

BCMTMS Practice Exam

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This BCMTMS practice exam is designed to help prepare you on your goal of obtaining BCMTMS certification. Certainly, you are smart enough to realize that if you pass this exam, you are not guaranteed to pass the BCMTMS exam. With that stated, I have created this in an attempt to mimic the difficulty of the questions on the exam. Best of luck on your exam, and I hope this provides great value into your preparation for the BCMTMS exam.

Eric Christianson, PharmD, BCPS, BCGP

Albumin	3.2 - 5 g/dl	
Alkaline phosphatase (Adults: 25-60)	33 - 131 IU/L	
Adults > 61 yo:	51 - 153 IU/L	
Ammonia	20 - 70 mcg/dl	
Bilirubin, direct	0 - 0.3 mg/dl	
Bilirubin, total	0.1 - 1.2 mg/dl	
	Arterial	Venous
pH	7.35 - 7.45	7.32 - 7.42
pCO ₂	35 - 45	38 - 52
pO ₂	70 - 100	28 - 48
HCO ₃	19 - 25	19 - 25
O ₂ Sat %	90 - 95	40 - 70
BUN	7 - 20 mg/dl	
	Male	Female
Hemoglobin (g/dl)	13.5 - 16.5	12.0 - 15.0
Hematocrit (%)	41 - 50	36 - 44
RBC's (x 10 ⁶ /ml)	4.5 - 5.5	4.0 - 4.9
RDW (RBC distribution width)	< 14.5	
MCV	80 - 100	
MCH	26 - 34	
MCHC %	31 - 37	
Platelet count	100,000 to 450,000	
CK-BB	0%	
CK-MB (cardiac)	0 - 3.9%	
CK-MM	96 - 100%	
Creatine phosphokinase (CPK)	8 - 150 IU/L	
Creatinine (mg/dl)	0.5 - 1.4	

Calcium	8.8 - 10.3 mg/dL
Calcium, ionized	2.24 - 2.46 meq/L
Chloride	95 - 107 mEq/L
Magnesium	1.6 - 2.4 mEq/L
Phosphate	2.5 - 4.5 mg/dL
Potassium	3.5 - 5.2 mEq/L
Sodium	135 - 147 mEq/L
Ferritin (ng/ml)	13 - 300
Folate (ng/dl)	3.6 - 20
Glucose, fasting (mg/dl)	60 - 110
Glucose (2 hours postprandial) (mg/dl)	Up to 140
Hemoglobin A _{1c}	<p><6% of total Hb</p> <p>Hemoglobin A_{1c}, % (as a screening test)</p> <p>≤5.4 - Normal</p> <p>-----</p> <p>5.5-6.4 - High risk/prediabetes; requires screening by glucose criteria</p> <p>-----</p> <p>≥6.5 -Diabetes, confirmed by repeating the test on a different day</p> <p>=====</p> <p>In general, therapy should target a A1C level of 7% or less for most nonpregnant adults.</p>
Iron (mcg/dl)	65 - 150
Lactic acid (meq/L)	0.7 - 2.1
LDH (lactic dehydrogenase)	56 - 194 IU/L
Cholesterol, total	< 200 mg/dl
HDL cholesterol	≥ 35 mg/dL. Negative risk factor: ≥ 60 mg/dL
LDL cholesterol	65 - 180 mg/dl
Triglycerides	<p>Normal: < 150 mg/dL.</p> <p>Borderline-high: 150 to 199 mg/dL</p> <p>High: 200 to 499 mg/dL</p> <p>Very High: >499 mg/dL</p>
Osmolality	289 - 308 mOsm/kg

SGOT (AST)	< 35 IU/L (20-48)
SGPT (ALT)	<35 IU/L
Testosterone - total (serum)	Male: 300 to 1000 ng/dL Female: < 62 ng/dL ALT: Male: 14-15 yr: 33-585 ng/dL 16-17 yr: 185-886 ng/dL 18-39 yr: 400-1080 ng/dL 40-59 yr: 350-890 ng/dL > 60 yr: 350-720 ng/dL Tanner Stage IV: 165-854 ng/dL Tanner Stage V: 194-783 ng/dL

Thyroid Function Testing

Thyroid Function Test	Measurement	Normal Range
Total T4 (TT4)	bound and free T4	4.5 -11.5 ug/dL
Free T4 (FT4)	free T4	0.8 -2.8 ng/dL
Free T4 Index (FT4I)	estimate of free T4 FT4I = TT4 x RT3U	1.0 -4.3 U
Total T3 (TT3)	bound and free T3	75 -200 ng/dL
Resin T3 Uptake (RT3U)	binding capacity of TBG	25 -35%
TRH	TRH	5 -25 mIU/mL
TSH	TSH	0.5 - 4.70 μ IU/mL American Association of Clinical Endocrinologists guidelines changed their normal range for TSH to 0.3 - 3.04 mIU/L.
Thyroglobulin	Thyroglobulin	5-25 ng/mL
Radioactive Iodine Uptake (RAIU)	Distribution of radiolabeled iodine in the thyroid	5 hr – 5 to 15% 24 hr – 15 to 35%

Notes:

Free T4 - much more useful than total T4 (e.g. interested in unbound or active form). Total T4 not commonly measured. Greatly affected by TBG.

Free T4 index: indirect measure of free T4. Corrects for high/low values of TBG.

Total T3: not as useful as free T3, however, may be useful in locating problems with TBG, or if looking

for problems with peripheral conversion of T4 to T3.

Resin T3 Uptake: if low, then TBG binding capacity is high. Opposite if high.

TSH: best measure to determine thyroid function.

Thyroglobulin: nonspecific test that is elevated when the thyroid gland is inflamed or enlarged.

Free T3	2.3-4.2 pg/ml
Total iron binding capacity (TIBC)	250 - 420 mcg/dl
Transferrin	> 200 mg/dl
Uric acid (male)	2.0 - 8.0 mg/dl
(female)	2.0 - 7.5 mg/dl

WBC (cells/ml)	4,500 - 10,000
Segmented neutrophils	54 - 62%
Band forms	3 - 5% (above 8% indicates left shift)
Basophils	0 - 1 (0 - 0.75%)
Eosinophils	0 - 3 (1 - 3%)
lymphocytes	24 - 44 (25 - 33%)
Monocytes	3 - 6 (3 - 7%)

Equations:

(1) Segs and bands reported as a percentage:

$WBC * ((\text{segs} / 100) + (\text{bands} / 100))$

(2) Segs and bands reported in total numbers:

$WBC * (\text{segs} + \text{bands})$

Neutrophils (aka polymorphonuclear cells, PMNs, granulocytes, segmented neutrophils, or segs) fight against infection and represent a subset of the white blood count. Neutropenia by definition is an ANC below 1800/mm³ (some sources use a lower value).

Absolute neutrophil count (ANC) of 1000-1800:

Most patients will be given chemotherapy in this range.

Risk of infection is considered low.

Mild neutropenia - Absolute neutrophil count (ANC) of 500-1000:

Carries with it a moderate risk of infection.

Absolute neutrophil count (ANC) of less than 500:

Severe neutropenia - high risk of infection. Remember that a reduced WBC is known as leukopenia.

The WBC consists of the following (differential):

Lymphocytes: 20-40%

Neutrophils: 50-60%

Basophils: 0.5-2%

Eosinophils: 1-4%

Monocytes: 2-9% (average: 4%).

ANC = Total WBC x (% "Segs" + % "Bands")

Equivalent to: WBC x ((Segs/100) + (Bands/100))

The ANC refers to the total number of neutrophil granulocytes present in the blood.

Normal value: ≥ 1500 cells/mm³.

Mild neutropenia: ≥ 1000 - <1500 /mm³.

Moderate neutropenia: ≥ 500 - <1000 /mm³.

Severe neutropenia: < 500 /mm³.

Reference:

Ayalew Tefferi, MD, ed. Primary Hematology. Totowa, NJ: Humana Press, 2001

Labs Courtesy: GlobalRph.com

1. A 17 year old female has tried salicylic acid and benzoyl peroxide for her mild to moderate acne. The salicylic acid did not work. The benzoyl peroxide once daily caused too much redness and irritation. Which of the following recommendations would be most appropriate for management?
 - a. Initiate systemic minocycline
 - b. Initiate Tazarotene**
 - c. Initiate topical clindamycin
 - d. Initiate systemic isotretinoin

Answer – topical retinoids like tazarotene, tretinoin, etc. are considered first line agents in the management of acne. Systemic agents are usually reserved for severe cases that have not responded to traditional therapy. Clindamycin would be an option, but likely 2nd or 3rd line after topical retinoids.

2. A total of 13,323 study participants with Type 2 diabetes underwent randomization into two groups. One group received aspirin 81 mg once daily and the other group received aspirin 325 mg once daily. Comparing the 325 mg once daily group to the aspirin 81 mg daily group, the change in heart attack rate was assessed by a 95% confidence interval of 0.88 – 1.05, P=0.13. Which of the following is true with regards to the findings?
 - a. The findings indicate that there was no statistical difference between the groups**
 - b. The findings indicate that there was significant benefit in heart attack reduction in the aspirin 325 mg group
 - c. The findings indicate that the aspirin 81 mg group had a statistically significant reduction in heart attack compared to the aspirin 325 mg group
 - d. There is too little information to assess statistical significance

Answer – Given the P value is greater than 0.05, these results would not be statistically significant in favor of the aspirin 325 mg once daily group. This is not an actual study, but a made up example.

3. One of your patients is a caregiver for her elderly grandfather. She presents today informing you that she is pregnant. Which of the following of her grandfather's medications should you educate her to be extremely careful when handling and use protective gloves?
 - a. Tamsulosin
 - b. Nifedipine
 - c. Acetaminophen
 - d. Finasteride**

Answer: Finasteride has historically been category X and women of childbearing age should avoid touching or handling broken or crushed tablets. Tamsulosin is category B, Nifedipine is category C as well as Acetaminophen.

4. A patient reports to you that their pen device for their exenatide doesn't seem to be working correctly. The patient brought it in and you also agree that it does not appear

to be working correctly. Which of the following forms would be useful for the patient to report this issue to MedWatch?

- a. **3500B**
- b. 106
- c. 224
- d. 3500A

Answer – 3500B is for consumers to report issues in relation to medications. Plain 3500 is for healthcare professionals. Both are voluntary. 3500A is for distributors, manufacturers, and investigators. 3500A is mandatory. 106 is a DEA form that is used to report significant loss. 224 is another DEA form used for registration.

5. A 68 year old has a history of HFrEF. The attending physician would like to put him on digoxin to help with this. He does not have atrial fibrillation. Which of the following is correct with regard to the use of digoxin in CHF?
- a. Much like atrial fibrillation, a loading dose can be used in CHF to improve symptoms quickly
 - b. **Target concentrations in CHF are generally lower than compared to atrial fibrillation**
 - c. Primary symptoms of digoxin toxicity include rash, hearing loss, and renal failure
 - d. Digoxin has the potential to raise potassium levels and this is why we need to monitor this closely

Answer – A loading dose in CHF is generally not appropriate, while you might see it done in atrial fibrillation. B is the only correct statement as we don't get as aggressive with target concentrations in CHF. Signs of digoxin toxicity include GI upset, weight loss, drop in pulse, CNS changes, and visual problems. In the setting of hypokalemia or hypomagnesemia, we do get concerned about an increased risk of arrhythmias. Digoxin itself does not cause hyperkalemia.

6. 75 research subjects were placed on extended release guanfacine for management of ADHD. The Clinical Global Impression-Improvement scale was utilized to assess response to the medication. Which type of variable would this scale be considered?
- a. Nominal
 - b. **Ordinal**
 - c. Ratio
 - d. Continuous

Answer – Psych related scales are often subjective, but they do have an order that indicates a patient being “better” or “worse” clinically. These scales are ordinal data.

7. A patient is inquiring about the use of medroxyprogesterone acetate injection as a means for birth control. Which of the following would be a potential risk with its use?
- a. Hepatic encephalopathy
 - b. **Loss of bone mineral density**
 - c. Risk of aplastic anemia
 - d. Atrial fibrillation risk

Answer – Medroxyprogesterone acetate increases the risk of reduced bone mineral density. It is recommended to try to avoid use of this for no more than 2 years.

8. One of your patients has been experiencing confusion, feels like his heart is racing, and is excessively sweating. His past medical history includes a history of anxiety, alcohol abuse (has recently been trying to stop), obesity, hypertension, and insomnia. His medications include hydralazine which was increased a couple of weeks ago, lorazepam 0.5 mg as needed, and trazodone as night for sleep. Which of the following is most likely the cause of his symptoms?
- a. Hydralazine
 - b. Lorazepam
 - c. Trazodone
 - d. Alcohol cessation**

Answer – these symptoms are likely indicative of alcohol withdrawal. The tachycardia, sweating, and CNS changes would likely not be due to any one medication. He should follow up with his primary care provider for further follow up and assessment of symptoms.

9. For a pharmacist to bill incident-to billing codes, which of the following would not be necessary?
- a. Patient must first be seen by a physician for an evaluation
 - b. The service must be medically appropriate to be given in a provider's office or clinic
 - c. The patient must receive greater than 80% of their prescriptions at one pharmacy**
 - d. Services must be within the pharmacist's scope of practice

Answer – All of the above are true except billing incident-to would not depend upon where the patient gets their prescriptions filled.

10. A 55 year old male has cardiovascular disease. Which of the following would not be considered a modifiable risk factor?
- a. Age**
 - b. Smoking
 - c. Dyslipidemia
 - d. Hypertension

Answer – there isn't much we can do about age. Medication therapy and lifestyle changes could all help alter his modifiable risk factors like smoking, elevated cholesterol, and hypertension.

11. Which of the following is agencies responsible for the approval of biologic agents?
- a. DMEPA
 - b. MERP
 - c. NIH
 - d. CBER**

Answer – CBER is the center for biologics evaluation and research and it is responsible for approval of biologics and biosimilars. DMEPA (Division of Medication Error Prevention and Analysis) reviews med error reports etc. MERP is the ISMP medication error reporting program. NIH is the National Institute of Health which primarily works on clinical trials and is taxpayer funded.

12. One of your patients has recently been diagnosed with severe cluster headaches. He takes triptans as needed, but is frequently using them several times per week. Which of the following would be the most appropriate initial intervention for prevention?
- a. Scheduled acetaminophen
 - b. Verapamil**
 - c. Nadolol
 - d. Lamotrigine

Answer – for prevention of cluster headaches, calcium channel blockers (non-dihydropyridine) are the usual medication of choice. Triptans and oxygen therapy are the usual treatments of choice for acute management.

13. A concerned mother comes in with her 16 year old daughter who has itching, redness, in the creases of the skin, particularly behind the knees and inside the elbow area. She has not seen a primary care provider yet, but states that she knows that it is dermatitis. It is not bleeding and does not look infected. She states her daughter has had a couple of flares in the past, but cannot recall what was done. Which of the following would be most appropriate to initiate?
- a. Hydrocortisone 1% cream – apply as twice daily needed**
 - b. Referral and recommend tacrolimus 0.1% ointment – apply twice daily as needed
 - c. Diphenhydramine 25-50 mg as four times daily as needed
 - d. Referral and recommend prednisone 10 mg daily for 5 days

Answer – in this scenario, the dermatitis does not sound severe. Topical OTC steroid like hydrocortisone would be the most appropriate initial step and if that does not clear things up, the patient would need to be referred to a primary care provider for a prescription for a more potent steroid or tacrolimus. Diphenhydramine could be used to augment, but it wouldn't be the most appropriate to relieve/treat the dermatitis. In severe cases, systemic therapy like prednisolone may be appropriate, but this situation is pretty limited to small areas of the body.

14. Which of the following is true regarding the use of ticagrelor?
- a. It can help lower uric acid levels in patients with gout
 - b. CYP3A4 drug interactions are a significant clinical concern**
 - c. Ticagrelor has a boxed warning for increasing the risk of liver failure
 - d. Doses of less than 100 mg of aspirin cause a reduction in effectiveness of ticagrelor

Answer – CYP3A4 drug interactions are a major clinical concern with the use of ticagrelor. There is also a boxed warning for ineffectiveness if doses of aspirin are HIGHER than 100 mg. Ticagrelor has been associated with increasing uric acid levels.

15. A 61 year old with reduced ejection fraction CHF is in for a routine recheck of his labs. He is on furosemide 40 mg once daily, lisinopril 5 mg once daily, metoprolol 25 mg twice daily, spironolactone 50 mg once daily, aspirin 81 mg daily, and famotidine 20 mg once daily. Labs 3 months ago revealed creatinine = 1.1 mg/dL, sodium 138 mEq/L, potassium 4.9 mEq/L, BUN 12 mg/dL, BNP = 91 pg/mL. Upon checking today, his labs reveal creatinine = 2.1 mg/dL, sodium = 139 mEq/L, potassium = 5.0 mEq/L, BUN = 44, BNP = 68 pg/mL. Which of the following actions would be most appropriate?
- a. **Reduction in furosemide**
 - b. Increase in furosemide
 - c. Discontinuing famotidine
 - d. Initiating sodium polystyrene sulfonate

Answer – with the elevated BUN/Creatinine ratio, this looks like a case of dehydration. Reducing the furosemide would help best manage this situation. Reduction in spironolactone and/or lisinopril could be a consideration as well, but is obviously not listed as a choice. Increasing furosemide could exacerbate the dehydration scenario. Giving Kayexalate (SPS) for a potassium of 5.0 would not be appropriate. Famotidine is dose adjusted based on renal function, but this is a pretty low dose already and would not need to be discontinued.

16. One of your patients is concerned about the use of her Epi-Pen. She uses it about 1-2 times per year for allergic reactions/angioedema type symptoms where she has difficulty breathing. She takes a lot of other medications and she had heard on the news that some medications can prevent this epinephrine from working. Which medication would be most likely to cause a concern?
- a. Clonidine
 - b. **Metoprolol**
 - c. Acetaminophen/diphenhydramine for sleep
 - d. Ranitidine

Answer – the beta-blocker can possibly reduce the effects of epinephrine and would have the potential to blunt the response.

17. A study was looking to investigate if the H2 blocker ranitidine had any effect on the rate of MI. Study participants were monitored for 5 years. 1,000 patients were on ranitidine and 1,000 were on placebo. Over that 5 year period, 70 had a heart attack in the ranitidine group while 90 had a heart attack in the placebo group. What would be the relative risk reduction of ranitidine?
- a. 20
 - b. **0.78**
 - c. 2%
 - d. 1.22

Answer – Ranitidine had a protective effect (made up example) and the relative risk is solved by taking the absolute risk of the treatment group (7%) divided by the absolute risk of the control group (9%). Remember that if a relative risk value is less than 1, it portrays a risk

reduction and if it is greater than 1, it portrays a greater likelihood of the outcome being studied.

18. From the question above, what would be the number needed to prevent one heart attack?

- a. 20
- b. 50**
- c. 100
- d. 10

Answer – Solving for number needed to treat, you take $1/ARR$. ARR = absolute risk reduction. $9\%-7\%$ is 2% or 0.02 . 1 divided by $0.02 = 50$.

19. In trying to minimize observation bias in a clinical trial, which of the following is the best strategy?

- a. Designing the trial to utilize continuous data
- b. Comparing drugs against the standard of practice versus placebo
- c. Ensuring that the patients are randomized to each group
- d. Blinding the researchers**

Answer – Blinding the researchers (medical personnel) from knowing which patients received the treatment and which ones didn't would be the best way to minimize observational bias. The researchers the ones determining diagnosis and assessment and you ideally would not want them to know who is receiving treatment and who isn't.

20. Which of the following would not be a significant barrier to implementing pharmacogenomics testing in trying to optimize patients' medication therapy.

- a. Prescriber uncertainty of clinical and economic benefits
- b. Financial concerns of patients and/or payers
- c. Ethical concerns of providers**
- d. Delays in therapy when awaiting results

Answer: C. Ethical concerns of providers is not a significant barrier to implement pharmacogenomics testing. Prescriber uncertainty of benefits, who pays for the testing, and the delay in waiting for the test results in starting medication if testing is done reactively would all be potential barriers.

21. A 51 year old female patient with AIDS has been diagnosed with Cryptococcal pneumonia. They would like to begin outpatient therapy as the patient's symptoms don't appear terribly severe. Which of the following would be most appropriate?

- a. Fluconazole**
- b. Sulfamethoxazole/trimethoprim
- c. Ciprofloxacin
- d. Ganciclovir

Answer – Cryptococcus is a fungal infection and fluconazole would be a potential option to use here. Ganciclovir and the other agents would not cover this infection.

22. A newly diagnosed 22 year old asthma patient has a reported peak expiratory flow reading of 71% of predicted. She is asking if she should begin a prednisone burst. Which of the following would be the most appropriate initial step?

- a. **Recommend giving 2 puffs of albuterol at this time**
- b. Wait and reassess in 60 minutes
- c. Go to the emergency room now
- d. Start the prednisone and reassess in one hour

Answer – A reduction in peak expiratory flow of 20% or more off a patient's previous best would potentially be indicative of an exacerbation. It would be most appropriate to give the initial doses of albuterol to help improve respiratory status quickly. Next steps would probably be determined by clinical response to the inhalations.

23. Which of the following would not be considered one of the 9 core chronic conditions that Medicare sponsors can choose to target beneficiaries from?

- a. **HIV**
- b. CHF
- c. COPD
- d. Osteoporosis

Answer – There are nine core chronic conditions. If drug plan sponsors are choosing to target beneficiaries eligible for MTM by chronic conditions, they must choose at least five. HIV is not a core chronic condition.

24. You are looking to develop a point of care testing program. Which of the following actions would be an initial step to providing CLIA Waived tests?

- a. **Contact state department of health**
- b. Apply to CMS for waiver
- c. Start providing lab testing, then you must apply for waiver within 1 year of starting your ambulatory care practice
- d. Train all staff members on how to do the testing

Answer – Your state department of health would be your first place to start the process of obtaining a CLIA certificate of waiver.

25. A 55 year old female is undergoing chemotherapy for metastatic breast cancer. She has been having some issues with urination and has been diagnosed with bladder cystitis. Which of the following chemo agents would be most likely to cause this?

- a. 5-fluorouracil
- b. **Cyclophosphamide**
- c. Cisplatin
- d. Paclitaxel

Answer – Cyclophosphamide is associated with bladder cystitis. Mesna and fluid replacement may help prevent this complication.

26. Which organization or agency is responsible for the creation of ICD codes for billing (i.e. 99211-99214)?

- a. CMS
- b. WHO**
- c. MedWatch
- d. NIH

Answer – The World Health Organization is responsible for creating and updating ICD (international classification of diseases). CMS and other payers utilize these codes as a means to classify tasks and procedures.

27. With regards to cervical cancer, which of the following is false?

- a. HPV is the most common cause
- b. Subtypes 6, 11 with HPV are strongly associated with cervical cancer**
- c. Pap-smear is an important screening tool
- d. Postcoital bleeding and spotting can be a potential symptom of cervical cancer

Answer – Human Papilloma virus is the most common cause of cervical cancer. Subtypes 6, 11 are most associated with genital warts. 16, and 18 are the most common cancer causing subtype of HPV. Gardasil-9 is the vaccine of choice to help prevent HPV and associated complications.

28. In a patient with depression who is taking a tri-cyclic antidepressant, which of the following complications would be most likely to result from overdose?

- a. Respiratory failure
- b. Cardiac abnormalities**
- c. Renal failure
- d. GI perforation

Answer – TCA's can cause sinus tachycardia especially in supratherapeutic concentrations. A patient with a preexisting prolonged QTc may be of higher concern. If you remember that atropine is used to stimulate the heart in bradycardia, this will help you remember that anticholinergics can cause tachycardia.

29. With respect to warfarin drug interactions, which of the following is true?

- a. Metronidazole inhibits CYP2C19 which can substantially raise INR
- b. After a course of rifampin is discontinued, INR will likely drop
- c. Amiodarone can raise levels of warfarin concentrations by inhibition of CYP3A4 and lead to elevations in INR**
- d. An increase in green leafy vegetable intake can lead to elevations in INR

Answer – Amiodarone does interact with warfarin and can raise concentrations. Metronidazole inhibits CYP2C9 and leads to elevations in INR, not CYP2C19. Because it is an enzyme induced, when rifampin is discontinued, we will likely have elevations in INR. Green leafy vegetables with high vitamin K will cause INR to drop.

30. Lucy is a 71 year old female who has been on conjugated estrogen for a period of 12 years. She is scared about tapering off of estrogen due to the hot flashes she experienced when she has tried off it in the past. She would like to know the risk of continuing with the estrogen replacement. Which one of the following is NOT a risk of

continuing with estrogen chronically?

- a. Breast Cancer
- b. Ovarian Cancer
- c. Colorectal Cancer**
- d. Blood Clot

Answer: C. Colorectal cancer is not a risk when using chronic estrogen therapy. Breast, ovarian, and DVT are all risks associated with long term use.

31. A physician has approached you about helping to develop an ambulatory care pharmacy practice in her clinic. Which of the following benefits would be least likely to happen?

- a. Reduced drug costs**
- b. Improved access to care
- c. Improved clinical outcomes
- d. Saved time for the physician

Answer – Reduce drug costs would be the least likely benefit from developing an ambulatory care pharmacy practice. Some evidence indicate that direct drug costs may go up due to increased adherence and patient compliance to medication therapy. Access, clinical outcomes, and physician time savings should all be positive outcomes from developing a practice.

32. Which of the following oral NSAIDs would it be recommended to take for no more than 5 days?

- a. Piroxicam
- b. Sulindac
- c. Ketorolac**
- d. Nabumetone

Answer – Ketorolac has a warning against using for more than 5 days. This is due to the significant risk of GI bleeding events.

33. A 55 year old male has a complex medical history including seizure disorder and atrial fibrillation. The cardiologist is going to initiate amiodarone for his atrial fibrillation. He has been on phenytoin for years. Which of the following would be most likely to happen in this situation with respect to potential drug interactions?

- a. Reduced dosing of amiodarone will be likely due to phenytoin's potential to increase concentrations
- b. Increased doses of both medications will be necessary as they can both induce each other's metabolism
- c. Phenytoin toxicity risk will be increased**
- d. Amiodarone and phenytoin do not affect each other

Answer – Phenytoin can potentially increase metabolism of amiodarone which may necessitate a higher dose of amiodarone than without it. Amiodarone does have the potential to raise phenytoin levels and contribute to toxicity, so C is the most correct answer.

34. A 34 year old male patient has been diagnosed with depression. He is concerned about sexual dysfunction as he has heard that some medications can cause this issue. Which of the following would be the best choice to avoid this potential adverse effect?

- a. Duloxetine
- b. Nortriptyline
- c. Fluvoxamine
- d. Mirtazapine**

Answer – Mirtazapine and bupropion are the two lower risk agents when it comes to causing sexual dysfunction. TCA's, SSRI's, and SNRI's all can potentially contribute to this issue.

35. In a clinical trial, mirabegron cardiovascular adverse effects are being monitored. Specifically, the test subjects will have their blood pressure monitored. Which of the following types of variables would blood pressure be?

- a. Independent
- b. Nominal
- c. Ordinal
- d. Continuous**

Answer – Blood pressure would be a continuous variable. In this situation, it would not be an independent variable because the blood pressure change would be dependent upon the drug (mirabegron) and dose of the medication. Blood pressure is easily measured and reproducible and is not subjective data.

36. A patient has a history of Addison's disease. In light of this diagnosis, which of the following would be least concerning to monitor in a patient on lisinopril, carbamazepine, and chlorthalidone?

- a. Risk for hyperkalemia
- b. Risk for hyponatremia
- c. Elevated risk for ACE inhibitor cough**
- d. Risk for hypotension

Answer – in Addison's disease, cortisol and aldosterone can be in short supply. This would potentially increase the risk of elevated potassium, low sodium, and also cause low blood pressure. We would need to be a little extra careful using these agents as lisinopril and chlorthalidone could lower blood pressure too much, carbamazepine and chlorthalidone could contribute to hyponatremia, and the lisinopril could cause or exacerbate hyperkalemia. There would not be an elevated risk for ACE cough in this patient due to Addison's.

37. Which of the following is a disadvantage of immediate release exenatide compared to liraglutide?

- a. Needs to be administered with food**
- b. Increased risk for thyroid tumors
- c. Cost
- d. Increased risk of hepatotoxicity

Answer – Exenatide immediate release is dosed twice daily and needs to be given with food which is a significant downside. Both liraglutide and exenatide have the warning for thyroid

tumor risk. Cost concerns aren't much different between these agents and isn't typically an advantage for liraglutide. Exenatide doesn't notably increase hepatotoxic risk compared to liraglutide.

38. A new medication is being evaluated for the treatment of migraines. The new drug indicates that the number needed to harm for the side effect of diarrhea was 88. Which of the following is most accurate in interpreting the number needed to harm?
- a. Diarrhea would be a common side effect for this medication
 - b. Severe diarrhea is problematic and the risk is substantial
 - c. Diarrhea is not very common**
 - d. None of the above

Answer – number needed to harm is an indicator of the safety of a medication. The higher the number, the safer a medication is. In this example, a number needed to harm (NNH) of 88 means that for 88 patients treated, one will have diarrhea. This is very low for a minor side effect like diarrhea. NNH generally doesn't give any indication of the severity of a side effect, just how often it occurs.

39. A 58 year old male patient has been diagnosed with essential tremor. It has bothered him all his life, but not to the extent that he wanted to do anything about it. He is now ready to take medication to help manage this. Past medical history includes hypertension, BPH, Type 2 diabetes, anemia, and osteoarthritis. Labs: GFR = 79 mL/min, K⁺ = 5.1 mEq/L, Na⁺ = 141 mEq/L, Hemoglobin = 12.2 g/dL. BP = 139/88, HR = 57 BPM. Which of the following would be most appropriate to initiate?
- a. Benztropine
 - b. Primidone**
 - c. Nadolol
 - d. Carbamazepine

Answer – Carbamazepine would not have a role in managing essential tremor. Using the beta-blocker would be risky given the low pulse already. Benztropine typically is not utilized unless that tremor is drug induced (i.e. antipsychotics). The anticholinergic nature of the medication could also exacerbate BPH. Primidone would be the best choice in this situation.

40. A patient is experiencing fatigue likely due to anemia. Current labs include B12 = 730 pg/mL, ferritin 234 ng/mL, folic acid 17 ng/mL, potassium = 4.8 mEq/L, sodium 134 mEq/L, hemoglobin = 9.7, creatinine = 1.9 mg/dL, MCV = 88 fL/cell. Which of the following would be most appropriate to manage the anemia?
- a. Addition of ferrous sulfate
 - b. Addition of B12
 - c. Addition of folic acid
 - d. None of the above**

Answer – this is likely anemia of chronic kidney disease given the elevated creatinine and the normal to high levels of ferritin, folic acid, and B12. MCV is also indicative of a normocytic anemia. Erythropoietin could be considered if anything was going to be done.

41. A 5 year old male who weighs 25 kg has had a recent asthma exacerbation. This is his first one in quite a while. He is on budesonide nebulizer twice daily and uses his albuterol nebulizer about 1-2 times per month. The primary care provider would like to prescribe prednisolone for the exacerbation. Which of the following would be most appropriate?
- a. Since he doesn't have many exacerbations, using montelukast for 10-14 days would be appropriate
 - b. Initiate prednisolone 5 mg daily for 5 days
 - c. Initiate prednisolone 20 mg daily for 5 days**
 - d. Do not utilize prednisolone and schedule albuterol nebulizer 4 times per day for 5 days

Answer – the most appropriate use of prednisolone for an asthma exacerbation is a dose of 0.5-1 mg/kg/day. The dose of 20 mg for 5 days would fall in this range and be the most appropriate. Montelukast would not be appropriate for an acute exacerbation. Increasing albuterol use may occur, but the steroid is recommended for exacerbations.

42. A 34 year old female is experiencing hypertensive episodes and they are considering starting her on medication therapy. Which of the following would be safest for her to take?
- a. Enalapril
 - b. Nifedipine**
 - c. Metoprolol
 - d. Spironolactone

Answer – Enalapril and spironolactone are absolutely contraindicated. Metoprolol likely should be avoided if possible as well. Nifedipine is utilized in pregnancy and would be the safest option of the medications listed.

43. Researchers are looking at a group of patients who are taking allopurinol. They want to do a study where they simply take the blood pressure of a group of patients on the medication and also take the blood pressure of a group of patients not on the medication (control group). They will compare those results to help determine if allopurinol increases blood pressure. What type of research would this best describe?
- a. Randomized controlled trial
 - b. Cohort
 - c. Cross sectional study**
 - d. Case study

Answer – Studying patients at a moment in time would be best described as a cross sectional study.

44. An 88 year old male has a past medical history of hypertension, GERD, hyperlipidemia, MI, CAD, diabetes, and osteoarthritis. He has just been diagnosed with atrial fibrillation. What is his Chads2Vasc score?
- a. 3
 - b. 4**

- c. 5
- d. 6

Answer – He has a history of hypertension (1), age > 75 (2), diabetes (1), and vascular disease (1) for a score of 5. Anticoagulation would be indicated in this patient according to this score.

45. One of your patients is concerned about potential adverse effects from levothyroxine supplementation. She thinks her dose is too high. Which of the following would likely not be associated with an excessive dose?

- a. Anxiety
- b. Tremor
- c. **Bradycardia**
- d. Increased appetite

Answer – With excessive levothyroxine intake, metabolism would be ramped up and there is risk to it contributing to tachycardia, increased appetite, weight loss, tremor, anxiety, and insomnia. Long term excessive thyroid supplementation could also be associated with osteoporosis.

46. A physician is asking which iron preparation has the highest elemental iron. Which of the following would you recommend?

- a. Ferrous gluconate
- b. **Ferrous fumarate**
- c. Ferrous sulfate
- d. All of the above have equivalent elemental iron

Answer – Ferrous fumarate has the highest amount of elemental iron. It tends to be a little more expensive and as you get higher amounts of elemental iron, you may encounter more GI side effects as well. Ferrous sulfate is often used first due to cost and tolerability, but fumarate has the highest elemental. Gluconate has the lowest elemental iron.

47. Which of the following would be an indirect cost in association with operating an MTM program?

- a. Education and training
- b. Dedicated salary for a pharmacist's time
- c. Office supplies
- d. **Lights and electricity in an existing pharmacy**

Answer: Lights and electricity in an existing pharmacy – Lights and electricity in a space that would operating anyway would be an example of an indirect cost. Salary, paying for education and training, and supplies would all be direct costs toward operating an MTM program.

48. In utilizing the incident-to billing codes, which of the following is true?

- a. A nurse practitioner would not be able to provide direct supervision under Medicare rules
- b. Incident-to codes can be billed under Medicare Part D for pharmacists
- c. The supervising provider must sign off on all notes and documentation from the pharmacist

d. The NPI of the Medicare provider is used to bill incident-to codes

Answer – The NPI of the Medicare provider is used to bill as pharmacists are not considered providers and they need to bill under another provider. A NP is listed as someone who is able to provide direct supervision under Medicare. Incident-to codes are billed under Medicare B. The supervising practitioner does not need to sign off on all notes and documentation.

49. Which of the following physiological changes happen as a patient ages?

- a. Increased flexibility of vessels leading to an increased risk in aneurysms
- b. Increased activity of the baroreceptor reflex leading to an increase in falls
- c. Increase in total body water

d. Potential increased volume of distribution for lipophilic drugs

Answer – As we age, fat % does increase and can lead to a greater volume of distribution for lipophilic drugs. Total body water tends to reduce and elderly are more susceptible to dehydration. Vessels become more stiff and rigid. The baroreceptor reflex reduces in activity and this can lead to an increase risk of dizziness and falls upon position changes.

50. Which of the following oral opioids would be the most potent?

- a. Morphine
- b. Oxycodone**
- c. Hydrocodone
- d. Codeine

Answer – Oxycodone would be the most potent opioid of the group here. 20 mg of oxycodone is approximately equivalent to 30 mg of oral morphine and 30 mg of hydrocodone. Codeine is the least potent. 200 mg of codeine is approximately equivalent to 30 mg of morphine.

51. An elderly patient has a really difficult time remembering to take his medications in the evening. He has significant COPD and forgets to take his medication especially when he has to do it twice per day or more. Which of the following would be most appropriate?

- a. Umeclidinium**
- b. Aclidinium
- c. Ipratropium
- d. Glycopyrronium

Answer – Umeclidinium is the one that will be used primarily once daily and would be most appropriate in this patient where adherence is an issue. Aclidinium and glycopyrronium are typically dosed twice daily. Ipratropium can be dose even more often. Tiotropium would also be an option (not listed) as this is also dosed once daily.

52. An elderly patient with mild dementia is having some urinary incontinence.

Anticholinergic therapy is desired to help manage these symptoms. Which of the following would be the most appropriate option to help minimize the impact on cognition?

- a. Tolterodine
- b. Oxybutynin oral tablets
- c. Oxybutynin patch

d. Trospium

Answer – Trospium is hydrophilic and should not cross the blood brain barrier under normal circumstances. This would likely have the least impact on cognition if an anticholinergic is necessary.

53. You have met with a patient for the first time for an MTM visit. The initial visit took 45 minutes. Which of the following MTMS codes should NOT be utilized?

- a. 99605
- b. 99606**
- c. 99607
- d. All codes could be used in the above situation

Answer: B. 99606 – MTMS code 99606 should not be used in this situation as this code is designated for the initial 15 minutes of an MTM visit of an ESTABLISHED (i.e. one you have met with before) patient. You would use 99605 for the initial 15 minutes with a new patient and 99607 for each additional 15 minutes.

54. In a patient with type 1 diabetes who is medically ill, which of the following is false?

- a. Increased cortisol release can contribute to hyperglycemia
- b. Closer monitoring of blood sugars would be recommended
- c. Insulin should be held for at least 4-6 hours upon recognition of symptoms of feeling ill**
- d. Consider use of small boluses (5-10% of usual total daily dose) of rapid acting insulin throughout the day as needed based upon blood sugar

Answer – With infection, blood sugars can be thrown out of whack. They can be low or they can increase the risk of DKA if they get too high. Cortisol and epinephrine production are generally increased which can raise blood sugars. If the patient is vomiting or not eating well, this can increase the risk of hypoglycemia. Closer monitoring of blood sugars and utilization of more of sliding scale short term can be helpful to avoid dangerously high or low BS. All of the above except C are true. Holding insulin for that long of a time would be risky and is not generally recommended.

55. ST is a 55 year old female with atrial fibrillation, hypothyroidism, hypertension, and osteoarthritis. She was recently diagnosed with a UTI. Given that culture and sensitivity is not an issue, which one of the following antibiotics would potentially interact with this patient's amiodarone for atrial fibrillation?

- a. Amoxicillin
- b. Cephalexin
- c. Nitrofurantoin
- d. Levofloxacin**

Answer: D. Levofloxacin could interact with amiodarone and increase the risk of QTc prolongation. It would be best to avoid this combination when other alternatives exist. Side note: Not using levofloxacin would also be nice to minimize the use of broad spectrum antibiotics.

56. According to the GOLD guidelines, what spirometry readings would classify a patient as having moderate COPD?

- a. FEV1 > 80% predicted
- b. FEV1 between 50 and 80% predicted**
- c. FEV1 between 30 and 50% predicted
- d. FEV1 < 30% predicted

Answer: B. FEV1 between 50 and 80% predicted – FEV1 > 80% predicted correlates to mild COPD, between 50 and 80% moderate, between 30 and 50% severe and < 30% very severe per the GOLD guidelines.

57. Researchers are putting together the analysis and interpretation of what they found in their clinical research. Which of the following sections would this be a part of in the clinical literature?

- a. Methods
- b. Results
- c. Discussion**
- d. Conclusion

Answer – the discussion section of the clinical literature is where the authors interpret and analyze the data and place their thoughts on how to apply this to clinical practice.

58. With regards to the use of opioids and benzodiazepines, which of the following is true?

- a. Naloxone has a role in both opioid and benzodiazepine overdose
- b. Opioid withdrawal symptoms are generally considered less lethal than benzodiazepine withdrawal**
- c. Anxiety, insomnia, and GI upset are common with opioid withdrawal, but not benzodiazepine withdrawal
- d. When benzodiazepines are used with opioids, there is a reduced risk of opioid induced respiratory depression

Answer – Opioid withdrawal is considered less lethal than benzodiazepines. They both can certainly be distressing to patients, but death due to opioid withdrawal is less likely. Anxiety, insomnia, GI problems are common to both types of withdrawal. Naloxone doesn't play much of a role in management of benzodiazepine overdose. Benzo's in combo with opioids increase the risk of respiratory depression.

59. A patient would like the recombinant Zoster Vaccine because she currently has an active Shingles episode. She is 57 years old. Which of the following is true with regards to this vaccine?

- a. It is a one time dose
- b. It would not be indicated for her as she is not yet 60 years old
- c. They should wait to give her the dose until after the shingles episode has resolved**
- d. The Zoster Live Vaccine should be given in place of the recombinant zoster vaccine

Answer – Recombinant Zoster Vaccine (Shingrix) is indicated in patients who are greater than 50 years old. It is a 2 dose course and more effective than the previous Zoster Live Vaccine (Zostavax). Even if she has had the Zoster Live Vaccine, she should still receive the recombinant vaccine. With active shingles, vaccination should wait until it has resolved.

60. A 67 year old female patient has a past medical history of stroke, Parkinson's, cirrhosis, esophageal stricture, heartburn, and Ulcerative colitis. She is having difficulty swallowing her medications. Which of the following would be least likely to exacerbate her dysphagia?

- a. **Ulcerative colitis**
- b. Esophageal stricture
- c. Parkinson's disorder
- d. Stroke

Answer – All of the above would be likely to increase her risk for dysphagia with the exception of ulcerative colitis.

61. A pharmacist is developing an ambulatory care practice within their community pharmacy. Which of the following billing codes would not be a potential source of revenue?

- a. G0108
- b. 99605
- c. **99211**
- d. State Medicaid MTM programs

Answer – 99211 would need to be billed incident to – this would need to be done in physician based clinic. Diabetes management codes, 99605, and state Medicaid MTM programs (depending upon the state) may all be potential sources of revenue for a community pharmacy.

62. In the case of a patient with SIADH due to carbamazepine, which of the following symptoms would be least likely to occur?

- a. **Edema**
- b. Confusion
- c. Increased risk of seizures
- d. Nausea and vomiting

Answer – Edema would be least likely to occur in hyponatremia due to SIADH. CNS changes like confusion, seizures (if severely low), and GI upset would be the most common symptoms that a patient would present with in addition to the lab revealing low sodium levels.

63. Which of the following medications would concentrations go up when a patient quits smoking?

- a. Clonidine
- b. **Clozapine**
- c. Risperidone
- d. Empagliflozin

Answer – Clozapine concentrations can go up when patients quit smoking cigarettes. Cigarette smoking induces CYP1A2 which is a primary metabolic pathway for the breakdown of clozapine. We should monitor for toxicity.

64. When developing an ambulatory practice, a SWOT analysis may be a useful tool. Which of the following is incorrect regarding the SWOT acronym?
- a. Strengths
 - b. Weaknesses
 - c. Objective data**
 - d. Threats

Answer – SWOT stands for strengths, weaknesses, opportunities, and threats. You want to identify positive and negative attributes of your pharmacy setting. You also have to look at what could use improvement or what your location provides (i.e. lots of geriatrics, diabetes, asthma, etc.). Threats is essentially competition, i.e. is there a pharmacy nearby doing the exact same thing?

65. One of your patients is having significant signs and symptoms of depression. She has discussed possibly starting to take an antidepressant with her primary provider. Her past medical history is fairly unremarkable with the exception of IBS with predominantly diarrhea which appears under control. She is 46 years old. Known allergies to: Sulfa drugs, amoxicillin - Which of the following antidepressants would be least appropriate?
- a. Sertraline**
 - b. Escitalopram
 - c. Citalopram
 - d. All of the above are equivalent

Answer: Sertraline is the most highly serotonergic and will likely have the highest chance of causing diarrhea in this patient as they have already had a problem with this in the past. Escitalopram and citalopram would be more appropriate in this situation to minimize the risk of exacerbating this patient's IBS.

66. Which of the following is a potential downside of motivational interviewing compared to providing instructions to patients as to how they should manage their disease.
- a. Time consuming**
 - b. Worse outcomes
 - c. Reduced adherence
 - d. Increased healthcare costs

Answer – One big disadvantage of motivational interviewing is that it can take a significant amount of time to listen to the patient, be empathetic, and develop a plan based upon the patient's ideas and preferences.

67. Which of the following would not be part of the plan of care in a patient receiving cyclosporine for plaque psoriasis?
- a. Monitor kidney function
 - b. Minimize use to as short of duration as possible

- c. Reserve for severe cases
- d. Monitor CPK**

Answer – With cyclosporine, we really want to try to minimize use if possible and use only for severe cases and as short of a time as possible. Monitoring kidney function is also important with cyclosporine. Checking CPK would not be a critical part of the plan of care.

68. It is determined that the incidence of cognitive impairment was overestimated by the physicians tasked with monitoring patients in a clinical trial for a new medication.

Which of the following would best describe this bias?

- a. Selection bias
- b. Recall bias
- c. Observation bias**
- d. Education bias

Answer – Observation bias is done by the investigators. This occurs when they see an event happen when it actually isn't occurring. This can also be represented by observers exaggerating the impact of an event.

69. Which of the following is false with regards to the use of varenicline?

- a. Patients should not smoke while taking this medication**
- b. GI upset and vivid dreams are two of the more common side effects
- c. Administration after eating with a full glass of water is recommended
- d. All of the above are true

Answer – Patients can smoke while using this medication. A quit day is typically selected about a week after starting varenicline, but alternatively can select a date up to 35 days after starting the medication. Certainly, it is allowable to smoke while on the medication. The partial nicotine agonist effect should hopefully curb the reward from smoking.

70. Which of the following Annual Wellness Visits cannot be performed by a pharmacist?

- a. G0402**
- b. G0438
- c. G0439
- d. All of the above can be done by a pharmacist

Answer – G0402 needs to be done by a physician or other qualified practitioner. This is the initial "Welcome to Medicare" visit done within 12 months of Medicare enrollment. The first annual Medicare wellness visit (G0438) and subsequent Medicare wellness visits (G0439) can be done by a pharmacist.

71. With the use of selegiline in Parkinson's disease, which of the following should be monitored for?

- a. Drug interaction with diphenhydramine
- b. Drug interaction with escitalopram**
- c. Reduced concentrations of carbidopa/levodopa upon initiation when used in combination
- d. Drug interaction with clopidogrel

Answer – Selegiline has MAOI activity and could increase the risk of serotonin syndrome when used in combination. This is usually only a concern with patients on higher doses, but it should be monitored for. The tyramine/food interaction is also possible, but not near as likely as MAOI antidepressants due to selegiline's activity on MAO type – B. Meaningful interactions with diphenhydramine and clopidogrel wouldn't be that clinically significant. Selegiline would raise concentrations of dopamine by reducing enzymatic breakdown.

72. Which of the following is false regarding GLP-1 agonists?

- a. They are available in twice daily, once daily and once weekly injectable formulations
- b. They can lower A1C by 1-1.5%
- c. GI adverse effects are the most common
- d. They are associated with weight gain**

Answer: D. They are associated with weight gain – GLP-1 agonists are advantageous in that they can help with weight loss versus weight gain. Downsides; injectable (except oral semaglutide), expensive. Liraglutide actually has a product that is specifically indicated for weight loss (3 mg dosing vs. 1.8mg).

73. Which of the following is true with regards to the use of misoprostol in prevention of NSAID induced ulcers?

- a. It is considered just as effective as PPI's**
- b. It is an option in patients who are pregnant
- c. It causes constipation as its major adverse effect
- d. It should be avoided due to risk of SJS

Answer – Misoprostol is considered just as effective as PPI's; however, its side effect profile is what prevents us from using it. It has a high incidence of GI adverse effects like GI pain, upset and diarrhea. Constipation is not common. It doesn't have a significantly higher incidence of SJS compared to other medications. It should absolutely be avoided in pregnancy (remember that the medication is used in abortion).

74. A 45 year old male patient has been diagnosed with a tumor that is excessively secreting aldosterone. Which of the patient's medications would potentially exacerbate the effect of aldosterone on potassium?

- a. Spironolactone
- b. Metolazone**
- c. Ivabradine
- d. Amlodipine

Answer – Excessive aldosterone production would likely lead to hypokalemia. Hypokalemia is most likely to be exacerbated by diuretics like loops and thiazides. Metolazone being a thiazide like diuretic would lower potassium levels. Spironolactone would potentially help block the aldosterone effects. Ivabradine and amlodipine would likely have no to minimal impact on potassium.

75. With the use of valproic acid, which of the following is false?

- a. **Drug levels to assess efficacy for migraine prophylaxis should be checked periodically**
- b. Ammonia levels should be checked in any patient displaying confusion or potential CNS adverse effects
- c. Adding valproic acid to lamotrigine can increase the risk of lamotrigine induced rash
- d. Valproic acid tends to cause more weight gain than weight loss

Answer – Valproic acid levels are typically not drawn for migraine prophylaxis. We are going to monitor clinical response (reduction of migraine # and severity). In the event of possible toxicity, we may check a level, but this would not likely be done for efficacy. In seizure disorder, it would be much more important to assess levels. The other statements about VPA are true.

76. A 44 year old Army veteran has a history of PTSD and nightmares. He also is having elevated blood pressures. Which of the following would potentially be beneficial for both of these indications?
- a. Valsartan
 - b. **Prazosin**
 - c. Hydralazine
 - d. Chlorthalidone

Answer – Prazosin has some potential benefit for its antihypertensive effect as well as in the management of nightmares.

77. Which of the following is not an accurate education point with lidocaine patches?
- a. Patches can be cut to fit the size of the painful location
 - b. Up to 3 patches can be used at once
 - c. Recommend a 12 hour lidocaine free period out of every 24 hours
 - d. **All of the above are appropriate education points**

Answer – all of the above are true in this question. 12 hours on/12 hours off, 3 patches at a time are ok (but expensive), and the patches can be cut, unlike fentanyl, clonidine, oxybutynin patches etc.

78. Which of the following would be the least effective strategy at delaying progression of peripheral arterial disease?
- a. Appropriate assessment and initiation of statin therapy
 - b. **Use of pentoxifylline for prophylaxis measures**
 - c. Smoking cessation
 - d. Initiating aspirin therapy

Answer – Pentoxifylline isn't that effective of an agent for peripheral arterial disease and if it does have any benefit, it will likely be just for symptoms of things like intermittent claudication. It would not have a role in delaying progression and reducing long term risk. Management of cardiovascular risk such as hypertension, statin, aspirin, and smoking cessation would be the best strategy to help reduce risk of future complications from PAD.

79. A 55 year old male has diagnoses of hypertension, BPH, depression, and GERD. He reports experiencing significant sexual dysfunction. Which of his medications would be most likely to cause this?

- a. **Finasteride**
- b. Lisinopril
- c. Terazosin
- d. Bupropion

Answer – Finasteride ultimately reduces dihydrotestosterone levels by inhibition of 5-alpha-reductase. This reduction in dihydrotestosterone is most likely to contribute to sexual dysfunction.

80. Of the following HIV agents, which would place a patient at highest risk for fat deposits in the back and neck contributing to “buffalo hump”?

- a. **Lopinavir/ritonavir**
- b. Emtricitabine
- c. Raltegravir
- d. Maraviroc

Answer – the protease inhibitors would be most associated with this adverse effect and likely to cause the fat redistribution as mentioned above.

81. Why is sulfamethoxazole avoided in the later stages of pregnancy?

- a. Risk of tooth discoloration for the baby
- b. Risk of abnormal limb formation
- c. **Risk of hemolytic anemia**
- d. Sulfamethoxazole can be used in all stages of pregnancy

Answer – Sulfamethoxazole can cause hemolytic anemia and in particular, in those that have G6PD deficiency.

82. As a preceptor, you’d like the student to educate a new asthma patient on how to use an inhaler. Throughout the process, the preceptor provides direct feedback to the student as they see necessary. This process would be considered:

- a. Instruction
- b. Modeling
- c. **Coaching**
- d. Facilitating

Answer – This would be coaching. Modeling would involve the preceptor giving the education first and the student copying (modeling). Instruction would be simply giving information on how to do the task to the student without the activity. Facilitating involves giving the student independence to do the activity without much oversight and then talk about it later.

83. A 68 year old male has atrial fibrillation. Which of the following would NOT be used for rate control?

- a. **Amiodarone**
- b. Metoprolol

- c. Verapamil
- d. Digoxin

Answer: A. Amiodarone – Non-dihydropyridine calcium channel blockers and beta blockers are typical meds used for rate control. Amiodarone is used for rhythm control not rate.

84. Which of the following would not be associated with the use of trazodone?
- a. Lower doses are typically used for insomnia while higher doses are more associated with the antidepressant benefit
 - b. A common side effect is dry mouth
 - c. The patient on blood pressure medication should monitor for orthostasis risk
 - d. Thyroid levels should be monitored 3-6 months following initiation**

Answer – monitoring of thyroid levels would not be necessary. Dry mouth, sedation, and orthostasis would all be important adverse effects to monitor for. Lower doses are typically used for insomnia, while higher doses are usually necessary to get the antidepressant effect.

85. In the management of Crohn's disease, which of the following is true in regards to the use of oral budesonide?
- a. Low bioavailability due to high first pass effect**
 - b. Primarily metabolized via CYP 2D6
 - c. It has an extremely long half-life compared to other corticosteroids (weeks)
 - d. It has no risk of HPA suppression

Answer: A. Low bioavailability due to high first pass effect – oral budesonide is metabolized via 3A4 and has a very high first pass effect making bioavailability very low. It has a short half-life and may carry less of a risk for HPA suppression compared to other corticosteroids, but certainly does have some risk when used chronically.

86. Phenobarbital will have highest potential to cause deficiency of what vitamin?
- a. B12
 - b. B1
 - c. Vitamin D**
 - d. Vitamin C

Answer – Phenobarbital can induce metabolism of vitamin D. This can ultimately lead to deficiency and potential issues with bone formation etc.

87. A 62 year old female has a history of cardiovascular disease, alcoholism, Raynaud's disorder, atrial fibrillation, diabetes, stroke, cirrhosis, and history of medication non-compliance. With the new onset of atrial fibrillation, it is determined to initiate warfarin for anticoagulation and stroke prevention. She is started on 5 mg once daily of warfarin and an INR is to be checked daily. Upon checking the INR after the first day, it was 2.1. Which of the following actions would be most appropriate?
- a. Continue current dose and recheck INR in 1 week
 - b. Stop warfarin and start apixaban
 - c. Question patient about adherence
 - d. Reassess other diagnoses and risk/benefit of using anticoagulation**

Answer – With this patient's history of cirrhosis, we should reassess anticoagulation in this scenario. Remember that with liver impairment, we can have a reduced capacity to make clotting factors. This is the most likely the cause of the elevated INR compared to the one dose of warfarin. This elevation is likely not due to an adherence issue. Continuing current dose and rechecking in one week would be very risky as this INR is likely to go higher as warfarin takes 3-7 days to get to full effect.

88. A 45 year old female has an A1C of 7.1. She has some cognitive impairment due to mild mental retardation. She is in charge of her medications and has been able to appropriately manage them. She currently takes metformin 1,000 mg twice daily and glipizide 5 mg once daily. In the last 4 weeks, she has had three hypoglycemia episodes. Which medication might be likely to impact her ability to recognize early symptoms of hypoglycemia?

- a. Pseudoephedrine
- b. Propranolol**
- c. Topiramate
- d. Venlafaxine

Answer – The propranolol would be the most likely agent that would blunt the signs and symptoms of hypoglycemia. Sweating usually is unaffected by the beta-blocker which the patient could be educated on to monitor for. Certainly, we'd also reassess the use of the sulfonylurea and maybe switch to an alternative oral agent (i.e. DPP4, SGLT2, etc.)

89. Which of the following is an advantage of pioglitazone over acarbose?

- a. Once daily dosing**
- b. Weight neutral to weight loss
- c. Lower risk of hypoglycemia when used alone
- d. More effective A1C lowering

Answer – once daily dosing is the advantage of using pioglitazones over alpha-glucosidase inhibitors like acarbose. Acarbose and pioglitazone aren't typically used much with all of the newer available agents. Pioglitazone causes weight gain, while acarbose needs to be dosed frequently throughout the day and cause a lot of GI side effects. Relative effectiveness of A1C lowering isn't clinically significantly different between these agents.

90. How frequently can a Targeted Medication Review be completed and billed for?

- a. Monthly
- b. Quarterly**
- c. Bi-annually
- d. Yearly

Answer – Targeted Medication Reviews can be done on a quarterly basis. Comprehensive Medication Reviews can be completed and billed on an annual basis.

91. A 38 year old presents to discuss some trouble with his feet. He has noticed itching, burning and redness in between his toes. Past medical history is heartburn for which he takes ranitidine. The symptoms have been happening for a few months. It has become

painful of late. He also reports working out and showing at the local gym. Which of the following would be most appropriate to recommend?

- a. Recommend referral to podiatrist
- b. Initiate topical clotrimazole**
- c. Oral fluconazole would be recommended
- d. Recommend topical nystatin

Answer – This appears to be a case of athlete's foot and topical clotrimazole would be a very appropriate over the counter selection. The case does not appear to warrant oral therapy at this time.

92. A 61 year old female has a history of Factor 5 Leiden. Which of the following medications would most likely increase complications associated with this diagnosis?

- a. Raloxifene**
- b. Alendronate
- c. Teriparatide
- d. Denosumab

Answer – Factor 5 is a clotting disorder where a patient is at higher risk of DVT/blood clots. Raloxifene can potentially increase this risk in comparison to the other osteoporosis agents listed.

93. A patient is placed on azathioprine for severe Crohn's disease. Which of the following would be least important in regards to its use?

- a. Azathioprine can increase the risk of lactic acidosis and this should be monitored for**
- b. LFT's should be monitored
- c. Allopurinol can significantly raise concentrations and lead to myelosuppression
- d. Azathioprine can increase the risk of malignancy

Answer – Lactic acidosis would not be common with the use of azathioprine. It is an immunosuppressant medications and infection and malignancy risk should be monitored. Allopurinol can significantly raise concentrations and LFT's should be monitored in patients on chronic therapy as well.

94. Which of the following would not be consistent with drug induced Cushing's syndrome?

- a. Weight loss**
- b. Acne
- c. Osteoporosis risk
- d. Erectile dysfunction

Answer – Weight gain would be common with drug (steroids) induced Cushing's syndrome. Acne, OP, ED, fatigue, CNS changes, abnormal fat distribution (i.e. buffalo hump, elevated BP, and elevated blood sugars are all associated with elevated levels of corticosteroids.

95. A patient is receiving furosemide and metolazone for her CHF. She also has uncontrolled diabetes. Which of the following medications would have greatest impact on increasing the risk of dehydration?

- a. Metformin
- b. Glipizide
- c. Semaglutide
- d. Empagliflozin**

Answer – While there is evidence that the SGLT2 inhibitors could reduce the risk of heart failure hospitalization, they do have a mild diuretic effect and could potentially worsen dehydration risk. There have been case reports of acute kidney injury due to this. It would probably be best to avoid this medication if kidney function is already poor as it also lacks blood sugar lowering benefit when renal function is impaired. If kidney function is adequate, you would need to closely monitor as the patient is at higher risk of renal complications due to the diuretics. Metformin obviously shouldn't be used in the setting of significant kidney impairment, but it is not strongly associated with cause renal impairment on its own.

96. Which treatment regimen would be most appropriate for initial therapy for treatment of peptic ulcer due to H. Pylori?

- a. Clarithromycin and omeprazole
- b. Lansoprazole, bismuth, metronidazole, and tetracycline**
- c. Levofloxacin, azithromycin, and omeprazole
- d. Amoxicillin, oral vancomycin, tetracycline, and omeprazole

Answer – A PPI, bismuth, metronidazole, and tetracycline (or doxycycline) quadruple therapy is the usual regimen of choice. Levofloxacin generally has higher rates of resistance and isn't typically used in first line therapy barring contraindications or allergies to other agents. Oral vancomycin isn't typically used in the management of H. pylori (used as drug of choice in C. Diff).

97. One of your patients has recently been diagnosed with GERD and Barrett's esophagus. He doesn't like to take medication and would prefer not to take his omeprazole any longer. He has taken it for about 4 weeks at this point. Which of the following actions would you recommend that he take?

- a. 4 weeks should be long enough, he will likely be able to stop following discussion with his physician
- b. Management of Barrett's should continue for at least 12 weeks, he should continue until then and follow up with his physician for reassessment
- c. He should continue at least one year, then follow up for reassessment
- d. Educate him that he will likely have to continue this medication for the rest of his life**

Answer – Best evidence in the management of Barrett's is to continue the PPI indefinitely to reduce the risk of esophageal adenocarcinoma. Uncontrolled acid reflux may lead to further damage and increase the risk for cancer formation.

98. Which of the following regarding eye drop administration is incorrect?

- a. You should wait at least 5 minutes between eye drops
- b. To ensure adequate efficacy, you can advise patients to place their finger gently on the tear duct and gently apply pressure

- c. **The tip of the eye dropper can gently touch the eye as long as the dropper is immediately rinsed after administration**
- d. Recommend that if the eye dropper is chipped or cracked that the patient should not use the eye dropper

Answer: The tip of the eye dropper can gently touch the eye as long as the dropper is immediately rinsed after administration – To avoid contamination, it is NOT recommended to touch the eye dropper to the eye. The other statements are correct regarding eye drop administration.

99. Which of the following would be least expected with use of roflumilast?

- a. Improvement in respiratory symptoms
- b. **Risk of drug induced rash**
- c. Potential to cause weight loss
- d. Risk of neuropsychiatric events

Answer: Risk of drug induced rash – Roflumilast is a PDE-4 inhibitor used in the treatment of COPD. Improvement in respiratory symptoms, risk of weight loss and neuropsychiatric events would be the most probable outcomes associated with this medication (there are warnings/precautions about possible GI effects/weight loss and neuropsychiatric events).

100. A 64 year old with Type 2 diabetes presents to her annual physical and has her A1C drawn. Past medical history includes hypertension, CAD, osteoarthritis, constipation, and urinary incontinence. She also recently had a lengthy back surgery that lasted about 4 hours just a couple weeks ago. She reports feeling a little tired, but overall pain has improved. Her blood sugars are under decent control and she reports that they have been between 80-130 most days and she has not had any hypoglycemia. Current medications include; metformin, glipizide, aspirin, clopidogrel, rosuvastatin, clonidine, lisinopril, sennosides, and tolterodine. Labs include WBC = 4.9 cells/L, Hemoglobin 9.1 g/dL, potassium 5.2 mEq/L, sodium = 141 mEq/L, Creatinine 1.0 mg/dL, A1C = 5.3. Which of the following actions would be most appropriate with her diabetes?

- a. Reduce or discontinue glipizide
- b. Reduce or discontinue metformin
- c. **Continue same medications, continue to monitor blood sugar and repeat A1C in 3 months**
- d. Discontinue lisinopril which is being used to help with diabetic nephropathy

Answer - The potassium level is not that severely elevated and should be continued at this time. Follow up potassium in the next 3-6 months might be appropriate, but discontinuing at this point doesn't seem appropriate. The A1C is likely falsely low due to the blood loss and substantial anemia likely from the surgery. No hypoglycemia is noted when she is checking and she reports no episodes. Reducing or changing metformin or glipizide at this time seems inappropriate.

101. Which of the following is true with the use of rivaroxaban in the management of atrial fibrillation?

- a. Usual dosing is 15 mg BID for 21 days, then 20 mg daily

- b. In patients with Creatinine clearance of 52 mls/min, dosages should be reduced
- c. Phenytoin and rivaroxaban combination should be avoided**
- d. When converting to warfarin, rivaroxaban can be discontinued and warfarin can be started at the usual time

Answer – The only true statement here would be that phenytoin and rivaroxaban combination should be avoided. Phenytoin is a strong inducer of 3A4 and could lead to reduced concentrations. The usual cut off for renal adjustments is 50 mls/min. 15 BID for 21 days is dosing for DVT treatment. Typically, it is recommended to switch to enoxaparin and then bridge to warfarin. The enoxaparin would be discontinued when the INR is at goal.

102. When using NSAIDs, which of the following strategies would be most effective to minimize the risk of drug induced renal dysfunction?

- a. Switching traditional NSAIDs to celecoxib
- b. Adding low dose hydrochlorothiazide with the NSAID
- c. Encourage adequate exercise
- d. None of the above**

Answer: None of the above – NSAIDs can cause renal impairment, and while using celecoxib can possibly help GI bleed risk, the risk to the kidney remains the same. Adding low dose HCTZ would likely increase risk to the kidney and while exercise is generally a good thing to recommend, it wouldn't likely have an impact on kidney risk in relation to drug related causes.

103. JS is having some frequency of urination at night. She would like a medication to help with this. She has a history of hypertension, DVT/PE, and GERD. Current medications include omeprazole 20 mg once daily, chlorthalidone 12.5 mg twice daily, ranitidine 150 mg in the evening, rivaroxaban 20 mg once daily, and amlodipine 5 mg once daily. BP = 112/58, pulse = 62. Which of the following would be the most appropriate recommendation?

- a. Initiation of tiroprium
- b. Discontinuation of 2nd dose of chlorthalidone**
- c. Initiation of oxybutynin
- d. Initiation of mirabegron

Answer – Since the frequency is happening at night and blood pressure is very well controlled, the best solution to avoid contributing to polypharmacy would be to discontinue the 2nd chlorthalidone dose. If unsuccessful in reducing frequency, then it would be reasonable to consider alternative options.

104. A 38 year old breastfeeding female has been diagnosed with bacterial mastitis. Which of the following would be the most appropriate agent to initiate?

- a. Ciprofloxacin
- b. Cephalexin**
- c. Sulfamethoxazole/trimethoprim
- d. Azithromycin

Answer – A simple beta-lactam would be the drug of choice for mastitis. Also remember that we need to think about medications that would be compatible with breastfeeding. Beta-lactams are typically not an issue as we give these medications to the baby as well.

105. A 64 year old male has a history of hypertension, renal transplant, Parkinson's, osteoarthritis, neuropathy, and Barrett's esophagus. His wife is noting that he has had a change in cognition and is more confused. She also says he is reporting seeing spiders on the walls and this is very distressing to him. Which of his medications would be most likely to contribute to this?

- a. Clonidine
- b. Tacrolimus
- c. Duloxetine
- d. Carbidopa/levodopa**

Answer – Drugs that can increase dopamine levels are associated with hallucinations and CNS changes. Carbidopa/levodopa is often associated with hallucinations and CNS changes. He is likely supratherapeutic with this medication and a reduction might be considered in this situation.

106. Which of the following would not be considered one of the CMS goals of the Medication Therapy Management program?

- a. Review of medication costs
- b. Development of compounded dosage forms that may be necessary for a patient**
- c. Identification of drug interactions
- d. Reducing the risk of adverse effects

Answer – MTM is intended to be a review of a patient's medications to develop goals of therapy, identify drug interactions, adverse effects, assess adherence and make sure there are no barriers to appropriate medication use such as medication costs.

107. A 52 year old male has controlled hypertension at 126/74 and is taking amlodipine 10 mg daily. He has a pretty unremarkable medical history otherwise. His LDL was checked 6 months ago and was 206. He was going to try to implement lifestyle changes. It was repeated today and revealed an LDL of 198. Which of the following would be the most appropriate treatment for this patient?

- a. Simvastatin 40 mg daily
- b. Pravastatin 10 mg daily
- c. Atorvastatin 10 mg daily
- d. Rosuvastatin 20 mg daily**

Answer – Given the LDL of >190, this patient should be receiving a high intensity statin. Rosuvastatin 20 mg is the only medication that would get us to high intensity management.

108. A 6 year old has a first degree burn after putting his foot on a hot burner on the stove. He was climbing up on the counter to get a glass out of the cupboard. He says it is

painful and itches sometimes as well. Which of the following agents would be most appropriate to use to help manage discomfort?

- a. **Aloe**
- b. Topical hydrocortisone
- c. Prednisone
- d. Topical diclofenac

Answer – A first degree burn is the least severe type of burn and aloe would be the most appropriate recommendation here. Corticosteroids can impair healing and are generally avoided. Topical diclofenac would not have a role in the management of burns.

109. A 71 year old has significant neuropathy and has been tried on duloxetine, venlafaxine, gabapentin, and pregabalin. The primary care provider would like to consider a TCA to help with his severe pain. Which of the following would be most appropriate?

- a. Amitriptyline
- b. **Nortriptyline**
- c. Doxepin
- d. Diphenhydramine

Answer – Diphenhydramine is not a TCA and would not be indicated in the management of neuropathy. Doxepin is generally associated with better relief of itching and other concerns compared to neuropathy. Nortriptyline is considered a better tolerated TCA in the elderly if one has to be used. Amitriptyline is more likely to cause complications in the elderly.

110. A 66 year old female is on chronic trimethoprim for UTI prophylaxis. Which of the following additions would potentially interact with trimethoprim and lead to electrolyte abnormalities?

- a. Metolazone
- b. Carbamazepine
- c. **Losartan**
- d. Sertraline

Answer – Trimethoprim has the potential to raise potassium levels and this is more prevalent in patients who are on other medications that can raise potassium.

111. One of your patients presents with a genetic testing profile. It states that they are a slow metabolizer at CYP3A4 and CYP1A2. They are a rapid metabolizer at enzymes CYP2D6 and CYP2C19. Which of the following genetic variations would be anticipated to affect the clinical response to hydrocodone the most?

- a. Increased response due to CYP2C19 genetic variation
- b. **Increased response due to CYP2D6 genetic variation**
- c. Reduced response due to CYP3A4 genetic variation
- d. Reduced response due to CYP1A2 genetic variation

Answer – hydrocodone is converted to hydromorphone which is significantly more potent than hydrocodone. CYP2D6 is the enzyme responsible for this conversion and a rapid metabolizer at this enzyme would be expected to have greater opioid activity.

112. JS is a 79 year old male with a history of cyanocobalamin deficiency. He reports taking his oral supplement faithfully, but levels remain low. He is on 1,000 mcg once daily. Which of the following would be most appropriate to replace stores?

- a. Take it with vitamin C
- b. Change to injectable**
- c. Add folic acid
- d. Increase dose

Answer – In elderly patients, there may be a challenge in absorbing vitamin B12 due to a deficiency in intrinsic factor. There isn't any magical way to overcome this and still give the oral supplement. Of the options provided, the most appropriate option would be to switch to IM B12.

113. A 43 year old female has a history of bipolar depression, hypertension, rheumatoid arthritis, and GERD. Labs reveal thrombocytopenia. Which of her medications would be most likely to contribute?

- a. Lamotrigine
- b. Valproic acid**
- c. Methotrexate
- d. Valsartan

Answer – Valproic acid has the strongest association with low platelets and could potentially cause this problem.

114. A 61 year old female has a history of resistant hypertension and was placed on hydralazine about 1 year ago. She is experiencing fatigue, hair loss, and having a lot of swelling and pain in her joints. Which of the following assessments would help us identify what the issue is?

- a. ANA**
- b. CPK
- c. ESR
- d. BNP

Answer – An antinuclear antibody titer is recommended for patients on hydralazine as this medication can cause a drug induced Lupus type situation. This lab would help us determine if the reported problems were due to the medication.

115. 200 patients with fibromyalgia were followed to monitor their frequency of exercise. A 95% confidence interval ranged between 0.28 and 0.47 for the proportion who exercised regularly. Which of the following statements would be erroneous?

- a. More than half exercised regularly**
- b. The hypothesis that 40% exercise regularly cannot be rejected
- c. More than 25% exercised regularly
- d. Less than 100 of the patients in the study exercised regularly

Answer – The confidence interval is represented as a proportion. If the confidence interval was close to 1, that would mean that nearly everyone exercised. We have a proportion between 28

and 47% of the patients meaning less than 50% (100 patients). 40% lies within the confidence interval and cannot be rejected. Certainly, more than 25% exercised regularly.

116. A 58 year old obese patient has recently been diagnosed with diabetes. His A1C is 8.6 despite efforts to change his lifestyle and eating habits. Past medical history includes gout, osteoarthritis, an MI 5 years ago, hypertension, hyperlipidemia, and GERD. Which of the following interventions would be most appropriate?
- a. Canagliflozin
 - b. Metformin**
 - c. Liraglutide
 - d. Sitagliptin

Answer – Don't over think this one. Metformin is the initial drug of choice. Liraglutide does have the potential to reduce cardiovascular risk, but from an efficacy, guideline, and cost perspective, metformin would be the initial drug of choice if it has never been tried.

117. A 44 year old female presents with increasing fatigue. She also has restless leg syndrome and has had unusual cravings for ice cubes. Which of the following lab assessments would be most important?
- a. Magnesium
 - b. Vitamin D
 - c. Iron**
 - d. Folic Acid

Answer – Restless legs, unique cravings, and possible anemia can happen from iron deficiency. The others might be appropriate to monitor, but the most likely contributing factor would be iron deficiency and this would be at the top of the list.

118. A 57 year old male has been started on insulin degludec as his blood sugars have been very high. He has consistently been in the 300's-400's. You are helping instruct him on using the device. He was instructed to slowly increase his insulin by 2 units over time until his morning blood sugar was less than 150 mg/dL and then contact his primary provider. He cannot recall how often he was supposed to increase the dose? You contact the provider to provide a recommendation. Which of the following would be most appropriate?
- a. Increase the dose daily until reaching goal
 - b. Increase dose every 3 days**
 - c. Increase dose on a weekly basis
 - d. Increase dose on a bi-weekly basis

Answer – For the really long acting insulins like degludec, you really want to be careful about making sure the patient is at or close to steady state before increasing the dose so as to not substantially increase the risk of hypoglycemia. That timeframe is usually 3-4 days. We wouldn't want to wait much longer than we have to in this patient as his sugars are very high.

119. A 61 year old female with CHF presents with worsening shortness of breath. Ejection fraction is 35%. She has not tolerated loop diuretics in the past. Current vitals include

BP 144/88, pulse = 67. Labs include creatinine = 1.1 mg/dL, Na⁺ = 141 mEq/L, K⁺ = 5.1 mEq/L, ALT 17 u/L, AST 19 u/L, Hemoglobin = 12.1 g/dL. Current medications include aspirin 81 mg daily, lisinopril 10 mg daily, Carvedilol 6.25 mg twice daily. Which of the following would be most appropriate to help with her acute exacerbation?

- a. **Metolazone**
- b. Spironolactone
- c. Add sacubitril/valsartan
- d. Increase Carvedilol

Answer – With the challenge of loop diuretic intolerance, we have to consider other options to help reduce fluid overload. Use of a diuretic would be most important. Adding the spironolactone would increase the risk of potassium elevations with the current level being 5.1. Metolazone, a thiazide like diuretic would be the most appropriate to initiate to help the exacerbation and not raise potassium levels. Increasing lisinopril and carvedilol is reasonable as we try to maximize doses in CHF, but this likely won't take care of the acute exacerbation. Increasing the lisinopril could also add to hyperkalemia. Adding sacubitril/valsartan would not help with the acute exacerbation and we would also need to DC the ACE inhibitor if we were going to do that.

120. Which of the following models would a healthcare facility be paid a fixed amount each month to care for an enrolled patient in a healthcare plan?

- a. Fee-for-service
- b. **Capitation**
- c. Group practice
- d. Partial reimbursement

Answer – Capitation is the term used to describe a reimbursement system that provides a fixed dollar figure to take care of a patient. Healthcare models are shifting in this direction and away from fee-for-service.

121. Which of the following would not be consistent with digoxin toxicity?

- a. **Hyperthyroidism**
- b. GI upset
- c. Confusion
- d. Visual changes

Answer – While rare, visual changes can happen. More common to digoxin toxicity is GI upset, weight loss, and confusion. Hyperthyroidism would not be consistent with digoxin toxicity.

122. For educating an illiterate patient about using insulin, which of the following would be least effective?

- a. Audio/visual presentation
- b. Demonstration
- c. PowerPoint presentation
- d. **Educational handouts**

Answer – Educational handouts would likely be the least effective in a patient who cannot read. All other teaching methods would likely involve some sort of pictures or supplemental education other than just words.

123. You are seeing a patient for medication therapy management. This is a patient you have established care with for years and have been following. She was in 3 months ago and had a change in her antihypertensive therapy. You meet with the patient for 15 minutes and in collaboration with the physician, you decide to increase her amlodipine. Which of the following billing codes would be most appropriate?

- a. 99605
- b. 99606**
- c. 99607
- d. 99606 and 99607

Answer – This would be a follow up with an established patient. 99606 would be the appropriate billing code since it only lasted 15 minutes. If it lasted 30 minutes, the appropriate coding would have been answer D.

124. Which one of the following medications would be least likely to contribute to drug induced hypertension?

- a. A 78 year old female who is taking mirabegron
- b. A 55 year old female on conjugated estrogens
- c. A 72 year old male on diphenhydramine**
- d. An 88 year old male on nabumetone

Answer: C. A 72 year old male on diphenhydramine – NSAIDs, mirabegron (beta-agonist activity), and estrogen therapy would be the most likely culprits as far as exacerbating hypertension. Diphenhydramine would be least likely to contribute to hypertension.

125. Which of the following would not increase the need for ambulatory care services?

- a. Increasing technology allowing for more outpatient procedures
- b. Regulatory pressure to lower costs of care
- c. Preferred outpatient versus inpatient care
- d. Lower numbers of elderly patients**

Answer – All of the above except reduced numbers of elderly patients would increase the need for ambulatory services. Increasing outpatient procedures, reducing costs of care by minimizing hospital stays and emergency department visits will increase the need for ambulatory care services. Higher numbers of elderly patients would increase the need for ambulatory services.

126. With regards to use of contraception, which of the following would be incorrect?

- a. Progestin only oral products are less sensitive to missed doses than estrogen/progesterone combination tablets**
- b. Elevated estrogen in a product is more likely to cause nausea and headaches
- c. Progestin only products are safer to use during breast feeding than combination progestin/estrogen
- d. Topical combination patches may be less effective in patients over 90 kg

Answer – All of the above are true with the exception of the first statement. Progestin only products are much more sensitive to missed or delayed doses. Even if off of timing for a few hours, this can potentially increase risk of breakthrough bleeding and/or pregnancy.

127. Which of the following is false with regards to Chronic Care Management billing codes?

- a. They are billed incident to a primary provider
- b. The code is 99490
- c. The work can only be completed by pharmacists**
- d. It can be billed monthly

Answer – All of the above are true with the exception of C. The work can be completed by pharmacists or other clinical staff (i.e. nurses). It can be billed monthly and the work must take at least 20 minutes. This is generally not considered a face to face visit but more non-face to face clinical work. Telephone call check-ins, medication reconciliation, disease state education are examples of tasks that may be a part of this work.

128. A 71 year old female was recently diagnosed with generalized anxiety disorder. She was placed on sertraline and this was titrated up to 150 mg once daily. This has not helped much. The primary provider added buspirone 7.5 mg two times daily as needed. The patient has tried it a couple of times and hasn't noticed much benefit. No adverse effects reported. Which of the following recommendations would be most appropriate?

- a. Recommend discontinuing the buspirone and initiate triazolam
- b. Discontinue sertraline and schedule buspirone
- c. Schedule buspirone 7.5 mg twice daily and begin to taper off of sertraline**
- d. Recommend increasing buspirone to 15 mg twice daily as needed

Answer – We would ideally like to give buspirone a trial for several weeks as it takes a while to work. Discontinuing sertraline at this high of a dose could potentially lead to discontinuation syndrome. The patient has tried the buspirone and did not experience any side effects so tapering down on the sertraline appears most appropriate. Buspirone can exacerbate serotonin risk. PRN buspirone is typically not effective, so increasing the PRN dose would not be appropriate. Triazolam, a benzodiazepine is not ideal in a 71 year old if we can avoid it.

129. Use of PPI's is associated with all of the following, except:

- a. Low B12 levels
- b. Elevated Magnesium levels**
- c. Increased risk of bone fractures
- d. Rebound symptoms with abrupt discontinuation

Answer – PPI's are associated with low B12, LOW magnesium, fractures, and definitely rebound symptoms with chronic use and abrupt discontinuation.

130. A patient with glaucoma has been on numerous different eye drops for management. He says that he noticed excessive eye lash growth with one of his medications which was unusual. Which of the following would be most likely to do this?

- a. Timolol

- b. Brimonidine
- c. Dorzolamide
- d. Travoprost**

Answer – prostaglandins can cause changes in the eye lashes and would be the most likely medication to cause this problem. It may be considered a beneficial adverse effect for some who are looking for longer/thicker lashes.

131. A 32 year old female is pregnant and prior to the pregnancy had been managing depression well with counseling alone. She has had tremendous relapse since becoming pregnant and drug therapy is desired. Which of the following would be most appropriate to use?
- a. Paroxetine
 - b. Sertraline**
 - c. Nortriptyline
 - d. Mirtazapine

Answer – Sertraline has the best track record for safety in pregnancy when compared to paroxetine. SSRI's are going to be the first line agent. Nortriptyline and mirtazapine would not generally be recommended first line in a patient who is pregnant.

132. JS is a 45 year old female who has been having more migraines of late. Typically, she has only had a couple a year and used naproxen and acetaminophen combination to manage them. She is now having them about monthly and her PCP would like to start a triptan. Past medical history includes kidney stones, peptic ulcer disease, IBS, and hypertension. BP = 128/68, pulse = 66. Which of the following would be a contraindication to use?
- a. Hypertension
 - b. Kidney stones
 - c. Peptic ulcer disease
 - d. None of the above**

Answer – None of the above are contraindications. The blood pressure is well managed. It would be a contraindication if it was uncontrolled.

133. A 91 year old patient has been experiencing significant anxiety since the loss of her husband. She has been tried on numerous anxiety medications that have had minimal effectiveness. Her primary provider has tried to avoid benzodiazepines due to her fall risk. Which of the following benzodiazepines would be safest in this patient to treat her anxiety?
- a. Clonazepam
 - b. Oxazepam**
 - c. Chlordiazepoxide
 - d. Diazepam

Answer: Oxazepam – Due to no active metabolites, remember the term “LOT” (lorazepam, oxazepam, temazepam). These are generally considered the safest to choose in the elderly.

134. A 58 year old male has had a history of hypertension, hyperlipidemia, morbid obesity, BPH, and diarrhea predominant IBS. He currently takes loperamide, aspirin, atorvastatin, and chlorthalidone. He reports feeling down and primary care initiates sertraline 50 mg once daily. What is the best recommendation?

- a. Continue sertraline as prescribed
- b. Switch sertraline to escitalopram**
- c. Switch sertraline to amitriptyline
- d. Switch sertraline to mirtazapine

Answer – Sertraline being the worst antidepressant for causing diarrhea should likely be avoided if other options exist. An SSRI would still be the best choice of the options listed so switching to escitalopram makes the most sense. Amitriptyline could help with the diarrhea, but with his BPH should be avoided. Mirtazapine would be pretty likely to cause weight gain in the patient who is morbidly obese.

135. Which of the following would not be an integral part of an MTM session?

- a. Identification of possible new diagnosis**
- b. Distinguishing potential adverse effects
- c. Recognition and evaluation of past medical history in relation to the patient's current drug therapy
- d. Detect possible barriers to patient medication adherence

Answer: A. Identification of new diagnosis would fall outside of the pharmacist's scope of practice and the patient should be referred to a physician or other appropriate healthcare professional for identification of a new diagnosis.

136. A 55 year old patient has a history of elevated triglycerides, gout, and recent labs reveal blood pressure 118/72, pulse 77, cholesterol 289mg/dL, HDL 48 mg/dL, LDL 119 mg/dL, triglycerides, 1123 mg/dL. He is currently on allopurinol 300 mg daily, colchicine 0.6 mg as needed for flares, aspirin 81 mg daily, and lisinopril 10 mg daily. Which of the following would be most appropriate to address the current situation?

- a. Lifestyle modifications
- b. Fenofibrate**
- c. Niacin
- d. Fish Oil

Answer – Triglycerides are very high and we should initiate an agent that can help lower these. Lifestyle modifications would be important, but at these levels, we should initiate drug therapy due to the risk of pancreatitis. Fenofibrate would be the most appropriate here. Niacin could exacerbate the patient's gout.

137. You are working with a physician group to reduce the number of hospital readmissions. A patient is seen 10 days following a hospital stay. Your role is to make sure the patient understands their medications, review for adverse effects and drug interactions, and assesses medication reconciliation. Which of the following billing codes can be billed incident to for a transitional care visit?

- a. 99495**

- b. 99496
- c. G0463
- d. 99211

Answer – the transition care codes are 99495 and 99496. These codes can be billed incident to the provider and the pharmacist can play a significant role in focusing on medication changes. The only one that can be billed however is 99495 as this patient was followed up in 10 days. If the patient is significantly complex and is seen in 7 days or less, 99496 can be billed.

138. You determine that using an ACE inhibitor would be an appropriate option for hypertension. The patient is a 71 year old female. You do notice in the medical record that the patient has a history of angioedema from an unknown cause. Other diagnoses include osteoarthritis, peptic ulcer disease, and alcoholism. Which of the following would be a risk factor for angioedema?

- a. **Age**
- b. Hypertension diagnosis
- c. Alcohol use
- d. Concomitant use of acetaminophen

Answer – Age > 65, previous angioedema history, concomitant use of NSAIDs, female, smoking, and seasonal allergies are all potential risk factors for angioedema.

139. A 31 year old male presents with severe toe and finger pain. He has been diagnosed with gout. Which of the following would not be considered a risk factor for gout?

- a. Male
- b. **Marijuana use**
- c. Use of systemic cyclosporine
- d. Use of OTC niacin

Answer – marijuana use has not been an associated risk factor for gout attacks. Male, alcohol use, family history, meds like thiazides, niacin, cyclosporine, foods high in purines (i.e. seafood), are all potential contributing risk factors.

140. LC is a 62 year old male who was recently diagnosed with atrial fibrillation. His past medical history includes GERD, hypertension, diabetes, TIA, constipation, and osteoarthritis. Current medications include:

- Losartan 50 mg daily
- Nebivolol 5 mg daily
- Omeprazole 20 mg daily
- Metformin 850 mg twice daily
- Glipizide 5 mg twice daily
- Bisacodyl 5 mg po as needed
- Acetaminophen 500 mg twice daily
- Naproxen 500 mg twice daily as needed
- Aspirin 81 mg daily

Given the patient information provided above, which of the following would NOT be considered a risk factor for stroke?

- a. Hypertension
- b. TIA
- c. Age**
- d. Diabetes

Answer: C. Age (62 years old) would not be considered a risk factor in this patient situation. Looking at the CHADS2Vasc scoring, it would be CHF, hypertension, Age >75, diabetes, and TIA or stroke = 2 points. This would definitely be a case where anticoagulation would be appropriate. A score of 2 or more would make warfarin or other anticoagulation appropriate. Remember that CHA2DS2Vasc gives one point for >65 and 2 points for >75. A score of 1 or 0 with atrial fibrillation, aspirin could be utilized (warfarin could be used for a score of 1 as well).

141. In which phase of clinical trials would the final dosing of the medication be set and safety and efficacy be monitored for?

- a. Phase 1
- b. Phase 2
- c. Phase 3**
- d. Phase 4

Answer – Phase 3 is the last step before approval and final dosing is set during this time. In phase 2, we really look hard at efficacy within a study and final dosing may not be set yet. Phase 1 involves identifying properties of the drug within humans. I.e. kinetics, dynamics, basic safety information etc. Usually the drug is given to younger, healthier patients in Phase 1.

142. When designing a clinical trial to investigate a medication versus placebo, which of the following factors would have greatest impact on the power of the study?

- a. Length of time of the study
- b. Number of study participants**
- c. A wider geographical area that is studied
- d. None of the above would impact power

Answer – sample size is the easiest way to improve the power of a study.

143. A patient presents to your care with a severe migraine headache. It started about 12 hours ago and 800 mg of ibuprofen has not helped. Cognition is fine and she is able to answer questions appropriately. Upon assessment of vitals, her blood pressure is 210/112 and pulse is 116. She is currently on lisinopril 10 mg once daily, the ibuprofen 800 mg as needed, and propranolol 20 mg twice daily. Which of the following recommendations would be most appropriate?

- a. Increase propranolol
- b. Initiate sumatriptan for her headache
- c. Recommend acetaminophen 1,000 mg
- d. Refer patient to emergency department**

Answer – With this severely elevated blood pressure and symptoms of headache, there could be a lot going on, and she needs to be further assessed in an emergency department/hospital type setting. Under normal vital signs circumstances, you could make an argument for either a, b, or c.

144. Which of the following would be most likely to impact serum concentrations of pregabalin?

- a. Worsening liver function
- b. Taking the medication with food
- c. Worsening kidney function**
- d. Taking it with gabapentin

Answer – While taking it with gabapentin could potentiate the clinical effects, it would not likely alter the serum concentrations. It is primarily eliminated through the urine, so worsening kidney function would increase the likelihood that the patient would get elevated levels. Food shouldn't impact concentrations much. Liver function changes would also likely not impact levels significantly.

145. Which of the following would be least important when trying to do medication reconciliation?

- a. Being approachable
- b. Review of most recent CBC**
- c. Asking if the patient takes any topical medications or patches
- d. Asking the patient what they are using for each disease state

Answer – review of labwork is important, but typically not that important when strictly doing medication reconciliation. Here we are just making sure that the medication list is accurate and up to date so we know what the patient is taking.

146. A 65 year old has a past medical history of gastroparesis, nausea and vomiting, atrial fibrillation, hypertension and heart failure. Current medications include metoprolol, omeprazole, amiodarone, lisinopril, aspirin, and amlodipine. Ondansetron was added about 4 weeks ago on a scheduled basis. Which of the following assessments would be most appropriate?

- a. LFT
- b. CPK
- c. EKG**
- d. TSH

Answer – Ondansetron can potentially contribute to QTc prolongation and with the scheduled dosing and amiodarone, it would be the most important monitoring parameter in this situation. Ondansetron typically doesn't impact LFT, CPK, or TSH.

147. A patient with a history of alcoholism has been taking acamprosate to try to reduce withdrawal symptoms and improve abstinence, which of the following is true regarding the use of this medication?

- a. It is dosed once daily
- b. Patient should stop taking if they relapse
- c. Diarrhea is one of the most common adverse effects**
- d. There is a boxed warning on liver toxicity

Answer – Acamprosate is used in alcohol use disorder and one of the most common adverse effects is diarrhea. A downside of the medication is that it is dosed multiple times per day. Patients should continue to take the medication even in relapse. There is not a boxed warning on hepatotoxicity.

148. One of your female patients has a lot of trouble with kidney stones and was prescribed a medication to help with elimination of them. Which of the following medications would potentially be most beneficial?

- a. **Tamsulosin**
- b. Sulfamethoxazole/trimethoprim
- c. Amlodipine
- d. Guanfacine

Answer – Alpha blockers have been utilized in females to help pass kidney stones. It isn't very common, but this would be the most likely medication to help with this. If they were uric acid based stones, you may see Xanthine Oxidase inhibitors used (i.e. allopurinol).

149. Which of the following monitoring parameters are part of the REMS program for bosentan for pulmonary arterial hypertension?

- a. **Liver function**
- b. Renal function
- c. CPK
- d. Skin – Steven Johnson's Syndrome

Answer – Bosentan is teratogenic and hepatotoxic and has a REMS program because of this. Liver function assessment would be the most appropriate answer here.

150. Which of the following risks is not associated with hormone replacement therapy?

- a. **Colon Cancer**
- b. Breast cancer
- c. DVT/PE
- d. Stroke

Answer – Colon cancer is likely not an associated risk with HRT. There may be a small protective effect reported in some of the literature. The other 3 are big reasons why we try to minimize use/length of therapy with these medications.

151. A 42 year old female has recently begun antiretroviral therapy. She also has a past medical history of depression, insomnia, and schizoaffective disorder. Which of the following medications would most likely exacerbate her psychiatric conditions?

- a. Lopinavir/ritonavir
- b. Zidovudine
- c. **Efavirenz**
- d. Enfuvirtide

Answer – C. Efavirenz is notoriously known to cause psychiatric issues as part of its side effect profile. In this situation, efavirenz should be very closely monitored if utilized.

152. A 68 year old male with Parkinson's has a really difficult time with walking at 5 PM in the afternoon. His movements slow down and he feels stiffer. This has led to some falls around this time. His current regimen is carbidopa/levodopa 25/100 at 0800, 1200, and 1800. Which of the following would be most appropriate?
- a. Initiate pramipexole 0.5 mg twice daily
 - b. Add a dose of carbidopa/levodopa 25/100 at 3 PM**
 - c. Reduce dose of carbidopa/levodopa to twice daily at 0800 and 2000
 - d. Stop current immediate release dosing and start carbidopa/levodopa controlled release 50/200 once daily

Answer – Sinemet CR should be dosed twice daily. Adding pramipexole would not be appropriate as this patient has a problem at a specific time when concentrations of Sinemet are lower. Adding a dose prior to the 5 PM period would be the most appropriate step to take to help alleviate symptoms of his Parkinson's. Remember the acronym TRAP (R=rigidity and A=akinesia).

153. Which of the following concerns would not be a clinical concern with the use of rivastigmine?
- a. Tachycardia**
 - b. Weight loss
 - c. Respiratory disease
 - d. Peptic ulcer disease

Answer: A. Tachycardia would not be a likely clinical concern with rivastigmine. Acetylcholinesterase inhibitors for dementia would potentially cause weight loss, should be monitored closely in patients with respiratory disease, as well as peptic ulcer disease. Bradycardia is more likely, but pretty low risk.

154. Which of the following therapies for osteoporosis will aid in working on osteoblasts to build bone?
- a. Denosumab
 - b. Teriparatide**
 - c. Calcitonin
 - d. Ibandronate

Answer – Teriparatide is the only agent that will work on osteoblast activity and help build bone. It is recommended to only use this medication for 2 years due to the risk of osteosarcoma. It is also very costly.

155. A 57 year old female is diagnosed with resistant hypertension. Current medications include: hydroxyzine 25 mg every 4 hours as needed for anxiety, citalopram 30 mg daily, meloxicam 15 mg twice daily, lisinopril 10 mg daily, amlodipine 10 mg daily, atenolol 100 mg daily, and lovastatin 40 mg daily. Which of her medications would be most likely to exacerbate resistant hypertension?
- a. Hydroxyzine
 - b. Citalopram
 - c. Meloxicam**

- d. Lovastatin

Answer – NSAIDs have the potential to contribute to elevated blood pressure and this is a high dose of meloxicam. The other medications likely would not cause this. The exception being serotonin syndrome which could raise BP, but the patient would be experiencing other symptoms.

156. Which of the following would not be considered a CMR expectation?

- a. Collecting patient specific information
- b. Creating a plan to resolve drug therapy problems
- c. Interactive discussion with the patient or other authorized individual
- d. Administration of all necessary vaccines at time of visit**

Answer – The administration of vaccines would not be a necessary component to bill a CMR. It is an interactive, person-to-person medication review to aid in the patient's knowledge about their medications and help them create a plan to resolve drug therapies.

157. A patient has plaque psoriasis. She only has a patch on one elbow at this time. Which of the following would be the initial drug of choice to manage this?

- a. Coal tar
- b. Topical corticosteroids**
- c. Systemic retinoid
- d. Topical calcineurin inhibitor

Answer – Topical corticosteroids are the usual place to start when it comes to management of small areas of psoriasis. Calcineurin inhibitors and topical vitamin D analogs are also potential options, but usually second line if topical steroids don't work. Coal tar is pretty messy and not first line due to this problem. Light therapy, methotrexate, and systemic retinoids might be considered for patients who have a greater surface area of their body impacted by psoriasis.

158. A new drug is being investigated for its potential to help patients with alcoholism stop drinking. The drug is used for one year and compared against placebo. Which of the following tests would be most appropriate to assess statistical significance of the number of patients who have quit drinking versus those who haven't?

- a. ANOVA
- b. Chi-Squared**
- c. T-test
- d. Mann-Whitney

Answer – When comparing nominal data (placing people into groups, drinkers versus non-drinkers), it would be most appropriate to use the Chi-Squared testing model.

159. With the use of ropinirole for Parkinson's, which of the following adverse effects would be least likely?

- a. Increase in dehydration risk**
- b. Orthostasis
- c. Behavioral changes
- d. Obsessive type behaviors

Answer – Ropinirole and the dopamine agonists would not be likely to cause or contribute to dehydration. They are likely more associated with edema than dehydration. Orthostasis, behavior (psych) changes are possible as when you stimulate dopamine receptors, psychiatric changes are possible. There have been reports of obsessive type behaviors like eating, gambling, etc.

160. A 54 year old female is on chronic methotrexate for her rheumatoid arthritis. Which of the following would be true with regards to methotrexate use?

- a. Maximum dosing in RA is 15 mg weekly
- b. Folic acid levels should be checked monthly for the first 6 months, then twice per year after that
- c. Renal toxicity is more concerning than liver toxicity
- d. In a patient who cannot tolerate oral methotrexate due to GI upset, they would need to switch to an alternative agent**

Answer – there is an injectable formulation of methotrexate and if the patient's GI upset was not that significant, it would definitely be reasonable to consider a trial of the methotrexate injection. Liver toxicity is more likely a concern versus impacts on renal function. Folic acid levels are not routinely monitored. Supplementation is given regardless of level if patient is on methotrexate. Doses higher than 15 mg can be utilized.

161. In regards to the use of sulfasalazine in the treatment of rheumatoid arthritis, which of the following would be incorrect?

- a. GI side effects are the most common adverse effects
- b. Sulfasalazine can impair absorption of vitamin B12**
- c. CBC and liver function should be monitored
- d. Serious infections have been reported with use

Answer: B. Sulfasalazine can impair absorption of vitamin B12 is incorrect – Sulfasalazine can possibly impair folate absorption, but not B12. The other three are true in regards to the use of sulfasalazine.

162. A 57 year old male is attempting to quit smoking. Past medical history includes hypertension and mild osteoarthritis. He takes hydrochlorothiazide 25 mg once daily and occasional ibuprofen. According to the ATS guidelines of the following agents would be first line for this patient?

- a. Nicotine replacement
- b. Bupropion
- c. Varenicline**
- d. All of the above would be acceptable choices

Answer – Nicotine replacement, bupropion, and varenicline were all considered first line therapies for smoking cessation by previous guidelines, but the most recent ATS guidelines prefer varenicline over the other options.

163. Which of the following is false with regard to the Affordable Care Act of 2010?

- a. Extended insurance eligibility to adult children up to the age of 26 under their parent's insurance plan
- b. Attempted to improve coverage of preexisting conditions
- c. Created the Medicare Part D drug coverage benefit**
- d. Established the CMS Innovation Center which allowed for experimental measures to help improve cost effectiveness of healthcare

Answer – The Medicare Prescription Drug Improvement and Modernization Act of 2003 created the Part D drug benefit. The other statements were part of the Affordable Care Act (Obamacare).

164. Which medication is only approved for rheumatoid arthritis in combination with methotrexate?

- a. Infliximab**
- b. Rituximab
- c. Anakinra
- d. Adalimumab

Answer – Infliximab is only approved in combination with methotrexate in the management of rheumatoid arthritis. You may see other biologics used off-label with methotrexate.

165. According to the NIH, waist circumference, elevated triglycerides, low HDL, elevated blood pressure, and elevated fasting blood sugar are part of the diagnosis for metabolic syndrome. How many of these 5 does a patient need to have to be diagnosed?

- a. 1
- b. 2
- c. 3**
- d. 5

Answer – To be diagnosed with metabolic syndrome, a patient would need to have a least 3 of these. Waistline >35 inches for women, or 40 inches for men; TG 150 mg/dL or higher, HDL <40 in men or <50 in women, BP 130/85 or higher, fasting blood sugar >100mg/dL. **if you are taking medication to manage these problems, that also counts (i.e. anti-diabetes medication, antihypertensive therapy, dyslipidemia)

166. Phenytoin is a narrow therapeutic window drug. What is the reason that this medication follows Michaelis-Menten kinetics?

- a. Age related increase in absorption
- b. As a patient ages, an increase in volume of distribution due to it lipophilicity
- c. Liver enzyme saturation**
- d. Renal transporter saturation

Answer – phenytoin concentrations can escalate quickly due to liver enzyme saturation. As the enzyme that metabolizes the drug gets bound up, this leaves a potential for a rapid increase in drug level and risk of toxicity. Clinically this means that once you reach the saturation level, small dose increases can lead to big changes in concentration.

167. Which of the following is false with regards to administration of vaccines?

- a. Part B covered vaccines can be administered from a pharmacy
- b. Each pharmacy will obtain a Medicare provider number if they would like to administer vaccines to Medicare patients
- c. The shingles vaccine is covered under both Medicare part B and part D**
- d. Influenza vaccine is a Part B covered vaccine, but can be administered in a pharmacy

Answer – the shingles vaccine is covered under Medicare Part D only. It is not covered under Medicare part B. Influenza is covered under part B, but pharmacies can bill for part B vaccines if they obtain a Medicare provider number.

168. A 78 year old female cannot afford extended release aspirin/dipyridamole for prevention of her atherosclerotic stroke. Which of the following would be the best alternative for her?

- a. Clopidogrel 75 mg once daily**
- b. Aspirin 325 mg twice daily
- c. Warfarin with goal INR 2-3
- d. Apixaban 5 mg twice daily

Answer – Clopidogrel would be the most appropriate selection here. Aspirin monotherapy is a consideration but not twice daily. Apixaban and warfarin are not indicated in this type of stroke, only proven beneficial in atrial fibrillation.

169. A 66 year old male is diagnosed with reduced Ejection Fraction Heart Failure. He is currently taking an ARB and furosemide for the fluid overload. Which of the following medications would also be indicated barring contraindication?

- a. Bisoprolol**
- b. Propranolol
- c. Atenolol
- d. Nadolol

Answer – The only beta-blockers that are truly approved for heart failure are bisoprolol, carvedilol, and metoprolol.

170. A patient has a history of fibromyalgia, atrial fibrillation, hypothyroidism, osteoporosis, and spinal stenosis. She is reporting extreme fatigue and TSH is 32.6. Current medications include duloxetine, levothyroxine, magnesium, amiodarone, calcium, alendronate, and ibuprofen. She has been on these medications for a very long time and at consistent doses. Which of the following would be least likely to contribute to the alteration in TSH?

- a. Use of calcium
- b. Use of magnesium
- c. Use of amiodarone
- d. Use of duloxetine**

Answer – Duloxetine is not typically going to cause any issues with hypothyroidism and would not be likely to contribute to this issue. It would be important to reassess the timing and use of

calcium and magnesium as these could potentially reduce absorption of the supplement. Amiodarone can impact thyroid function and should be assessed as well.

171. A 67 year old with severe heart failure is going to be put on ivabradine. Which of the following would be a contraindication to its use?
- a. Use of ondansetron
 - b. Pulse <60**
 - c. History of pancreatitis
 - d. BP >160/110

Answer – Bradycardia would be a contraindication to the use of ivabradine as it could exacerbate this.

172. Which of the following would not be associated with motivational interviewing?
- a. Asking the patient why they think their A1C went from 7 to 9
 - b. Listening to the patient discuss about recent important life changes that has impacted their desire to take care of themselves
 - c. Empathizing with the patient about their recent loss of a family member
 - d. Instructing the patient to eat less carbohydrates and more protein**

Answer – D is not consistent with motivational interviewing. Empathy, patient driven goals, relationship building, and using a significant number of open-ended questions starting with “why” are consistent with motivational interviewing.

173. A new drug inhibits CYP3A4. You’d like to investigate the change in concentration of simvastatin following administration. Which study design would be most helpful in assessing this?
- a. Double blind, placebo controlled parallel design
 - b. Single blind (study participants), placebo controlled parallel design
 - c. Crossover design with washout period**
 - d. Observational trial with monitoring of incidence of simvastatin adverse effects for comparing those on the new drug versus those not on the new drug

Answer – The crossover design makes the most sense to ensure minimum problems with genetic variations between patient groups. This gives you the results before and after if you are specifically able to monitor concentrations.

174. A patient has an upcoming eye surgery for cataract removal. Which of his medication could potentially increase the risk for ocular complications?
- a. Tamsulosin**
 - b. Finasteride
 - c. Metformin
 - d. Hydralazine

Answer – Tamsulosin and the alpha blockers have the potential to contribute to floppy iris syndrome. Patients undergoing eye surgery for cataracts or glaucoma are at an increased risk of this happening.

175. JT is a 59 year old male who has recently started on antidepressant therapy. He was started on bupropion about 2 weeks ago and is experiencing significant insomnia. His primary provider would like to try a traditional SSRI. Which of the following would be most appropriate to try to avoid exacerbating his insomnia?

- a. Sertraline
- b. Fluoxetine
- c. Citalopram
- d. Paroxetine**

Answer: Paroxetine – Of the SSRI's, paroxetine is considered the most sedating and would be most appropriate to use in this situation where we are trying to avoid exacerbating insomnia (or cause sedation).

176. ST presents with terrible symptoms of BPH. He has had significant retention as well as frequency. He was started on finasteride about 2-3 weeks ago and states that it has done absolutely nothing for him. He has a past medical history coronary artery disease, GERD, and constipation. Which of the following would be the most appropriate course of action?

- a. Recommend discontinuing finasteride and start dutasteride
- b. Recommend adding tamsulosin**
- c. Recommend adding oxybutynin
- d. Recommend discontinuing finasteride and start tamsulosin

Answer: Recommend adding tamsulosin – 5 alpha reductase inhibitors can take several months to begin working for BPH patients. Discontinuing finasteride would not be appropriate at this point. An anticholinergic could help with the frequency and certainly could worsen the retention (and constipation) and would not be recommended if an alpha blocker hasn't been tried first.

177. KA is a 59 year old female with a history of angina, hypertension, coronary artery disease, Barrett's esophagus, osteoporosis, hypothyroidism, and seizure history. Which of the following would be least likely to contribute to her osteoporosis risk?

- a. TSH value of 0.04
- b. Use of phenobarbital for seizures
- c. Use of chlorthalidone for hypertension**
- d. Use of pantoprazole for Barrett's esophagus

Answer - Use of chlorthalidone for hypertension – Thiazide diuretics would not be likely to contribute to osteoporosis risk. Thiazides can actually raise calcium levels in the body. Phenobarbital can potentially lead to vitamin D deficiency, hyperthyroidism (suppressed TSH) could potentially contribute to osteoporosis, and PPI's are a potential contributor to osteoporosis as well.

178. With which of the following medications should caution be used if a patient has a severe allergy to milk protein?

- a. Theophylline

- b. Prednisone
- c. Fluticasone inhaler
- d. Budesonide inhaler**

Answer - Budesonide – The Pulmicort Flexhaler contains lactose (milk sugar with milk protein) and in patients with a severe allergy, we need to be careful.

179. Which of the following medications would have a black box warning for lactic acidosis?

- a. Tenofovir**
- b. Efavirenz
- c. Lopinavir
- d. Ritonavir

Answer - Tenofovir for the treatment of HIV suppression has a black box warning for lactic acidosis and hepatic steatosis.

180. JS is a 56 year old female who has felt fatigued. She has been diagnosed with anemia and placed on Iron and B12 supplementation. Her current chronic medications include omeprazole 20 mg daily, metolazone 5 mg daily, spironolactone 25 mg daily, trimethoprim 100 mg daily, and clonidine 0.1 mg twice daily. Past medical history includes GERD, CHF, chronic UTI's, and hypertension. Which of the following medications should a folic acid level be checked?

- a. Clonidine
- b. Trimethoprim**
- c. Spironolactone
- d. Metolazone

Answer - Trimethoprim can potentially interfere with folate absorption and exacerbate a pre-existing deficiency. The omeprazole could potentially contribute to the B12 deficiency.

181. In regards to point of care testing in the ambulatory setting, which of the following would be incorrect?

- a. Patients are significantly more reluctant to accept a finger stick from a pharmacist versus the traditional clinical model**
- b. Workflow can be set up similar to an immunization program
- c. Hepatitis C and HIV are considered CLIA-waived tests
- d. Pharmacists are one of the most accessible health and could significantly improve health outcomes

Answer - Patients are significantly more reluctant to accept a finger stick from a pharmacist versus the traditional clinical model – is incorrect. In surveys patients consider pharmacists to be acceptable at delivery of lab tests as a clinic setting.

182. Investigators are looking into whether sulfasalazine reduces the risk of breast cancer. In a recent study, the % of patients who developed breast cancer on sulfasalazine was 3% and the percentage on placebo who developed breast cancer was 13%. What is the NNT?

- a. 20

- b. 33
- c. 12
- d. 10**

Answer – 10 Calculating the absolute risk reduction (ARR) would be 13%-3%; from there, the NNT would be $1/ARR = 1/10\%$ or $1/0.1 = 10$ (This is made up study example by the way)

183. A mother presents with her son for an MTM session. She states that her son uses his albuterol “multiple” times per day. Upon further questioning and assessment, her son is experiencing tachycardia. Along with tachycardia, which of the following electrolyte abnormalities would be possible in a patient who is overusing albuterol?

- a. Hypercalcemia
- b. Elevated creatinine
- c. Hypokalemia**
- d. Hyponatremia

Answer - Hypokalemia – While significant hypokalemia would be pretty rare with minimal or even appropriate use of albuterol, in an overdose or abuse type situation of a beta agonist, hypokalemia could be a possible issue. Hypercalcemia, elevated creatinine, and hyponatremia would not be as likely as potassium changes.

184. BP is a 36 year old woman with a history of migraines with aura. What is the most appropriate method of contraception for her?

- a. Hormonal patch
- b. Oral combination hormonal tablets
- c. Progestin only oral tablets**
- d. Progestin only IUD

Answer - Progestin only oral tablets – Women over age 35 with a history of migraines (regardless of aura) are recommended to use either oral progestin only oral tablets or copper-releasing IUD (Paragard). Estrogen containing products are not acceptable per the CDC and WHO.

185. BB is a 34 year old female that would like to start a prescription medication to treat her obesity. Her other medical conditions include hypertension, depression and GERD. Current medications include losartan 50 mg daily, bupropion XL 300 mg daily, fluoxetine 20 mg daily and ranitidine 150 mg nightly. Which medication would be the best option for BB?

- a. Phentermine/topiramate ER
- b. Naltrexone/bupropion
- c. Liraglutide**
- d. Orlistat

Answer - Liraglutide – Saxenda (liraglutide 3 mg daily), a GLP-1 agonist would be the best option for BB. Qsymia (phentermine and topiramate) has the potential to increase blood pressure. The recommended dose Contrave is 2 tablets twice daily, each tablet contains 8 mg naltrexone and 90 mg bupropion, making the total daily dose 32 mg naltrexone and 360 mg bupropion. BB

already takes 300 mg bupropion daily, this addition would put her over the maximum recommended dose. Orlistat is not a first line agent due to the oily stools adverse effects.

186. JS has contacted you questioning what she should do with her insulin. Her blood sugar this morning was 223. She woke up feeling very ill with the “stomach flu”. She has not eaten anything today. She normally takes her insulin glargine in the morning and has three scheduled doses of rapid acting throughout the day. What is the best course of action?

- a. Recommend scheduling an appointment to be assessed
- b. Give her morning dose of rapid acting insulin but not the glargine
- c. Give the glargine but hold the rapid acting**
- d. Give the glargine and the rapid acting

Answer - Give the glargine but hold the rapid acting – In this scenario, it would be best to give her the long acting with her blood sugar at 223, you can feel pretty comfortable with that and hold the rapid acting all day if she is not going to eat much. Giving the rapid acting would increase the risk of dropping the blood sugar abruptly and precipitating a hypoglycemia event in a patient who can't hold food down. Increased monitoring would also be very important with checking blood sugars every 1-2 hours if possible.

187. Which of the following assessment tools would be most appropriate for an elderly patient who is having some confusion?

- a. HAM-D
- b. MMSE**
- c. PHQ-9
- d. AIMS

Answer - MMSE – The Mini-mental status exam is intended to screen for Alzheimer's and would be the most appropriate in this scenario. PHQ-9 and HAM-D are both used for depression, while AIMS is used to monitor for Tardive Dyskinesia in patients on antipsychotics (or other drugs that might block dopamine).

A daughter of one of your patients would like to ask you your thoughts on starting a dementia medication on her mom. She has been diagnosed with Alzheimer's and was classified as mild to moderate at this point according to the daughter. Her past medical history includes CHF, hypertension, GERD, GI bleed, and rheumatoid arthritis. Other than decline in memory, the daughter/mother have no complaints. Recent labs and vitals:

- Height: 170 cm
- Weight: 40 kg
- Creatinine = 0.9
- Potassium = 4.1
- Hemoglobin = 11.2
- Sodium = 139
- BUN = 17

Current medications:

- Aspirin 81 mg daily

- Metoprolol 50 mg twice daily
- Omeprazole 20 mg daily
- Methotrexate 15 mg weekly
- Folic acid 1 mg daily
- Furosemide 20 mg daily

188. Which recommendation regarding initiating pharmacotherapy would be most appropriate?

- a. **Initiate memantine**
- b. Initiate donepezil
- c. Initiate duloxetine
- d. Discontinue methotrexate and reassess in 4-6 weeks

Answer - Initiate Memantine – Initiating Memantine would be more appropriate than donepezil given the weight and height of the patient. By adding donepezil, you will possibly increase that risk of weight loss, much more so than the Memantine. Discontinuing methotrexate doesn't make much sense and could lead to worsening RA symptoms. Duloxetine is not indicated to help with dementia.

189. A 75 year old female has a past medical history of GERD, asthma, Type 2 diabetes, and CHF. She presents with increasing blood pressures; last two readings were 166/98 and 172/96. Which of the following would be most appropriate to initiate?

- a. Metoprolol
- b. Hydrochlorothiazide
- c. **Lisinopril**
- d. Amlodipine

Answer - Lisinopril – With this patient's past medical history and compelling indications of type 2 diabetes and CHF, the most appropriate agent of choice would be Lisinopril. With CHF, the metoprolol would also be important down the line, but the ACE with 2 compelling indications would likely take precedent.

190. At what frequency can a Comprehensive Medication Review be completed?

- a. **Annually**
- b. Bi-annually
- c. Quarterly
- d. Whenever "deemed" appropriate

Answer - Annually – CMR's can be done on an annual basis and is a top to bottom review of all medications, OTC's Herbals etc. (i.e. COMPREHENSIVE), and not more frequently than that.

191. AL is a 52 year old male with osteoarthritis (OA). He presents with worsening OA pain in many of his joints including hips, knees, and hands. He is currently on Glucosamine and will take an occasional acetaminophen (about once a week) which he says doesn't usually work that well. His past medical history includes BPH, seizures and glaucoma.

What recommendation would you make for him today?

- a. Trial topical capsaicin as needed
- b. Initiate tramadol as needed

- c. Schedule acetaminophen
- d. Trial PRN ibuprofen**

Answer - NSAIDs are a preferred agent in the management of OA as long as the patient does not have contraindications. Acetaminophen hasn't worked for him and evidence of efficacy in OA is weak. Capsaicin is not effective when used as needed and the pain is also all over making capsaicin not very realistic. Tramadol would not be recommended given this patient's seizure history and also carries risk for addiction and dependence.

192. You are approached by a colleague who has a patient that has just completed genetic testing. The patient has an "A" allele for VKORC1 indicating that this patient produces unusually less VKORC1 than other patients. Her current dose of warfarin is 2.5 mg daily and recent INR was 2.8, with goal of 2-3. Which of the following actions would be most appropriate given this new information?

- a. Discontinue warfarin and begin aspirin
- b. Reduce the dose of warfarin
- c. Do not change this patient's medication**
- d. Suggest reducing the goal INR to 1.5-2.5

Answer - Do not change this patient's medication – A shortage of VKORC1 simply means that less warfarin is required. This has already been compensated for, and the INR is fine. The dose doesn't need to be changed. However, if this patient was starting on warfarin for the first time, it would help you recognize that a lower starting dose would be appropriate.

193. For the calendar year of 2022, which of the following would NOT be an accurate requirement for automatically enrolling the patient into the Part D targeted beneficiary MTM program?

- a. 2 or more chronic diseases**
- b. 8 or more medications
- c. Are likely to incur over \$4,696 in medication costs
- d. All of the above are requirements for automatic enrollment

Answer – 2 or more chronic diseases would not be a requirement for automatically enrolling the patient into the Medicare Part D MTM program, but it should be 3 or more chronic diseases, however some sponsors may elect (optional) to use less chronic disease states as their criteria.

194. JE is a 65 year old male with a past medical history of osteoarthritis and gout. He is currently taking allopurinol and acetaminophen as needed. Upon assessment today, his blood pressure is 186/78 with a recheck of 182/80. Which of the following recommendations would be most appropriate?

- a. Terazosin
- b. Metoprolol
- c. Hydrochlorothiazide
- d. Amlodipine**

Answer - Amlodipine – (CCB's) is generally considered more effective for isolated systolic hypertension with beta blockers and alpha blockers being less desirable to use first line without

compelling indications. Hydrochlorothiazide would be a potential option, but with history of gout and another option available, it would be best to avoid this one.

195. FA's provider has started them on simvastatin but would also like to start her on a medication to target her triglycerides. Total cholesterol is 289 mg/dL, triglycerides are 398 mg/dL, HDL 41 mg/dL, and LDL is 193 mg/dL. Which choice below would be appropriate to add to her atorvastatin?

- a. Fenofibrate 54 mg daily
- b. Gemfibrozil 600 mg twice daily
- c. Niacin 500 mg daily
- d. Icosapent Ethyl**

Answer - Under the guidelines, specific drug therapy to lower triglycerides is not recommended until triglycerides are greater than 500. The exception is Icosapent ethyl in high risk CV patients. For patients at very high CV risk who have TG of 150 mg/dL or greater despite statin use, Icosapent ethyl might be a potential option. Gemfibrozil is contraindicated in combination with simvastatin due to an increased risk of myopathy. Niacin generally isn't utilized due to adverse effects.

196. Under the current guidelines for cholesterol management, what is the most appropriate answer regarding lab monitoring?

- a. ALT at baseline and 4-12 weeks after medication initiation
- b. CK at baseline for all patients
- c. Lipid panel 4-12 weeks after medication initiation**
- d. No lab monitoring is recommended

Answer - Lipid panel 4-12 weeks after medication initiation – ALT is recommended at baseline and then additionally only if patients present with hepatotoxic symptoms. CK is only recommended for patients at high risk for myopathy. ACC/AHA guidelines recommend checking a lipid panel 4-12 weeks after starting a statin, for the purpose of monitoring for an expected % drop in LDL and to check for adherence.

197. What is false about SGLT2 inhibitors?

- a. They can lower A1C by approximately 0.5-1%
- b. They can increase the risk of urinary tract infections and genital fungal infections
- c. They can contribute to weight gain**
- d. All of the above are true

Answer - They can contribute to weight gain – SGLT2 inhibitors lower A1C by approximately 0.5-1% and have an increased risk of urinary tract infections and genital fungal infections. They are also associated with weight loss and have a low risk of hypoglycemia when used alone.

198. Which antipsychotic is least likely to cause EPS?

- a. Clozapine**
- b. Paliperidone
- c. Haloperidol
- d. Risperidone

Answer - Clozapine, pimavanserin, and quetiapine are the least likely to cause EPS – clozapine seldom used due to agranulocytosis risk however. In a Parkinson's patient, generally quetiapine will be tried first given no contraindications.

199. Which contraceptive method is not preferred for women with a body weight of over 90 kg?

- a. **Norelgestromin and ethinyl estradiol patch**
- b. Oral combination hormonal tablets
- c. Progestin only oral tablets
- d. Progestin only IM injection

Answer - Norelgestromin and ethinyl estradiol patch – The Othro Evra patch contains norelgestromin and ethinyl estradiol patch is not recommended for use in women with body weight > 90 kg due to concerns for decreased efficacy.

200. With regards to prostate cancer, which of the following is false?

- a. **PSA is a true indicator of prostate cancer**
- b. Leuprolide can contribute to erectile dysfunction and hot flashes
- c. Prostate cancer is often a slow growing type of cancer
- d. Finasteride is not indicated in the management of prostate cancer

Answer – PSA may be indicative of cancer, but this is not always true and cannot be relied upon as a diagnostic indicator. Leuprolide is a luteinizing hormone-releasing hormone agonist which ultimately reduces testosterone production that can feed the cancer. Finasteride is not indicated for cancer. Prostate cancer is typically a very slow growing cancer.