**NURS 6521 Week 2: Pharmacotherapy for Cardiovascular Disorders**

Student Full Name

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Course Full Title

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Due Date

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Drug pharmacokinetics and pharmacodynamics are essential factors for consideration when prescribing and administering medications. According to Rosenthal & Burchum (2021), drug pharmacokinetics entails four components; absorption, distribution, metabolism, and excretion. Absorption is the drug's movement from the administration site to the bloodstream whole distribution is its subsequent movement from the blood to the interstitial tissue spaces and into the cell. On the other hand, metabolism is the enzymatically-mediated alteration of the drug structure upon moving into the cells (Rosenthal & Burchum, 2021, p. 81). Finally, pharmacodynamics refers to the biochemical and physiologic effects of drugs on the body's molecular mechanisms. Although healthcare professionals administer specific medications to patients demonstrating specific systems, individual modifiable and non-modifiable factors such as age gender, genetics, and body composition affect the subsequent pharmacokinetics and pharmacodynamics of the administered drugs. Consequently, this paper elaborates on how age affects the pharmacokinetics and pharmacodynamics of antihypertensive drugs and recommendations for changes to pharmacotherapy required to optimize the patient's therapeutic plan.

**Review of the Patient's Case Study and Therapeutic Plan**

The case scenario involves a 74-year-old African American male patient (BN) suffering from various symptoms of hypertension, including irregular heartbeat and dizziness. The patient has a history of multiple comorbidities associated with cardiovascular conditions like myocardial infarction (MI), and atrial fibrillation (Afib). Also, he has a history of type II diabetes mellitus (T2DM) and coronary artery disease (CAD). Upon presentation to the hospital, the primary care physician (PCP) administers various medications to the patient, including Digoxin 0.25 mg, Diltiazem CD 180 mg, Metoprolol 5-mg, BID Warfarin 5mg, Lisinopril 20 mg, Imdur 30 mg, and HCTZ 12.5 mg.

**How Patient's Age Can Affect the Pharmacokinetics and Pharmacodynamics of these Drugs**

Age is a non-modifiable factor that results in various changes in body organs. According to Drenth-van Maanen et al. (2019), age-related body changes, including impaired vision, swallowing, motor, and cognitive functions can affect medication administration and the subsequent intake. For instance, changes in body functions can lead to impaired drug dissolution, decreased absorption, increased absorption of high-clearance drugs, increased concentration of free drugs, and decreased hepatic blood flow and hepatic mass that reduce drug metabolism. Equally, older adults are susceptible to decreased renal blood flow and reduced glomerular filtration rate that affect drug elimination through excretion (Drenth-van Maanen et al., 2019). Schwartz et al. (2018) argue that age results in altered end-organ responsiveness to drugs and reduced cardiac and baroreflex responses. Also, older adults add vulnerable to adverse events associated with the drugs' side effects. For example, the patient may be susceptible to Digoxin-related side effects, including irregular heartbeat, blurred vision, and headache. Therefore, it is essential to consider his intrinsic factors when administering antihypertensive drugs.

**Recommendations for Changes in Pharmacotherapy to Optimize the Patient's Therapeutic Plan**

As a primary care physician (PCP), I would maintain the low-end dosage of various medications for preventing hypertension, including Imdur 30 mg, Digoxin 0.25 mg, Metoprolol 5 mg, and Lisinopril 20 mg. The objective of maintaining a low-end dosage of these medications is to prevent their side effects. Secondly, I would adopt a dosing model which includes a broad range of personalized factors, including the consideration of the underlying type II diabetes mellitus (DM) as a pharmacotherapeutic factor. Schwartz et al. (2018) recommend aligning medications with person-centered goals and developing tools to determine patient preferences as ideal strategies for optimizing a patient's therapeutic plan. As a PCP, I would incorporate new technologies such as telemedicine, involve the patient in a collaborative care plan, educate him on medication adherence, and develop a follow-up plan to ensure adherence to these medications.

**Conclusion**

Older people with hypertension are susceptible to issues that affect the drugs' pharmacokinetics and pharmacodynamics. For instance, age-related body changes, including impaired vision, low blood flow, and reduced renal and hepatic clearance affect drug absorption, distribution, metabolism, and elimination. As a result, these issues expose patients to adverse side effects of antihypertensive drugs. Consequently, primary care physicians (PCPs) should apply care models that recognize personal aspects and involve patients in collaborative care plans to optimize therapeutic plans.

**References**

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