Nurse practitioners (NPs) must possess a comprehensive understanding of prescribing considerations, encompassing a broad range of topics from pharmacology principles to client-specific care. This includes pharmacokinetics, pharmacodynamics, pharmacogenetics, and pharmacogenomics to support personalized treatment strategies. NPs also need to be mindful of the unique needs of different populations, including pediatric, pregnant, breastfeeding, and older adult clients. Familiarity with clinical practice guidelines (CPGs) is essential for their effective integration into care, alongside knowledge of their development, benefits, and limitations. Furthermore, NPs must take measures to ensure that safe, effective, and ethical prescribing guidelines are integrated into practice and should be adept at monitoring and addressing adverse drug reactions.

Key Points

Pharmacokinetics and Pharmacodynamics

Pharmacokinetics describes how drugs move through the body and their eventual effects. The study of pharmacokinetics focuses on four main processes: absorption, distribution, metabolism, and excretion. This knowledge is essential for safely prescribing medication, managing medication regimens, ensuring effective therapy, and minimizing the risk of adverse drug reactions.

Drug absorption is the process through which a drug moves from its site of administration into the bloodstream. This process begins when the drug is administered and concludes when it enters systemic circulation. The absorption rate determines how quickly a drug enters the bloodstream, influencing the onset of its effects.

Once in the bloodstream, a drug must be distributed to sites of action throughout the body via the vascular system. To reach the target tissue, a drug must first exit the vascular system. Factors influencing distribution include blood flow, the drug's ability to leave the vascular system and enter cells, and the degree of plasma protein binding.

Metabolism describes the process by which the body chemically alters drugs for therapeutic use, converting them into components that can be more easily excreted. This process primarily occurs in the liver, although it can also take place in other parts of the body. The liver utilizes cytochrome P450 (CYP450) system enzymes to convert the drug into metabolites.

The first-pass effect influences certain oral drugs absorbed through the stomach or small intestine and transported to the liver via portal venous circulation for metabolism before entering systemic circulation.

Substrates are medications (xenobiotics) that require the body's metabolic processes to activate or deactivate the drug. Like inducers and inhibitors, substrates also need careful prescribing.

More than half of all adverse drug reactions (ADRs) are caused by drug metabolism and CYP450 enzymes (Luu et al., 2021).

Drug excretion encompasses the removal of drugs and their metabolites from the body. This process is essential to prevent the accumulation of drugs and their potentially toxic effects.

Pharmacodynamics describes how drugs affect the body's response at the site of action (Luu et al., 2021). This knowledge is essential for NPs to grasp how drugs interact with the body to produce therapeutic effects and potential side effects.

Most drugs exert their therapeutic effects by assisting the body in utilizing its own capabilities to trigger a therapeutic response, either by activating or blocking the actions of the body’s regulatory molecules at receptor sites.

Pharmacogenetics focuses on how genetic inheritance affects an individual's response to drugs.

When prescribing medication, it is crucial to recognize that different clients may respond differently to the same medication due to genetic, physiological, or pathological differences.

Prescribing medications during pregnancy and breastfeeding requires careful consideration of the benefits and risks associated with the medication regimen, tailored to each client’s condition and circumstances. This task can be challenging due to the limited availability of clinical drug trials and safety data regarding pregnancy. Most drug trials examining safety during pregnancy are conducted on animals, and evidence of safety does not always correlate with safety in humans (Rosenthal & Burchum, 2021).

Pregnancy drug categories, from A to X, indicate the safety of medication use during pregnancy.

The same caution for prescribing during breastfeeding is advised as during pregnancy.

Neonates (under four weeks old) and infants (under one year old) with immature organ systems cannot reliably regulate drug levels, placing them at greater risk for intensified and prolonged drug effects.

Many older adults frequently have multiple comorbidities and may take several medications simultaneously (polypharmacy), which complicates prescribing in older adult populations, increasing the risk of drug interactions and adverse reactions.

ADRs are seven times more prevalent in older adults than in younger adults, representing approximately 16% of all hospitalizations and half of all medication-related fatalities in this age group (Rosenthal & Burchum, 2021).

The American Geriatric Society (AGS, 2023) recommends several strategies, known as the Beers Criteria, to reduce ADRs in older adults.

Adverse Reactions

A drug's therapeutic index measures safety by indicating the range between the drug's minimum effective concentration and its toxic concentration.

Prescribers must avoid adverse drug interactions and ensure effective pharmacotherapy. This requires careful consideration of the client's entire medication regimen, including over-the-counter drugs and dietary habits, because drugs, foods, and other substances can affect CYP450 enzymes and, consequently, drug metabolism.

Clinical Practice Guidelines

Clinical practice guidelines (CPGs) are developed systematically to establish standards of practice based on the best available evidence without imposing strict dictates on how practice should be conducted.

Prescription Writing

Writing prescriptions is crucial for NPs, requiring precision and a comprehensive understanding of pharmacology and individual client factors.

Ethical prescribing requires informed decision-making that considers factors like drug interactions, side effects, and the individual needs of clients.

Rational drug selection requires a logical approach that involves formulating a diagnosis through clinical reasoning and selecting and monitoring the most appropriate pharmacological treatment (Rosenthal & Burchum, 2021).

Off-label prescribing refers to recommending medications for uses, dosages, routes of administration, or populations that are not included in the indications approved by a regulatory authority (i.e., the Food and Drug Administration [FDA]).

A valid prescription must satisfy specific requirements to ensure accuracy, legality, and client safety.
Medication adherence is a critical issue in healthcare, with only about 50% of patients in developed countries taking their medications as prescribed at least 80% of the time (Luu et al., 2021).

Medication Errors

The act of prescribing medication carries a significant responsibility to safeguard the client's well-being. It requires careful attention to detail to prevent or monitor for ADRs and medication errors.

A medication error is any incident that can be prevented and may result in the incorrect use of medication or harm to the client.

NP Scope of Practice

The NP's scope of practice is defined by state laws regarding practice and licensure. This scope is divided into practice authority and prescription authority.

Nurse practitioners (NPs) prescribing medications for managing hypertension, arrhythmias, and chronic coronary disease must consider a comprehensive range of pharmacologic and nonpharmacologic options while tailoring treatment to the individual needs of each client. For all conditions, lifespan factors and personal circumstances should guide prescribing practices to ensure adherence to the latest clinical practice guidelines (CPGs). It is crucial that NPs reference the most up-to-date CPGs and emerging evidence to optimize client outcomes when addressing these complex cardiovascular conditions.

Key Points

Drugs for Hypertension

Hypertension affects millions of people worldwide and is a leading cause of death, potentially leading to cardiovascular disease, kidney disease, and stroke. Effective management includes lifestyle changes and medication to reduce blood pressure and prevent complications.

Diuretics play an essential role in managing hypertension by decreasing blood volume through diuresis, which leads to lower blood pressure. They can be effective when taken alone or in combination with other antihypertensive medications (Rosenthal & Burchum, 2021).

Loop diuretics primarily act on the ascending limb of the loop of Henle within the nephron to enhance the excretion of sodium and water.

Contraindications: Not recommended for clients with a sulfa allergy. Considerations for clients who are pregnant or breastfeeding.