Appendix L: Chart found on page 114-121 of original guideline Nursing Care of Dyspena: The 6th Vital Sign in Individuals with Chronic Obstructive Pulmonary Disease (COPD) has been replaced with the chart below.

Medications	Actions	Side Effects	Pharmacokinetics	Nursing Considerations
Short acting β2 agonists:				
salbutamol • Airomir® MDI (HFA) 100 µg • Ratio-Salbutamol® MDI (HFA) 100 µg • Alti-Salbutamol® MDI (HFA) 100 µg • Ventolin® Diskus® PD 200 µg • Ventolin® MDI (HFA) 100 µg • Ventolin® Nebuamp® Wet Nebulization 1.25 or 2.5 mg	• Promotes bronchodilation through stimulation of 2-adrenergic receptors thereby relaxing airway smooth muscle **Onset of action:** a few minutes **Peaks:** 15-20 minutes **Duration:** 2-4 hours, fenoterol up to 8 hours	• tremor • tachycardia • headache • nervousness • palpitations • insomnia	salbutamol **Absorption:** 20% inhaled, well absorbed (PO) **Distribution:** 30% inhaled, crosses blood brain barrier, crosses placenta **Metabolism:** liver extensively, tissues **Excretion:** mostly urine, feces, breast milk **Half-Life:** 4-6 hrs	First Line Medication for treatment of dyspnea.
terbutaline • Bricanyl® Turbuhaler® PD 500 µg			terbutaline **Absorption:** partially absorbed (PO), minimal (inhalation) **Distribution:** crosses placenta **Metabolism:** liver, gut wall **Excretion:** bile, feces, urine, breast milk **Half-Life:** unknown	
fenoterol • Berotec® MDI 100 µg • Berotec® vials Wet Nebulization 0.25 mg/ml, 0.625 mg/ml			fenoterol **Absorption:** inhalation, minimal; incomplete PO **Distribution:** unknown **Metabolism:** liver, 90% **Excretion:** breast milk, kidney 12% **Half-Life:** 7 hours	
formoterol • Oxeze® Turbuhaler® PD 6 µg and 12 µg • Foradil® PD 12 ug			formoterol **Absorption:** rapid, lung deposition 21-37% **Distribution:** plasma protein binding approximately 50% **Metabolism:** liver, extensive **Excretion:** 10% unchanged in urine **Half-Life:** approximately 8-10 hours	

Anticholinergic:				
ipratropium bromide • Atrovent® MDI 20 µg • Atrovent® Wet Nebulization 125 µg/ml and 250 µg /ml	An anticholinergic drug that has been shown to have bronchodilator properties • Reduces vagal tone to the airways **Onset of action:** 5 – 15 minutes **Peaks:** 1 – 2 hours **Duration:** 4 – 5 hours	• dry mouth • bad taste • tremor	ipratropium bromide **Absorption:** minimal **Distribution:** does not cross blood-brain barrier **Metabolism:** liver, minimal **Excretion:** urine feces **Half-Life:** 3-5 hrs	Avoid contact with eyes. Use a holding chamber.
tiotropium bromide • Spiriva for oral inhalation only • 18 µg tiotropium light green capsule • HandiHaler is an inhalation device used to inhale the dry powder contained in the capsule	• An anticholinergic drug that inhibits M3-receptors at the smooth muscle leading to bronchodilation **Onset of action:** 30 minutes **Peaks:** 1 – 4 hours **Duration:** 24 hours **Half Life:** 5 – 7 days	• dry mouth • constipation • ⇧heart rate • blurred vision • urinary retention • glaucoma	tiotropium bromide **Absorption:** highly bioavailable in the lung, poorly absorbed from the GI tract **Distribution:** does not cross blood-brain barrier **Metabolism:** liver, minimal **Excretion:** urine feces **Half-Life:** 5-7 days	Contraindicated in patients with hypersensitivity to atropine or its derivatives or lactose monohydrate. Administer at the same time each day. Capsules sensitive to light and moisture. Avoid contact with eyes.
Methylxanthine:				
aminophylline • Phyllocontin SRT theophylline • Apo-Theo-LA SRT • Novo-Theophyl SRT • Theochron SRT • Theolair SRT 24-Hour: theophylline • Uniphyl	• Relaxes airway smooth muscle • May have some anti-inflammatory effect • Patients may benefit even when serum levels are low	• Usually caused by a high drug serum concentration or the patient's inability to tolerate the drug and include: • upset stomach with heartburn • nausea • diarrhea • loss of appetite • headaches • nervousness • insomnia • tachycardia • seizures	theophylline **Absorption:** well absorbed (PO), slowly absorbed (extended release) **Distribution:** crosses placenta, widely distributed **Metabolism:** liver **Excretion:** kidneys, breast milk **Half-Life:** 3-13 hrs, increased in liver disease, CHF and elderly; decreased in smokers Several drug interactions include: • antibiotics Therapeutic Range: 29-55 umol/L	Take with food or after meals. Monitor blood serum.

Inhaled/ Oral Steroids:				
Glucocorticosteroids (Inhaled): beclomethasone • Alti-beclomethasone® MDI (CFC) 50 g • QVAR® MDI(HFA) 50 µg, 100 µg	• Prevents and suppresses activation and migration of inflammatory cells • Reduces airway swelling, mucus production, and microvascular leakage • Increases responsiveness of smooth muscle beta receptors	Inhaled route • sore throat • hoarse voice • thrush	beclomethasone **Absorption:** 20% **Distribution:** 10-25% in airways (no spacer) **Metabolism:** minimal **Excretion:** less than 10% in urine/feces **Half-Life:** 15 hrs	Rinsing, gargling and expectorating after inhalation can minimize these side effects. A spacer should be used with MDIs to reduce side,effects. Assess denture fit to avoid thrush. Rinse mouth, also prior to reinsertion of dentures. May irritate gum line and medication deposits may accumulate in improper fitting dentures.
budesonide • Pulmicort® Nebuamp® Wet Nebulization 0.125 mg/ml, 0.25 mg/ml and 0.5 mg/ml • Pulmicort® Turbuhaler® PD100 µg, 200 µg, and 400 µg			budesonide **Absorption:** 39% **Distribution:** 10-25% in airways (no spacer) **Metabolism:** liver **Excretion:** 60% urine, smaller amounts in feces **Half-Life:** 2-3 hrs	
Ciclesonide *Not indicated for COPD at this time • Alvesco® MDI 100ug, 200ug	• Ciclesonide is a nonhalogenated, glucocorticoid prodrug that is hydrolyzed to the pharmacologically active metabolite des-ciclesonide following administration. • Des-ciclesonide has a high affinity for the glucocorticoid receptor and exhibits anti-inflammatory activity.	Same as other inhaled corticosteroids.	Ciclesonide is presented in HFA –134a propellant and ethanol as a solution aerosol. **Absorption:** > 50% (active metabolite) **Distribution:** protein binding 99%, lung deposition - 52% **Metabolism:** ciclesonide hydrolyzed to active metabolite, des-ciclesonide via esterases in lungs, further metabolism via hepatic CYP3A4 and 2D6 **Excretion:** feces (78%) **Half-Life:** 6 hours	
fluticasone • Flovent® Diskus® PD 50 µg, 100 µg, 250 µg, and 500 µg • Flovent® MDI(HFA) 50 µg, 125 µg, and 250 µg			fluticasone **Absorption:** 30% aerosol, 13.5% powder **Absorption:** 10-25% in airways (no spacer), 91% protein binding **Metabolism:** liver **Excretion:** less than 5% in urine, 97-100% in feces **Half-Life:** 14 hrs	Promote good dental hygiene.
Glucocorticosteroids (oral): prednisone • Prednisone 5 mg and 50 mg tablets • Deltasone® 5 mg and 50mg tablets methylprednisolone • Medrol® 4 mg tablets and 16 mg tablets		Oral or IV route-short term (less than 2 weeks): • weight gain • increased appetite • mood changes • easy bruising • muscle cramps • mild reversible acne	prednisone **Absorption:** well absorbed **Distribution:** widely distributed; crosses placenta **Metabolism:** liver, extensively **Excretion:** urine, breast milk **Half-Life:** 3-4 hrs	Assess baseline bone density. Dietary education (calcium, protein) Promote eye/dental health and regular eye/teeth examinations.

Corticosteroids (intravenous): • methylprednisolone • SoluCortef ® • SoluMedrol ®		Oral route-long term (more than 2 weeks): • adrenal suppression • immune-suppression • osteoporosis • hyperglycemia • hypertension • weight gain • cataracts • glaucoma • peptic ulcer • ecchymosis • avascular necrosis of the hip	IV steroids: **Absorption:** rapid **Distribution:** widely distributed **Metabolism:** liver **Excretion:** urine **Half-Life:** 18 to 36 hrs, depending on the drug	Monitor glucose level Skin care education re: dry, thin, bruising. Avoid use of adhesive bandages. Use Vitamin E lotion.
Long-Acting β2 agonists:				
formoterol • Oxeze® Turbuhaler® PD 6 µg and 12 µg • Foradil® PD 12 µg	• Promotes bronchodilation through stimulation of 2-adrenergicreceptors thereby relaxing airway smooth muscle formoterol **Onset of action:** 1-3 minutes **Duration:** 12 hours	• tremor • tachycardia • headache • nervousness • palpitations • insomnia	formoterol **Absorption:** rapid, lung deposition 21-37% **Distribution:** plasma protein binding approximately 50% **Metabolism:** liver, extensive **Excretion:** 10% unchanged in urine **Half-Life:** approximately 8-10 hours	
salmeterol • Serevent® Diskus® PD 50 µg • Serevent® MDI(HFA) 25 µg	salmeterol **Onset of action:** 10-20 minutes **Duration:** 12 hours		salmeterol **Absorption:** minimal systemic **Distribution:** local **Metabolism:** liver first pass **Excretion:** unknown **Half-Life:** 5.5 hrs	
Combination Drugs:				
Two bronchodilators: ipratropium bromide and salbutamol • Combivent Wet Nebulization 0.5mg ipratropium/ 3 mg salbutamol per 2.5 ml vial	• the same as those listed for each medication separately			Dry Mouth-Rinse mouth due to dryness.
Long-acting bronchodilators and inhaled steroids: budesonide and formoterol • Symbicort® Turbuhaler® PD 100/6 βg, 200/6 βg fluticasone and salmeterol • Advair® Diskus® PD 100/50 µg, 250/50 µg, 500/50 µg • Advair® MDI(HFA) 125/25 µg, 250/25 µg				Rinse mouth postinhalation to prevent thrush.

Macrolides/Anti-Infectives:				
clarithromycin (Biaxin) • PO 250-500 mg bid x 7-14 days	Binds to 50S ribosomal subunits of subunits of susceptible bacteria and suppresses protein synthesis	• hepatotoxicity • dizziness • headache • nausea • diarrhea • constipation	**Absorption:** 50% **Distribution:** widely distributed **Metabolism:** liver **Excretion:** kidney's unchanged (20%-30%) **Half-Life:** 4-6 hrs	Be aware whether the antibiotic the patient is prescribed is to be taken with or without food. Determine if the patient has a sensitivity or allergy to the prescribed medication.
azithromycin (Zithromax) • PO 500 mg on day 1 then 250mg qd on days 2-5 for a total dose of 1.5 g • IV 500 mg qd > 2 days then 250 mg qd to complete 7-10 day therapy (community acquired pneumonia)	• Binds to 50S ribosomal subunits of subunits of susceptible bacteria and suppresses protein synthesis, much greater spectrum of activity than erythromycin	• palpitations • chest pain • dizziness • headache • tremors • nausea • diarrhea • hepatotoxicity	**Absorption:** rapid, (PO) up to 50% **Distribution:** widely distributed **Metabolism:** unknown, minimal metabolism **Excretion:**unchanged (bile); kidney's, minimal **Half-Life:** 11-70 hrs	
erythromycin • PO 250-500 mg q6h (base, estolate, state), PO 400-800 mg q6h (ethylsuccinate) • IV inf 15-20 mg/kg/day (lactobionate) divided q6h	• Binds to 50S ribosomal subunits of subunits of susceptible bacteria and suppresses protein synthesis	• anaphylaxis • dysrhythmias • vaginitis • nausea • vomiting • diarrhea	**Absorption:** well absorbed (PO), minimally absorbed (topically, ophthalmic) **Distribution:** widely distributed; minimally distributed (CSF); crosses placenta **Metabolism:** liver partially **Excretion:** unchanged (bile); kidney's, minimal unchanged **Half-Life:** 1-3hrs	
amoxicillin (Amoxil) • PO 750 mg-1.5g qd in divided doses q8h	• Interfers with cell wall replication of susceptible organisms by binding to the bacterial cell wall, the cell wall, rendered osmotically unstable, swells and bursts from osmotic pressure	• anaphylaxis • anemia • uticaria • bone marrow depression • dizziness • headache • fever • nausea • diarrhea	**Absorption:** well absorbed (90%) **Distribution:** readily in body tissues, fluids, CSF; crosses placenta **Metabolism:** liver (30%) **Excretion:** breast milk, kidney, unchanged (70%) **Half-Life:** 1-1.3hrs	
doxycycline (Doxy, Doxycin) • PO/IV 100 mg q12h on day 1 then 100mg/day; IV 200mg in 1-2 infusion on day 1 then 100-200mg/day	• Inhibits protein synthesis, phosphorylation in microorganisms by binding to 30S ribosomal subunits, reversibly binding to 50S ribosomal subunits, bacteriostatic	• vomiting • fever • diarrhea • pericarditis • increased BUN • hemolytic anemia	**Absorption:** well absorbed **Distribution:** widely distributed; crosses placenta **Metabolism:** some hepatic recycling **Excretion:** bile, feces, kidney, unchanged (20%-40%) **Half-Life:** 15-22 hours; increased in severe renal disease.	
ciprofloxacin (Cipro) • For respiratory infections PO 500 mg q12h	• Interferes with conversion of intermediate DNA fragments into high-molecular-weight DNA in bacteria; DNA gyrase inhibitor	• headache • dizziness • nausea • rash • vomiting • diarrhea	**Absorption:** well absorbed (75%) (PO) **Distribution:**widely distributed **Metabolism:** liver (15%) **Excretion:** kidneys (40-50%) **Half-Life:** 3-4 hr; increased in renal disease	Monitor for Achilles Tendonitis

Fluoroquinolone/Antibacterial:				
moxifloxacin (Avelox) • PO/IV 400 mg daily for 7-14 days	• Bacterialcidal, interferes with DNA replication, repair, transcription and recombination in susceptible gramnegative and gram-positive bacteria, preventing cell reproduction and leading to cell death	• nausea • headache • insomnia • diarrhea • tendon inflamation, rupture	**Absorption:** unknown **Distribution:** crosses placenta **Metabolism:** liver **Excretion:** feces, urine **Half-Life:** 12-13.5 hrs	Allergy to fluoroquinolones Hypokalemia Hepatic impairment Monitor for tendon inflamation, rupture
Psychotropics:				
buspirone (BuSpar) • PO 5 mg tid; may increase by 5 mg/day q2-3 days not to exceed 60 mg/day	• Acts by inhibiting the action of serotonin by binding to serotonin and dopamine receptors also increases norepinephrine metabolism	• hyperventilation • chest congestion • shortness of breath • tachycardia • palpitations • hypertension • hypotension • dizziness • headache • tremors • nausea • diarrhea • constipation	**Absorption:** rapidly absorbed **Distribution:** unknown **Metabolism:** liver extensively **Excretion:** feces **Half-Life:** 2-3 hours	
chlorpromazine (Chlorpromanyl) • PO 10-50 mg q1-4h initially then increase up to 2g/day if necessary • IM 10-50 mg q1-4h • In elderly, use lowest effective dose	• Depresses cerebral cortex, hypothalamus, limbic system, which control activity aggression, blocks neurotransmission produced by dopamine at synapse, exhibits a strong alphaadrenergic, anticholinergic blocking action, mechanism for antipsychotic effects is unclear.	• respiratory depression • dyspnea • laryngospasm • cardiac arrest • orthostatic hypotension • tachycardia • headache • akathisia • dystonia	**Absorption:** variable PO, well absorbed IM **Distribution:** widely distributed; crosses placenta **Metabolism:** liver, GI mucosa extensively **Excretion:** kidneys **Half-Life:** 30 hours	
Opioids **Opioid Analgesics:**				
Morphine (Morphine sulfate) • SC/IM 4-15 mg q4h prn • PO 10-30 mg q4h prn; ext rel q8-12h; rectal 10-20 mg q4h prn • IV 4-10 mg diluted in 4-5 ml water for injection, over 5 min	• Depresses pain impulse transmission at the spinal cord level by interacting with opioid receptors, produces CNS depression	• constipation • respiratory depression • drowsiness • dizziness • confusion • sedation • bradycardia • hypotension • nausea • vomiting • constipation • urinary retention	**Absorption:** variably absorbed (PO); well absorbed (IM, SC, rectally); completely absorbed IV **Distribution:** widely distributed, crosses placenta **Metabolism:** liver extensively **Excretion:** kidneys **Half-Life:** 1.5- 2 hours	Nebulized opioids are almost exclusively used in palliative care in patients with end-stage COPD.

hydromorphone (Dilaudid) • Antitussive PO 1 mg q3-4h prn • Analgesic PO 2 mg q3- 6h prn, may increase to 4 mg q4-6h • SC/IM 1-2 mg q3-6h prn, may increase to 3-4 mg q4-6h • IV 0.5-1mg q3h prn; rec 3 mg q4-8h prn	• Depresses pain impulse transmission at the spinal cord level by interacting with opiod receptors, increases respiratory tract fluid by decreasing surface tension and adhesiveness, which increases removal of mucus, analgesic, antitussive	• respiratory depression • drowsiness, dizziness • confusion • sedation • bradycardia • hypotension • nausea • vomiting • constipation	**Absorption:** well absorbed (PO); completely absorbed IV **Distribution:** unknown, crosses placenta **Metabolism:** liver extensively **Excretion:** kidneys **Half-Life:** 2-3 hours	Give injection when not contraindicated (e.g., egg allergy, thimersol sensitivity)
Vaccination:				
Influenza Vaccination • 0.5ml IM	• Inhibits influenza virus neuraminidase with possible alteration of virus particle aggregation and release	• pain and/or erythema at injection site • anaphylaxis	**Absorption:** rapidly absorbed **Distribution:** protein binding is low **Metabolism:** converted to oseltamivir carboxylate **Excretion:** eliminated by conversion **Half-Life:** 1-3 hours	Revaccination recommended for high risk patients every 5-10 years/
Pneumo 23 (Pneumococcal Polysaccharide Vaccine) • IM/SC immunizing dose is a single injection of 0.5ml • Revaccination: One injection of 0.5ml		• pain and/or erythema at the injection site • headache • general malaise • uticaria • anaphylaxis reaction		Allergy to any components of the drug. COPD Asthma
Pneumovax 23 (Pneumococcal Vaccine) • Administer a single 0.5ml dose of the vaccine SC or IM (preferably in the deltoid muscle or lateral thigh)		• pain and/or erythema at the injection site • headache • low grade fever anaphylaxis reaction		
Antiviral:				
Zanamivir (Relenza) Oral inhalation 5mg/blister (4 blisters per Rotadisk), packaged with Diskhaler inhalation device 2 inhalations (10mg) twice daily x 5 days. Begin within 2 days of signs or symptoms.	• Selectively inhibits influenza virus neuroam-inidase; by blocking the action of this enzyme, there is decreased viral release from infected cells, increased formation of viral aggregates, and decreased spread of virus	• headache • nausea • diarrhea • bronchospasm-use cautiously with patients with asthma or COPD-Fast acting bronchodilator should be on hand	**Absorption:** inhalation 4% - 17% **Distribution:** protein binding, plasma<10% **Metabolism:** liver **Excretion:** feces and urine **Half-Life:** 2.5-5 hrs	
osteltamivir (Tamiflu) • PO 75 mg x 5 days begin treatment within 2 days of onset of symptoms	• Inhibits influenza virus neuraminidase with possible alteration of virus particle aggregation and release	• headache • fatigue • nausea • vomiting • diarrhea • cough • abdominal pain	**Absorption:** rapidly absorbed **Distribution:** protein binding is low **Metabolism:** converted to oseltamivir carboxylate **Excretion:** eliminated by conversion **Half-Life:** 1-3 hours	