Code silver** – Controlled access

**Code grey** – disaster plan

**Code white** –OB hemorrhage

**CT scan** – an x-ray image using a form of tomography in which a computer controls the motion of the x-ray source and detectors, processes the data, and produces an image.

**Ischemia** – Reduced blood flow.

**Hemorrhage** – bleeding from a broken blood vessel.

## Take away

In a high-pressured situation, the pharmacist acts, in a sense, as a second pair of eyes. They are ensuring that the doctor is making the correct call. They ensure that the drug the doctor has requested is the correct drug for the purpose in which the doctor is using it for. The pharmacist also ensures that the medication is drawn up in the correct and safe dosage for the patient. This means it is imperative for the pharmacist to review the patient’s chart, in a stroke alert, prior, in order to accurately treat the patient. The pharmacist plays a key role in patient treatment during codes and the collaboration between doctor and pharmacist is necessary for the patient to be taken care of efficiently and to the best possible degree.

# September 15, 2019 (10)

## Experience

Today I went to more emergency codes. One of them stood out in particular. There was a code called for a patient that had been in the emergency department for awhile already. The patient is a frequent flyer and has been in the emergency department three previous times within the month. This patient has an anabolic stroke in August after a left heart Cath was performed. The patient did not receive TPA due to being heparinized for the procedure.

The patient is currently experiencing right sided numbness, more than her baseline. She is slightly numb on the right side at baseline due to her previous stroke. She is also experiencing right sided weakness and slurred speech. These symptoms developed as she was in the emergency department. She was then immediately sent to CT to determine hemorrhagic or ischemic stroke origins. We sat and observed the CT scan. This CT scan ended up taking a bit longer than usual because the pressure in the line to administer the contrast. The CT had to be stopped and the technicians had to readjust the line. Patient did not have any contraindications for TPA administration. She had onset of symptoms 1.5 hours prior to appearance in the ED. The patient is on Plavix, however, TPA is not contraindicated with anticoagulants, it is contraindicated with antiplatelets. The ED doctor was waiting on the call from neurology; however, he did not think the patient would be needing TPA so we left the ED and were told we would be contacted if they needed us further. Ultimately TPA was not given and the patient was given 325 mg of Aspirin and inulin for her blood sugar was over 490. There were no intracranial findings in the CT without contrast. The CTA of the head and neck showed no new stenosis or branch vessel occlusion.

TPA

* Can be given within a 4.5-hour window of onset of symptoms
* INR has to be under 1.7 if it is going to be given to patients on blood thinners
* Generally, not given to patients on blood thinners such as
  + Warfarin
  + Rivaroxaban
  + Dabigatran
  + Apixaban
* TPA is given in the same quantity/dosage for patients above 150 kilos. Otherwise dosage is weight dependent.

## Terms

**TPA** – a naturally occurring protein found in the cells that line blood vessels. It activates the conversion of plasminogen to plasmin, an enzyme responsible for the breakdown of clots. TPA prevents the enlargement of blood clots that obstruct blood flow in the brain.

**Plasminogen** – Zymogen, inactive substance which is converted into plasmin when activated by another enzyme (TPA).

**Plasmin** – Important enzyme in blood that degrades blood plasma proteins.

**Left heart catheterization** – the passage of a thin flexible tube (catheter) into the left side of the heart done to diagnose or treat certain heart conditions.

**Heparinized** – The addition of heparin to blood to prevent it from coagulating.

**Heparin** – A medication used as an anticoagulant.

**Anticoagulants** – Blood thinner medication that prevents or reduces coagulation of blood, prolonging the clotting time.

**Coagulation** – process of a liquid, especially blood, changing to a solid or semi-solid state.

**Antiplatelets** – medication that prevents clotting by preventing platelet aggregation.

**Stenosis** – Narrowing

**Occlusion** – Blockage or closing of a blood vessel.

**CTA scan** – Computed tomography angiography is a medical exam that combines a CT scan with an injection of a dye too produce pictures of blood vessels and tissues. The dye is injected through IV in the arm or hand.

**INR** – International normalized ratio, this is the measurement of how long it takes for the patient’s blood to clot. If too low, the patient is at risk of a blood clot and if it is too high, the patient can experience bleeding. Normal range is 2 to 3, but ideal range varies from patient to patient.

**PT-INR** – Prothrombin time INR is the test that measures how long it takes for the blood to clot.

## Take away

For stroke alerts there is not much that the pharmacy has to do. The main thing is catching the symptoms as quick as possible to prevent further and permanent damage. Mainly in a stroke alert situation the pharmacist needs to know the patient’s history and whether it is safe for the patient to receive TPA. Administering the TPA is the pharmacist’s job in a stroke alert situation. The only time TPA is given is in an ischemic stroke because it thins the blood allowing circulation of blood flow to proceed within the brain. However, if the stroke is not ischemic then the pharmacists cannot do anything, the patient has to be flown out to be seen by neurologists which are not at this hospital If there is no intracranial findings then that goes back to the doctors to determine a diagnoses. Furthermore, if the stroke is ischemic and the patient cannot receive the TPA it is a collaboration with the doctor and pharmacist to determine what they can do for the patient. I am learning how important collaboration is between the doctor and the pharmacy in emergency situations.

# September 21-22, 2019 (20)

## Experience

This weekend we had a couple code blues to attend. One of the patients was brought in by ambulance (BIBA) for a motor vehicle collision (MVC). The patient had a possible syncopal episode. Patient did not remember the accident, but stated he felt dizzy before having lunch and was driving home, the next thing he remembered was waking up after an accident. EMS reported the patient hit the back of a tractor truck. Code blue was called because this patient went asystole with PA-C in room. Patient had just told the PA that he was feeling dizzy, he then became unresponsive and the PA noted grey skin. The RN then entered the room, no pulse was found, CPR was initiated. Patient immediately woke up and was asking where he was at, at this time the doctor was in the room. Another patient was unresponsive at work and when EMS arrived there was no pulse. This patient with cardiac arrest got put on a LUCAS device when he arrived at the emergency department. His glucose meter (POC) should be 70-99 mg/dL but came out to 49. His pulse was never regained since lost in the field and was declared dead twenty minutes. These situations are vastly different, as though, they are on opposite ends of the spectrum. The first code blue, the patient was unresponsive but immediately came to and did not need much pharmaceutical intervention. The same goes with the patient put on the LUCAS device; not much pharmaceutical intervention was needed because a pulse was never regained for the patient and the LUCAS device was the last stitched effort in getting the patient to come to. Typically, in code blue situations the pharmacist is supplying medication to be given to the patient. Code blues typically take a lot of medicinal intervention. The room becomes a mess as the doctors, nurses, pharmacists, etc. tare things out of their sterile packages and insert IVs, intubation, bandage wounds and whatever else is needed in the situation. The family is typically outside the room because the vast number of caretakers that participate in the emergency situation.

## Terms

**Asystole** – A cardiac arrest rhythm with no discernable electrical activity on the EKG monitor.

**LUCAS device** – A mechanical chest compression device providing automated closed chest compressions.

**Syncopal** – Fainting or temporary loss of consciousness.

**PA-C** – Physician assistant -certified, can practice medicine with a supervising physician.

**Glucose Meter (POC)** – Point of care blood glucose meter measures blood sugar and can indicate whether the patient is hyperglycemic or hypoglycemic.

**Hyperglycemic** – High blood sugar levels.

**Hypoglycemic** – Low blood sugar levels.

## Take away

I am impressed at the swift action and steadiness of the caretakers thrown in this situation. I have taken multiple CPR training classes and first aide classes, but there is nothing like being thrown into the middle of an actual emergency. It is almost as if there is so much chaos that its calm. I felt like it was peculiar that they placed the LUCAS devices once the patient was in the ED and not prior. The device is especially helpful out in the field when there are not enough hands to continue chest compressions. The pharmacist plays a larger role in code blue situations because multiple drugs are administered as the doctors are trying everything in their power to resuscitate the patient. The pharmacist is rapidly drawing up epinephrine, norepinephrine, phenylephrine, etomidate, bicarb, calcium acetate, atropine, and more depending on what the doctor requests and what the patient is responding to. The cause of cardiac arrest plays a vital role in the treatment of cardiac arrest.

# September 29, 2019 (10)

## Experience

Today I got to learn how TPNs are managed and ordered for patients in the hospital. It turns out the pharmacy at this hospital does not compound their TPNs themselves. TPNs are ordered in EPIC by the physician caring for the patient. TPNs are ordered for malnutritional patients that need supplemental nutrients when the person cannot and or should not receive feeding or fluids by mouth. The pharmacy and dieticians are the ones that decide what goes into the TPN. Specifically, it is the pharmacy that orders which electrolytes and the amount needed for the patient. The dietician is in charge of the macronutrients. After collaboration between the dietician, pharmacist, and doctor, the dietician puts the order in Epic. The pharmacy then has to verify the order, here is a double check to make sure everything has been put in accurately for the patient. The Pharmacist then sends the order to CAPS and they receive the order in the same day. The order usually needs to be placed prior to noon and the order arrives in the evening around 19:00. Administration is always scheduled for 21:00. This schedule time provides wiggle room if something happens and the TPN arrives late. The TPN arrives refrigerated. It is then taken up to the floor the patient is on and put in the patient specific fridge via Pyxis. The TPN is brought to room temperature prior to administration to the patient.

## Terms

**TPN** – Total parenteral nutrition, a method of feeding that bypasses the gastrointestinal tract.

**Epic** – electronic health record software.

**Parenteral** – Administered or occurring elsewhere in the body than the mouth and alimentary canal.

**PICC** – Peripheral inserted central catheter. A type of central line going into the vein in the arm. The line runs up the vein inside the arm and ends up in a large vein in the chest.

**Electrolytes** – Chemical that produces an electrically conducting solution when dissolved in a polar solvent such as water. Sodium, calcium, potassium, chloride, phosphate, and magnesium.

**Macronutrients** – Carbohydrates, proteins, lipids, and alcohol, provides humans with bulk energy.

**CAPS** – Central Admixture Pharmacy Services is an offsite compounding pharmacy.

**Pyxis** – An automated medication dispensing system supporting decentralized medication management. It helps clinicians safely and efficiently dispense the right medication for the right patient, at the right time.

## Take away

I did not realize the role that the dietician played with a patient’s health and care. Dieticians are experts in dietetics and, therefore, it makes sense that the dietician would be in charge of the macronutrients of the patient reviewing a TPN. This made me realize more profoundly that the dietician alters their patient’s nutrition based on their medical conditions and specified needs, they are licensed to assess, diagnose, and treat the nutritional problems of patients. It is a no brainer as to why they are called upon to order a TPN. The TPN is then adjusted and monitored by pharmacy because of the complexities of electrolytes and their interaction with other medications and medical conditions within the patient.

# October 5-6, 2019 (20)

## Experience

Vancomycin dosing seems really confusing to me. There are a lot of factors involved in vancomycin dosing and I am not sure I understand why. This weekend was learning all about vancomycin dosing. Vancomycin levels are drawn on each patient being treated with vancomycin. This level is to make sure the body is clearing the vancomycin at a healthy level. The continuing dosage is based off of this level drawn. The dosage may be increased, decreased, or kept the dame depending on what the vancomycin level comes back at. The pharmacists order random levels to be drawn as well as scheduled levels. The first thing the pharmacist checks is to see if the levels were drawn at the correct time. If the levels were drawn too early this can change the dosage due to the level showing too much vancomycin still in the patient’s system. For proper dosing, the levels need to be drawn at the proper time. The pharmacist is looking to see if the vancomycin has reached its steady state. The range they look for is 10-15 in patients with less severe infections and no complications. However, the majority of hospital patients fall under the range 15-20. If the range is lower the pharmacist interprets whether it is closer to the steady state or not. It is roughly four to five half lives to reach steady state. If the level is at 10 the dose is increased, levels less than have shown resistance. There is a vast protocol for vancomycin levels. Vancomycin can treat multiple infections such as clostridium difficile and staph infections. The side effects can consist of kidney problems, and low potassium which is why these are monitored within the hospital. If the levels are high in the patient, then the dose is likely decreased because it is accumulating, and the body is not exposing of it properly. One patient ended up being allergic to the vancomycin and the pharmacist was the one who collaborated with the doctor to see which other antibiotic would be best to treat the patient’s problem with regards to her history.

## Terms

**Steady state** – The situation in which the overall intake of a drug is in an equilibrium with its elimination. The steady state is reached when a time of four to five times the half-life for a drug after regular dosing is started.

**Half-life** – The time is takes for the concentration of the drug in the body to be half of the starting dose.

**Code sepsis** – This code is called when it is suspected that the patient has sepsis. This code is usually called depended on the results of the blood panel as well as the visible symptomology of the patient. The pharmacy immediately sends a loading dose of vancomycin, azithromycin and Zosyn.

**Sepsis** – Life threatening complication of infection. The body’s response to normal chemicals released in the bloodstream in response to an infection is out of balance. This imbalance triggers changes that damage the organ systems and needs to be treated immediately by treating the infection.

**Clostridium difficile** – This is a bacterium in the colon that can cause inflammation to the colon and can cause severe damage to the colon.

## Take away

Antibiotic resistance is a well-known problem. The pharmacists mediate this by determining whether the doctor needs to be prescribing an antibiotic and if they are prescribing the proper antibiotic. There are multiple types of antibiotics and each one treats certain strains of bacteria. There are multiple different fast mover antibiotics within the hospital. The one used for more serious infections is vancomycin. Vancomycin has more regulations in place than other antibiotics. The other antibiotics are monitored in regard to frequency and dosage, but levels are not drawn for them because they have less complications associated with them as well as shorter half-lives. When code sepsis is called the patient typically receives a two-gram loading dose and then it is monitored and adjusted to the patient considering the patients weight and history.

# Summary

The pharmacists do multiple things, verifying all the doses and medications and indications with every patient in the hospital. They do consults and help the doctors with determining treatments specified for the patient. It is a very collaborated system that makes the hospital function. The patient would not be receiving the best and most efficient care without the collaboration. The hospital is a fine network of medical specialists with the same goal of proper diagnosis, safest treatment first, and patient health, happiness, and stability. The pharmacists have a hand in all things patient care. They verify every medication the doctor orders. The doctors turn to them to make sure they are ordering the proper medication, if there is a better treatment plan, and if they have suggestions of certain medications. The pharmacists monitor patients PT-INR and verify all blood thinner medications. They monitor all blood thinners patients have been on to make sure there is no overdosages. They order TPNs. They attend codes. They continually help the nursing staff with administrative questions and contraindication questions. They mediate the timing and schedules of when the patient should be receiving a certain medication. The pharmacist plays a much larger role within the hospital than I think is perceived by the public and even the doctors.

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