Chronic Obstructive Disease: Case Study

Charlotte Maduram Moore

University of Arizona

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**Background Information**

A widow (M. L.) (a pseudonym for patient’s given name) was interviewed and examined for this paper. The patient traveled approximately ten miles to Oro Valley Hospital and was admitted to the emergency department (ED) on October 4, 2013 with a primary diagnosis of asthenia and urinary tract infection. She was transferred to the telemetry unit; however, her symptoms became progressively worse and she was transferred to the intensive care unit (ICU) due to a chronic obstructive pulmonary disease (COPD) exacerbation. She was stabilized and returned to the telemetry unit on October 7, 2013.

The patient conveyed she has one adopted daughter, age 24 and has been in a devoted relationship with her fiancé for ten years. According to the patient, her fiancé has two daughters and one grandchild and the youngest daughter was identified as the primary care taker of the patient. The patient states her role is to be an emotional support system for her daughters and fiancé. She revealed she is unable to marry her fiancé because she will suspend her military benefits from her previous husband. The patient denies any emotional, physical, or sexual abuse. During the interview, the patient disclosed she has a mental health history of depression which manifested after her hysterectomy at age 26. This has caused her to gain weight over the years. The patient is obese with a body mass index (BMI) of 34.7. She communicated she desperately wanted to have children of her own, despite several miscarriages. Her developmental stage falls under older adult and according to Erikson’s developmental stage, the patient is placed in the category of ego integrity versus despair (as cited in Wilkinson & Treas, 2011). The patient stated she has lead “a great life” (M. L., personal communication, October 9, 2013) but she was remiss conveying she should have adopted more children and never started smoking.

The patient graduated tenth grade and formally had a profession in the healthcare field. She appears well educated on her diagnosis; however, she refrains from adhering to proper care to control the following comorbidities consisting of: asthma, diabetes type 2, hypertension, neuropathy, arthritis, cerebrovascular accident (CVA), COPD, sleep apnea, hypothyroid, and coronary heart disease (CAD). In addition to the hysterectomy, the patient revealed she has had multiple surgeries including an appendectomy, left shoulder surgery, bilateral wrist surgeries, bilateral knee replacements, and quadruple coronary artery bypass grafts.

**Physiology**

 The system of focus will be the function of the pulmonary system primarily the lower respiratory tract. The primary purpose of the respiratory system is to sustain proper gas exchange sufficient to supply the entire body. In addition to gas exchange, the respiratory system: “brings air to the proper body temperature, moistens the inhaled air, protects the body from harmful substances, and senses smell” (American Lung Association, 2013, p. 1).

In the upper respiratory tract, air is inhaled through the mouth or nose, filtering any irritants via the cilia and travels down the pharynx, adenoids, tonsils, epiglottis, larynx, and trachea (Lewis, Dirksen, Heitkemper, Butcher, & Camera, 2011). The lower respiratory tract starts at the carina continuing to the bronchi, bronchioles, alveolar ducts and finally the alveoli (Lewis et al., 2011). The alveoli are small sacs which serve as the primary site in gas exchange by transferring oxygen and carbon dioxide. “In the alveoli, oxygen from the air is absorbed into the blood. Carbon dioxide, a waste product of metabolism, travels from the blood to the alveoli, where it can be exhaled” exhibiting proper gas exchange (WebMD, 2013, p. 1).

COPD consists of multiple disorders that effect the respiratory systems air movement inhibiting proper gas exchange (Lewis et al., 2011). Therefore, inadequate gas exchange and hypoxia can lead to a problematic systemic effect throughout the body including “chronic systemic inflammation, increased cardiovascular risk, musculoskeletal wasting, and depression” (Robinson & Maxwell, 2012, p. 1). The patient displays signs of affected cardiovascular, musculoskeletal, and neurological systems.

**Pathophysiology**

The patient (M. L.) was admitted with a primary diagnosis of asthenia. Inadequate gas exchange contributes to the patient’s weakness; therefore, the author will mainly focus on COPD. “An estimated 12.1 million adults in the United States over age 18 have COPD” (Lewis et al., 2011, p. 610). Also, according to Lewis et al. (2011) COPD is the fourth leading cause of death in the United States more prevalent in women than men. COPD is a combination of two other obstructive airway diseases: chronic bronchitis and emphysema. A diagnosis of chronic bronchitis is identified when the inflamed bronchi produces excessive mucus causing obstruction of air. Emphysema involves damage of air sacs causing interference with gas exchange (Medline Plus, 2013). COPD is a chronic inflammation found in the airways involving interleukins, cytokines, neutrophils, macrophages, and T cells as mediators (Robinson & Maxwell, 2012). These inflammatory mediators provoke deviations in the airway “leading to remodeling, decreased compliance, elasticity, and narrowing” (Robinson & Maxwell, 2012, p. 2). In addition, “the abnormal inflammatory process causes tissue destruction and disrupts the normal defense mechanisms and repair process of the lung” (Lewis et al., 2011, p. 612).

Smoking and exposure to tobacco smoke is a major risk factor for COPD. The patient admits smoking in her younger years accompanied by little concern over the effects it had on her body. She conveyed she was raised in an environment of second hand smoke, but patient omitted pertinent information in order to calculate pack years. She now realizes smoking and second hand smoke has significantly contributed to her present breathing problems. The patient exhibits a chronic productive cough with sticky yellow stained sputum. The patient remained in an upright position, otherwise, her cough became worse and it was difficult to clear secretions. In addition, the patient has difficulty exhaling air, has adventitious wheezing lung sounds, and experiences chest tightness due to alveolar hypoventilation.

Another risk factor the patient demonstrated for her COPD exacerbation was an acute infection. The patient was initially admitted with a urinary tract infection positive for *Klebsiella pneumonia*, a gram negative unencapsulated bacteria identified in the blood cultures (Centers for Disease Control and Prevention, 2010). Patient also contributes allergies, dyspnea during exercise, and family history of asthma to COPD. In addition, the patient had a quadruple coronary artery bypass resulting from CAD. There can be an interrelationship with COPD and CAD since both cause difficulty in breathing and other similar symptoms (WebMD, 2013). The patient exhibits weakness due to under usage of skeletal muscles from decreased activity. The patient also voiced depression and anxiety. Therefore, COPD encompasses several disease processes.

**Orders**

 The patients is limited to a diabetic diet, cardiac diet, and low sodium diet. Three bed rails are placed for patient safety with no restraints, a bed alarm, and the bed is positioned low.The patient Morse fall scale is 70 indicating high fall risk (Lewis et al., 2011). The patient is placed on bed rest due to weakness; however, she can arise from her bed with assistance. The physician ordered several consults with the occupational therapist, physical therapist, respiratory therapist, nutritionist, and rehabilitation. The occupational therapist will assist the patient to modify patient’s routines and activities of daily living. The physical therapist will support the patient to gain strength and mobilization. The respiratory therapist will advise and model specific breathing techniques such as pursed lip breathing, huff cough, and diaphragmatic breathing to maximize gas exchange. In addition, the respiratory therapist will demonstrate proper techniques to administer inhalers, spacers, and nebulizers. The nutritionist or dietitian will educate the patient to make healthy nutritional choices such as high protein, extra calories, well hydrated diet to decrease weakness and provide strategies to lose weight. Several COPD treatments and bronchodilator medications are prescribed to alleviate patient’s respiratory symptoms. Finally, the doctor ordered several diagnostic tests to identify the causes of the exacerbations and arranged rehabilitation to regain previous abilities, as well as, to maintain former quality of living (refer to Appendix A). These orders are an essential element for pertinent information in order to provide adequate and appropriate nursing care and allowing nurses to continue care with the other services.

**Medications**

 “COPD is linked with repeated airway exposure to harmful substances and resultant inflammation, leading to airflow limitation that is only partially reversible with bronchodilator use” (Robinson & Maxwell, 2012, p. 1). Medications prescribed for COPD are anti-inflammatory corticosteroids such as inhaler Fluticasone for maintenance and oral prednisone with calcitrol for exacerbations. Long term corticosteroids therapy requires supplement of vitamin D to prevent osteoporosis (Lewis et al., 2011). In addition, a leukotriene receptor blocker that can have both bronchodilator and anti-inflammatory effects such as Montelukast used for maintenance therapy (Lewis et al., 2011). Furthermore, first-line therapy short acting bronchodilators, beta 2 adrenergic agonist rescue, and long acting beta-adrenergic agonist inhalers albuterol, ipratropium, and mometasone, which “relaxes smooth muscle in the airway and improves ventilation in the lungs” (Lewis et al., 2011, p. 617). Finally, the patient is on two liters oxygen therapy via nasal cannula. During the night, the patient is provided with continuous positive airway pressure (CPAP) equipment to guarantee she is able to breath easily in her sleep. The patient stated without her respiratory medications she would be unable to maintain her activities and lifestyle instead she would live in fear and anxiety of the inability to breath. The patient tolerated the respiratory medications while in the author’s care (refer to Appendix C).

**Diagnostic Tests**

 Diagnostic test will include, but not limited to hemoglobin level, hematocrit level, chest x-ray, oxygen saturation, blood culture, electrocardiogram, and echocardiogram. Chest x-rays will help determine if the patient has pneumonia, pneumothorax, or other respiratory problems. The patient’s chest x-rays revealed her lung volume was low and the left lung was clear except minor linear scarring. In addition, there is a partial clearing of infiltrate at the right base. Tiny pleural effusions are present indicating buildup of fluid between the pleural cavities. The patient was ordered on continuous oxygen via nasal cannula at a rate of two liters and oxygen levels were monitored several times a day. The patient’s blood culture was positive for *Klebsiella pneumonia* and white blood cells were high indicating an infection. The patient’s labs reveal low hemoglobin and hematocrit levels indicating less red blood cells with inadequate levels of oxygen. An echocardiogram is an ultrasound allowing visualization of the heart and an electrocardiogram records electrical activity of the heart (Van Leewen, Poelhuis-Leth, & Bladh, 2011). The patient’s heart was normal size and the sinus rhythm had short PR, prolonged QT, and abnormal ST and T waves (refer to Appendix D).

**Nursing Priorities**

* Nursing Diagnosis # 1: Ineffective breathing pattern related to alveolar hypoventilation due to inadequate gas exchange, and anxiety secondary to asthma, smoking, and COPD as evidence by shortness of breath, inability to speak, weakness, use of nasal cannula, breathing treatments, use of CPAP, wheezing, and chest x-ray indicating low lung volume, pleural effusions, and partial clearing at right base.
* Goal: Patient is able to obtain adequate oxygenation
* Outcome: The patient will continue to demonstrate an open airway and maintain oxygen perfusion of 95% and above until the end of my shift.
* Nursing Action: Auscultate breath sounds for distant or absent sounds, wheezing, or crackles and monitor respiratory rate and oxygen status (Lewis et al., 2011).
* Nursing Action: Teach patient the importance of deep breathing, turning, and coughing to promote effective breathing techniques and secretion mobilization (Lewis et al., 2011).
* Nursing Action: Position patient in an upright or semi-Fowler’s position and educate the patient to move into this position to minimize respiratory efforts and maximize chest expansion (Ackley & Ladwig, 2011).
* Evaluation: The patient maintained oxygen saturation of 97% and continued to have an open airway; therefore, goals were met. The patient exhibited no accessory muscle use, nasal flaring, or retractions. The adventitious wheezing lung sounds remained consistent and there were no exacerbations. The patient was in an upright position of at least 45 degrees and able to deep breathe, turn, and cough during this author’s shift.
* Nursing Diagnosis # 2: Activity intolerance related to impaired circulation and limited mobility secondary to diabetes, COPD, and smoking as evidence by bed rest, weakness, chest pain, obesity, neuropathy, use of inhalers, breathing difficulties, and altered metabolic state with low potassium (refer to appendix C).
* Goal: Patient will regain abilities to continue previous activities
* Outcome: The patient will be able to demonstrate pursed-lip breathing and diaphragmatic breathing techniques by the end of this author’s shift.
* Nursing Action: Model and teach patient proper pursed-lip breathing, diaphragmatic breathing techniques, and inspiratory muscle training (Lewis et al., 2011).
* Nursing Action: Evaluate the patient’s nutritional status and educate patient proper foods high in protein and high calorie that can optimize body function and decrease fatigue. (Young, Bunn, Trivedi, & Dickinson, 2011).
* Nursing Action: Educate and train patient to do activities with portable supplemental oxygen tank to decrease dyspnea (Celli, MacNee, & ATS/ERS Task Force, 2004)
* Evaluation: The patient was able to repeat proper pursed-lip and diaphragmatic breathing techniques; therefore the goal was met. The patient expressed these methods helped her breathing when she was walking. The patient verbalized the portable oxygen tank decreased her anxiety and was able to increase her activity time before she took a break. She confessed she refrained from making healthy choices due to laziness and convenience. The patient was appreciative of recommended websites to support her decisions.
* Nursing Diagnosis # 3: Readiness for enhanced sleep related to fluctuation in sleep-wake cycle and anxiety secondary to sleep apnea, COPD, asthma as evidence by increased restlessness, increased agitation, facial reactions, body language, weakness, fatigue, and use of CPAP.
* Goal: Patient will be able to fall asleep without any difficulties
* Outcome: The patient will verbalize she fell asleep without difficulty and had decreased anxiety during the night.
* Nursing Action: Engage in relaxing activities before bed and providing a quiet environment without disturbances including limiting interruptions at night (Ackley & Ladwig, 2011).
* Nursing Action: Encourage patient to converse her concerns openly and use appropriate therapeutic communication skills (Godoy & Godoy, 2003).
* Nursing Action: Provide back rubs/massage and counsel patient regarding normal age-related changes in sleep ((Billhult & Maata, 2009) (Cole & Richard, 2007).
* Evaluation: The patient acknowledged her walk with the physical therapist helped her sleep well. The back massage aided in her relaxation and was evident by her body language and facial expressions. The patient also conveyed it was a relief to express herself openly without any judgment.

**Literature Reviews**

* Research Article:

Young, K., Bunn, F., Trivedi, D., & Dickinson, A. (2011). Nutritional education for

 community dwelling older people: A systematic review of

randomized controlled trial. *International Journal of Nursing Studies, 48,* 751-

780. doi: 10.1016/j.ijnurstu.2011.03.007

* Purpose of study: The purpose of this study was to evaluate the effectiveness of nutritional education conducted by heath care professionals for people over 65 year olds who lived at home.
* Design, method, and sample: The design consisted of a systematic review of randomized controlled trials with or without blinding. Twenty-three studies ranging from 1991 to 2008 were included in the review that focused on nutritional interventions containing dietary advice tailored to an individual. The participants were 65 years or older and varied from healthy to frail elderly.
* Research findings: The results showed evidence that personalized nutritional education with counseling and group sessions can positively influence diet and improve physical function in the elderly.
* How this research applied to this patient: This patient will benefit from nutritional interventions allowing her to regain her prior energy level. In addition, it may increase her inspiratory muscle function and dyspnea. The patient will recover control in her diet with extra support and reduce anxiety level.
* Non-Research Focused Article:

Billhult, A. & Maatta, S. (2009). Light pressure massage for patients with severe

 anxiety. C*omplementary Therapies in Clinical Practice, 15,* 96-101. doi:

 10.1016/j.ctcp.2008.10.003

* Purpose of article: The purpose of this study was to evaluate the effectiveness of light pressure massage with participants diagnosed with generalized anxiety disorder.
* Implications for nursing care with this patient: This patient exhibits high anxiety level due to her COPD. According to the article, light pressure massage can aid in relaxing her body and mind, give her unconditional attention, decrease her anxiety, and increase her self-confidence through this alternative attainable method.
* Non-Research Focused Article:

De Godoy, D. & De Godoy, R. (2003). A randomized controlled trial of the effect of

 psychotherapy on anxiety and depression in chronic obstructive pulmonary

 disease. *Archives of Physical Medicine and Rehabilitation, 84*, 1154-1157.

* Purpose of article: The purpose of this blind randomized control trail was to evaluate the effectiveness of incorporating psychotherapy sessions into a pulmonary rehabilitation program in order to reduce anxiety and depression level of patients with COPD.
* Implications for nursing care with this patient: The patient has a history of anxiety and depression mostly due to her COPD and other comorbidities. The article addresses topics such as psychosocial needs, social, marital, work, health, habits, and interpersonal issues during the psychotherapy sessions. This will be invaluable to the patient to be able to express her feelings and talk freely with no limitations.

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 *Journal of Nursing Studies, 48,* 751-780. doi: 10.1016/j.ijnurstu.2011.03.007

Appendix A: Physician’s Orders

* Respiratory Consultation
* Physical Therapy Consultation
* Occupational Therapy Consultation
* Dietary Consultation due to several diets
* Rehabilitation
* Fall precautions
* Comprehensive metabolic panel
* Complete blood count
* Blood culture
* Chest X-ray
* Echocardiogram
* Electrocardiogram

Appendix B: Medication Chart

Include all scheduled medications and any PRN medications given within the past 24 hours.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Drug Name****Generic and Brand & Time Due** | **Classification and****Mechanism of action** | **Actions and Indications (Reason MY patient is on this medication)** | **Patient dose,****Route, and****frequency**  | **Most common or serious side effects****Red is what patient shows of side effects** | **Contraindications &****Major Interactions (Food and Drug)** | **Nursing Interventions and Patient Teaching****(What you need to know before administering)** |
| AlbuterolProair HFA0900 | AdrenergicsBronchdilator | Binds to beta2-adrenergic receptors in airway smooth muscle, leading to activation of adenyl cyclase and increased levels of cyclic-3', 5'-adenosine monophosphate (cAMP | 2.5 mg= 3 ml nebulizer 4 times a day | **CNS:***nervousness*, *restlessness*, *tremor*, headache, insomnia **Resp:**PARADOXICAL BRONCHOSPASM (EXCESSIVE USE OF INHALERS)**CV:***chest pain*, *palpitations*, angina, arrhythmias, hypertension**GI:**nausea, vomiting**Endo:**hyperglycemia**F and E:**hypokalemia**Neuro:**tremor | Hypersensitivity to adrenergic amines.Careful with diabetics’ Concurrent use with other adrenergic agents will have ↑ adrenergic side effects.Use with MAO inhibitors may lead to hypertensive crisis.Beta blockers may negate therapeutic effect.May ↓ serum [digoxin](http://www.drugguide.com/ddo/ub/view/Davis-Drug-Guide/51218/all/digoxin) levels.Hypokalemia ↑ the risk of [digoxin](http://www.drugguide.com/ddo/ub/view/Davis-Drug-Guide/51218/all/digoxin) toxicity.Caffeine | Intervention: Assess lung sounds, pulse, and BP before administration and during peak of medication. Note amount, color, and character of sputum produced.Monitor pulmonary function tests before initiating therapy and periodically during therapy. Observe for paradoxical bronchospasm (wheezing). If condition occurs, withhold medication and notify health care professional immediately.Teach proper use and take as directedPatient has Diabetes and low potassium labresults |
| CalcitriolRocaltrol0900 | Fat soluble vitamins | Management of hypocalcemia in patients undergoing chronic renal dialysis (IV and PO).Treatment of hypocalcemia in patients with hypoparathyroidism or pseudohypo-parathyroidism (PO only) Calcitriol is the active form of vitamin D. Promotes the absorption of calcium and decreases parathyroid hormone concentrations | 0.25MCG capsule oral daily | **CNS:**headache, somnolence, weakness**EENT:**conjunctivitis, photophobia, rhinorrhea**CV:**arrhythmias, hypertension**GI:**abdominal pain, anorexia, constipation, dry mouth, liver function test elevation, metallic taste, nausea, PANCREATITIS, polydipsia, vomiting, weight loss**GU:**albuminuria, azotemia, decreased libido, nocturia, polyuria**Derm:**pruritus**F and E:**hypercalcemia**Local:**pain at injection site**Metabolic:**hyperthermia**MS:**bone pain, metastatic calcification, muscle pain**Misc:**allergic reactions (pruritis, rash, urticaria) | HypersensitivityHypercalcemiaVitamin D toxicityConcurrent use of magnesium-containing antacids or other vitamin D supplements | Interventions: Assess for symptoms of vitamin deficiency prior to and periodically during therapy.Assess patient for bone pain and weakness prior to and during therapy.Observe patient carefully for evidence of hypocalcemia (paresthesia, muscle twitching, laryngospasm, colic, cardiac arrhythmias, and Chvostek's or Trousseau's sign). Protect symptomatic patient by raising and padding side rails; keep bed in low position. Teach to take meds as directed. Review diet modifications.Patient had low levels of calcium in labs. Patient has hypothyroidism. |
| Gabapentin Neurontin09001800 | Analgesic adjuncts, therapeutic[anticonvulsants](http://www.drugguide.com/ddo/ub/view/Davis-Drug-Guide/50912/all/anticonvulsants)mood stabilizers | Mechanism of action is not known. May affect transport of amino acids across and stabilize neuronal membranes | 300 mg capsule oral twice a day | **CNS:**SUICIDAL THOUGHTS, *confusion*, , *depression*, *drowsiness*, sedation, anxiety, concentration difficulties, malaise, vertigo, weakness**EENT:**abnormal vision, nystagmus**CV:**hypertension**GI:**weight gain, anorexia, flatulence, gingivitis**MS:**arthralgia**Neuro:***ataxia*, altered reflexes, hyperkinesia, paresthesia**Misc:**MULTI-ORGAN HYPERSENSITIVITY REACTIONS, facial edema | Hypersensitivity Renal insufficiency (↓ dose and/or ↑ dosing interval if CCr ≤60 mL/min) **Geri:**May be more susceptible to toxicity due to age-related ↓ in renal function Antacids may ↓ absorption of gabapentin | Monitor closely for notable changes in behavior that could indicate the emergence or worsening of suicidal thoughts or behavior or depression **Seizures:**Assess location, duration, and characteristics of seizure activity**Post-herpetic Neuralgia & Neuropathic Pain:**Assess location, characteristics, and intensity of pain periodically during therapy**Migraine Prophylaxis:**Monitor frequecy and intensity of pain on pain scale Lab test urinalysis Advise patient not to take gabapentin within 2 hour of an antacid.  |
| HydralazineApresoline | Antihypertensivevasodilator | Direct-acting peripheral arteriolar vasodilator. | 10 mg IV Q 8 hours PRN | **CNS:**dizziness, drowsiness, headache**CV:***tachycardia*, angina, arrhythmias, edema, orthostatic hypotension**GI:**diarrhea, nausea, vomiting**Derm:**rash**F and E:***sodium retention***MS:**arthralgias, arthritis**Neuro:**peripheral neuropathy**Misc:***drug-induced lupus syndrome* | HypersensitivitySome products contain tartrazine and should be avoided in patients with known intolerance. MAO inhibitors may exaggerate hypotension. | Intervention: Monitor BP and pulse frequently during initial dose adjustment and periodically during therapy. Teach and emphasize the importance of continuing to take this medication |
| Insulin RegularHumuLin R | AntidiabeticsHormoneShort-acting | Lowers blood glucose by:stimulating glucose uptake in skeletal muscle and fat,inhibiting hepatic glucose production. | Sliding scale140-179 for 5 units and every 10+ add a unit | **Endo:**HYPOGLYCEMIA**Local:**lipodystrophy, pruritus, erythema, swelling**Misc:**ALLERGIC REACTIONS INCLUDING ANAPHYLAXIS | Hypoglycemia.Corticosteroids, thyroid supplements, estrogens, [niacin](http://www.drugguide.com/ddo/ub/view/Davis-Drug-Guide/51539/all/niacin), phenothiazines,, and [rifampin](http://www.drugguide.com/ddo/ub/view/Davis-Drug-Guide/51664/all/rifampin) may ↑ insulin requirements.**Drug-Natural Products:**Glucosamine may worsen blood glucose control.Fenugreek, chromium, and coenzyme Q-10 may produce additive  | Intervention: Assess patient periodically for symptoms of hypoglycemia Monitor body weight periodically. Changes in weight may necessitate changes in insulin doseA1C testInstruct patient on proper technique for administration and compliance. Include type of insulin and equipment Accu chekPatient is a diabetic. |
| IpratropiumAtrovent0900 | BronchodilatorAnticholinergicInhibits cholinergic receptors in bronchial smooth muscle, resulting in decreased concentrations of cyclic guanosine monophosphate (cGMP). Decreased levels of cGMP produce local bronchodilation | **Inhaln:**Maintenance therapy of reversible airway obstruction due to COPD, including chronic bronchitis and emphysema**Intranasal:**Rhinorrhea associated with allergic and nonallergic perennial rhinitis (0.03% solution) or the common cold (0.06% solution). | 500 mcg inhalation 4 times a day | **CNS:**dizziness, headache, nervousness**EENT:**blurred vision, sore throat**nasal only:**epistaxis, nasal dryness/irritation**Resp:**bronchospasm, cough**CV:**hypotension, palpitations**GI:**GI irritation, nausea**Derm:**rash**Misc:**allergic reactions | Hypersensitivity to ipratropium, atropine, belladonna alkaloids, or bromide. Avoid use during acute bronchospasm**Use Cautiously in:**Patients with bladder neck obstruction, prostatic hyperplasia, glaucoma, or urinary retention **Geri:**May be more sensitive to effects. | Intervention: Assess for allergy to atropine and belladonna alkaloids Assess respiratory status (rate, breath sounds, degree of dyspnea, pulse Instruct patient in proper use of inhaler, nebulizer, or nasal spray and to take medication as directedPatient bladder had fallen 3 times and has been repaired |
| HeparinHep-lock0900 | Anti-coagulant | Prophylaxis and treatment of various thromboembolic disordersPotentiates the inhibitory effect of anti-thrombin on factor Xa and thrombin.PE | 5000 units= 1ml solution every 8 hours | **GI:**drug-induced hepatitis**Derm:**alopecia (long-term use), rashes, urticaria**Hemat:**BLEEDING, HEPARIN-INDUCED THROMBOCYTOPENIA (HIT) (WITH OR WITHOUT THROMBOSIS), *anemia***Local:**pain at injection site**MS:**osteoporosis (long-term use)**Misc:**fever, hypersensitivity | HypersensitivityUncontrolled bleedingSevere thrombocytopenia | Intervention: Assess for signs of bleeding and hemorrhage. Monitor aPTT tests.Report bleedingAvoid IM injectionTeach patient to identify signs of bleeding. |
| LevofloxacinLevaquin0900 | Anti-infectivesFluoroquinolonesInhibits bacterial DNA synthesis by inhibiting DNA gyrase enzyme | **PO: IV:**Treatment of the following bacterial infections:Urinary tract infections, including cystitis, pyelonephritis, and prostatitis,Respiratory tract infections, including acute sinusitis, acute exacerbations of chronic bronchitis, community-acquired pneumonia, and nosocomial pneumonia, | 250 mg = 50 ml piggyback in D5W | **CNS:**ELEVATED INTRACRANIAL PRESSURE (INCLUDING PSEUDOTUMOR CEREBRI),SEIZURES, agitation, anxiety, confusion, depression, dizziness, drowsiness, hallucinations, headache, insomnia, nightmares, paranoia, tremor**CV:**TORSADE DE POINTES, QT interval prolongation **GI:**HEPATOTOXICITY, PSEUDOMEMBRANOUS COLITIS, *nausea*, abdominal pain, diarrhea, vomiting **GU:**vaginitis **Derm:**STEVENS-JOHNSON SYNDROME, photosensitivity, rash **Endo:**hyperglycemia, hypoglycemia**Local:**phlebitis at IV site **Neuro:**peripheral neuropathy **MS:**arthralgia, tendonitis, tendon rupture **Misc:**HYPERSENSITIVITY REACTIONS INCLUDING ANAPHYLAXIS | Hypersensitivity (cross-sensitivity within class may exist)QTc interval prolongationUncorrected hypokalemia or hypomagnesemia | Intervention: Assess for infection, bowel movement, anaphylasisTeach: Take med as directedNotify provider taking theophyllinePatient has prolonged QT in EKG |
| Ondanestron ZofranPRN | AntiemeticsNauseaBlocks the effects of serotonin at 5-HT3–receptor sites (selective antagonist) located in vagal nerve terminals and the chemoreceptor trigger zone in the CNS. | Prevention of nausea and vomiting associated with highly or moderately emetogenic chemotherapy. **PO:**Prevention of nausea and vomiting associated with radiation therapy. Prevention and treatment of postoperative nausea and vomiting. | 4mg/2ml solution IV Q8 PRN | **CNS:***headache*, dizziness, drowsiness, fatigue, weakness**CV:**TORSADE DE POINTES, QT interval prolongation**GI:***constipation*, *diarrhea*, abdominal pain, dry mouth, ↑ liver enzymes**Neuro:**extrapyramidal reactions | HypersensitivityOrally disintegrating tablets contain aspartame and should not be used in patients with phenylketonuria Congenital long QT syndrome Concurrent use of apomorphine.Use with [apomorphine](http://www.drugguide.com/ddo/ub/view/Davis-Drug-Guide/51828/all/apomorphine) ↑ risk of severe hypotension and loss of consciousness; concurrent use contraindicated.Carbamazepine, [phenytoin](http://www.drugguide.com/ddo/ub/view/Davis-Drug-Guide/109077/all/phenytoin), and [rifampin](http://www.drugguide.com/ddo/ub/view/Davis-Drug-Guide/51664/all/rifampin) may ↓ levels. | Intervention: Assess patient for nausea, vomiting, abdominal distention, and bowel sounds prior to and following administration. Assess patient for extrapyramidal effects (involuntary movements, facial grimacing, rigidity, shuffling walk, trembling of hands) periodically during therapy. Monitor ECG in patients with hypokalemia or hypomagnesemia, HF, bradyarrhythmias, or patients taking concomitant medications that prolong the QT interval.Teach to take as directedPatient showed prolonged QT in EKG |

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| Potassium ChlorideKCL0800 | Mineral and electrolyte replacement | Maintain acid-base balance, isotonicity, and electrophysiologic balance of the cell Treatment/prevention of potassium depletion | 40 mEq oral 30 ml | CNS: confusion, restlessness, weaknessCV: ARRHYTHMIAS, ECG changesGI: *abdominal pain*, *diarrhea*, *flatulence*, *nausea*, *vomiting*tablets | HyperkalemiaSevere renal impairmentUntreated Addison's diseaseSome products may contain tartrazine (FDC yellow dye #5) or alcohol; avoid using in patients with known hypersensitivity or intolerance Hyperkalemic familial periodic paralysis | Intervention: Teach patient about potassium intoxication.Teach: Take as directedDo not chew enteric-coated tabletMonitor serum levelsPatient had low potassium levels |
| SertralineZoloft0900 | Antidepressantselective serotonin reuptake inhibitors | Inhibits neuronal uptake of serotonin in the CNS, thus potentiating the activity of serotonin. Has little effect on norepinephrine or dopamine. | 100mg tablet oralDaily | CNS: NEUROLEPTIC MALIGNANT SYNDROME, SUICIDAL THOUGHTS, *dizziness*,*drowsiness*, *fatigue*, *headache*, *insomnia*, agitation, anxiety, confusion, emotional lability, impaired concentration, manic reaction, nervousness, weakness, yawning EENT: pharyngitis, rhinitis, tinnitus, visual abnormalities CV: chest pain, palpitations GI: *diarrhea*, *dry mouth*, *nausea*, abdominal pain, altered taste, anorexia, constipation, dyspepsia, flatulence, ↑ appetite, vomiting GU: *sexual dysfunction*, menstrual disorders, urinary disorders, urinary frequency Derm: *↑ sweating*, hot flashes, rash F and E: hyponatremia MS: back pain, myalgia Neuro: *tremor*, hypertonia, hypoesthesia, paresthesia, twitching Misc: SEROTONIN SYNDROME, fever, thirst | HypersensitivityConcurrent MAO inhibitor therapy (may result in serious, potentially fatal reactions)Concurrent pimozideOral concentrate contains alcohol; avoid in patients with known intoleranceUse Cautiously in:Severe hepatic or renal impairment | Intervention: Assess for suicidal tendencies, especially during early therapy Monitor appetite and nutritional intake. Weigh weekly. Assess for serotonin syndromeTeach: Take as directed avoid alcohol |

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| MometasoneFormoterol1300 | Anti-inflammationcortiosteroids | To maintain patencyStabilizes and separates nasal mucosal tissue, prevents obstruction caused by adhesions and decreases edema | 200/5 mcg 2 puffs | CNS: headache Resp: *sinusitis*, bronchitisMisc: TOXIC SHOCK SYNDROME, foreign body reaction | Intolerance to mometasoneHypersensitivity to co-polymers  | Intervention: Monitor degree of nasal stuffiness, amount, and color of nasal discharge and frequency of sneezingTeach use as directed |
| ValsartanDiovan0900 | Anti-hypertensive | Blocks the vasoconstrictor and aldosterone-secreting effects of angiotensin II at various receptor sites, including vascular smooth muscle and the adrenal glands. | 160 mg tablet oral once a day | CNS: *dizziness*, fatigue, headacheCV: edema, hypotensionEENT: pharyngitis, rhinitis, sinusitisF and E: hyperkalemiaGI: abdominal pain, diarrhea, nauseaGU: impaired renal functionMS: arthralgia, back painMisc: ANGIOEDEMA | Hypersensitivity | Intervention: Assess BP and angioedema. Monitor renal labs BUN and creatinine.Teach to take meds as directed. Orthostatic hypotension.Patient had high BUN and creatinine levels |
| LevothyroxineLevoxyl0900 | Thyroid hormoneReplacement of or supplementation to endogenous thyroid hormones | Thyroid supplementation in hypothyroidism.Treatment or suppression of euthyroid goiters.Adjunctive treatment for thyrotropin-dependent thyroid cancer. | 88 mcg tablet once daily | CNS: headache, insomnia, irritabilityCV: angina pectoris, arrhythmias, tachycardiaGI: abdominal cramps, diarrhea, vomitingDerm: sweatingEndo: hyperthyroidism, menstrual irregularitiesMetabolic: heat intolerance, weight lossMS: accelerated bone maturation in children | HypersensitivityRecent MIHyperthyroidism | Intervention: Assess apical pulse and BP. Monitor thyroid tests. TSH and Thyroxine.Teach patient to take medication as directed at the same time each day.Lab results were normal for patient. |
| Insulin DetemirLevemir0900 | AntidiabeticHormoneLowers blood glucoseLong acting | Control of hyperglycemia in patients with type 1 or type 2 diabetes mellitus. |  | Endo: HYPOGLYCEMIALocal: lipodystrophy, pruritis, erythema, swellingMisc: ALLERGIC REACTIONS INCLUDING ANAPHYLAXIS | HypersensitivityHypoglycemia | Intervention: Assess patient for signs of hypoglycemia. Monitor weight. A1C test.Teach patient proper technique for administration and the importance of compliance. |
| MontelukastSingulair | BronchodilatorLeukotriene antagonist | Prevention and chronic treatment of asthma | 10 mg oral every day | CNS: Suicidal thoughts, agitation, aggression, anxiety, depression, disorientation, dream abnormalities, fatigue, hallucinations, headache, weakness | HypersensitivityInteractions with drugs that induce the CYP450 enzyme system | Intervention: Assess lung sounds, allergies, and monitor for behavior changes. Teach to use as directed and to discontinue or reduce other asthma medications |

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| MetronidazoneFlagyl | Do not crushAnti-infectiveAnti-protozoalsAnti-ulcerDisrupts DNA and protein synthesis in susceptible organisms | IV: Treatment of the following anaerobic infections:Lower respiratory tract infections,Bone and joint infections,CNS infections,Septicemia,Endocarditis. | 500mg= 100ml piggyback every 8 hours | CNS: SEIZURES, *dizziness*, *headache*, *aseptic meningitis (IV)*, *encephalopathy (IV)*GI: *abdominal pain*, *anorexia*, *nausea*, diarrhea, dry mouth, furry tongue, glossitis, unpleasant taste, vomitingNeuro: peripheral neuropathyMisc: superinfection | Hypersensitivity | Intervention: Assess for infection (vital signs; appearance of wound, sputum, urine, and stool; WBC) at beginning of and throughout therapy. Obtain specimens for culture. Monitor intake and outtake.Teach to be compliant and take as directed. Refrain from intercourse or use a condom. Avoid alcohol |
| FluticasoneAdvair Diskus0900 | Anti-inflammatorycorticosteriod | Maintenance and prophylactic treatment of asthma | 500 mcq O2 aerosoliz-ation every 12 hours puff | CNS: headache, dizzinessMS: muscle painResp: bronchospasm, cough, upper respiratory infection, wheezingANAPHYLAXIS, LARYNGEAL EDEMA, UTICARIA, BRONCHOSPASM, CHURG-STRAUSS SYNDROME and fever | Hypersensitivity and interactions with CYP3A4 inhibitors | Intervention: Monitor respiratory status and lung sounds. Monitor withdrawal symptomsTeach to take as directed and proper use of inhaler |
| Prednisone0900 | Anti-inflammatorysteroidal | Suppresses inflammation | 40 mg every day | CNS: depression, euphoria, headacheEENT: cataractsCV: hypertentionGI: PEPTIC ULCERATIONF and E: hypokalemiaHemat: THROMBOEMBOLISMMS: muscle wasting | Active untreated infections | Intervention: Monitor for signs of adrenal insufficiency and input and output.Teach correct technique of medication administration. Take missed dose as soon as possible |

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Vallerand, A. H., Sanoski, C. A., & Deglin, J. H. (2013). *Davis’s drug guide for nurses* (13th ed.). Philadelphia, PA: F. A. Davis.

Appendix B: Lab values

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| **Lab Data (per Level)** | **Description of Lab Test** | **Normal Value** | **Admission Result & Date****10/4/13** | **Recent Result &****10/7/13** | **Recent Result &****Date** | **Pathophysiology explanation of abnormal lab value, including trends and correlation with disease process** |
| WBCNeutrophils (ANC)LymphocyteMonocytes | Leukocytes in blood - fight infectionTo evaluate viral and bacterial infections and to assist in diagnosing and monitoring leukemic disorders | 4.5-11.0Wbc x 103/mm3(2.7-6.5) (50-70%)(1.5-3.7) (20-40%)(0.2-0.4) (1.7-9.3%) | **21.4****19.1****0.6****1.6** | 10.3**93.1****4.1****2.8** |  | High due to infection |
| Hemoglobin (Hgb) | Oxygen transport protein of red blood cells | 12.6-17.4 g/dl | 12 | **9.3** |  | Low renal failure, nutritional deficit, dehydration |
| Hematocrit (Hct) | Erythrocytes volume percentage in blood | 36-52 % | **35.9** | **28** |  |  |
| Platelets | Thrombocytes blood-clotting-coagulation status | 150,000-450,000/mm3 | 271 |  |  |  |
| Serum Na | Assess electrolyte balance and hydration- sodium in blood | 135-145 mEq/L | 135 | 140 |  |  |
| Serum K | Assess electrolyte balance –potassium in blood | 3.5-5.0 mEq/L | **3.2** | 3.6 |  | Low excessive insulin renal tubular acidosis |
| Serum Cl | Assess electrolytes, acid base balance, and hydration level --chloride in blood | 97-107 mEq/L | 99 | 102 |  |  |
| Serum CO2 | Assess effect of carbon dioxide levels –metabolic acid base balance  | 22-26 mmol/L | **20** | 27 |  | Low acute renal failure, anxiety- respiratory alkalosis, diabetic ketoacidosis |
| BUN | Assess renal function-blood urea nitrogen | 10-31 mg/dL | **67** | **52** |  | High due to acute renal failure, decreased renal perfusion, diabetes |
| Creatinine | Assess kidney function | 0.6-1.2 mg/dL | **4.1**  | **2.4** |  | High acute renal failure |
| Glucose | Blood sugar—evaluate carbohydrate metabolism | Less than 110 mg/dL | **188** | **294** |  | High due to diabetes |
| Ca | Calcium in blood | 8.2-9.6 mg/dL | 8.7 | **2.4** |  | Low due to alkalosis increase phosphate and decrease albumin inadequate nutrition |
| Mg | Magnesium in blood | 1.6-2.6 mg/dL | 1.6 |  |  |  |
| Prothrombin Time (PT) | Assess and monitor coagulation | Clot detection 10-13 sec | **12.7** |  |  | High in chart may be due to hospital time frame |
| International Normalized Ratio (INR) | Time it takes for blood to clot | Less than 2.0 for patients receiving anticoagulation therapy | 10/5/131.2 |  |  |  |
| Activate Partial Thromboplastin time (APTT) | Assessing coagulation disordersTo assist in assessing coagulation disorders and monitor the effectiveness of therapeutic interventions. | Clot detection 25-29 sec | 10/5/1326.5 |  |  |  |
| Liver Function Test | Assess liver or kidney function | 2.9-4.5 g/dL |  | N/A |  |  |
| Urinalysis | Test for E-Coli |  | YellowCloudyGlucose (-)Bilirubin (-)Ketone (-)Blood **3+**pH 5.0Protein **2+**Urobilinogen <2Nitrate (-)Leukocyte **2+**WBC **too many**RBC **25-50**Bacteria **4+**Epithelial Ce **2-5**Casts **2-5** |  |  | Bacteremia patient has *Klebsiella pneumoniae* |
| TB test | Determine past or present exposure to tuberculosis |  |  | N/A |  |  |
| ABGspHpO2pCO2HCO3BEOn room air or what % O2D-dimerGlucose fastingGFRTSHThyroxineBlood culture | To assess oxygenation and acid base balanceTo assist in diagnosing a diffuse state of hypercoagulation as seen in disseminated intravascular coagulation (DIC), acute myocardial infarction (MI), deep venous thrombosis (DVT), and pulmonary embolism (PE).To assist in the diagnosis of diabetes and to evaluate disorders of carbohydrate metabolism such as malabsorption syndromeTo assess kidney function found in acute and chronic renal failure, related to drug reaction and disease such as diabetes.To evaluate thyroid gland function related to the primary cause of hypothyroidism and assess for congenial disorders, tumor, cancer, and inflammation.To identify pathogenic bacterial organisms | 0–3 nmol/LLess than 100 mg/dL45–98 micromol/L0.5-8.9 micro-international unit/ml | **210****11&**1.37 | N/A**253****21&**1.18 |  | High due to Type 2 diabetes Low due to less volumeGram negative bacilli  *Klebsiella pneumoniae* |

Van Leeuwen, A. M., Poelhuis-Leth, D., & Bladh, M. L. (2011). *Davis’s comprehensive handbook of*

*laboratory and diagnostic tests with nursing implications* (4th ed.). Philadelphia, PA: F. A. Davis.

Appendix C: Diagnostic Test

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| **Tests** | **Purpose of Test****(For THIS patient)** | **Date of Test** | **Test Results**  |
| EKG | To evaluate the electrical impulse generated by the heart during the cardiac cycle to assist with diagnosis of cardiac arrhythmias, block damage, enlargement, and infection | 10/4/13 | Sinus rhythm with short PR. Nonspecific ST and T wave abnormality. Prolonged QT. Abnormal ECG |
| CH-Chest | Visualize and assess heart and surrounding structure for abnormalities, defect, aneurysm, tumor abscess, and metastasis | 10/4/13 | Lung volume are low. No pneumothorax or pleural effusion. Prominent cardiac silhouette. Enlargement of the cardiac silhouette |
|  |  |  |  |
| CH-Chest  | -To assist in the evaluation of cardiac, respiratory, skeletal structures with lung cavity and diagnose multiple diseases | 10/4/13 | Heart normal size. Left lung clear except minor linear scarring. Post-operative change (L) shoulder arthroplasty and sternotomy noted. |
| Echocardiogram | To visualize and assess structures within the thoracic cavity such as the heart, lungs, and mediastinal structures to evaluate for aneurysm, cancer, tumor, and infection. Used as an evaluation tool for surgical, radiation, and medical therapeutic interventions | 10/5/13 | Normal sinus rhythm. Borderline concentric (L) ventricular hypertrophy |
| CH-Chest | To assist in the evaluation of cardiac, respiratory, skeletal structures with lung cavity and diagnose multiple disease  | 10/5/13 | Partial clearing of infiltrate at right base. Tiny pleural effusions are present. No pneumothorax. Mediastinal contours have significantly changed. A sternotomy and a left shoulder arthroplasty has been performed |

**References:**

Van Leeuwen, A. M., Poelhuis-Leth, D., & Bladh, M. L. (2011). *Davis’s comprehensive handbook of laboratory and diagnostic tests with nursing implications* (4th ed.). Philadelphia, PA: F. A. Davis.

Appendix D: Links to Articles

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