5 Rights + 10 rights

1. Right medication:

Matching the prescription/medication order against the label of the disp med

Being aware of look-alike and similar sounding medications

using generic names of medications whenever possible

***RIGHT REASON: understand the intended purpose of the medicines to be administered.

2. The right patient:

Check medical record number + identification band + asking the patient/service user to state her/his name

3. The right dose:

if appropriate based on age, size, vital signs or other variables, measure the dose (e.g., liquid form

4. The right form: correct form. If not indicated on the prescription clarify with the prescriber.

***RIGHT ROUTE: Route matching with form

***RIGHT ACTION: correct administration

5. The right time: the correct timing, frequency and duration of the prescribed order Accurately documenting medication administration times.

***RIGHT DOCUMENTATION: Accurate and contemporaneous documentation should be made for any medicinal product admin or withheld or refused.

***RIGHT RESPONSE: Awareness and observation for medication allergies, side effects, adverse reactions, interactions and contraindications. Monitoring the effectiveness of the administered medicinal products.

  • Double-checking medications: verification of the medication against the medication prescription order, performing calculations for dosing of the correct volume or quantity of medication and/or other aspects of medication administration as appropriate.

  • The assessment and evaluation of the administered prescribed medicinal product should encompass the observation of the patient:

    - Vital signs and laboratory values prior to administration (as applicable)

    - Effectiveness of medication administration method (e.g., is the oral route appropriate for this patient/service-user?)

    • Standard Education should be provided to the patient:

    - mechanism of action of the medicinal product

    - potential side effects

    - symptoms of potential adverse effects and actions to take if they occur
-Possible interactions of the medicinal product with other medications, particular foods or other substances

The nursing/midwifery care plan should capture if patients/service-users use complementary therapies and should be documented in her/his chart.

- **IM sites:**

  Ventrogluteal (gluteus medius) up to 2.5 ml, recommended one
  
  Dorsogluteal (gluteus maximus) up to 4 ml, sciatic nerve risk
  
  Deltoid site, 1 ml, mainly vaccinations
  
  Vastus lateralis and Rectus femoris, up to 1 to 5 ml

- **Drugs calculation**

  Conversion: g -1000 -milligram- 1000 -microgram
  
  Tablet: what I want / what I have
  
  Fluid: what I want/ what I have **volume of stock solution
  
  Ratio IV: what I want/ the time of admin **drops= x drops *min
  
  Weight loss: Birth weight (gms) - current weight (gms) X 100, divided by the birth weight (gms)

- **Side effects:**

  Physiological response unrelated to the desired drug effects that occur with therapeutic doses of the medication

- **Anaphylaxis:** Life threatening allergic reaction to a foreign protein antigen characterised by a sudden onset and rapid progression of signs and symptoms. Can be fatal if not recognised and treated appropriately.

  Release of histamine and other mediators cause to swell, low bp, hard breathing

  Treat: seek help, assess circulation, airway and breathing and then IM adrenaline

  **Adrenaline action:** causes constriction, or tightening, of the blood vessels, which decreases swelling and also helps to increase blood pressure. It also increases the heart’s contraction and heart rate, which can help to prevent or reverse cardiovascular collapse. It elaxes the muscles around the airways in the lungs, helping the airways to open up. Finally, it prevents the release of additional allergic chemicals, which aids in stopping further progression of the reaction.

- **ADR, adverse drug reaction:** Response to a drug that is noxious and unintended, it occurs at doses normally used for prophylaxis, diagnosis or treatment of disease.

  o **Dose related and predictable:** Severity usually related to dose administered.

  o **Not dose related – unpredictable:** can occur with any drug at any dose any time. Triggering an immune response in susceptible people (allergic/hypersensitivity)

**Common drugs giving ADRs:**
Warfarin: Avoid any drug which could affect clotting e.g. Aspirin (NSAIDs)- contraindicated in Asthmatics or those with GIT problems- ulcers, Crohns Disease Antacids- can interfere with action of a drug which needs gastric acid for absorption

Certain anti hypertensives (ACE- inhibitors)

Management:

Does depend of severity of reaction. Full assessment of woman, get help, check vital signs. Document; Drug may be discontinued alternatives must be considered; Dose may require adjusting

- Neonatal Pharmacology
Pharmacodynamics and pharmacokinetics differ

Drugs dissolve in body water

- Newborn infant = 70-80% of weight
  - 67% at 1 year, 60% in adulthood
- extra cellular fluid turnover:
  - Infant is 50%, adult 20% daily (higher doses in infant)
  - Infant muscle mass 25%, 40% in adult
  - Infant proportions of body fat vary
  
  ▪ Drug absorption: in the liver but Hepatic levels 50-70% of adults = lower and slower = Greatest risk of drug toxicity
  
  ▪ Reduced plasma proteins 15-20% less =Lower binding capacity to drug= increase in free drug concentration
  
  ▪ Glomerular filtration Rate (GFR) ie. renal activity to excrete, 30-50% that of an adult Thus drug Half life is approx 50% longer
  
  ▪ Blood Brain Barrier- immature under 2 years
  
  ▪ Competitive binding with bilirubin
  
  ▪ Decreased binding of penicillin, phenobarbitone, theophylline, phenytoin
  
  ▪ Dermal and subcutaneous absorption increased.
  
  ▪ Enteral Absorption generally slower but slow gastric emptying and gastric acid secretion favours lipid soluble drugs; GI tract ph neutral= Absorption of basic drugs enhanced
  
  ▪ VLBW and ELBW infants need higher loading doses and well as increases in dosing intervals

Over the counter drugs:
- Paracetamol is generally regarded as safe for short-term use in all three trimesters
- Aspirin and non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen are not recommended during pregnancy. In the last trimester, they can delay labour, increase the length of labour and cause complications in the newborn baby; (ibuprofen) premature closure of the ductus arteriosus; risk of bleeding in the mother and baby if taken in the third trimester; first trimester risk of miscarriage or malformations.
- Codeine and dihydrocodeine can affect the baby's breathing if taken in the last trimester, or during labour in large amounts. Heavy use may also cause a withdrawal syndrome in the newborn infant. However, small doses for a short period of time to treat specific pain can be taken in the first and second trimesters. Can easily cause significant constipation postnatally.
- Antacids are generally safe, though sodium bicarbonate is absorbed into the bloodstream and so antacids containing this ingredient should be avoided in pregnancy, to avoid high sodium.

**Drugs and placental barrier:**

How do drugs cross placenta?

- Pynocitosis, oil soluble, membrane takes it around and inside
- Effects of drug on the baby Depends on: **stage** of placental and fetal development, **rate of drug** transfer and **dose**, **duration** of drug exposure. **Distribution** in fetal tissues
- Some are beneficial: corticosteroid for surfactant in lungs, cardiac drug that can regulate the fetal heart, some to ensure maternal medical wellbeing
- Some are teratogenic: Warfarin- fetal warfarin syndrome, IUGR; Tetracyclines-teeth; Lithium – cardiac defects → Greatest risk teratogenicity 15-60 days after conception
- Smoke and alcohol

**Supplements:**

-Folic Acid:
  - Recommendation- take 4 weeks preconception and for first 12 weeks of pregnancy. 400 micrograms
  - Up to 70% of neural tube defects can be prevented(IOG,2013).
  - Women with specific needs, the higher dose- has to be prescribed- up to 5mgs

-Vitamin D
  - Recommendation – 5 microgram's daily
  - Vitamin D necessary for the absorption of calcium.
  - If woman taking a multivitamin ask her to check amount of Vit D in it.

-No routine Iron supplementation, but if taken:
  - Take iron with fruit, fruit juice- vitamin C helps absorption
  - Avoid taking iron at the same time as tea, coffee or milk
• Increase dietary fibre and water intake
• Can cause stools to be black.

-No vitamin A supplement liver and liver products

Vitamins & Minerals:

-Vitamins
• Demand for micronutrients increased in pregnancy by 50%
• **B Complex**- normal development- preconception- breastfeeding
• **C and E** – cell development
• **D** – normal growth and bone development
• **K** – normal blood clotting and bone development

-Minerals
• **Iron**- normal brain development
• **Omega 3** – brain development
• **Iodine**- helps development of brain and nervous system
• **Calcium**- development bones and teeth
• **Magnesium**- aids bone growth and muscle development
• **Selenium**- immune system
• **Zinc**- normal fertility and reproduction

✔ **Pain physiology and management**
  o The experience of pain involves the interplay between biological, psychological and social factors. A combination of pharmacological and non-pharmacological interventions may be used to manage pain
  o Pain signals travel to the **somatosensory cortex**. On the way many things can modulate the pain perception. Many chemicals/neurotransmitters involved e.g. prostaglandins, substance P, endorphins etc. **Different analgesic drugs will act at different points of the pain pathway**
  o **Response to pain**: Increased ACTH & adrenaline release; Increased respiration; Increased cardiac output and Anxiety= Effective coping strategies can control these responses
    ▪ Physical (Medication, stimulation of large fibres)
    ▪ Emotional - Happiness, relaxation, control
    ▪ Behavioural - Concentration, distraction
  o **Kind of pain:**
    - acute or chronic
**neuropathic:** Pain caused by a lesion or disease of the somatosensory nervous system. Can involve peripheral and/or central NS. E.g. Phantom limb pain, carpal tunnel syndrome.

**nociceptive:** Pain that arises from actual or threatened damage to nonneural tissue and is due to the activation of nociceptors. 2 Types: Somatic (from skin, muscle, soft tissue, bone) & Visceral (from organs) pain.

**Pain in labour:**

1**\textsuperscript{st}** stage **visceral:** Nociceptive nerve endings in wall of uterus & cervix → sympathetic ganglia → To cervical and uterine plexuses → To the pelvic plexus, the middle hypogastric plexus, the superior hypogastric plexus → Then to the lumbar sympathetic nerves → Eventually join the thoracic 10, 11, 12 and lumbar 1 spinal nerves → Signals are then received at the dorsal horn of the spinal column → Then via the spinothalamic tract to the higher centres of the brain.

2**\textsuperscript{nd}** stage: Perineum and lower pelvis (**somatic**): Pudendal nerves → S2, S3, S4 nerve roots → Then via the spinothalamic tract to the higher centres of the brain.

**Pain relief in labour:**

**Entonox:** 50% Nitrous oxide (N2O) & 50% Oxygen: Rapid action (20-30s after inhalation) Maximum effect around 60s = inhalation should take place before contraction.

**Epidural:** between L2-3 into epidural space.

**Spinal analgesia:** subaracnoid space.

**Opiods: affect the baby too**

- **Prescribing:** Only medical practitioners and dentists are authorized to prescribe medicines. The nurse or the midwife must follow the conditions of the prescriptive authority, along with the Misuse of Drugs Amendment Regulation 2007, which raises the specific schedule of the use of MDA's by the registered nurse prescriber (RNP) and needs to be employed in a health service setting, the drug must be one that would be given in the usual course of the provision of the health service provided in the health service setting in which the nurse/midwife is employed. The RNP prescribes the drug. Another nurse/midwife then checks the drug with a third nurse/midwife before administering the drug. There should be clear separation of the prescribing of the drug and of the administration.

- **Administration:** Giving an individual dose of a medicinal product to a patient/service-user via direct contact (e.g., orally, by injection) or by indirect contact (e.g., application of a medicated dressing) and ensuring the completion of this activity.

- **Supply:** Distribute, sell, or offer a medicinal product to a patient/service-user under the direction of a registered medical practitioner as noted in an individual prescription or written instructions.
o Dispensing: starting from the receipt of a prescription request, assessment of the request, review of medicines therapy and health information, the preparation of the product, recording the prescription, and delivery of the final product with appropriate counselling. Extension to midwifery/nursing scope, should be pharmacist. Second check by another professional colleague should be carried out.

o MDAs: Specifying the total number of the drug that is required is one of the general requirements for a requisition. It also must be countersigned by a medical practitioner employed in the same institution. Changeover shift should also include a complete count of drugs. Appropriate documentation of administration should always be entered in the drugs register and patients chart. Two people checking is a local requirement but not legal.

  o Medications should be stored in a fridge that is purely for medicinal products.
  o Medication storage should be stored securely at all times in a locked unit.
  o Medications that require refrigeration can be stored with other medicinal products if they are clearly labelled and require the same storage environment.

o Medication management: the facilitation of safe and effective use of prescription and over-the-counter medicinal products. Prescribing, dispensing, storing, supplying and administering scheduled medicinal products

o Medication protocols: direction put in place for nurses and midwives for the supply and dispensing of medicinal products. And individual prescription is not required when medication protocols are in use, this allows a nurse or midwife to administer medication to a patient when in an identified situation and when a specific criteria for this medication is met. The nurse or midwife who has been appointed to supply the medication can be the only one to administer it also.

- no mail delivery of medication

- The labelling requirements for dispensed medicinal products

  ▪ MDA schedule 1: Special license required in respect of these drugs. In practice, such activities are strictly limited to scientific research or forensic analysis (cannabis, coca leaf)
  ▪ MDA schedule 2: Opiates, amphetamines and synthetic narcotics only supplied by pharmacist. License required for import/export of these drugs. Record-keeping. Destruction must be witnessed
  ▪ MDA schedule 3: Less strict controls. Record-keeping requirements in a CD register do not apply. Destruction does not need to be witnessed. Safe custody provisions applicable as are controlled drug prescription writing requirements. Most barbiturates, some potent analgesics, minor stimulants and two benzodiazepines
  ▪ MDA schedule 4: Control is minimal. Record keeping in a controlled drugs register, retention of invoices and safe custody regulations do not pertain. Most benzodiazepines, phenobarbitone, methylphenobarbitone preparations containing less than 100mg and Selegiline are examples
- MDA schedule 5: This schedule lists medicinal products exempt from most restrictions under the Regulations. Invoices regarding these products must be retained for two years. *preparation of many drugs
- MDA Schedule 8: list of drugs a registered nurse/midwife prescriber is legally entitled to prescribe which may include drugs under MDA schedule 2 and 3

Pharmacokinetics: the branch of pharmacology concerned with the movement of drugs within the body. What the body does to the drug

Admo altered during pregnancy

Therapeutic range: the difference between the minimum effective concentration and the maximum safe concentration.
- Not fixed and varies for different drugs.
- Drugs with narrow therapeutic range require close monitoring
- Monitor plasma concentrations or patient observation

1. Absorption of the drug
- Enteral (passing through GI system)= oral drugs
- Parenteral System=directly to bloodstream IV, IM drugs.
- Transdermal= i.e. patch, slowly absorbed through the skin
- Respiratory= i.e. nebuliser

2. Distribution of the drug
Volume of distribution (Vd)= amount of drug in body divided by amount of drug in the plasma. Affected by blood flow, lipid solubility, size, plasma proteins* free drugs= active, protein-bound drug= inactive
Bioavailability= percent of drug into the system (absorbed-extracted= bioavailability)
IV drugs have 100% bioavailability!
Extraction= how much of drug of the absorbed can be used by the body
Loading dose= high dose, to reach the pick concentration as quick as possible.
Formula: Desired pick dose x Vd (cause if you have a large body you need higher dose) all divided by bioavailability.
Maintenance dose= when the drug is already used, we want to maintain the concentration.
Formula: desired pick concentration x Clearance (elimination* if kidney disease, much less!!!) all divided by bioavailability

3. Metabolism of the drug (from inactive to active) active metabolites.
Reaction Phase 1 and Phase 2
Phase 1: Oxidation, Reduction, Hydrolytic (in zone 3 Hepatic acinus) =to make polar water-soluble molecules
Phase 2: Glucuronidation, Acetylation, Sulfation= to convert in inactive metabolites
‘First pass effect’= liver encounters drug before it enters the system, oral drug → GI system → intestine → portal circulation (small intestine to our liver) → Hepatic portal vein → central vein → hepatic vein → inferior vena cava → heart → body!
Decreased bioavailability if the drug encounters the liver first!
IV doesn’t have first pass effect → directly to the body

4. Elimination of the drug
Through kidney- urine
Through GI system- bile
Clearance= elimination of the drug divided by plasma concentration= Vd x Elimination Constant
T1/2= time to eliminate half of the drug from the system. 0.7 x Vd all divided by clearance= 0.7/Elimination constance.
Increased T1/2 the more drug we will have in the system for longer.
It takes about 5xT1/2 to accumulate or get read of the drug
First order drugs: dependent on the drug concentration. The more drug we have the more elimination we have. The leftovers take more time to eliminate!

Zero order drugs: constant elimination at a certain rate. i.e. -10 U/min, Phenytoin, Aspirin, Alcohol

Pharmacodynamics: the branch of pharmacology concerned with the effects of drugs and the mechanism of their action. What the drug does to the body
Substrates interact with → enzymes → become some kind of product
Enzymes have a certain velocity they convert substrates to

\[ V_{\text{max}} \]

is the maximum velocity (efficiency) the enzyme can work to
We need to increase the enzyme concentration= we will increase the \( V_{\text{max}} \)
Km= affinity of substrate to enzyme. Low Km= high affinity; High Km= low affinity

Competitive inhibitors: looks like substrate, binds temporarily to active site of enzyme
Vmax of comp. Inhibitors, stays the same, Km instead increases. The reaction will decrease affinity with substrate.

Non-competitive inhibitors: doesn’t look like substrate binds to the non active site of enzyme
Vmax of non comp inhibitors decreases, Km stays the same. Slows down the reaction

Potency= how much drug concentration required for certain effect. If it takes 0.5 grams of X drug vs 100 grams of Y drug, drug X is more potent

Efficiency: maximum effect of the drug. Between drug X and Y with the same potency (100 grams for example), giving the maximum dose, which one is the more efficient in get the wished effect?

ED50= Effective Dose dose required for 50% of research population for drug to be effective
LD50= Lethal dose dose required to kill 50% of research population
TD50= Toxic dose dose required to provoke adverse effects for 50% of the research population

TI= Therapeutic Index, = TD50/ED50, safety of drug. A high TI is excellent!

Pharmacotherapeutics: study of the therapeutic uses and effects of drugs, study of beneficial and adverse effects of drugs.

Considerations during pregnancy:
Placenta not an effective drug barrier
Lipid soluble drugs cross placenta
Later stages of pregnancy, placenta thins, fetal exposure increases
Neonates – lower body fat proportionately • Dose adjustments not made by weight alone

**calculation half life:**

Drug A has a half-life of 2 hours. If the initial plasma level of the drug, given as a single dose, is 1200mg/L, what will its plasma level be after 8 hours?

@ 2 hours 1200/2= 600
@ 4 hours 600/2= 300
@ 6 hour 300/2= 150
@8 hours 150/2= 77mg/L

Drug B has a half-life of 3 hours. If the initial plasma level of the drug, given as a single dose, is 3600mg/L, what will its plasma level be after 10 hours? Note: In this case the time/value does not coincide with an exact half-life interval.

3hr = 1 half – life = 3600 ÷ 2 = 1800mg/L
6hr = 2 half – life = 1800 ÷ 2 = 900mm/L

9hr = 3 half – life = 900 ÷ 2 = 450mm/L

12hr = 4 half – life = 450 ÷ 2 = 225mm/L Step 2:

10 hours is between 9hr and 12hr. Since 10hr equals 9hr + 1/3 of the interval to 12hr, the value will equal that at 9hr – 1/3 of the difference, time and value being inversely proportional.

450 – 225 = 225 225 × 1/3 = 75 450 – 75 = 33333/L

Blood products:

- **Prescription**: by medical staff in the Prescription and Administration booklet for blood and blood Components before administration of any blood component and Anti-D with date, blood component, reason, volume and duration, signature. Prescription valid for 24 hrs

- Before cross match bloods, handwritten vials

- Checks pre transfusion: obs

- **Transporting**: > 1 unit of Red Cells with blood coolers and cell safe box with coolant blocks up to 6 units; Validated for 6 hours (refrigerate and transport for theatre). Blood Container for use in the Clinical areas Blood/Blood Products eg. Anti-D, Only for transport not for storage, Only one product for one patient at a time

- **Administration**: Check at beside (2 staff members), Ask patient to confirm details (where applicable), Check information (Name, Hospital no, date of birth) correct on all documents (Blood Forms, Wrist band, Blood bag, Prescription booklet)

- Check monitoring: Obs- 15 minutes, then every hour (altering obs can be sign of reaction)

- Transfusion haemoglobin completed within 4 hours and giving set changed every 6 hours

- Transfusion plasma: use within 8 hours over 30-60mins

- Transfusion platelets: for massive haemorrhage

- **Anti-D**: If not given within 72 hours, a dose given within 10 days may provide some protection providing woman have not developed her own antibodies