DETAILED NURSING NOTES

Administration of Medicines • Blood Transfusion • Oxygen Administration

Author: Dr. Martian

5.1 ADMINISTRATION OF MEDICINES

Learning Outcomes / Competence

- Safely prepare, administer and document medications according to the rights of medication administration.
- Perform accurate dosage calculations for tablets, liquids, injections and weight-based (paediatric) doses.
- Recognise high-alert medications, manage allergies and respond to adverse drug reactions.
- Educate patients and complete OSCE/OSPE checklists competently.

Key Definitions

- Drug / Medicine: A chemical substance used for diagnosis, treatment, prevention or cure of disease.
- Pharmacology: Study of drugs – their sources, effects, mechanisms and uses.
- Pharmacokinetics: What the body does to the drug (absorption, distribution, metabolism, excretion – ADME).
- Pharmacodynamics: What the drug does to the body (mechanism of action, effects).
- Prescription: Written order by a qualified prescriber for a specific medication.
- Medication error: Any preventable event that may cause or lead to inappropriate medication use or patient harm.

Routes of Administration

- Enteral: Oral (PO), sublingual (SL), buccal, rectal (PR).
- Parenteral: Intramuscular (IM), intravenous (IV), subcutaneous (SC/SQ), intradermal (ID).
- Topical / Local: Skin (creams, ointments), eye, ear, nose, vaginal, inhalation.
- Others: Transdermal patches, epidural, intrathecal, intra-articular.

Choice of route depends on desired onset, drug properties, patient condition and availability.

Rights (Rules) of Medication Administration

The classic “5 Rights” have been expanded. Always verify:

- Right Patient (check ID band + ask name/DOB)
- Right Drug (check label three times: when taking, preparing, administering)
- Right Dose (calculate carefully; double-check high-alert drugs)
- Right Route
- Right Time (and frequency)
- Right Documentation
- Right Reason / Indication
- Right Response (monitor effect)
- Right to Refuse (patient autonomy – document and inform prescriber)
- Right Education (inform patient about the drug)

Interpretation of Prescriptions & Common Abbreviations

- A valid prescription should contain: patient details, drug name (preferably generic), dose, route, frequency, duration, prescriber signature and date.

Common abbreviations (use with caution – many institutions prefer full terms):

Abbreviation	Meaning	Abbreviation	Meaning
PO / p.o.	By mouth	IV	Intravenous
IM	Intramuscular	SC / SQ	Subcutaneous
OD / od	Once daily	BD / bid	Twice daily

TDS / tid	Three times daily	QID / qid	Four times daily
PRN / prn	When required	STAT	Immediately
ac	Before meals	pc	After meals
hs	At bedtime	gtt(s)	Drop(s)
mg	Milligram	mcg / µg	Microgram
mL	Millilitre	IU	International Unit

Dangerous abbreviations to avoid: U (unit), IU, q.d., q.o.d., trailing zeros (1.0 mg), naked decimal (.5 mg).

Dosage Calculations (with Worked Examples)

Basic formula (oral / tablets):

Dose required = (Desired dose ÷ Stock strength) × Stock volume (or number of tablets)

Worked Example 1 – Tablet

Order: Amoxicillin 500 mg PO. Stock: 250 mg tablets. → 500 ÷ 250 = 2 tablets.

Worked Example 2 – Liquid / Oral suspension

Order: Paracetamol 240 mg. Stock: 120 mg / 5 mL. → (240 ÷ 120) × 5 = 10 mL.

Worked Example 3 – Injection (dose-volume)

Order: Gentamicin 80 mg IM. Stock: 40 mg / mL. → 80 ÷ 40 = 2 mL.

Worked Example 4 – Weight-based (paediatric)

Order: Paracetamol 15 mg/kg. Child weight 12 kg. → 15 × 12 = 180 mg. Stock 120 mg/5 mL → (180 ÷ 120) × 5 = 7.5 mL.

Unit conversions commonly needed: 1 g = 1000 mg; 1 mg = 1000 mcg; 1 L = 1000 mL; 1 kg = 1000 g.

Safe practice: Always double-check calculations, especially for high-alert drugs. Use an independent second checker when required.

High-Alert Medications

- Medicines with heightened risk of causing significant harm if used in error (e.g. insulin, anticoagulants/heparin/warfarin, opioids, concentrated electrolytes (KCl), chemotherapy, neuromuscular blockers).
- Strategies: independent double-check, tall-man lettering, restricted access, smart pumps, clear labelling.

Allergies and Medication Reconciliation

- Always ask about and document drug allergies (and the reaction type) before administering any medicine.
- Medication reconciliation: compare the patient's current medication list with new orders at every transition of care to avoid omissions, duplications or interactions.

Documentation and Monitoring

- Record: drug, dose, route, time, site (if injection), batch number (if required), signature/initials, and any patient response or refusal.
- Monitor for therapeutic effect and adverse effects according to the drug profile.

Adverse Drug Reactions (ADRs) and Medication Errors

- ADR: any unintended, harmful reaction to a medicine given at normal doses. Report serious ADRs through the national pharmacovigilance system.
- Common error types: wrong patient, wrong drug, wrong dose, wrong route, wrong time, omission, documentation error.
- If an error occurs: ensure patient safety first, inform the prescriber/senior, document factually, and complete an incident report.

Role of the Nurse / Clinical Officer

- Verify orders, prepare and administer medicines safely, educate the patient, monitor response, document accurately, and advocate for the patient.

Patient Education

- Explain the name, purpose, dose, timing, possible side effects, and what to do if a dose is missed. Encourage questions and confirm understanding.

OSCE / OSPE Key Points – Administration of Medicines

• Introduce yourself, identify patient, explain procedure, check allergies, verify prescription, perform calculations, prepare drug using aseptic technique, administer correctly, document, and monitor.

5.2 BLOOD TRANSFUSION

Definition

Blood transfusion is the process of transferring blood or blood components from a donor into the circulatory system of a recipient. It is a potentially life-saving but high-risk procedure that requires strict adherence to safety protocols.

Blood Components

- Whole blood: rarely used now; mainly for acute massive haemorrhage.
- Packed Red Blood Cells (PRBCs): increase oxygen-carrying capacity (anaemia, haemorrhage).
- Platelet concentrates: thrombocytopenia or platelet dysfunction with bleeding.
- Fresh Frozen Plasma (FFP): clotting factor replacement, coagulopathy, massive transfusion.
- Cryoprecipitate: fibrinogen, factor VIII, vWF (e.g. DIC, hypofibrinogenaemia).
- Albumin / Plasma protein fractions: volume expansion in selected cases.

Indications

- Acute blood loss / hypovolaemic shock, severe symptomatic anaemia, exchange transfusion, clotting factor deficiencies, thrombocytopenia with bleeding, massive transfusion protocols.

Contraindications / Relative Contraindications

- Patient refusal (Jehovah's Witnesses – respect autonomy), mild asymptomatic anaemia that can be corrected otherwise, fluid overload risk (careful in heart failure), previous severe transfusion reaction (unless essential and with precautions).

Principles of Safe Blood Transfusion

- Correct patient identification at every step (bedside check is critical).
- Compatibility testing (ABO, Rh, cross-match) and correct component selection.
- Informed consent (except in life-threatening emergency).
- Proper storage, handling and administration within recommended times.
- Close monitoring especially in the first 15 minutes.
- Prompt recognition and management of transfusion reactions.

Investigations Required Before Transfusion

- Blood grouping (ABO & Rh), cross-matching, full blood count, (where relevant) coagulation profile, indirect Coombs test, screening for transfusion-transmissible infections in donor units.

Patient Identification and Consent

- Confirm identity using at least two identifiers (name + hospital number / date of birth) against the prescription, blood bag and compatibility label.
- Obtain informed consent after explaining benefits, risks and alternatives.

Equipment / Requirements

- Blood unit (checked), compatible giving set with filter (170–200 µm), IV cannula (preferably 18G or larger for PRBCs), normal saline for flushing, observations chart, emergency drugs (antihistamine, hydrocortisone, adrenaline) available.

Detailed Procedure (Key Steps)

- 1. Verify prescription, consent and baseline observations (TPR, BP, SpO_2).
- 2. Perform bedside identity and compatibility check with a second qualified person.
- 3. Inspect the blood bag (no leaks, clots, discolouration, expiry).
- 4. Prime the giving set with the blood (or as per policy) and connect to the patient.
- 5. Start transfusion slowly (e.g. 1–2 mL/min) for the first 15 minutes while remaining with the patient.
- 6. If no reaction, increase to the prescribed rate (PRBCs usually over 2–4 hours; never exceed 4 hours from removal from controlled storage).
- 7. Monitor observations at 15 min, then regularly (e.g. hourly) and at completion.
- 8. On completion: flush line, record volume given, observations, and discard empty bag as per policy (or return to lab if required).
- 9. Document everything clearly.

Transfusion Reactions and Complications

Acute reactions:

- Acute haemolytic (ABO incompatibility): fever, chills, back/chest pain, hypotension, haemoglobinuria → stop transfusion immediately, maintain IV access with saline, inform doctor, send blood/urine samples, supportive care.
- Febrile non-haemolytic: fever, chills (common) → stop or slow, antipyretic, investigate.
- Allergic / Anaphylactic: urticaria, itching, bronchospasm, hypotension → stop, antihistamine, adrenaline if severe.
- Transfusion-associated circulatory overload (TACO): dyspnoea, tachycardia, raised BP, pulmonary oedema → stop, sit up, oxygen, diuretic.
- TRALI (Transfusion-related acute lung injury): acute respiratory distress → stop, oxygen, supportive ICU care.

Delayed reactions: delayed haemolytic reaction, post-transfusion purpura, iron overload (chronic), infection transmission (rare with screening).

Unit / Volume Calculations

One unit of PRBCs (~250–300 mL) typically raises Hb by approximately 1 g/dL in an average adult (varies with patient size and ongoing loss).

Worked Example – Transfusion rate: 1 unit (300 mL) to be given over 3 hours. Rate = 300 mL ÷ 3 h = 100 mL/h. (Set pump or calculate drops if using gravity set.)

Documentation & Patient Education

- Record start/finish times, unit number, volume, observations, any reaction and actions taken.
- Educate the patient about the reason for transfusion, possible sensations, and the importance of reporting any unusual symptoms immediately.

OSCE / OSPE Key Points – Blood Transfusion

- Positive patient identification, two-person check, correct component, baseline obs, slow start with close observation, recognition and immediate management of reactions, accurate documentation.

5.4 OXYGEN ADMINISTRATION

Definition

Oxygen administration is the therapeutic delivery of supplemental oxygen to prevent or correct hypoxaemia (low oxygen level in arterial blood) and tissue hypoxia.

Indications

- Hypoxaemia (low SpO_2 or PaO_2), acute respiratory failure, shock, major trauma, carbon monoxide poisoning, perioperative care, severe anaemia (supportive), during resuscitation.

Target SpO_2 is usually 94–98% for most patients; 88–92% for those at risk of hypercapnic respiratory failure (e.g. some COPD patients) unless otherwise prescribed.

Oxygen Delivery Systems / Equipment

- Nasal cannula (prongs): 1–6 L/min → approx. 24–44% FiO_2. Comfortable for long-term low-flow use.
- Simple face mask: 5–10 L/min → approx. 40–60% FiO_2. Minimum 5 L/min to flush CO_2.
- Venturi (air-entrainment) mask: fixed, accurate FiO_2 (24%, 28%, 31%, 35%, 40%, 60%). Preferred in COPD patients needing controlled oxygen.
- Non-rebreather mask (with reservoir): 10–15 L/min → up to 90–95% FiO_2. For severe hypoxaemia (ensure bag remains inflated).
- High-flow nasal cannula (HFNC): heated, humidified, high flow; precise FiO_2 and PEEP effect.
- CPAP / BiPAP / Mechanical ventilation: non-invasive or invasive positive-pressure support.

Oxygen Sources

- Piped wall oxygen, oxygen cylinders (check content/pressure before use), oxygen concentrators.
- Always ensure a full backup cylinder is available when using piped supply or during transfer.

Flow Rates and Prescription / Titration Principles

- Oxygen is a drug – it must be prescribed with target saturation range and device.
- Titrate to the lowest flow that achieves the target SpO_2. Avoid both hypoxia and unnecessary hyperoxia.
- In critically ill patients, start high and then titrate down once stable.

Patient Preparation

- Explain the procedure and reason for oxygen. Position the patient comfortably (usually upright or semi-upright if tolerated). Clear nasal passages if using cannula. Assess baseline SpO_2, respiratory rate, work of breathing and colour.

Detailed Administration Procedure

- 1. Confirm prescription and target saturations.
- 2. Select appropriate device and set the prescribed flow rate / FiO_2.
- 3. Attach to oxygen source and check that oxygen is flowing.
- 4. Apply device correctly to the patient (cannula prongs curve backward into nostrils; mask covers nose and mouth).
- 5. Monitor SpO_2 and clinical status; adjust as needed to reach target.
- 6. Humidify if high flow or prolonged use (as per protocol).
- 7. Document start time, device, flow rate, SpO_2 response and patient comfort.

Monitoring

- Continuous or frequent SpO_2, respiratory rate, heart rate, work of breathing, mental status, skin colour. Blood gases when indicated.

Complications of Oxygen Therapy

- Absorption atelectasis, oxygen toxicity (high FiO_2 for prolonged periods), drying of mucosa, pressure sores from devices, fire hazard, CO_2 retention in susceptible patients (e.g. some COPD) if uncontrolled high-flow oxygen is given.

Special Considerations

- COPD / chronic hypercapnia: use controlled oxygen (Venturi 24–28%) and target SpO_2 88–92% unless otherwise directed.
- Home oxygen: education on safety (no smoking, distance from flames), cylinder handling and when to seek help.

• Transfer and emergencies: ensure adequate oxygen supply for the journey.

Documentation & Patient Education

• Record device, flow rate/FiO_2, target range, SpO_2 readings, time started/stopped and any adverse effects.

• Explain why oxygen is needed, how to wear the device, safety precautions (especially fire), and symptoms that require calling for help.

OSCE / OSPE Key Points – Oxygen Administration

• Correct device selection, accurate flow setting, proper application, continuous monitoring of SpO_2 and clinical response, patient comfort and education, clear documentation.

QUICK HIGH-YIELD REVISION POINTS

• Always follow the Rights of Medication Administration and check allergies.

• Dosage formula: (Desired ÷ Stock) × Volume/Stock quantity. Double-check high-alert drugs.

• Blood transfusion: two-person bedside identity check is mandatory; stay with the patient for the first 15 minutes.

• Any suspected transfusion reaction → STOP the transfusion, maintain IV access with saline, call for help, and manage according to the type of reaction.

• Oxygen is a drug – prescribe target saturations. Most patients 94–98%; at-risk of hypercapnia 88–92%.

• Nasal cannula 1–6 L/min; simple mask ≥5 L/min; non-rebreather 10–15 L/min; Venturi for controlled FiO_2.

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End of Notes – Review actively and practise calculations and OSCE stations.