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# Application of Pharmacology in Nursing Practice

## Why Should A Nursing Student Learn About Drugs?

- Motivation for studying Pharmacology
- Essential for nursing practice
- Worthwhile investment
- Much more required than the Six Rights
    - right drug, right patient, right dose, right route, right time documentation

## Evolution of Nursing Responsibilities Regarding Drugs

- More rights have been added to the Six Rights
    - right assessment, right evaluation, the patients right to education and refusal
- The rights guarantee only that a drug will be administered as prescribed
    - correct administration, without additional interventions, cannot ensure that a treatment will result in maximum benefit (therapeutic objective) and minimum harm
- Proper delivery of a medication is only the beginning of a nurse's responsibilities
    - important event will take place after the medication is delivered and these must be responded to by the nurse
- Nurses, physicians, and pharmacists participate in a system of checks and balances designed to promote beneficial effect and to minimize harm
- The nurse must know
    - what medications are appropriate for the patient
    - what drugs are contraindicated for the patient
    - the probable consequences of the interaction between drug and patient
    - in advance the response that a medication is likely to elicit
- The nurse's role as an advocate for the patient
    - detect mistakes made by the physician or pharmacists
    - the nurse follows the patients status most closely
    - the nurse is usually the first to observe and evaluate drug responses and to intervene if required
    - the nurse is the last person to check medication before it is administered
    - the nurse is the patients last line of defence against medication errors
    - it is ethically and legally unacceptable for you to administer a drug that is harmful to the patient; even though the medication has been prescribed by a licensed prescriber and dispensed by a licensed pharmacist

## Application of Pharmacology

- The two main areas in which you can apply pharmacologic knowledge are
    1) patient care
    2) patient education

Application of Pharmacology in Patient Care

- The application of pharmacology in patient care focuses on seven aspects of drug therapy
    1) Preadministration assessment
    2) Dosage and administration
    3) Evaluating and promoting therapeutic effects
    4) Minimizing adverse effects
    5) Minimizing adverse interactions
    6) Making as needed (PRN) decisions
    7) Managing toxicity

Pre-administration Assessment in Patient Care

- All drug therapy begins with the assessment of the patient
- Assessment has 3 basic goals
    1) collecting baseline data needed to evaluate therapeutic and adverse responses
        - needed to evaluate therapeutic responses and adverse effects
        - specific to each drug, must have an understanding of pharmacology
    2) identifying high-risk patients
        - live and kidney impairment
        - drug allergies
        - pregnancy
        - elderly and paediatric
        - genetic factors
        - specific to each drug, must have an understanding of pharmacology
    3) assessing the patient's capacity for self care
        - applies to all drugs
        - does not require specific knowledge on the drug you re about to give

Dosage and Administration in Patient Care

- Certain drugs have more than one indication and dosages may differ depending on which indication the drug is used for
- Many drugs cab be administered by more than one route, and dosage may differ depending upon the route selected
    - oral doses are often much larger than injected doses
- Certain IV agents can causes sever local injury if the drug extravasates (seeps into the tissue surrounding the IV line)
- Read the medication order carefully
- Verify the identity of the patient
- Read the medication label carefully
    - verify the identity of the drug, the amount of the drug, and its route of administration
- Verify dosage calculation
- Implement and special handling the drug may require
- Don’t administer any drug if you don’t understand the reason for its use
    - Six Rights: right drug, right patient, right dose, right route, right time, documentation

Evaluating and Promoting Therapeutic Effects in Patient Care

- Evaluating therapeutic responses
    - one of the most important aspects of drug therapy
    - tells us whether a drug is beneficial or harmful
    - must know the rationale for treatment and the nature and time course of the intended response
    - when a drug has more than one application, you can only evaluate its response of a drug if you know the specific indication for which the drug is being used
    - must understand the reason for the drug
- Promoting patient adherence
    - also known as compliance or concordance
    - extent to which a patient's behaviour coincides with medical advise
    - by educating patients about the drugs they re taking, you can help elicit the required participation
- Implementing non-drug measures
    - drug therapy can be enhanced by non-pharmacologic measures
    - enhancing drug therapy of asthma through breathing exercises, biofeedback, and emotional support
    - enhancing drug therapy of arthritis through physical therapy and rest
    - enhancing drug therapy of hypertension through weight reduction, smoking cessation and sodium restriction

Minimizing Adverse Effects in Patient Care

- All drugs have the potential to produce undesired effects
- When drugs are employed properly the incidence and severity of adverse effects reduces
- Measures to reduce adverse effects include:
    - identifying high-risk patients through patient history
    - ensuring proper administration through patient education
    - teaching patients about activities that might precipitate and adverse event
- Must know the following to reduce adverse effects:
    - the major adverse effects the drug can produce
    - when theses reactions are likely to occur
    - early signs that an adverse reaction is developing
    - interventions that can minimize discomfort and harm

Minimizing Adverse Interactions in Patient Care

- When a patient is taking 2 or more drugs, those drugs may interact with one another to diminish therapeutic effects or intensify adverse effects
- Take a thorough drug history
- Advise the patient to avoid over-the-counter drugs that can interact with the prescribed medication
- Monitor for adverse interactions known to occur between the drugs the patient is taking, and being alert for unknown interactions

Making Decisions on PRN in Patient Care
- PRN = pro re nata meaning as needed
- Nurses may have discretion regarding when to give a drug and how much
- Common for drugs that promote sleep, relieve pain, and reduce anxiety
- Nurses must know the reason for drug use and be able to assess the patient's medication needs

Managing Toxicity in Patient Care
- Early identification makes early intervention possible
- Must know the early signs of toxicity and the procedure for toxicity management

Application of Pharmacology In Patient Education
- Nurse is responsible for educating patients about medications
- Must give the patient the following information:
    - drug name and therapeutic category
    - dosage
    - dosing schedule
    - route and technique of administration
    - expected therapeutic response and when it should develop
    - non-drug measures to enhance therapeutic responses
    - duration of treatment
    - method of drug storage
    - symptoms of major adverse effects and measures to minimize discomfort and harm
    - major adverse drug-drug and drug-food interactions
    - whom to contact int he even of therapeutic failure, severe adverse reactions, or severe adverse interactions

Dosage and Administration in Patient Education
- Give name of drug
    - if patient is prescribed the trade name, give them the generic name too (reduce risk of overdose from paten unknowingly taking the same medication twice)
- Teach dosage and schedule of administration
    - patient must be told how much drug to take and when to take it
- Teach technique of administration
- Give duration of drug use
- Teach drug storage

Promoting Therapeutic Effects in Patient Education
- Patients must know the nature and time course of expected beneficial effects
    - helps them to evaluate success or failure of treatment
- By recognizing treatment failure, allows for timely alternative therapy implementation
- Awareness that some treatments may not produce immediate results allows the patients to have realistic expectations

Minimizing Adverse Effects in Patient Education

- Knowledge of adverse effects will enable the patient to avoid some adverse effects and minimize others through early detection
- Insulin overdose can cause blood glucose levels to drop
- Anticancer drugs predispose patients to acquiring serious infections
- Some side effects are benign but disturbing, especially if unknown to the patient

Minimizing Adverse Interactions in Patent Education

- Patient education can help avoid drug-drug and drug-food interactions
- Educate patients about potential OTC and natural health products interactions

Application of the Nursing Process in Drug Therapy

- Modify nursing process format to include nursing implications in drug therapy
- Review of the nursing process
    - assessment
    - analysis nursing diagnosis
    - planning
    - implementation
    - evaluation

Applying the Nursing Process in Drug Therapy

- Pre-administration assessment
    - establishes the baseline data needed to tailor drug therapy to the individual
    1) collection of baseline data to evaluate therapeutic effects
    2) collection of baseline data to evaluate adverse effects
    3) identification of high-risk patients
        - if a drug is eliminated through renal excretion and the patient has impaired kidney function they will be at risk for drug toxicity
        - contraindication = preexisting condition that precludes use of a particular drug under all but the most critical circumstances
        - precaution = preexisting condition that significantly increases the risk of an adverse reaction to a particle drug but not to a degree that is life threatening
    4) assessment of the patient's capacity for self-care
    - the first three goals are specific to the particular drug being used
    - the fourth goal applies to equally to all drugs
- Analysis and Nursing Diagnosis
    - has three objectives
    1) judge the appropriateness of the prescribed regimen
    2) identify potential health problems that the drug might cause
    3) determine the patient's capacity for self-care
    - must analyze the data collected during assessment to determine if the proposed treatment has a reasonable likelihood of being effective and safe

- question drugs appropriateness if
    - drug has no actions that are known to benefit the patient
    - patient failed to respond to the drug in the past
    - patient has a series adverse reaction to the drug in the past
    - patient has a condition or is using a drug that contraindicates the prescribed drug
- Planning
    - defining goals
        - produce maximum benefit and minimum harm
    - establishing priorities
        - highest priority is given to life threatening issues, cause sever, acute discomfort and to reactions that can result in long-term harm
    - identifying specific interventions
        1) drug administration
        2) interventions to enhance therapeutic effects
        3) interventions to minimize adverse effects and interactions
        4) patient education
    - establishing criteria for evaluating success
- Implementation
    1) drug administration
    2) patient education
    3) interventions to promote therapeutic effects
    4) interventions to minimize adverse effects
- Evaluation
    - therapeutic response
    - adverse drug reactions and interactions
    - adherence to the prescribed regimen
    - satisfaction with treatment
    - must know which adverse effects are to occur, how they manifest and their expected time course

<u>Routes of Administration</u>
- Oral (swallow)
    - tablets/capsules
        - swallow whole, follow with water or juice
        - do not break unless scored
        - sublingual = under the tongue to dissolve, usually absorbed faster
        - buccal = between gum and cheek to dissolve
        - tablet is a solid form and a capsule is a plastic casing with powder inside
        - sustained release drug = drug is realized slowly through the GI tract
        - enteric coating = prevents drug from being released in the stomach, it will be relaxed later on in the GI tract (do not break the coating)
    - Liquids
        - emulsions = oil/water mixtures

        - suspensions = solid in water; shake continuously for accurate dosing
        - elixir = alcohol/water mixtures
        - solutions/syrups
        - use of oral syringes is the best form
        - when using medication cups make sure you fill little above measurement
- Nasogastric route
    - use only solutions or thin suspensions (others clog)
    - verify that tube is in stomach, not lung (lack of froth liquid returns)
    - flush with the volume pf tube (5-25 mL water/saline)
    - infants unconscious = position on left side, avoids medication entering the lungs
- Nasal/Oral inhalations
    - assure clean nebulizers
    - do not mix with other drugs unless verified
    - metered aerosols
        - shake, distance, exhale
        - inspire deeply as medication is released
        - wait a minute for 2nd puff
        - rinse mouth and pharynx and clean aerosol
- Skin and mucous membranes/EENT meds
    - ointments, creams, lotions, pastes, solutions, and dressings
    - special sites
        - ear = have patient stay on opposite side that drops were administered for 2-3 minutes
        - nasal = patient is supine, title head back for drops or spray
        - eye = patient is supine, hold lid, and do not touch eye with bottle or tube
- Rectal administration
    - enemas
        - patient is positioned on left side and should breath from the mouth to relax anal sphincter
        - administer solutions slowly and keep patient flat for 30 minutes
        - retention vs evacuant enemas
    - suppositories
        - some melt at room temperature so they must be administer quickly
        - all melt at body temperature (e.g. in your hand)
        - inserted in the anus and melt in the rectum
        - use finger cot (small finger for child); insert 5cm
        - make sure all foil and wapping is removed
        - ask patient to stay on left side for 20 minutes after administration
- Vaginal administration
    - vaginal tablets, suppository, cream
    - administer in lithotomy position
        - hips elevated for 5 minutes, prone for 20 minutes

- Parenteral routes
    - the salt and pH content are the same as the human body
    - solutions/suspensions
    - always sterile
    - usually isotonic and iso-osmotic
    - some with preservations to inhibitory contamination
- Intravenous (IV) administration
    - direct (into vein or below an administration set) and very fast
    - once it is given you can not remove it
    - intermediate volumetric devices (Soluset, Buretrol) or mini bags special Y says
        - conisdered a risky route
        - higher concentrations in the blood than tissues
        - often rate-related toxicity
    - used for water, electrolytes and nutritional needs (saline, dextrose solutions)
    - drugs should usually be given slowly over at least one circulation time, few are done very fast
    - always check compatibility of more than 1 drug (not visually)
    - rate regulation is a problem
        - use IVD's, electronic pumps or rate controllers
    - frequent monitoring, especially first hour
    - air emboli
        - check all connectors, sites, levels and devices
    - phlebitis
        - hypertonic solutions
    - central vein administration
        - used for large volumes, hypertonic solutions, and very concentrated medication (TPN)
    - intra-arterial infusion
        - for some anti-cancer drugs
- Intramuscular (IM) administration
    - choose a new site of healthy muscle with a good blood supply
        - gluteus maximus or deltoid
    - massage area and insert at 90 degrees quickly, aspirate give 2-5 mL
    - 'Z' track technique
    - be sure to inect into the muscle and not the fatty tissue
    - most painful because you are in ejecting into the muscle where there are many nerve endings
- Subcutaneous (SC) administration
    - many sites (abdominal)
    - rotate (do not repeatedly give medication in same location)
    - insert at 45 degrees, aspirate, give up to infusions
    - administer into the fat

Nurses Other Responsibilities

- Verify medication card/pharmacy MAR/unit-dose with original doctor's order
- Check drug allergy status on admission
    - verify if possible real allergy
    - check before administering a new med
- Follow "Automatic Stop Orders" or verify need for medication
- She/he who prepares should administer
- Check patient's ID before giving medication
- Deal with patients questions
- Chart meds only after having given them
- Establish monitoring parameters for meds in order to be able to observe beneficial and side side effects
- works towards the establishing therapeutic endpoints for a med
- before discharge assess patients attitude and knowledge towards meds that he/she must take at home