

BASIC PHARMACOTHERAPEUTICS

Ms. Sears's Medications

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Basic Pharmacotherapeutics

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1. **Why are these medications ordered** for Ms. Sears? What is the **therapeutic effect** of each medication? (How do they work?)

<p>Ancef (cefazolin) Anti-infective First generation cephalosporin</p>	<p>Ancef was ordered for Ms. Sears to treat the cellulites in her left leg. Ancef is an anti-infective cephalosporin used for “skin and skin structure infections.” The therapeutic effects of Ancef are to “bind to bacterial cell wall membrane, causing cell death” and decreasing inflammation (Vallerand &amp; Sanoski, 2015, p. 284).</p>
<p>Elavil (amitriptyline) Tricyclic antidepressant</p>	<p>Elavil was ordered for Ms. Sears primarily to treat her Depression. It may also help to alleviate the client’s <u>migraine headaches</u> as it has an “unlabeled use [for] chronic pain ... headaches” (Vallerand &amp; Sanoski, 2015, p. 142). According to Vallerand &amp; Sanoski (2015), Elavil works on the body to “potentiate the effect of serotonin and norepinephrine in the CNS” (p. 142); therefore, its therapeutic effect is to treat depression.</p>
<p>calcium carbonate (Amitone) Mineral Supplement</p>	<p>Calcium carbonate was prescribed for Ms. Sears for her osteoporosis. The therapeutic effect of calcium carbonate is “replacement of calcium in deficiency states; therefore, preventing further bone degeneration” (Vallerand &amp; Sanoski, 2015, p. 256).</p>
<p>Vitamin D (cholecalciferol) Fat-soluble Vitamin</p>	<p>Vitamin D was ordered for Ms. Sears for her osteoporosis. Cholecalciferol is an inactive form of <u>Vitamin D3</u>. It requires activation by the kidneys and the liver to convert into <u>Vitamin D3</u>. Vitamin D promotes the intestinal absorption of calcium. The therapeutic effect of</p>

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	<p>vitamin D is its “treatment and prevention of deficiency states, particularly bone manifestations” (Vallerand &amp; Sanoski, 2015, p.1266).</p>
<p>Actonel (risedronate) Biphosphate bone reabsorption inhibitor</p>	<p>Actonel was ordered for Ms. Sears to <del>treat</del> the osteoporosis she is diagnosed with. The action of this drug, according to Vallerand (2015), is that it “inhibits bone reabsorption by binding to bone hydroxyapatite, which inhibits osteoclast activity” (p.1085). The therapeutic effect of this drug is to <u>reverse the progression of osteoporosis and lessen the risk for fractures</u> (Vallerand &amp; Sanoski, 2015, p.1085).</p>
<p>Vagifem (estradiol) Estrogen Hormone</p>	<p>Ms. Sears’ uses Vagifem as an <u>Osteoporosis treatment</u>. Vagifem helps replace estrogen and can be used for “treatment and prevention of postmenopausal osteoporosis (not vaginal dose forms)” (Vallerand &amp; Sanoski, 2015, p.515-516). The therapeutic effect of the medication is to restore hormone balance in numerous deficiency states.</p>
<p>Imitrex (SUMAtriptan) 5-HT Vascular Headache Suppressant Agonist</p>	<p>Imitrex was ordered for Ms. Sears because she occasionally complains of <u>migraine headaches</u>. The therapeutic effects of this drug are to relieve “acute attacks of migraine” (Vallerand &amp; Sanoski, 2015, P. 1145). The medication causes vasoconstriction in the <u>arteries of the brain</u>, acting as an agonist against her migraines.</p>
<p>metFORMIN (Glycon) Antidiabetic</p>	<p>This drug is used to <u>treat Ms. Sears’s type two diabetes mellitus</u>. Metformin decreases hepatic glucose production and intestinal glucose absorption and also increases the body’s sensitivity to insulin. Diabetes can be managed in this way because the <u>glucose levels in the blood</u> are balanced (Vallerand &amp; Sanoski, 2015, p.810). The therapeutic effect of</p>

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	metformin is to balance blood glucose levels.
Buffered Aspirin (salicylates) Antipyretic Non-Opioid Analgesics	Ms. Sears uses Aspirin for her migraine headaches. She may also be taking Aspirin for any pain she may have related to her osteoporosis.  Buffered Aspirin is a salicylate acid that has therapeutic effects of reducing fever, inflammation and pain. As well as its therapeutic effects, it also inhibits production of prostaglandins to reduce inflammation and fever (Vallerand & Sanoski, 2015, p.1103).

2. Indicate the **safe dosages** for the medications ordered. **Are the** dosages and routes for this client **safe**?

Ancef	According to Vallerand & Sanoski (2015), the recorded dose for a “moderate to severe infection [is] 500 mg-2g every 6-8 hours; maximum 12 g p/day” (p. 285). Maggie’s dose will provide her with 1500 mg each day by IV; therefore, her dosage and route are safe.
Elavil	According to Vallerand & Sanoski (2015), Elavil is typically prescribed in 75 mg to a maximum of 300 mg (in hospital patients) or given as “50-100 mg at bedtime” (p. 142). Ms. Sears has been prescribed 50 mg, orally, each night at bedtime; therefore, her dosage and route for this medication are safe.
Calcium Carbonate	According to Vallerand & Sanoski (2015), safe dosage for calcium carbonate in the treatment of osteoporosis is 1000-2000 mg of elemental calcium (2500 – 5000 mg of calcium carbonate). Ms. Sear’s dose is 1000

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	<p>mg of calcium carbonate (400 mg elemental calcium) by mouth, once a day. Her dosage and route are safe (Vallerand &amp; Sanoski, 2015, p. 256).</p>
Vitamin D	<p>Safe dosage of vitamin D in adults is 400-1000 IU each day. Maggie's oral dose is 1000 IU every day; therefore, her route and dosage are safe (Vallerand &amp; Sanoski, 2015, p. 1267).</p>
Actonel	<p>The safe oral dosage of Actonel for adults is 5 mg daily or 35 mg, orally, once a week. Ms. Sears is ordered to take one 35 mg tablet per week, by mouth. The dosage and route ordered is safe for her to take (Vallerand &amp; Sanoski, 2015, p.1085).</p>
Vagifem	<p>The route for this client is not safe because according to Vallerand &amp; Sanoski (2015), vaginal dose forms of this medication are not used to treat osteoporosis (p.515). On the other hand, the dose of 10 mcg is safe for an adult when the tablet is taken once daily for two weeks and then twice weekly (Vallerand &amp; Sanoski, 2015, p.516).</p>
Imitrex	<p>Safe dosage and route for Imitrex in an adult is initially 25 mg by mouth. If there is no response to the medication in two hours, up to 100 mg can be given. If the headache does not subside, then doses may be repeated every two hours, without exceeding 300 mg/day (Vallerand &amp; Sanoski, 2015, p.1145). Ms. Sears' order is to take Imitrex at 75 mg, by mouth, every four hours as needed, without exceeding two doses each day. Both Ms. Sears' route and dose will be safe.</p>
Metformin	<p>The safe dose for adults and children older than 17 years of age is an oral tablet of 500 mg twice daily. It may be increased by 500 mg at weekly</p>

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	<p>intervals up to 2000 mg/day. The medication can be given in three divided doses not exceeding 2500 mg/day, if more than 2000 mg/day is required (Vallerand &amp; Sanoski, 2015, p.810). Ms. <del>Sears</del>' order of metformin is 750 mg PO TID with meals. This medication is safe for the patient because the medication ordered is within safe dose for an <del>adult</del>. The route of the medication is safe as well.</p>
Buffered Aspirin	<p>The recommended dose for buffered Aspirin is 325-1000 mg, by mouth, every 4 to 6 hours, not exceeding 4 g/day (<del>Vallerand &amp; Sanoski, 2015, p.1104</del>). Ms. Sears' order for the medication is 650 mg, orally, every six hours as needed. When converting grams to milligrams, 4 g/day of the medication equals 4000 mg/day. So, when 650 mg of the medication ordered is multiplied by 4 (which is the <del>number of times a day the medication is to be taken</del>) the answer will be 3900 mg/day, which is within the recommended dose of 4000 mg/day. For Ms. Sears, the ordered dose and route of the medication is safe.</p>

3. What would you do if the dosage ordered was **not safe**?

If a nurse on duty sees a medication order which he or she feels is not safe, the medication must not be given. The health care professional who prescribed the order, as well as the charge nurse, should be notified. Medication calculations should be confirmed and validated by a coworker. A prescription must be written for the correct dose or dosage for this resident as soon as possible. Above all, "you [as a nurse] are professionally obligated to contact the prescriber for verification [when] a prescriber orders a drug that you identify as contraindicated ... [when] the ordered dose

exceeds the recommended limits, or the ordered route is contraindicated for the client” (Potter & Perry, 2009, p.695).

4. Indicate **potential drug interactions** based on the medications ordered.

Ancef	According to Vallerand & Sanoski (2015), Ancef must not be taken with “Probenecid [because] it may decrease excretion and increase blood levels of ... cephalosporins” (p. 285), causing toxicity.
Elavil	Ms. Sears has been “smoking half a pack of cigarettes a day and has since she was a teenager.” “Nicotine may increase metabolism [of Elavil] and alter [it’s] effects” (Vallerand & Sanoski, 2015, p. 143). Additionally, Mr. Sears’ use of St. John’s Wort oil for the skin inflammation on her left leg may “decrease serum concentrations and efficacy” of the Elavil (Vallerand & Sanoski, 2015, p. 143).
Calcium Carbonate	Calcium carbonate may interact with the vitamin D to increase the client’s “risk of hypercalcemia” (Vallerand & Sanoski, 2015, p. 256).
Vitamin D	Ms. Sears’ use of both vitamin D and calcium carbonate increases her “risk of hypercalcemia” (Vallerand & Sanoski, 2015, p. 1266).
Actonel	The calcium supplement ordered for Ms. Sears will decrease the absorption of Actonel if taken within two hours of each other. Also the use with aspirin increases the chance of gastrointestinal irritation. Actonel should be administered 30 minutes before meals since food decreases absorption of the medication (Vallerand & Sanoski, 2015,

	p.1085).
Vagifem	A relevant interaction which may occur is that between the client Vagifem and her nicotine intake: cardiovascular reactions are at an increased risk. Also according to Vallerand & Sanoski (2015), drug-drug interactions “may alter requirement for warfarin, oral hypoglycemic agents or insulins” (p.518).
Imitrex	According to Vallerand & Sanoski (2015), there are no drug interactions with Imitrex based on the medications ordered (p.1145). However, her use of Imitrex with St. John’s Wort Oil may cause serotonergic side effects, including serotonin syndrome (Vallerand & Sanoski, 2015, p.1145).
Metformin	According to Vallerand & Sanoski (2015), there are no drug interactions with metformin based on the medications ordered (p.810).
Buffered Aspirin	Buffered Aspirin may increase activity of oral hypoglycemic agents (Vallerand & Sanoski, 2015, p.1104).

5. What **primary assessments** are required prior to administration of these medications?

Ancef	Primary assessments I would perform include a history of “any previous use of [or reactions to] penicillins or cephalosporins” as well as a skin assessment for infection. I would also obtain a C&S, vital signs, and a WCB count before beginning therapy with Ancef, to procure a baseline and to monitor for infection (Vallerand & Sanoski, 2015, p.285-286).
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Elavil	<p>According to Vallerand &amp; Sanoski (2015), treatments that should be performed before beginning Elavil include <del>recording</del> a baseline of Ms. Sears' weight, BMI, Vitals, and to monitor her blood pressure (p. 143). I would also perform an assessment to gauge her level of depression, <u>thoughts of suicide</u>, and <u>anxiety</u> so I will have a better idea of how the medications are helping, or not helping, her.</p>
Calcium Carbonate	<p>Before treatment begins, client should be observed for signs of hypocalcemia ("paresthesia, muscle twitching, laryngospasm, cardiac arrhythmias...") and blood should <del>be</del> taken to detect serum calcium levels (Vallerand &amp; Sanoski, 2015, p.257).</p>
Vitamin D	<p>According to Vallerand &amp; Sanoski (2015), the primary assessments I would obtain include blood work to assess for vitamin and mineral deficiency, vital signs and a history of bone pain or weakness (p.1268). This will help to assess her osteoporosis, <del>her</del> pain levels, and also to ensure safe drug levels in her body.</p>
Actonel	<p>According to Vallerand &amp; Sanoski (2015), it is important to "assess patients via bone density study for low bone <del>mass</del> before and periodically during therapy" (p.1085). This is in order to monitor the effectiveness of Actonel on Ms. Sears' osteoclast activity. Assessment of pain and taking vital signs is important as well. Since calcium interferes with absorption of risedronate, Actonel should be taken at a different time with food. Ms. Sears takes calcium supplements; therefore, checking the last time she took the <del>supplements</del> would be</p>

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	<p>helpful in determining whether to give Actonel or waiting for the right time to administer the medication (Vallerand &amp; Sanoski, 2015, p.1086).</p>
Vagifem	<p>The primary assessment necessary before giving this medication is to check the <u>patient's blood pressure</u>, not only before giving the medication but also periodically afterwards. This is because hypertension is one of the adverse effects of estrogen. The patient should be weighed weekly and intake and output ratios should be monitored to gauge for <u>positive or negative effects</u> for Ms. Sears. The frequency and severity of <u>vasomotor symptoms</u> should also be assessed (Vallerand &amp; Sanoski, 2015, p.516). Patient's allergic status should be checked prior to administering the medication, to prevent allergic reactions to the drug (Lilly, Harrington, &amp; Snyder, 2011, p.632).</p>
Imitrex	<p>Assessment of "pain location, intensity, duration, and associated symptoms (photophobia, <u>phonophobia</u>, nausea, vomiting) during migraine attack" should be practiced to gauge extent of pain and the medications' <u>therapeutic effects</u> (Vallerand &amp; Sanoski, 2015, p.1146). Patient's blood pressure should be monitored before and for 1 hour after administration of the drug to monitor the body's response. Monitoring ECG for <u>ischemic changes</u> should be followed if angina occurs (Vallerand &amp; Sanoski, 2015, p.1146).</p>
Metformin	<p>Signs and symptoms of hypoglycemia and hyperglycemia should be noted and blood glucose should be tested as this will affect the medications given. For patients who develop <u>illness</u> while on</p>

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	metformin, assessment of serum electrolytes, ketones, glucose, and, if indicated, blood pH, lactate, pyruvate, and metformin levels should be monitored. If acidosis is present, metformin should be discontinued (Vallerand & Sanoski, 2015, p.810).
Buffered Aspirin	Assess patient's limitation of movement and pain, noting the type, location, and intensity before and at the peak after administration to ensure drug effectiveness and/or correct dosage. An assessment for side effects such as fever should also be considered, noting associated signs such as diaphoresis, tachycardia, malaise and chills (Vallerand & Sanoski, 2015, p.1104).

6. What are the **clinical implications** associated with each medication prescribed for Ms. Sears?

Ancef	According to Vallerand & Sanoski (2015), during the course of therapy, I would observe Ms. Sears for signs of anaphylaxis, assess frequently for skin rash, fever and bowel function including diarrhea, blood in stool, and abdominal discomfort, vital signs and blood work to monitor for adverse effects and infection (p.285-286).
Elavil	Ms. Sears should be monitored for depression, thoughts of "suicide... pain... sexual dysfunction... liver function [and] glucose levels" and weight. This is because of the side effects, physical and cognitive, which many antidepressants have on our bodies (Vallerand & Sanoski, 2015, p.143).

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Calcium Carbonate	Blood work should be monitored throughout therapy to track mineral levels in the blood. Client should be assessed for toxicity such as "nausea, vomiting, anorexia, thirst, severe constipation and bradycardia." This will help to ensure she is provided with a safe dosage (Vallerand & Sanoski, 2015, p. 257).
Vitamin D	During treatment, Maggie should be monitored "for bone pain and weakness," blood work should be taken periodically to monitor drug levels and she should be assessed for any signs of toxicity (Vallerand & Sanoski, 2015, p.1268).
Vagifem	Vagifem should be given with food or patient should have meal immediately after taking the medication to reduce nausea; therefore, nursing staff should keep an eye out for signs of upset stomach and nausea. Hepatic functions should be monitored before and periodically during therapy to ensure her dose does not exceed her rate of metabolism. The medication "may cause hypercalcemia in patients with metastatic bone lesions"; therefore, blood work must be evaluated (Vallerand & Sanoski, 2015, p.516).
Imitrex	The initial dose of Imitrex should be given under observation for drug interactions for patients who are postmenopausal, have diabetes or are smoking (Vallerand & Sanoski, 2015, p.1146).
Metformin	Metformin cannot be taken by a client with renal impairment as it may lead to toxicity. Renal function must be assessed during therapy and metformin should be stopped if renal impairment does occur. Blood

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	<p>glucose should be periodically taken during while on metformin to evaluate effectiveness of therapy (Vallerand &amp; Sanoski, 2015, p.810).</p>
Buffered Aspirin	<p>Ms. Sears' skin should be monitored throughout therapy to assess for rash or changes in her skin including integrity of her oral mucosa (blisters/oral lesions). Metformin should be discontinued if Ms. Sears begins to show signs of fever, fatigue and/or muscle and joint aches. Serum salicylate levels should be monitored periodically in prolonged high dose therapy so that the dose given to the patient can be determined as a safe level for that client. In large doses, Aspirin may cause intestinal ulcers, leading to gastrointestinal blood loss. Hematocrit should be monitored periodically since Ms. Sears is taking a high dose of Aspirin at 3900mg/day of the 4000mg/day recommended (Vallerand &amp; Sanoski, 2015, p.1105).</p>
Actonel	<p>Prior to administering Actonel, the patient's body must be looked at to see the size, gross deformity, bone enlargement and symmetry (Lilly, Harrington, &amp; Snyder, 2011, p.604). As well, serum calcium should be assessed by blood work before and during therapy to ensure proper drug dose and the need for treatment. Patient's lab tests for hypocalcemia and vitamin D deficiency should be looked at and treated before starting therapy (Vallerand &amp; Sanoski, 2015, p.1085).</p>

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7. Give the appropriate dosage **calculations** for the medications ordered and indicate the route of each.

Ancef	750 mg/750 mg IV (Add 10 mL sterile water into the one gram vial of Ancef. Syringe out 7.5 mL of the solution using a 10 mL syringe. This will provide you with 750 mg Ancef to administer through Ms. Sears' IV).
Elavil	50 mg/25mg x 1 tab = 2 tabs PO ✓
Vitamin D	1000 IU/400 IU x 1 tab = 2.5 tabs PO ✓
Actonel	35mg/35mg x 1tab = 1tab PO ✓
Vagifem	10mcg/10mcg x 1tab = 1 tab PO ✓
Imitrex	75mg/50mg x 1 tab = 1.5 tabs PO ✓
Metformin	750mg/500mg x 1tab = 1.5 tabs PO ✓
Buffered Aspirin	650mg/325mg x 1 tab = 2 tabs PO ✓
Calcium Carbonate	1000 mg/500 mg x 1 = 2 tabs PO ✓

8. What **teaching** should be provided to Ms. Sears about Actonel and metformin?

Actonel: Actonel is taken for the treatment of postmenopausal and corticosteroid-induced osteoporosis, as well as the treatment of paget's disease. Ms. Sears should be encouraged to take Actonel as directed. This means that she should take it with 6 to 8 ounce of water, not with beverages such as orange juice, coffee or other beverages that decrease absorption. If a dose is missed, a tablet of the ordered medication, in this case, 35mg/week per oral, should be taken on the morning when it is remembered and then 1 tablet/week on the original scheduled day should

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follow. Two pills should never be taken at the same time. Ms. Sears needs to be informed that she should sit upright for 30 minutes after taking the recommended dose so that the medication may pass to the stomach easily and therefore minimizing risk of esophageal irritation. A balanced diet should to be maintained as well as taking calcium and vitamin D supplements while she is on the medication. Ms. Sears should know that severe musculoskeletal pain may occur within days, months, or years after starting Actonel. If this occurs she must notify her health care provider. The patient should be encouraged to exercise regularly and change habits that increase the risk of osteoporosis such as smoking. Concerning dental surgery, Ms. Sears should inform health care providers about use of Actonel before surgery (Vallerand & Sanoski, 2015, p.1086).

**Metformin:** Metformin is used for the management of type two diabetes. Ms. Sears needs to know that Metformin should be taken at the same time each day and that missed doses must be taken as soon as possible to prevent double dosing. She should be notified that while the medication controls hyperglycemia, it does not treat diabetes and that therapy is long term. Ms. Sears should follow the diet, medication, and exercise regimens prescribed in order to prevent hyperglycemic or hypoglycemic incidents. She should also know the signs of hypoglycemia and hyperglycemia. For example, if Ms. Sears finds herself feeling hypoglycemic (dizzy, lethargic or shaky) she should drink a glass of orange juice or take 2 to 3 tea spoons of sugar or honey and notify health care provider. She must be taught how to test blood glucose properly and notify health care provider of significant changes. According to Vallerand & Sanoski (2015), Ms. Sears must know that metformin cannot be taken in cases of “severe infection, dehydration, or sever or

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continuing diarrhea occurs or if medical tests or surgery is required. Symptoms of lactic acidosis (chills, diarrhea, dizziness, low blood pressure, muscle pain, sleepiness, ~~slow~~ heartbeat or pulse, dyspnea or weakness)" must be reported to health care workers (p.811). All over the counter medications should be reported to health care providers as well as notifying them before starting new medications. Ms. Sears should be encourage to notify health care providers of her medication regimen before treatment or surgery, as well as of any symptoms such as diarrhea, nausea, vomiting, and stomach pain or fullness. Ms. Sears should always carry a snack containing sugar and identification describing her disease process and medication regimen. She should have regular testing of blood glucose and routine follow up exams (Vallerand & Sanoski, 2015, P.811).

9. Ms. Sears tells you she used St. John's Wort oil at home for the inflammation on her leg. What **information** should Ms. Sears know about St. John's Wort and her medical diagnoses and prescribed medications?

Ms. Sears has told you that she has used St. John's Wort oil on her leg for a week but 'it didn't help'. Ms. Sears should be made aware that the oil may need ~~longer~~ than a week for her to notice an effect but also, that it should only be "taken for a period of 4-6 weeks. If no improvement is seen, another therapy should be considered" (Vallerand & Sanoski, 2015, p.1341). The nurse must also tell Ms. Sears that some drugs, when taken together, interact in a way that may decrease effectiveness, or even cause unpleasant side effects; for this reason, she must make her doctor aware that she is using this medication, as well as any other OTCs or herbal supplements which she is taking. Other points the nurse should teach Ms. Sears include: ~~She~~ must be careful



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to watch for any changes such as “dizziness... restlessness... abdominal pain... dry mouth... sensitivity to light... and any changes in her skin” (Vallerand & Sanoski, 2015, p.1341). Ms. Sears must not drink alcohol while using St. John’s Wort because it increases the risk of adverse CNS reactions. Client should be instructed to take St. John’s Wort as directed and to ensure that her oil has come from a reputable source. Ms. Sears should avoid sun exposure and also wear sunscreen to reduce the risk of photosensitivity reactions (Vallerand & Sanoski, 2015, p.1340-1341).

References

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