NURSING PHARMACOLOGY · CLINICAL SKILLS · PATIENT SAFETY

A E T C M

100 Drugs & 100 Procedures

Every Nurse Must Know

Medications · Nursing Procedures · Rationale · Safety

One drug, one page — class, indications, dose, what to check before giving, adverse effects with the nursing action, when to hold and patient teaching. One procedure, one page — equipment, **step-by-step actions with rationale**, safety points and documentation.

► Open the quick menu — tap to jump ›



AETCM
Academy for Emergency, Trauma & Critical care Medicine

By

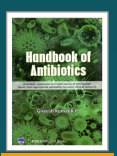
Dr. Gireesh Kumar K.P.

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Kochi, Kerala

For nursing students (GNM, B.Sc. & M.Sc. Nursing), staff nurses, ICU and emergency nurses

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Quick Menu

Drug classes, procedure domains, most-searched topics and reference tables — tap any button

PART 1 · 100 DRUGS

Cardiovascular & renal › | Anticoagulants & blood › | Respiratory & allergy › | Endocrine & hormones ›
Gastrointestinal › | Antimicrobials › | Psychiatric & neurological › | Analgesics & critical care ›
Obstetric drugs ›

PART 2 · 100 PROCEDURES

Assessment & vital signs › | Medication administration › | IV access & vascular care ›
Infection control & wounds › | Perioperative & assisting › | Respiratory & airway › | GI & nutrition ›
Genitourinary care › | Fluids & blood products › | Mobility, safety & skin › | Emergency & critical care ›

MOST-SEARCHED

Insulin › | Heparin › | Digoxin › | Adrenaline › | Noradrenaline › | Morphine ›
Magnesium sulfate › | Oxytocin › | Potassium & furosemide › | Paracetamol › | CPR ›
IV cannulation › | Blood transfusion › | NG tube › | Catheterisation › | Oxygen therapy ›
Suctioning › | Chest drain › | GCS › | 12-lead ECG › | PPE › | Pressure injury ›

REFERENCE

Drug calculations › | High-alert drugs & antidotes › | Normal values › | Abbreviations › | How to use ›
Preface › | Contents › | A–Z index › | Books by the author ›



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INTRODUCTION

How to use this book

100 Drugs & 100 Procedures Every Nurse Must Know — Dr. Gireesh Kumar K.P. · AETCM · First edition · November 2026

This book is written for nursing students (GNM, B.Sc. and M.Sc. Nursing), staff nurses, and nurses in wards, ICUs, operation theatres, labour rooms and emergency departments. It brings together the **100 medications** and the **100 procedures** that a nurse uses or meets almost every day, each on a single page.

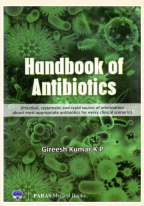
Part 1 groups the drugs into 9 classes; **Part 2** groups the procedures into 11 clinical domains. Every section opens with a one-page summary table. Indian generic names are used, with the international name in brackets where it differs (e.g. salbutamol / albuterol, paracetamol / acetaminophen).

On a drug page	On a procedure page
Class, overview and indications	Purpose and indications
Blue box — what to check before giving	Equipment list
Dose, route and administration (adult)	Numbered nursing actions with the rationale for each
Adverse effects with the nursing action	Risks and complications with prevention
Red box — hold the dose and inform the doctor if…	Gold box — what to document
Green box — patient and family teaching	Clinical pearl and free reference link
Clinical pearl and free label link (DailyMed, NFI)	Section summary and contents links

The rights of medication administration

Right patient (two identifiers) · right drug · right dose · right route · right time · right documentation · right reason · right response · right to refuse · right education. Check three times: when taking from storage, when preparing, and at the bedside.

Doses are typical adult doses for teaching. Always follow the prescription, the product label, your hospital policy and the guidance of the Indian Nursing Council. High-alert drugs need an independent double check.



ALSO BY THE AUTHOR · COMPANION BOOK

Handbook of Antibiotics

A practical, systematic and rapid source on choosing the right antibiotic for every clinical scenario (PARAS Medical Books). BUY NOW ›



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PREFACE

Preface

Why this book, and how I hope you will use it



Dr. Gireesh Kumar K.P.

Nurses are the last line of defence between a prescription and a patient. Every tablet handed over, every injection given and every infusion connected passes through a nurse's hands and a nurse's judgement. In our busy Indian hospitals — with high patient loads, many new graduates and night shifts with few senior staff — that judgement must be quick, safe and grounded in knowledge.

This book was written to support that moment. It lists the hundred medicines nurses meet most often and the hundred procedures they perform every day, and gives each one a single page: what to check before giving, what to watch for afterwards, when to hold the dose and call the doctor, what to teach the patient, and — for procedures — each step with its rationale and the risks to prevent.

The emphasis throughout is on patient safety: two identifiers before every intervention, independent double checks for high-alert drugs, asepsis, early recognition of deterioration and complete documentation. Reference tables at the end cover drug calculations, high-alert medications and antidotes, and normal values every nurse should know.

I thank the nursing teams of Amrita and the faculty and students of AETCM, whose questions shaped these pages, and the patients who trust us with their care. Suggestions from readers are always welcome.

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Kochi, Kerala · November 2026
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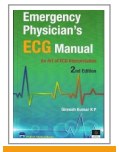
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Cardiovascular & Renal Drugs

Overview and one-page summary table

Antihypertensives, antiarrhythmics, vasopressors, nitrates, statins and diuretics are the most frequently given drugs in wards and ICUs. Most are given only after checking the pulse and blood pressure, and many are high-alert drugs when given intravenously.

#	Drug	Key point	Page
1	Lisinopril / Enalapril	ACE inhibitors block conversion of angiotensin I to angiotensin II, lowering blood pressure and afterload and protecti…	8
2	Losartan / Telmisartan	ARBs block the AT1 receptor directly	9
3	Metoprolol	Metoprolol slows heart rate, reduces myocardial oxygen demand and lowers BP	10
4	Amlodipine	Amlodipine relaxes arterial smooth muscle, lowering BP and relieving angina	11
5	Diltiazem	Diltiazem slows AV-node conduction and heart rate and dilates coronary arteries	12
6	Clonidine	Clonidine reduces sympathetic outflow from the brainstem, lowering BP and heart rate	13
7	Hydralazine	Hydralazine relaxes arteriolar smooth muscle	14
8	Digoxin	Digoxin inhibits Na+/K+-ATPase, increasing myocardial contractility and slowing AV conduction	15
9	Amiodarone	Amiodarone prolongs the action potential and refractory period	16
10	Adenosine	Adenosine causes transient AV-node block (half-life <10 seconds), terminating re-entrant supraventricular tachycardia …	17
11	Atropine	Atropine blocks vagal effects on the heart and secretions	18
12	Adrenaline (Epinephrine)	Adrenaline is the first drug in cardiac arrest and anaphylaxis	19
13	Noradrenaline (Norepinephrine)	Noradrenaline is the first-line vasopressor in septic shock, raising systemic vascular resistance and mean arterial pr…	20
14	Dopamine	Dopamine has dose-dependent effects: β1 inotropy at moderate doses and α vasoconstriction at high doses	21
15	Nitroglycerin (Glyceryl Trinitrate)	Nitrates release nitric oxide, dilating veins (reducing preload) and coronary arteries	22
16	Atorvastatin / Rosuvastatin	Statins lower LDL cholesterol and stabilise atherosclerotic plaques, reducing heart attack and stroke	23
17	Furosemide	Furosemide blocks the Na+/K+/2Cl− cotransporter in the loop of Henle, causing rapid diuresis	24
18	Spironolactone	Spironolactone blocks aldosterone in the collecting duct, causing sodium loss with potassium retention	25
19	Hydrochlorothiazide / Chlorthalidone	Thiazides block Na+/Cl− reabsorption in the distal tubule	26
20	Mannitol	Mannitol raises plasma osmolality, drawing water out of brain tissue	27

Tap a name or page number to open its full page.



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DRUG 1 · CARDIOVASCULAR & RENAL DRUGS

Lisinopril / Enalapril

ACE inhibitor (angiotensin-converting enzyme inhibitor)

Overview. ACE inhibitors block conversion of angiotensin I to angiotensin II, lowering blood pressure and afterload and protecting the kidneys in diabetes. Enalapril and ramipril are widely used in India.

Indications

- Hypertension
- Heart failure (HFrEF)
- After myocardial infarction
- Diabetic nephropathy, proteinuria

Check before giving

- BP and pulse
- Serum potassium and creatinine (baseline and 1–2 weeks after starting)
- Pregnancy status — contraindicated
- History of angioedema

Dose and administration	Detail
Lisinopril oral	5–40 mg once daily
Enalapril oral	2.5–20 mg once or twice daily
Ramipril oral	1.25–10 mg once daily
First dose	Give at bedtime; patient lying down (first-dose hypotension)

Adverse effect / risk	Nursing action
Dry persistent cough (10–15%)	Report; doctor may switch to an ARB
Angioedema (lips, tongue, airway swelling)	Emergency — stop drug, maintain airway, call rapid response; never restart
Hyperkalaemia	Check K^+; avoid K^+ supplements and salt substitutes
First-dose hypotension, dizziness	Rise slowly; fall precautions
Rise in creatinine	Report rise >30%; hold in AKI or dehydration

Hold the dose and inform the doctor if

- SBP <90 mmHg or symptomatic hypotension
- K^+ >5.5 mmol/L
- Creatinine rising, vomiting/diarrhoea (sick-day rule)
- Any facial or tongue swelling
- Pregnancy

Patient and family teaching

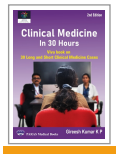
- Take at the same time daily
- Report cough, swelling of face or lips immediately
- Avoid salt substitutes (contain K^+)
- Stand up slowly

Clinical pearls

Angioedema can occur even after years of uneventful use. ACE inhibitors are teratogenic — stop as soon as pregnancy is confirmed.

Further reading — tap to open (free) ► DailyMed label: Lisinopril · National Formulary of India (IPC)

Section: Cardiovascular & Renal Drugs · Summary table on page 7 · Contents



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DRUG 2 · CARDIOVASCULAR & RENAL DRUGS

Losartan / Telmisartan

Angiotensin II receptor blocker (ARB)

Overview. ARBs block the AT1 receptor directly. They have the same benefits as ACE inhibitors without the bradykinin-mediated cough; telmisartan is the most prescribed ARB in India.

Indications

- Hypertension
- Heart failure when ACE inhibitor causes cough
- Diabetic kidney disease
- Stroke prevention

Check before giving

- BP
- Potassium and creatinine
- Pregnancy — contraindicated
- Do not combine with an ACE inhibitor

Dose and administration	Detail
Losartan oral	25–100 mg once daily
Telmisartan oral	20–80 mg once daily
Combinations	Often with amlodipine or hydrochlorothiazide (fixed-dose)

Adverse effect / risk	Nursing action
Hypotension, dizziness	Check BP before each dose; fall precautions
Hyperkalaemia	Monitor K^+; avoid potassium-sparing diuretics unless prescribed
Renal impairment	Monitor creatinine and urine output
Angioedema (rare)	Stop, airway management

Hold the dose and inform the doctor if

- SBP <90 mmHg
- K^+ >5.5 mmol/L
- Acute kidney injury or dehydration
- Pregnancy

Patient and family teaching

- Take daily even when feeling well
- Avoid NSAIDs (reduce effect, harm kidneys)
- Check BP at home
- Inform doctor if pregnant

Clinical pearls

An ARB is the usual switch for a patient who develops an ACE-inhibitor cough — but not after ACE-inhibitor angioedema without specialist advice.

Further reading — tap to open (free) ► DailyMed label: Losartan · National Formulary of India (IPC)

Section: Cardiovascular & Renal Drugs · Summary table on page 7 · Contents

Handbook of Antibiotics
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DRUG 3 · CARDIOVASCULAR & RENAL DRUGS

Metoprolol

Beta-1 selective adrenergic blocker

Overview. Metoprolol slows heart rate, reduces myocardial oxygen demand and lowers BP. It is used in angina, after MI, heart failure (succinate), atrial fibrillation rate control and thyrotoxicosis.

Indications

- Hypertension
- Angina, after MI
- Heart failure (metoprolol succinate)
- Rate control in atrial fibrillation/flutter

Check before giving

- **Apical pulse for 1 minute and BP before every dose**
- ECG for heart block
- Asthma/COPD history
- Blood glucose in diabetics (masks hypoglycaemia)

Dose and administration	Detail
Oral tartrate	25–100 mg twice daily
Oral succinate (extended release)	12.5–200 mg once daily — do not crush
IV	5 mg slow IV over 1–2 min, repeat every 5 min to max 15 mg (with ECG monitoring)

Adverse effect / risk	Nursing action
Bradycardia, heart block	Hold dose; ECG; atropine if symptomatic
Hypotension	Hold; lie flat; inform
Bronchospasm	Stop; salbutamol nebulisation
Masked hypoglycaemia	Monitor glucose (sweating persists, tremor/tachycardia masked)
Fatigue, cold extremities, depression	Reassure, report

Hold the dose and inform the doctor if

- Heart rate <60/min
- SBP <90 mmHg
- New heart block or wheeze
- Signs of acute heart failure

Patient and family teaching

- Check pulse before taking; skip and call if <60
- Never stop suddenly (rebound angina, MI)
- Rise slowly
- Diabetics: check sugar — palpitations may not warn of hypoglycaemia

Clinical pearls

Abrupt withdrawal of a beta-blocker can precipitate unstable angina or MI — taper over 1–2 weeks. Overdose antidote: glucagon.

Further reading — tap to open (free) ▶ DailyMed label: Metoprolol · National Formulary of India (IPC)

Section: Cardiovascular & Renal Drugs · Summary table on page 7 · Contents

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DRUG 4 · CARDIOVASCULAR & RENAL DRUGS

Amlodipine

Dihydropyridine calcium channel blocker

Overview. Amlodipine relaxes arterial smooth muscle, lowering BP and relieving angina. It is long-acting, once daily and the most commonly prescribed antihypertensive in India.

Indications

- Hypertension
- Chronic stable and vasospastic angina
- Raynaud phenomenon

Check before giving

- BP and heart rate
- Pedal oedema at baseline
- Liver disease (reduce dose)

Dose and administration	Detail
Oral	2.5–10 mg once daily
Elderly or liver disease	Start 2.5 mg
Combinations	With telmisartan, atenolol, metoprolol

Adverse effect / risk	Nursing action
Peripheral (ankle) oedema	Not due to fluid overload — elevate legs; report if severe
Headache, flushing	Usually settle in 1–2 weeks
Dizziness, hypotension	Fall precautions
Gingival hyperplasia	Oral hygiene; dental review
Reflex tachycardia	Monitor pulse

Hold the dose and inform the doctor if

- SBP <90 mmHg
- Severe oedema or new breathlessness
- Chest pain worsening

Patient and family teaching

- Take same time daily
- Ankle swelling is common — report if painful or with breathlessness
- Brush and floss well
- Avoid grapefruit juice in large amounts

Clinical pearls

Ankle oedema from amlodipine does not respond to diuretics; it lessens with dose reduction or adding an ACE inhibitor/ARB.

Further reading — tap to open (free) ► DailyMed label: Amlodipine · National Formulary of India (IPC)

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DRUG 5 · CARDIOVASCULAR & RENAL DRUGS

Diltiazem

Non-dihydropyridine calcium channel blocker; class IV antiarrhythmic

Overview. Diltiazem slows AV-node conduction and heart rate and dilates coronary arteries. IV diltiazem is used for rapid rate control in atrial fibrillation or flutter.

Indications

- Rate control in atrial fibrillation/flutter
- Supraventricular tachycardia
- Angina
- Hypertension

Check before giving

- Apical pulse, BP, continuous ECG for IV use
- Heart failure (avoid in reduced EF)
- Concurrent beta-blocker (risk of block)
- Pre-excitation (WPW) — avoid

Dose and administration	Detail
IV bolus	0.25 mg/kg (≈15–20 mg) over 2 min; repeat 0.35 mg/kg after 15 min if needed
IV infusion	5–15 mg/h
Oral	30–90 mg 3–4 times daily or SR 120–360 mg once daily

Adverse effect / risk	Nursing action
Bradycardia, AV block	Stop infusion; atropine; pacing if needed
Hypotension	Lie flat, fluids; calcium gluconate for severe toxicity
Heart failure worsening	Assess lungs, oedema; report
Constipation, oedema	Fluids, fibre

Hold the dose and inform the doctor if

- HR <60/min or new heart block
- SBP <90 mmHg
- Breathlessness, crackles
- QRS widening

Patient and family teaching

- Do not crush SR tablets
- Report dizziness, fainting, swelling
- Check pulse daily
- Avoid grapefruit

Clinical pearls

IV diltiazem must be given with continuous ECG and BP monitoring. Calcium gluconate is the first antidote for calcium-channel-blocker toxicity.

Further reading — tap to open (free) ► DailyMed label: Diltiazem · National Formulary of India (IPC)

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DRUG 6 · CARDIOVASCULAR & RENAL DRUGS

Clonidine

Central alpha-2 adrenergic agonist

Overview. Clonidine reduces sympathetic outflow from the brainstem, lowering BP and heart rate. It is also used for opioid/alcohol withdrawal and as an ICU sedation adjunct.

Indications

- Resistant hypertension
- Hypertensive urgency
- Opioid and alcohol withdrawal
- ADHD, sedation adjunct

Check before giving

- BP and pulse
- Mental status, sedation
- Adherence — risk of rebound if doses missed

Dose and administration	Detail
Oral	0.1 mg twice daily, up to 0.6 mg/day in divided doses
Transdermal patch	Weekly
IV	150–300 µg slowly (specialist)

Adverse effect / risk	Nursing action
Rebound hypertension on abrupt stop	Taper over 2–4 days; never stop suddenly
Sedation, dry mouth	Avoid driving; sips of water
Bradycardia, hypotension	Hold; report
Depression	Monitor mood

Hold the dose and inform the doctor if

- SBP <100 mmHg or HR <55/min
- Excess sedation
- Missed doses with BP surge

Patient and family teaching

- Never stop suddenly
- Rise slowly
- Avoid alcohol and sedatives
- Patch: rotate sites; remove old patch

Clinical pearls

Severe rebound hypertension (headache, agitation, tachycardia) occurs 18–36 hours after abrupt withdrawal — especially if on a beta-blocker too.

Further reading — tap to open (free) ► DailyMed label: Clonidine · National Formulary of India (IPC)

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DRUG 7 · CARDIOVASCULAR & RENAL DRUGS

Hydralazine

Direct arteriolar vasodilator

Overview. Hydralazine relaxes arteriolar smooth muscle. It remains an important drug for severe hypertension in pregnancy (pre-eclampsia) and, with nitrates, in heart failure.

Indications

- Severe hypertension in pregnancy/pre-eclampsia
- Heart failure (with isosorbide dinitrate)
- Resistant hypertension

Check before giving

- BP every 5–15 min after IV dose
- Heart rate (reflex tachycardia)
- Fetal heart rate in pregnancy
- Angina history

Dose and administration	Detail
IV (pre-eclampsia)	5 mg slow IV, repeat 5–10 mg every 20–30 min to max 20–30 mg
Oral	25–100 mg two to four times daily

Adverse effect / risk	Nursing action
Reflex tachycardia, palpitations	Monitor; often given with a beta-blocker (outside pregnancy)
Hypotension	Target gradual fall; lie on left side in pregnancy
Headache, flushing	Analgesia
Drug-induced lupus (long-term)	Report joint pain, fever, rash
Fluid retention	Daily weight

Hold the dose and inform the doctor if

- SBP <140 in pre-eclampsia (avoid overshoot)
- HR >120/min
- Fetal distress

Patient and family teaching

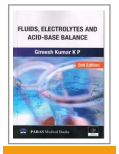
- Report joint pain, fever, rash
- Take with food (oral)
- Rise slowly

Clinical pearls

In pre-eclampsia aim to reduce BP gradually to about 140–150/90–100 mmHg; an abrupt fall reduces placental blood flow.

Further reading — tap to open (free) ► DailyMed label: Hydralazine · National Formulary of India (IPC)

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DRUG 8 · CARDIOVASCULAR & RENAL DRUGS

Digoxin

Cardiac glycoside — positive inotrope, AV-nodal blocker

Overview. Digoxin inhibits Na^+/K^+-ATPase, increasing myocardial contractility and slowing AV conduction. It has a narrow therapeutic index (0.5–2.0 ng/mL; aim 0.5–0.9 in heart failure).

Indications

- Rate control in atrial fibrillation
- Heart failure with reduced ejection fraction

Check before giving

- **Apical pulse for a full minute**
- Serum potassium (hypokalaemia ↑ toxicity), magnesium, creatinine
- Digoxin level if toxicity suspected
- ECG

Dose and administration	Detail
Oral maintenance	0.0625–0.25 mg once daily (lower in elderly and renal failure)
IV loading	0.25–0.5 mg slow IV, then 0.25 mg 4–6 hourly to ~1 mg (AF)
Levels	Draw ≥6 h after the dose

Adverse effect / risk	Nursing action
Toxicity — nausea, vomiting, anorexia	Hold; check level and K^+
Visual disturbance (yellow-green halos, blurred)	Hold; report
Bradycardia, heart block, any arrhythmia	ECG; hold
Hypokalaemia (with diuretics)	Correct K^+
Severe toxicity	Digoxin-specific antibody (Fab)

Hold the dose and inform the doctor if

- **Apical pulse <60/min** (adult; <70 child, <90 infant)
- New nausea, visual changes or irregular pulse
- K^+ <3.5 mmol/L
- Rising creatinine

Patient and family teaching

- Check pulse daily
- Report loss of appetite, nausea, visual changes
- Do not double a missed dose
- Eat potassium-rich foods if on diuretics

Clinical pearls

Hypokalaemia, hypomagnesaemia, hypercalcaemia, renal failure, old age and amiodarone/verapamil all increase digoxin toxicity.

Further reading — tap to open (free) ▶ DailyMed label: Digoxin · National Formulary of India (IPC)

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CBME-BASED INTERNAL MEDICINE
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DRUG 9 · CARDIOVASCULAR & RENAL DRUGS

Amiodarone

Class III antiarrhythmic (also class I, II, IV actions)

Overview. Amiodarone prolongs the action potential and refractory period. It is used for ventricular and atrial arrhythmias and in cardiac arrest (shock-refractory VF/pulseless VT).

Indications

- Shock-refractory VF/pulseless VT in cardiac arrest
- Haemodynamically stable VT
- Atrial fibrillation (rhythm control)

Check before giving

- ECG (QT), BP, pulse
- Baseline thyroid function, LFT, chest X-ray
- Use central line or large vein for infusions; check site
- Drug interactions (warfarin, digoxin)

Dose and administration	Detail
Cardiac arrest	300 mg IV bolus after 3rd shock, then 150 mg after 5th
Stable VT/AF	150 mg (or 5 mg/kg) IV over 20–60 min, then 900 mg/24 h infusion
Diluent	Glucose 5% only (not saline)
Oral	200 mg TDS ×1 week → BD ×1 week → 100–200 mg OD

Adverse effect / risk	Nursing action
Hypotension, bradycardia (IV)	Slow infusion; monitor
Phlebitis	Large/central vein; inline filter; check site hourly
QT prolongation, torsades	ECG; correct K^+, Mg^{2+}
Thyroid (hypo/hyper), pulmonary fibrosis, liver injury	Periodic TFT, LFT, CXR; report cough, breathlessness
Photosensitivity, blue-grey skin, corneal deposits	Sunscreen; eye checks

Hold the dose and inform the doctor if

- HR <50/min or heart block
- QTc >500 ms
- SBP <90 mmHg
- New cough/breathlessness on long-term therapy

Patient and family teaching

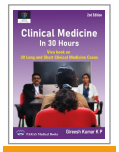
- Use sunscreen and cover skin
- Report cough, breathlessness, vision change
- Regular blood tests (thyroid, liver)
- Avoid grapefruit

Clinical pearls

Amiodarone raises warfarin and digoxin levels — the doses usually need reducing. Infuse in glucose 5% using a non-PVC set if long infusions.

Further reading — tap to open (free) ► DailyMed label: Amiodarone · National Formulary of India (IPC)

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Adenosine

Purine nucleoside antiarrhythmic

Overview. Adenosine causes transient AV-node block (half-life <10 seconds), terminating re-entrant supraventricular tachycardia and revealing atrial flutter.

Indications

- Regular narrow-complex SVT (AVNRT, AVRT)
- Diagnostic aid in regular broad-complex tachycardia of uncertain origin

Check before giving

- Continuous ECG recording during injection
- Large proximal vein (antecubital)
- Asthma — relative contraindication
- Resuscitation equipment ready

Dose and administration	Detail
Rapid IV	6 mg as a rapid push followed immediately by 20 mL saline flush
If no response	12 mg after 1–2 min; a further 12–18 mg may be given
Technique	Two-syringe or three-way tap; raise the arm

Adverse effect / risk	Nursing action
Brief asystole/pause, flushing, chest tightness, sense of doom	Warn patient beforehand — lasts seconds
Bronchospasm	Avoid in severe asthma; salbutamol
Atrial fibrillation	Monitor rhythm
Reduced effect with theophylline/caffeine; increased with dipyridamole/carbamazepine	Inform doctor

Hold the dose and inform the doctor if

- Severe asthma
- Second/third-degree heart block or sick sinus
- Pre-excited AF (WPW)

Patient and family teaching

- Explain the brief unpleasant sensation before injection
- Report breathlessness

Clinical pearls

Give through a large vein as close to the heart as possible — a slow push is broken down before reaching the heart and fails.

Further reading — tap to open (free) ► DailyMed label: Adenosine · National Formulary of India (IPC)

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Atropine

Antimuscarinic (anticholinergic)

Overview. Atropine blocks vagal effects on the heart and secretions. It treats symptomatic bradycardia and is the key antidote in organophosphate poisoning — common in India.

Indications

- Symptomatic bradycardia
- Organophosphate/carbamate poisoning
- Pre-anaesthetic drying of secretions
- Reversal of neostigmine (with it)

Check before giving

- HR, BP, ECG
- Pupils, chest secretions, skin (in poisoning)
- Glaucoma, urinary retention, prostatism

Dose and administration	Detail
Bradycardia	0.5–1 mg IV every 3–5 min, maximum 3 mg
Organophosphate poisoning	1.8–3 mg IV bolus, double every 5 min until atropinised; then infusion 10–20% of loading dose per hour
Pre-medication	0.3–0.6 mg IM/IV

Adverse effect / risk	Nursing action
Tachycardia, palpitations	Monitor ECG
Dry mouth, urinary retention	Bladder scan, catheter if needed
Atropine toxicity — delirium, hyperthermia, absent bowel sounds	Reduce/stop infusion; cool; report
Blurred vision, dilated pupils	Reassure; protect eyes

Hold the dose and inform the doctor if

- HR >120/min (in OP poisoning re-evaluate dose)
- Agitation, delirium, temperature >38.5 °C
- Urinary retention

Patient and family teaching

- Expect dry mouth and blurred vision
- Avoid heat exposure (cannot sweat)

Clinical pearls

Atropinisation endpoints in OP poisoning: clear chest, HR >80, SBP >80, dry axillae, pupils no longer pinpoint — not pupil size alone.

Further reading — tap to open (free) ► DailyMed label: Atropine · National Formulary of India (IPC)

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DRUG 12 · CARDIOVASCULAR & RENAL DRUGS

Adrenaline (Epinephrine)

Catecholamine — alpha and beta adrenergic agonist; vasopressor

Overview. Adrenaline is the first drug in cardiac arrest and anaphylaxis. Concentrations (1:1,000 = 1 mg/mL; 1:10,000 = 0.1 mg/mL) differ — confusion causes fatal errors.

Indications

- Cardiac arrest
- Anaphylaxis
- Severe asthma (selected)
- Shock (infusion), bradycardia

Check before giving

- Read the ampoule strength aloud and double-check
- Route: IM for anaphylaxis, IV for arrest
- Continuous ECG and BP for infusions; central line preferred

Dose and administration	Detail
Cardiac arrest	1 mg IV/IO (10 mL of 1:10,000) every 3–5 min
Anaphylaxis	0.5 mg IM (0.5 mL of 1:1,000) anterolateral thigh; repeat after 5 min
Infusion	0.05–0.5 µg/kg/min via central line
Child anaphylaxis	0.01 mg/kg IM (max 0.5 mg)

Adverse effect / risk	Nursing action
Tachycardia, arrhythmias, angina	ECG; report
Severe hypertension, stroke (IV bolus in non-arrest)	Never give 1:1,000 IV
Tissue necrosis on extravasation	Central line; phentolamine infiltration
Hyperglycaemia, hypokalaemia, lactate rise	Monitor

Hold the dose and inform the doctor if

- Chest pain or new arrhythmia (non-arrest)
- Extravasation
- SBP >180 on infusion

Patient and family teaching

- Anaphylaxis patients: carry auto-injector, use into outer thigh, then go to hospital
- Recognise allergy symptoms early

Clinical pearls

In anaphylaxis, IM adrenaline in the thigh is the single most important treatment — antihistamines and steroids are secondary.

Further reading — tap to open (free) ► DailyMed label: Adrenaline · National Formulary of India (IPC)

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DRUG 13 · CARDIOVASCULAR & RENAL DRUGS

Noradrenaline (Norepinephrine)

Catecholamine vasopressor — mainly alpha-1 agonist

Overview. Noradrenaline is the first-line vasopressor in septic shock, raising systemic vascular resistance and mean arterial pressure. It is a high-alert drug given by infusion pump.

Indications

- Septic shock (first-line)
- Vasodilatory/distributive shock
- Hypotension after adequate fluid resuscitation

Check before giving

- Central venous line (peripheral large vein short-term only)
- Arterial line or BP every 5–15 min
- Fluid status, urine output, lactate
- Infusion concentration double-checked

Dose and administration	Detail
Dilution	e.g. 4 mg in 50 mL glucose 5% or saline (80 µg/mL)
Dose	0.05–1 µg/kg/min (≈2–20 µg/min), titrate to MAP ≥65 mmHg
Administration	Dedicated lumen; never flush the line; syringe changeover technique

Adverse effect / risk	Nursing action
Extravasation — tissue necrosis	Stop; aspirate; phentolamine 5–10 mg in 10 mL saline infiltrated
Peripheral ischaemia (cold, mottled digits)	Assess perfusion hourly
Arrhythmias, hypertension	Titrate down; ECG
Reduced gut/renal perfusion	Urine output, lactate

Hold the dose and inform the doctor if

- MAP >90 or <65 despite titration (inform for escalation)
- Mottled/cold extremities
- Pallor or swelling at the line site

Patient and family teaching

- Explain to family the need for close monitoring

Clinical pearls

Never interrupt or bolus a vasopressor line — flushing delivers a dangerous bolus; use a dedicated lumen and prepare the next syringe before the current one ends.

Further reading — tap to open (free) ▶ DailyMed label: Noradrenaline · National Formulary of India (IPC)

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DRUG 14 · CARDIOVASCULAR & RENAL DRUGS

Dopamine

Catecholamine — dose-dependent dopaminergic, beta and alpha agonist

Overview. Dopamine has dose-dependent effects: β1 inotropy at moderate doses and α vasoconstriction at high doses. It has been largely replaced by noradrenaline in shock but is still used in some Indian units.

Indications

- Cardiogenic shock and hypotension (when noradrenaline unavailable)
- Symptomatic bradycardia (second-line)

Check before giving

- Central line preferred
- Continuous ECG (arrhythmias)
- BP, urine output
- Correct hypovolaemia first

Dose and administration	Detail
Dilution	200 mg in 50 mL (4,000 µg/mL)
Inotropic	5–10 µg/kg/min
Vasopressor	10–20 µg/kg/min
Bradycardia	2–10 µg/kg/min

Adverse effect / risk	Nursing action
Tachyarrhythmias	ECG; reduce dose; report
Extravasation necrosis	Phentolamine infiltration
Nausea, headache	Monitor
Ischaemia of extremities	Assess hourly

Hold the dose and inform the doctor if

- HR >130/min or new arrhythmia
- Signs of extravasation
- Cold, pale extremities

Patient and family teaching

- Explain monitoring to family

Clinical pearls

"Renal-dose" dopamine does not protect the kidneys and is no longer recommended.

Further reading — tap to open (free) ► DailyMed label: Dopamine · National Formulary of India (IPC)

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DRUG 15 · CARDIOVASCULAR & RENAL DRUGS

Nitroglycerin (Glyceryl Trinitrate)

Organic nitrate — venodilator/antianginal

Overview. Nitrates release nitric oxide, dilating veins (reducing preload) and coronary arteries. Sublingual GTN relieves angina within 1–3 minutes; IV GTN treats acute heart failure and hypertensive emergencies.

Indications

- Acute angina, acute coronary syndrome
- Acute pulmonary oedema
- Hypertensive emergency

Check before giving

- BP (SBP must be >90 mmHg)
- PDE-5 inhibitor (sildenafil, tadalafil) in past 24–48 h — contraindicated
- Right ventricular infarction (avoid)
- Headache history

Dose and administration	Detail
Sublingual	0.4–0.5 mg tablet or spray every 5 min, maximum 3 doses
IV infusion	50 mg in 50 mL; start 5–10 µg/min, titrate every 3–5 min (glass/non-PVC set)
Transdermal/oral (isosorbide)	For prophylaxis; nitrate-free interval 8–12 h

Adverse effect / risk	Nursing action
Headache (very common)	Paracetamol; reassure
Hypotension, dizziness, syncope	Patient sits/lies; check BP before each dose
Reflex tachycardia	Monitor
Tolerance	Ensure nitrate-free interval

Hold the dose and inform the doctor if

- SBP <90 mmHg or fall >30 mmHg
- Sildenafil/tadalafil taken recently
- Chest pain not relieved after 3 doses → emergency (ACS)

Patient and family teaching

- Sit before taking; keep tablets in original dark glass bottle
- Call emergency if pain persists after 3 doses (15 min)
- Never take with sildenafil-type drugs

Clinical pearls

If chest pain persists 5 minutes after the first sublingual dose, call for emergency help — do not wait for the third dose.

Further reading — tap to open (free) ► DailyMed label: Nitroglycerin · National Formulary of India (IPC)

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DRUG 16 · CARDIOVASCULAR & RENAL DRUGS

Atorvastatin / Rosuvastatin

HMG-CoA reductase inhibitor (statin)

Overview. Statins lower LDL cholesterol and stabilise atherosclerotic plaques, reducing heart attack and stroke. High-intensity statins are given after ACS and ischaemic stroke.

Indications

- Dyslipidaemia
- Secondary prevention after MI, stroke
- Primary prevention in diabetes and high risk

Check before giving

- Baseline lipid profile, LFT
- Muscle pain history; CK if symptomatic
- Interacting drugs (clarithromycin, azole antifungals)
- Pregnancy — contraindicated

Dose and administration	Detail
Atorvastatin	10–80 mg once daily (80 mg after ACS)
Rosuvastatin	5–40 mg once daily
Timing	Any time for atorvastatin/rosuvastatin; evening for simvastatin

Adverse effect / risk	Nursing action
Myalgia, myopathy	Report unexplained muscle pain/weakness; check CK
Rhabdomyolysis (rare)	Dark urine, weakness — stop, CK, renal function
Raised transaminases	LFT if symptomatic
New-onset diabetes (small risk)	Glucose monitoring

Hold the dose and inform the doctor if

- Severe muscle pain, weakness or dark urine
- Jaundice
- Pregnancy

Patient and family teaching

- Report muscle pain or dark urine
- Continue diet and exercise
- Avoid large amounts of grapefruit juice
- Do not take in pregnancy

Clinical pearls

Muscle pain is common and usually benign, but pain with dark urine means rhabdomyolysis — stop the drug and check CK and creatinine.

Further reading — tap to open (free) ► DailyMed label: Atorvastatin · National Formulary of India (IPC)

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DRUG 17 · CARDIOVASCULAR & RENAL DRUGS

Furosemide

Loop diuretic

Overview. Furosemide blocks the $Na^+/K^+/2Cl^-$ cotransporter in the loop of Henle, causing rapid diuresis. IV furosemide acts within 5 minutes and is the mainstay of acute pulmonary oedema treatment.

Indications

- Acute pulmonary oedema, heart failure
- Oedema of renal or liver disease
- Hypertension with renal impairment
- Hypercalcaemia (with fluids)

Check before giving

- BP, weight, intake–output
- Serum K^+, Na^+, Mg^{2+}, creatinine
- Hearing (high doses)
- Sulfonamide allergy (caution)

Dose and administration	Detail
IV	20–80 mg slowly (≤4 mg/min to prevent ototoxicity); repeat as needed
Infusion	5–40 mg/h
Oral	20–80 mg once or twice daily (morning)

Adverse effect / risk	Nursing action
Hypokalaemia (cramps, weakness, arrhythmia)	Check K^+; supplement; K^+-rich diet
Dehydration, hypotension	Monitor BP, urine output, skin turgor; daily weight
Ototoxicity (tinnitus, deafness)	Give IV slowly; avoid with aminoglycosides
Hyponatraemia, hypomagnesaemia, hyperuricaemia (gout), hyperglycaemia	Monitor electrolytes, glucose

Hold the dose and inform the doctor if

- K^+ <3.5 mmol/L
- SBP <90 mmHg or signs of dehydration
- Anuria not responding
- Tinnitus or hearing loss

Patient and family teaching

- Take in the morning (avoid nocturia)
- Weigh daily; report gain >1 kg/day or 2 kg/week
- Eat bananas, coconut water (unless K^+ restricted)
- Rise slowly

Clinical pearls

Daily weight is the best bedside measure of fluid balance — 1 kg weight ≈ 1 litre of fluid.

Further reading — tap to open (free) ► DailyMed label: Furosemide · National Formulary of India (IPC)

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DRUG 18 · CARDIOVASCULAR & RENAL DRUGS

Spironolactone

Potassium-sparing diuretic; aldosterone antagonist

Overview. Spironolactone blocks aldosterone in the collecting duct, causing sodium loss with potassium retention. It reduces mortality in heart failure and is first-line for cirrhotic ascites.

Indications

- Ascites in cirrhosis
- Heart failure (HFrEF)
- Resistant hypertension, primary hyperaldosteronism
- Nephrotic oedema

Check before giving

- Serum K^+ and creatinine before and during therapy
- Concurrent ACE inhibitor/ARB, K^+ supplements
- Renal function

Dose and administration	Detail
Oral	25–50 mg daily (heart failure); 100–400 mg daily (ascites, with furosemide 40:100 ratio)
Timing	Morning, with food

Adverse effect / risk	Nursing action
Hyperkalaemia	Check K^+; avoid salt substitutes and K^+ supplements; ECG if high
Gynaecomastia, breast pain, menstrual irregularity	Report; eplerenone alternative
Hyponatraemia, dehydration	Monitor sodium, weight
Renal impairment	Creatinine monitoring

Hold the dose and inform the doctor if

- K^+ >5.0–5.5 mmol/L
- Rising creatinine
- Severe hyponatraemia (Na^+ <125)

Patient and family teaching

- Avoid salt substitutes and high-potassium supplements
- Report breast tenderness
- Weigh daily (ascites)

Clinical pearls

Spironolactone plus an ACE inhibitor in an elderly patient with CKD is a classic recipe for life-threatening hyperkalaemia.

Further reading — tap to open (free) ► DailyMed label: Spironolactone · National Formulary of India (IPC)

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Hydrochlorothiazide / Chlorthalidone

Thiazide and thiazide-like diuretics

Overview. Thiazides block Na^+/Cl^- reabsorption in the distal tubule. They are effective, cheap first-line antihypertensives, often combined with an ARB or ACE inhibitor.

Indications

- Hypertension
- Mild oedema
- Recurrent calcium kidney stones
- Nephrogenic diabetes insipidus

Check before giving

- BP
- Na^+, K^+, glucose, uric acid
- Gout history
- Sulfonamide allergy

Dose and administration	Detail
Hydrochlorothiazide	12.5–25 mg once daily (morning)
Chlorthalidone	12.5–25 mg once daily
Indapamide	1.5–2.5 mg once daily

Adverse effect / risk	Nursing action
Hypokalaemia, hyponatraemia (especially elderly women)	Check electrolytes at 2–4 weeks
Hyperuricaemia, gout	Report joint pain
Hyperglycaemia, dyslipidaemia	Monitor glucose
Photosensitivity	Sun protection

Hold the dose and inform the doctor if

- Na^+ <130 mmol/L or confusion
- K^+ <3.5 mmol/L
- Acute gout

Patient and family teaching

- Take in the morning
- Report muscle cramps, weakness, confusion
- Use sunscreen

Clinical pearls

Thiazide-induced hyponatraemia is a common cause of confusion and falls in older women — check sodium in any elderly patient on a thiazide who becomes unwell.

Further reading — tap to open (free) ► DailyMed label: Hydrochlorothiazide · National Formulary of India (IPC)

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DRUG 20 · CARDIOVASCULAR & RENAL DRUGS

Mannitol

Osmotic diuretic

Overview. Mannitol raises plasma osmolality, drawing water out of brain tissue. It is used to reduce raised intracranial pressure and intraocular pressure.

Indications

- Raised intracranial pressure (head injury, cerebral oedema)
- Acute angle-closure glaucoma
- Rhabdomyolysis (selected)

Check before giving

- Inspect bottle for crystals — warm to dissolve; use an **in-line filter**
- Serum osmolality, Na^+, creatinine
- Urinary catheter for output
- Heart failure — risk of pulmonary oedema

Dose and administration	Detail
IV (20% solution)	0.25–1 g/kg over 15–30 min (e.g. 100 mL of 20% = 20 g)
Repeat	Every 4–6 h as needed
Limit	Stop if serum osmolality >320 mOsm/kg

Adverse effect / risk	Nursing action
Fluid and electrolyte imbalance	Strict intake–output; electrolytes 6-hourly
Pulmonary oedema (initial volume expansion)	Watch breathing, crackles
Acute kidney injury	Monitor creatinine, osmolar gap
Extravasation	Large vein; check site
Rebound raised ICP	Avoid prolonged use

Hold the dose and inform the doctor if

- Serum osmolality >320 or Na^+ >155
- Urine output <30 mL/h
- New crackles or breathlessness

Patient and family teaching

- Explain catheter and frequent observations to family

Clinical pearls

Mannitol crystallises at low temperatures — never infuse a bottle with crystals; warm it and always use a filter set.

Further reading — tap to open (free) ► DailyMed label: Mannitol · National Formulary of India (IPC)

Section: Cardiovascular & Renal Drugs · Summary table on page 7 · Contents



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Anticoagulants & Blood Modifiers

Overview and one-page summary table

Anticoagulants are among the drugs most often involved in serious medication errors. Know the monitoring test, the antidote and the bleeding signs for each — and double-check every heparin and insulin dose.

#	Drug	Key point	Page
21	Warfarin	Warfarin blocks synthesis of clotting factors II, VII, IX and X	29
22	Heparin (Unfractionated)	Heparin potentiates antithrombin, inactivating thrombin and factor Xa	30
23	Enoxaparin	Enoxaparin mainly inhibits factor Xa	31
24	Rivaroxaban / Apixaban	DOACs directly inhibit factor Xa	32
25	Clopidogrel	Clopidogrel irreversibly blocks platelet ADP receptors	33
26	Aspirin (Acetylsalicylic acid)	Low-dose aspirin irreversibly inhibits platelet thromboxane for the life of the platelet (7–10 days)	34
27	Alteplase / Tenecteplase	Thrombolytics convert plasminogen to plasmin, dissolving fibrin clots	35
28	Erythropoietin (Epoetin alfa)	Recombinant erythropoietin stimulates red-cell production	36
29	Ferrous Sulfate / Iron Preparations	Iron deficiency anaemia is the commonest anaemia in India, especially in women and children	37

Tap a name or page number to open its full page.

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DRUG 21 · ANTICOAGULANTS & BLOOD MODIFIERS

Warfarin

Vitamin K antagonist — oral anticoagulant

Overview. Warfarin blocks synthesis of clotting factors II, VII, IX and X. Its effect takes 3–5 days and is monitored by the INR; it has many food and drug interactions.

Indications

- Mechanical heart valves
- Atrial fibrillation
- DVT/PE treatment and prevention
- Rheumatic mitral stenosis with AF (common in India)

Check before giving

- INR before each dose change
- Bleeding signs, Hb
- Interacting drugs (antibiotics, amiodarone, NSAIDs)
- Pregnancy — teratogenic

Dose and administration	Detail
Oral	2–10 mg once daily in the evening, adjusted to INR
Target INR	2.0–3.0 (most); 2.5–3.5 for mechanical mitral valve
Monitoring	INR daily until stable, then 2–4 weekly

Adverse effect / risk	Nursing action
Bleeding (gums, urine, stool, bruising)	Check INR; report; pressure on sites
INR >4.5 without bleeding	Hold; oral vitamin K as prescribed
Major bleeding	Stop; IV vitamin K 5–10 mg + prothrombin complex concentrate or FFP
Skin necrosis (rare)	Report

Hold the dose and inform the doctor if

- INR above target range
- Any bleeding, black stools, haematuria
- Falls or head injury
- New antibiotic or interacting drug started

Patient and family teaching

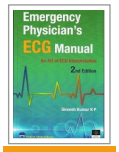
- Take at the same time each evening
- Keep green leafy vegetable intake consistent
- Use soft toothbrush, electric razor
- Carry an anticoagulant card; tell every doctor and dentist
- Avoid NSAIDs and herbal remedies

Clinical pearls

Antidote: vitamin K (slow), plus prothrombin complex concentrate or fresh frozen plasma for rapid reversal in major bleeding.

Further reading — tap to open (free) ► DailyMed label: Warfarin · National Formulary of India (IPC)

Section: Anticoagulants & Blood Modifiers · Summary table on page 28 · Contents



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DRUG 22 · ANTICOAGULANTS & BLOOD MODIFIERS

Heparin (Unfractionated)

Indirect thrombin inhibitor — parenteral anticoagulant

Overview. Heparin potentiates antithrombin, inactivating thrombin and factor Xa. It acts immediately IV, is monitored by aPTT, and is reversed by protamine.

Indications

- Acute DVT/PE
- Acute coronary syndrome
- Prophylaxis of DVT
- Dialysis, cardiopulmonary bypass, line patency

Check before giving

- **Independent double check of dose and pump rate**
- Baseline aPTT, platelet count, Hb
- Bleeding risk, recent surgery
- Heparin concentration on vial (1,000 vs 5,000 vs 25,000 units/mL)

Dose and administration	Detail
IV bolus	80 units/kg (or 5,000 units)
IV infusion	18 units/kg/h, adjust to aPTT 1.5–2.5× control (6-hourly)
SC prophylaxis	5,000 units 8–12 hourly
Site	SC in abdomen; do not rub; no IM

Adverse effect / risk	Nursing action
Bleeding	Stop infusion; check aPTT; protamine 1 mg per 100 units given in last 2–3 h
Heparin-induced thrombocytopenia (platelets fall >50% at day 5–10)	Stop all heparin including flushes; report
Haematoma at injection site	Rotate sites; no rubbing
Hyperkalaemia (long-term)	K^+ monitoring

Hold the dose and inform the doctor if

- aPTT above range or any bleeding
- Platelets fall by >50%
- Planned procedure or LP

Patient and family teaching

- Report bleeding gums, dark urine, black stools
- Avoid aspirin/NSAIDs
- Soft toothbrush

Clinical pearls

Heparin is a high-alert drug — most fatal errors come from confusing vial strengths. Read the strength aloud with a second nurse.

Further reading — tap to open (free) ► DailyMed label: Heparin · National Formulary of India (IPC)

Section: Anticoagulants & Blood Modifiers · Summary table on page 28 · Contents

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DRUG 23 · ANTICOAGULANTS & BLOOD MODIFIERS

Enoxaparin

Low-molecular-weight heparin (LMWH)

Overview. Enoxaparin mainly inhibits factor Xa. It has predictable dosing by weight and is given subcutaneously without routine monitoring.

Indications

- DVT prophylaxis (surgical, medical patients)
- Treatment of DVT/PE
- Acute coronary syndrome
- Bridging anticoagulation

Check before giving

- Weight and creatinine clearance (reduce if CrCl <30)
- Platelet count
- Bleeding risk, spinal/epidural catheter timing

Dose and administration	Detail
Prophylaxis	40 mg SC once daily
Treatment	1 mg/kg SC 12-hourly or 1.5 mg/kg once daily
Renal failure (CrCl <30)	1 mg/kg once daily
Technique	Abdomen 5 cm from umbilicus; pinch skin; 90°; **do not expel the air bubble**; do not rub

Adverse effect / risk	Nursing action
Bruising/haematoma at site	Rotate sites; no rubbing
Bleeding	Report; protamine partly reverses
Spinal/epidural haematoma	Neuro checks if neuraxial catheter
HIT (rare)	Platelet monitoring

Hold the dose and inform the doctor if

- Active bleeding or platelets <50,000
- Epidural catheter within 12 h of dose (check timing)
- Severe renal failure without dose adjustment

Patient and family teaching

- Self-injection technique if going home
- Report bleeding or large bruises
- Dispose of syringes safely

Clinical pearls

The air bubble in a prefilled syringe ensures the full dose is delivered and seals the drug in the subcutaneous tissue — do not expel it.

Further reading — tap to open (free) ► DailyMed label: Enoxaparin · National Formulary of India (IPC)

Section: Anticoagulants & Blood Modifiers · Summary table on page 28 · Contents



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DRUG 24 · ANTICOAGULANTS & BLOOD MODIFIERS

Rivaroxaban / Apixaban

Direct oral anticoagulants (DOAC) — factor Xa inhibitors

Overview. DOACs directly inhibit factor Xa. They have fixed doses, fewer interactions than warfarin and need no INR monitoring, but dosing depends on renal function.

Indications

- Non-valvular atrial fibrillation
- DVT/PE treatment
- Post hip/knee replacement prophylaxis

Check before giving

- Creatinine clearance
- Not for mechanical valves or rheumatic mitral stenosis
- Interacting drugs (rifampicin, azoles)
- Bleeding risk

Dose and administration	Detail
Rivaroxaban	20 mg OD with evening meal (AF; 15 mg if CrCl 15–49)
DVT treatment	15 mg BD ×21 days, then 20 mg OD
Apixaban	5 mg BD (AF); 10 mg BD ×7 days then 5 mg BD (VTE)

Adverse effect / risk	Nursing action
Bleeding	Report; antidote andexanet alfa or prothrombin complex concentrate
GI upset	Take with food (rivaroxaban)
Spinal haematoma with neuraxial anaesthesia	Timing per protocol

Hold the dose and inform the doctor if

- Active bleeding
- Before surgery (stop 24–48 h per renal function)
- Severe renal failure

Patient and family teaching

- Do not miss doses — protection wears off within a day
- Carry anticoagulant card
- Report bleeding

Clinical pearls

No routine blood test is needed — which also means missed doses go unnoticed. Adherence teaching is essential.

Further reading — tap to open (free) ► DailyMed label: Rivaroxaban · National Formulary of India (IPC)

Section: Anticoagulants & Blood Modifiers · Summary table on page 28 · Contents

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DRUG 25 · ANTICOAGULANTS & BLOOD MODIFIERS

Clopidogrel

P2Y12 receptor antagonist — antiplatelet

Overview. Clopidogrel irreversibly blocks platelet ADP receptors. With aspirin it forms dual antiplatelet therapy after stenting and acute coronary syndrome.

Indications

- Acute coronary syndrome, after coronary stent
- Ischaemic stroke/TIA
- Peripheral arterial disease

Check before giving

- Bleeding risk, recent surgery
- Platelet count
- Proton pump inhibitor (omeprazole reduces effect — prefer pantoprazole)

Dose and administration	Detail
Loading	300–600 mg oral
Maintenance	75 mg once daily
Before elective surgery	Stop 5–7 days (only after consulting cardiologist if stented)

Adverse effect / risk	Nursing action
Bleeding, bruising	Report; pressure on puncture sites
GI bleed	Watch for melaena; PPI cover
TTP (rare)	Fever, purpura, confusion — report urgently
Rash, diarrhoea	Report

Hold the dose and inform the doctor if

- Active bleeding
- Planned surgery (inform doctor)
- Black stools

Patient and family teaching

- Never stop without asking the cardiologist — stent thrombosis risk
- Tell dentist
- Report black stools

Clinical pearls

Stopping dual antiplatelet therapy early after a stent can cause stent thrombosis and fatal MI — always discuss with the cardiologist first.

Further reading — tap to open (free) ► DailyMed label: Clopidogrel · National Formulary of India (IPC)

Section: Anticoagulants & Blood Modifiers · Summary table on page 28 · Contents

Handbook of Antibiotics
BUY NOW ›

DRUG 26 · ANTICOAGULANTS & BLOOD MODIFIERS

Aspirin (Acetylsalicylic acid)

Cyclo-oxygenase inhibitor — antiplatelet (low dose), NSAID

Overview. Low-dose aspirin irreversibly inhibits platelet thromboxane for the life of the platelet (7–10 days). 300 mg chewed is the first drug in suspected heart attack.

Indications

- Acute coronary syndrome (chewed loading dose)
- Secondary prevention of MI, stroke
- Pre-eclampsia prevention (low dose)
- Rheumatic fever (high dose)

Check before giving

- Allergy/aspirin-sensitive asthma
- GI bleeding or ulcer history
- Children <16 years (Reye syndrome)
- Dengue — avoid

Dose and administration	Detail
Acute MI	300 mg chewed
Maintenance	75–150 mg once daily after food
Pre-eclampsia prophylaxis	75–150 mg at night from 12–36 weeks

Adverse effect / risk	Nursing action
GI irritation, ulcer, bleeding	Give after food; report black stools
Tinnitus (toxicity)	Report; check salicylate level
Bronchospasm in sensitive asthmatics	Stop; bronchodilator
Bleeding, bruising	Monitor

Hold the dose and inform the doctor if

- Black stools, haematemesis
- Tinnitus
- Dengue or suspected viral illness in a child

Patient and family teaching

- Take after food
- Not for children with fever
- Tell surgeon/dentist
- Report black stools

Clinical pearls

Aspirin is avoided in dengue fever because of bleeding risk — paracetamol is the antipyretic of choice.

Further reading — tap to open (free) ▶ DailyMed label: Aspirin · National Formulary of India (IPC)

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DRUG 27 · ANTICOAGULANTS & BLOOD MODIFIERS

Alteplase / Tenecteplase

Thrombolytic — tissue plasminogen activator

Overview. Thrombolytics convert plasminogen to plasmin, dissolving fibrin clots. They are time-critical in ischaemic stroke (within 4.5 h) and STEMI when PCI is not available.

Indications

- Acute ischaemic stroke within 4.5 h
- STEMI when primary PCI is not available
- Massive pulmonary embolism

Check before giving

- Time of onset (last seen normal)
- Checklist of contraindications (bleeding, recent surgery, stroke)
- BP must be <185/110 (stroke)
- CT brain excludes haemorrhage
- Weight for dose

Dose and administration	Detail
Alteplase (stroke)	0.9 mg/kg (max 90 mg): 10% IV bolus over 1 min, rest over 60 min
Tenecteplase (STEMI)	Single weight-based IV bolus (30–50 mg)
Tenecteplase (stroke)	0.25 mg/kg bolus (max 25 mg)

Adverse effect / risk	Nursing action
Intracranial haemorrhage	Neuro checks every 15 min; new headache, vomiting, fall in GCS → stop, urgent CT
Bleeding from puncture sites, gums	Pressure; avoid new punctures/IM injections
Angioedema (especially on ACE inhibitors)	Airway assessment
Hypotension, reperfusion arrhythmias	ECG monitoring

Hold the dose and inform the doctor if

- Any neurological deterioration
- BP >180/105 after stroke thrombolysis
- Bleeding

Patient and family teaching

- Explain need for close observation and bed rest
- No antiplatelets/anticoagulants for 24 h after stroke thrombolysis

Clinical pearls

After stroke thrombolysis: BP and neuro checks every 15 min for 2 h, every 30 min for 6 h, then hourly to 24 h.

Further reading — tap to open (free) ► DailyMed label: Alteplase · National Formulary of India (IPC)

Section: Anticoagulants & Blood Modifiers · Summary table on page 28 · Contents



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DRUG 28 · ANTICOAGULANTS & BLOOD MODIFIERS

Erythropoietin (Epoetin alfa)

Erythropoiesis-stimulating agent

Overview. Recombinant erythropoietin stimulates red-cell production. It is used mainly for anaemia of chronic kidney disease, usually with iron supplementation.

Indications

- Anaemia of chronic kidney disease
- Chemotherapy-induced anaemia
- Reducing transfusion needs

Check before giving

- Hb (target 10–11.5 g/dL; do not exceed 12)
- BP — uncontrolled hypertension is a contraindication
- Iron studies (ferritin, TSAT)

Dose and administration	Detail
SC/IV	50–100 units/kg three times weekly, or 4,000–10,000 units weekly
Darbepoetin	Weekly or fortnightly
Storage	Refrigerate 2–8 °C; do not shake

Adverse effect / risk	Nursing action
Hypertension	Monitor BP; antihypertensives
Thrombosis (access, DVT, stroke) when Hb rises too fast	Report Hb rise >1 g/dL in 2 weeks
Seizures (rare)	Monitor
Pure red-cell aplasia (rare)	Report sudden fall in Hb

Hold the dose and inform the doctor if

- Hb >12 g/dL or rising rapidly
- Uncontrolled BP
- Signs of thrombosis

Patient and family teaching

- Keep refrigerated
- Check BP regularly
- Take iron as prescribed

Clinical pearls

Erythropoietin will not work if iron stores are low — check ferritin and transferrin saturation and give IV iron when needed.

Further reading — tap to open (free) ► DailyMed label: Erythropoietin · National Formulary of India (IPC)

Section: Anticoagulants & Blood Modifiers · Summary table on page 28 · Contents


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DRUG 29 · ANTICOAGULANTS & BLOOD MODIFIERS

Ferrous Sulfate / Iron Preparations

Haematinic — iron supplement

Overview. Iron deficiency anaemia is the commonest anaemia in India, especially in women and children. Oral iron is first-line; IV iron (iron sucrose, ferric carboxymaltose) for intolerance or rapid repletion.

Indications

- Iron deficiency anaemia
- Pregnancy (IFA under Anaemia Mukt Bharat)
- Chronic kidney disease (with erythropoietin)

Check before giving

- Hb, ferritin
- Allergy history before IV iron
- Interacting drugs (antacids, calcium, tetracycline)

Dose and administration	Detail
Oral	Elemental iron 60–100 mg once daily or alternate days
Pregnancy (IFA)	60 mg iron + 500 µg folic acid daily
IV iron sucrose	100–200 mg diluted infusion
Ferric carboxymaltose	500–1,000 mg infusion over 15 min

Adverse effect / risk	Nursing action
Nausea, epigastric pain	Take with food if needed (reduces absorption slightly)
Constipation; black stools	Fibre, fluids; reassure — black stool is expected
Teeth staining (liquid)	Use straw; rinse
IV iron hypersensitivity	Observe 30 min; resuscitation ready
Overdose in children — toxic	Keep out of reach

Hold the dose and inform the doctor if

- Signs of allergy during IV infusion
- Severe GI symptoms
- Suspected overdose

Patient and family teaching

- Take on empty stomach with vitamin C (lemon, amla)
- Avoid tea, coffee, milk within 1 h
- Black stool is normal
- Keep away from children

Clinical pearls

Hb should rise by about 1 g/dL every 2–3 weeks with adequate iron; continue for 3 months after Hb normalises to refill stores.

Further reading — tap to open (free) ► DailyMed label: Ferrous Sulfate · National Formulary of India (IPC)

Section: Anticoagulants & Blood Modifiers · Summary table on page 28 · Contents

Emergency Physician's ECG Manual
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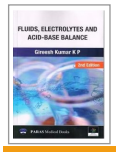
Respiratory & Allergy Drugs

Overview and one-page summary table

Inhaled bronchodilators and corticosteroids control asthma and COPD — the inhaler technique matters as much as the drug. Theophylline has a narrow therapeutic range, and first-generation antihistamines cause sedation and falls.

#	Drug	Key point	Page
30	Salbutamol (Albuterol)	Salbutamol relaxes bronchial smooth muscle within minutes	39
31	Ipratropium / Tiotropium	Ipratropium (short-acting) and tiotropium (long-acting, LAMA) block bronchial muscarinic receptors	40
32	Inhaled Corticosteroids (Budesonide / Fluticasone)	Inhaled corticosteroids reduce airway inflammation and are the foundation of asthma control	41
33	Montelukast	Montelukast blocks cysteinyl-leukotriene receptors, reducing airway inflammation	42
34	Chlorpheniramine / Diphenhydramine	First-generation antihistamines cross the blood–brain barrier, causing sedation and anticholinergic effects	43
35	Theophylline / Aminophylline	Theophylline relaxes bronchial muscle and stimulates respiration	44
36	Guaifenesin / Ambroxol	Expectorants and mucolytics thin respiratory secretions to make coughing productive	45

Tap a name or page number to open its full page.



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DRUG 30 · RESPIRATORY & ALLERGY DRUGS

Salbutamol (Albuterol)

Short-acting beta-2 agonist (SABA) — reliever bronchodilator

Overview. Salbutamol relaxes bronchial smooth muscle within minutes. It is the rescue drug for asthma and COPD attacks and also shifts potassium into cells (hyperkalaemia).

Indications

- Acute asthma, COPD exacerbation
- Exercise-induced bronchospasm
- Hyperkalaemia (adjunct)

Check before giving

- Respiratory rate, SpO_2, wheeze, peak flow
- Heart rate (tachycardia)
- Serum K^+ with frequent nebulisation

Dose and administration	Detail
MDI	100–200 µg (1–2 puffs) via spacer as needed
Acute attack (spacer)	4–10 puffs every 20 min for 1 h
Nebuliser	2.5–5 mg every 20 min ×3, then 2–4 hourly (oxygen-driven 6–8 L/min)
Hyperkalaemia	10–20 mg nebulised

Adverse effect / risk	Nursing action
Tachycardia, palpitations	Monitor pulse; report HR >140
Tremor, anxiety	Reassure
Hypokalaemia	Check K^+ with repeated doses
Lactic acidosis (high doses)	Report
Paradoxical bronchospasm (rare)	Stop; inform

Hold the dose and inform the doctor if

- HR >140/min or chest pain
- No improvement after 3 nebulisations — call for senior help (life-threatening asthma)
- Silent chest, cyanosis, drowsiness

Patient and family teaching

- Carry reliever inhaler always
- Using it more than twice a week means poor control — see doctor
- Use a spacer
- Shake MDI before use

Clinical pearls

A silent chest, SpO_2 <92%, exhaustion or confusion in acute asthma signals life-threatening disease — call for help immediately.

Further reading — tap to open (free) ► DailyMed label: Salbutamol · National Formulary of India (IPC)

Section: Respiratory & Allergy Drugs · Summary table on page 38 · Contents

CBME-BASED INTERNAL MEDICINE
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Ipratropium / Tiotropium

Inhaled antimuscarinic bronchodilator

Overview. Ipratropium (short-acting) and tiotropium (long-acting, LAMA) block bronchial muscarinic receptors. Ipratropium is added to salbutamol nebulisation in acute attacks; tiotropium is a COPD maintenance drug.

Indications

- COPD (maintenance — tiotropium)
- Acute severe asthma and COPD exacerbation (ipratropium + salbutamol)

Check before giving

- Glaucoma, prostatic enlargement
- Breathing pattern, SpO_2
- Inhaler technique

Dose and administration	Detail
Ipratropium nebuliser	500 µg every 4–6 h (with salbutamol)
Ipratropium MDI	20–40 µg 3–4 times daily
Tiotropium	18 µg capsule inhaled once daily (Handihaler) or 2.5 µg ×2 puffs (Respimat)

Adverse effect / risk	Nursing action
Dry mouth, throat irritation	Sips of water; mouth care
Urinary retention	Monitor voiding in older men
Acute angle-closure glaucoma (nebuliser mist in eyes)	Use mouthpiece or tight mask; protect eyes
Constipation	Fluids, fibre

Hold the dose and inform the doctor if

- Eye pain or blurred vision
- Urinary retention
- Worsening breathlessness

Patient and family teaching

- Do not swallow tiotropium capsules — inhale
- Rinse mouth after use
- Keep spray away from eyes

Clinical pearls

Tiotropium capsules are for inhalation only — patients sometimes swallow them, getting no benefit.

Further reading — tap to open (free) ► DailyMed label: Ipratropium · National Formulary of India (IPC)

Section: Respiratory & Allergy Drugs · Summary table on page 38 · Contents

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DRUG 32 · RESPIRATORY & ALLERGY DRUGS

Inhaled Corticosteroids (Budesonide / Fluticasone)

Inhaled corticosteroid (ICS) — controller

Overview. Inhaled corticosteroids reduce airway inflammation and are the foundation of asthma control. Budesonide–formoterol can be used as both maintenance and reliever (MART).

Indications

- Persistent asthma (all steps)
- COPD with frequent exacerbations or eosinophilia
- Croup (nebulised budesonide)

Check before giving

- Inhaler technique
- Oral cavity for thrush
- Growth in children on high doses

Dose and administration	Detail
Budesonide	200–800 µg/day in divided doses (MDI/DPI)
Fluticasone	100–500 µg twice daily
Budesonide/formoterol	1–2 inhalations BD + as needed (max 8–12/day)
Nebulised budesonide	0.5–1 mg BD

Adverse effect / risk	Nursing action
Oral candidiasis (thrush), hoarseness	Rinse mouth and gargle after each use; spacer
Adrenal suppression (high doses)	Do not stop abruptly at high dose
Pneumonia risk in COPD	Monitor
Easy bruising, cataract (long-term high dose)	Eye checks

Hold the dose and inform the doctor if

- White patches in mouth
- Hoarse voice persisting
- Signs of pneumonia

Patient and family teaching

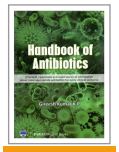
- Use daily even when well — it is not a reliever
- Rinse, gargle and spit after use
- Use a spacer with MDI
- Clean inhaler regularly

Clinical pearls

If a patient uses both a bronchodilator and a steroid inhaler, use the bronchodilator first — it opens the airways for the steroid.

Further reading — tap to open (free) ► DailyMed label: Inhaled Corticosteroids · National Formulary of India (IPC)

Section: Respiratory & Allergy Drugs · Summary table on page 38 · Contents



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DRUG 33 · RESPIRATORY & ALLERGY DRUGS

Montelukast

Leukotriene receptor antagonist

Overview. Montelukast blocks cysteinyl-leukotriene receptors, reducing airway inflammation. It is an add-on controller in asthma and allergic rhinitis and is taken once daily orally.

Indications

- Asthma (add-on controller)
- Exercise-induced bronchospasm
- Allergic rhinitis
- Aspirin-exacerbated respiratory disease

Check before giving

- Mood and behaviour history
- Not for acute attacks

Dose and administration	Detail
Adults	10 mg once daily in the evening
Children 6–14 y	5 mg chewable
Children 2–5 y	4 mg chewable/granules

Adverse effect / risk	Nursing action
Neuropsychiatric effects — agitation, nightmares, depression, suicidal thoughts	Report any change; stop
Headache, abdominal pain	Usually mild
Churg–Strauss syndrome (rare)	Rash, neuropathy, eosinophilia

Hold the dose and inform the doctor if

- Mood change, nightmares or suicidal thoughts
- Not to be used to relieve an acute attack

Patient and family teaching

- Take every evening
- Continue reliever inhaler for attacks
- Report mood or sleep changes

Clinical pearls

The FDA boxed warning on neuropsychiatric effects means families should be told to watch for behaviour changes, especially in children.

Further reading — tap to open (free) ► DailyMed label: Montelukast · National Formulary of India (IPC)

Section: Respiratory & Allergy Drugs · Summary table on page 38 · Contents

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DRUG 34 · RESPIRATORY & ALLERGY DRUGS

Chlorpheniramine / Diphenhydramine

First-generation H1 antihistamine (sedating)

Overview. First-generation antihistamines cross the blood–brain barrier, causing sedation and anticholinergic effects. Chlorpheniramine (CPM) is widely used in India, including IV in allergic reactions.

Indications

- Allergic reactions, urticaria (adjunct in anaphylaxis)
- Allergic rhinitis
- Blood transfusion reactions (pre-medication)
- Pruritus

Check before giving

- Fall risk, elderly
- Glaucoma, urinary retention
- Driving/occupation
- Other sedatives

Dose and administration	Detail
Chlorpheniramine oral	4 mg every 4–6 h (max 24 mg/day)
Chlorpheniramine IV/IM	10 mg slowly
Diphenhydramine	25–50 mg oral/IV every 6–8 h
Cetirizine (non-sedating alternative)	10 mg OD

Adverse effect / risk	Nursing action
Drowsiness, impaired coordination	Fall precautions; no driving
Anticholinergic — dry mouth, urinary retention, constipation, confusion in elderly	Monitor; avoid in elderly where possible
Paradoxical excitation in children	Report
Hypotension (IV)	Give slowly

Hold the dose and inform the doctor if

- Excess sedation or confusion
- Urinary retention
- Respiratory depression with other sedatives

Patient and family teaching

- Do not drive or operate machinery
- Avoid alcohol
- Prefer non-sedating antihistamines for daytime use

Clinical pearls

In anaphylaxis antihistamines treat itch and urticaria only — they never replace IM adrenaline.

Further reading — tap to open (free) ► DailyMed label: Chlorpheniramine · National Formulary of India (IPC)

Section: Respiratory & Allergy Drugs · Summary table on page 38 · Contents

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Theophylline / Aminophylline

Methylxanthine bronchodilator

Overview. Theophylline relaxes bronchial muscle and stimulates respiration. It has a narrow therapeutic range (10–20 µg/mL) and many interactions — toxicity causes seizures and arrhythmias.

Indications

- COPD and asthma (add-on, when inhalers inadequate)
- Apnoea of prematurity (caffeine/aminophylline)

Check before giving

- Serum level
- Heart rate, ECG
- Interacting drugs (ciprofloxacin, erythromycin raise levels; smoking lowers)
- Liver disease, heart failure (reduce dose)

Dose and administration	Detail
Oral SR	200–400 mg once or twice daily
Aminophylline IV	Loading 5 mg/kg over 20 min (omit if on oral theophylline), then 0.5 mg/kg/h
Levels	10–20 µg/mL (many aim 5–15)

Adverse effect / risk	Nursing action
Nausea, vomiting, restlessness (early toxicity)	Check level
Tachyarrhythmias	ECG monitoring for IV
Seizures (severe toxicity)	Seizure precautions; stop; report
Hypokalaemia, hyperglycaemia	Monitor

Hold the dose and inform the doctor if

- HR >120/min or arrhythmia
- Persistent vomiting
- Level >20 µg/mL
- Any seizure

Patient and family teaching

- Swallow SR tablets whole
- Avoid excess tea/coffee
- Tell doctor about new antibiotics
- Smoking changes the dose needed

Clinical pearls

Vomiting in a patient on theophylline is toxicity until proved otherwise — check a level before the next dose.

Further reading — tap to open (free) ► DailyMed label: Theophylline · National Formulary of India (IPC)

Section: Respiratory & Allergy Drugs · Summary table on page 38 · Contents

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Guaifenesin / Ambroxol

Expectorant / mucolytic

Overview. Expectorants and mucolytics thin respiratory secretions to make coughing productive. Ambroxol and bromhexine are commonly prescribed in India; N-acetylcysteine is a nebulised mucolytic.

Indications

- Productive cough with thick sputum
- Bronchiectasis, COPD (adjunct)
- Post-operative secretion clearance

Check before giving

- Hydration status
- Character of sputum, cough effectiveness
- Combination products containing sedating antihistamines or codeine

Dose and administration	Detail
Guaifenesin	200–400 mg every 4 h (max 2.4 g/day)
Ambroxol	30 mg three times daily
N-acetylcysteine nebulised	3–5 mL of 10% two to four times daily (with bronchodilator)

Adverse effect / risk	Nursing action
Nausea, GI upset	Take with water
Bronchospasm with nebulised acetylcysteine	Give salbutamol first
Drowsiness (combination syrups)	Check contents

Hold the dose and inform the doctor if

- Haemoptysis
- Breathlessness increasing
- Fever with purulent sputum

Patient and family teaching

- Drink plenty of fluids (8–10 glasses/day if allowed)
- Deep breathing and coughing exercises
- Avoid cough suppressants with productive cough

Clinical pearls

Good hydration is the most effective "expectorant" — and chest physiotherapy helps clearance more than syrups.

Further reading — tap to open (free) ► DailyMed label: Guaifenesin · National Formulary of India (IPC)

Section: Respiratory & Allergy Drugs · Summary table on page 38 · Contents

Emergency Physician's ECG Manual
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Endocrine & Hormonal Drugs

Overview and one-page summary table

Insulin is the single most common cause of serious medication errors in hospitals. Know the onset and peak of each insulin, never use "U" for units, and check blood glucose before every dose. Steroids and thyroid drugs need careful timing and tapering.

#	Drug	Key point	Page
37	Insulin Lispro / Aspart (Rapid-acting)	Rapid-acting analogues begin to act in 10–15 minutes, peak at 1–2 hours and last 3–5 hours	47
38	Insulin Regular (Soluble, Short-acting)	Regular (soluble) insulin acts in 30 minutes, peaks at 2–4 hours and lasts 6–8 hours	48
39	Insulin NPH (Isophane, Intermediate-acting)	NPH is a cloudy suspension that acts in 1–2 hours, peaks at 4–12 hours and lasts 12–18 hours	49
40	Insulin Glargine (Long-acting)	Glargine releases slowly with no peak for about 24 hours, providing basal insulin once daily with less nocturnal hypog…	50
41	Metformin	Metformin reduces hepatic glucose output and improves insulin sensitivity	51
42	Glimepiride / Glipizide / Gliclazide	Sulfonylureas stimulate insulin release from beta cells	52
43	Glucagon / 25% Dextrose	Glucagon mobilises liver glycogen and is given IM/SC when IV access is not available in severe hypoglycaemia	53
44	Levothyroxine	Levothyroxine replaces thyroid hormone in hypothyroidism	54
45	Carbimazole / Propylthiouracil (PTU)	Thionamides block thyroid hormone synthesis	55
46	Desmopressin (DDAVP)	Desmopressin acts on renal V2 receptors to concentrate urine	56
47	Prednisolone / Hydrocortisone / Dexamethasone	Corticosteroids are powerful anti-inflammatory and immunosuppressive drugs	57
48	Fludrocortisone	Fludrocortisone mimics aldosterone, retaining sodium and water and excreting potassium	58

Tap a name or page number to open its full page.

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DRUG 37 · ENDOCRINE & HORMONAL DRUGS

Insulin Lispro / Aspart (Rapid-acting)

Rapid-acting insulin analogue

Overview. Rapid-acting analogues begin to act in 10–15 minutes, peak at 1–2 hours and last 3–5 hours. They are given with meals as "bolus" insulin in basal–bolus regimens and in insulin pumps.

Indications

- Type 1 diabetes (mealtime bolus)
- Type 2 diabetes on basal–bolus
- Correction (sliding-scale) doses
- Insulin pumps

Check before giving

- Capillary blood glucose before dose
- **Meal tray present — give within 0–15 min of eating**
- Correct insulin, correct pen/syringe (U-100)
- Independent double check (high-alert)

Dose and administration	Detail
SC	Dose individualised (e.g. 4–10 units before each meal) — within 15 min before or immediately after meal
Onset / peak / duration	10–15 min / 1–2 h / 3–5 h
Sites	Abdomen (fastest), thigh, arm; rotate

Adverse effect / risk	Nursing action
Hypoglycaemia (sweating, tremor, confusion)	If glucose <70 mg/dL: 15–20 g fast sugar, recheck in 15 min (rule of 15); IV 25% dextrose if unconscious
Lipohypertrophy	Rotate sites; inspect regularly
Hypokalaemia	Monitor K^+ with IV insulin
Allergy, local reaction	Report

Hold the dose and inform the doctor if

- Blood glucose <70 mg/dL (or as protocol)
- Patient nil by mouth or not eating
- Meal tray not available

Patient and family teaching

- Inject only when food is in front of you
- Carry glucose tablets/sugar
- Recognise and treat hypoglycaemia
- Rotate sites within an area

Clinical pearls

Never give a rapid-acting insulin when the meal is delayed or the patient is vomiting — hypoglycaemia follows within an hour.

Further reading — tap to open (free) ► DailyMed label: Insulin Lispro · National Formulary of India (IPC)

Section: Endocrine & Hormonal Drugs · Summary table on page 46 · Contents

CBME-BASED INTERNAL MEDICINE
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Insulin Regular (Soluble, Short-acting)

Short-acting human insulin

Overview. Regular (soluble) insulin acts in 30 minutes, peaks at 2–4 hours and lasts 6–8 hours. It is the only insulin routinely given intravenously — in DKA, HHS, hyperkalaemia and peri-operative infusions.

Indications

- Diabetic ketoacidosis, HHS (IV infusion)
- Hyperkalaemia (with dextrose)
- Perioperative/ICU glucose control
- Mealtime insulin (SC, 30 min before meals)

Check before giving

- Blood glucose and K^+ before starting IV infusion (K^+ must be ≥3.3 in DKA)
- Clear appearance
- Pump settings double-checked
- Use only insulin syringes or pens

Dose and administration	Detail
SC	30 min before meals
IV infusion (DKA)	0.1 units/kg/h fixed rate; 50 units in 50 mL saline (1 unit/mL)
Hyperkalaemia	10 units IV with 50 mL of 50% dextrose (or 25% 100 mL)
Onset / peak / duration (SC)	30 min / 2–4 h / 6–8 h

Adverse effect / risk	Nursing action
Hypoglycaemia	Hourly glucose on infusion; add dextrose when glucose <250 mg/dL in DKA
Hypokalaemia	K^+ every 1–2 h in DKA; add KCl to fluids
Insulin adsorbs to tubing	Prime the line
Fluid overload	Monitor

Hold the dose and inform the doctor if

- K^+ <3.3 mmol/L before IV insulin
- Glucose <70 mg/dL
- Infusion pump alarm or line problem

Patient and family teaching

- Take SC dose 30 min before meals
- Recognise hypoglycaemia

Clinical pearls

Insulin is a high-alert drug: write "units" in full — a "U" has been misread as "0", causing ten-fold overdoses.

Further reading — tap to open (free) ► DailyMed label: Insulin Regular · National Formulary of India (IPC)

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Insulin NPH (Isophane, Intermediate-acting)

Intermediate-acting human insulin

Overview. NPH is a cloudy suspension that acts in 1–2 hours, peaks at 4–12 hours and lasts 12–18 hours. Premixed 30/70 (regular/NPH) is very widely used in India.

Indications

- Type 1 and type 2 diabetes (basal, twice daily)
- Premixed regimens (30/70)
- Steroid-induced hyperglycaemia (morning NPH)

Check before giving

- Blood glucose
- Suspension appearance — uniformly cloudy after mixing
- Meal timing (peak causes afternoon/night hypoglycaemia)

Dose and administration	Detail
SC	Twice daily before breakfast and dinner, dose individualised
Mixing	**Roll vial between palms 10 times and tip gently — do not shake**
Onset / peak / duration	1–2 h / 4–12 h / 12–18 h
Route	Subcutaneous only — never IV

Adverse effect / risk	Nursing action
Hypoglycaemia at peak (afternoon, 2–3 am)	Bedtime snack; check night glucose if symptoms
Inaccurate dose if not mixed	Roll until uniformly cloudy
Lipohypertrophy	Rotate sites
Weight gain	Diet counselling

Hold the dose and inform the doctor if

- Glucose <70 mg/dL
- Patient not eating
- Clumps or frosting in vial (discard)

Patient and family teaching

- Roll, do not shake
- Eat meals on time
- Bedtime snack if prone to night hypoglycaemia
- Store opened vial at room temperature up to 28 days

Clinical pearls

When mixing regular and NPH in one syringe, draw up clear (regular) before cloudy (NPH) — "clear before cloudy".

Further reading — tap to open (free) ► DailyMed label: Insulin NPH · National Formulary of India (IPC)

Section: Endocrine & Hormonal Drugs · Summary table on page 46 · Contents

Handbook of Antibiotics
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DRUG 40 · ENDOCRINE & HORMONAL DRUGS

Insulin Glargine (Long-acting)

Long-acting basal insulin analogue

Overview. Glargine releases slowly with no peak for about 24 hours, providing basal insulin once daily with less nocturnal hypoglycaemia than NPH. Degludec lasts even longer.

Indications

- Basal insulin in type 1 and type 2 diabetes
- Transition from IV insulin infusion (overlap 2 h)

Check before giving

- Blood glucose (fasting)
- Clear solution
- Same time every day
- Not for IV use or DKA

Dose and administration	Detail
SC	Once daily at the same time (start 10 units or 0.1–0.2 units/kg), titrate to fasting glucose
Mixing	**Never mix with any other insulin**
Onset / duration	1–2 h / ~24 h, peakless

Adverse effect / risk	Nursing action
Hypoglycaemia (less but possible)	Glucose monitoring; adjust dose
Injection-site pain (acidic pH)	Rotate sites
Confusion with rapid-acting (both clear)	Check label and pen colour every time

Hold the dose and inform the doctor if

- Fasting glucose <70 mg/dL
- Wrong insulin suspected — check before giving

Patient and family teaching

- Take at the same time daily, even if not eating normally (dose may need reducing — ask)
- Do not mix
- Check pen label every time

Clinical pearls

Do not stop basal insulin in type 1 diabetes even when the patient is nil by mouth — this precipitates DKA. Reduce the dose and give dextrose instead.

Further reading — tap to open (free) ► DailyMed label: Insulin Glargine · National Formulary of India (IPC)

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DRUG 41 · ENDOCRINE & HORMONAL DRUGS

Metformin

Biguanide — oral antidiabetic

Overview. Metformin reduces hepatic glucose output and improves insulin sensitivity. It is first-line in type 2 diabetes, does not cause hypoglycaemia alone and is weight-neutral.

Indications

- Type 2 diabetes (first-line)
- Prediabetes
- Polycystic ovary syndrome

Check before giving

- eGFR (avoid <30; reduce dose 30–45)
- Iodinated contrast planned
- Alcohol use, liver disease, hypoxia, sepsis (lactic acidosis risk)

Dose and administration	Detail
Oral	500 mg once or twice daily with meals, titrate to 1,000 mg BD (max 2–2.5 g/day)
Extended release	Once daily with evening meal
Contrast	Hold at the time of / before contrast if eGFR <60 or AKI; restart after 48 h if creatinine stable

Adverse effect / risk	Nursing action
GI upset, diarrhoea, metallic taste	Start low, take with food; extended release
Lactic acidosis (rare; vomiting, abdominal pain, breathlessness, drowsiness)	Stop; urgent lactate and ABG
Vitamin B12 deficiency (long-term)	Check B12 if neuropathy or anaemia

Hold the dose and inform the doctor if

- eGFR <30, AKI, dehydration
- Sepsis, shock, hypoxia
- Before contrast/major surgery as per protocol
- Persistent vomiting

Patient and family teaching

- Take with meals
- Sick-day rule: stop during vomiting, diarrhoea or dehydration
- Avoid heavy alcohol

Clinical pearls

Metformin is withheld on the day of surgery and in any acutely ill patient (sepsis, dehydration) because of the risk of lactic acidosis.

Further reading — tap to open (free) ► DailyMed label: Metformin · National Formulary of India (IPC)

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DRUG 42 · ENDOCRINE & HORMONAL DRUGS

Glimepiride / Glipizide / Gliclazide

Sulfonylurea — oral antidiabetic (insulin secretagogue)

Overview. Sulfonylureas stimulate insulin release from beta cells. They are cheap and effective but cause hypoglycaemia — prolonged and dangerous in the elderly and in renal failure.

Indications
• Type 2 diabetes (add-on to metformin)

Check before giving
• Blood glucose
• Meal pattern (skipped meals = hypoglycaemia)
• Renal and hepatic function
• Elderly, fasting (Ramadan, religious fasts)

Dose and administration	Detail
Glimepiride	1–4 mg once daily with breakfast
Glipizide	2.5–20 mg/day before meals
Gliclazide MR	30–120 mg once daily with breakfast

Adverse effect / risk	Nursing action
Hypoglycaemia (may last 24–72 h)	Treat with sugar then complex carbohydrate; admit for IV dextrose if recurrent
Weight gain	Diet advice
Rash, photosensitivity	Report
Disulfiram-like reaction with alcohol (older agents)	Avoid alcohol

Hold the dose and inform the doctor if
• Glucose <70 mg/dL
• Not eating or NPO for procedure
• Renal failure

Patient and family teaching
• Never skip meals after taking
• Carry sugar
• Inform doctor before fasting

Clinical pearls
Sulfonylurea hypoglycaemia recurs after initial treatment — observe for at least 24 hours; octreotide is used for refractory cases.

Further reading — tap to open (free) ► DailyMed label: Glimepiride · National Formulary of India (IPC)

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DRUG 43 · ENDOCRINE & HORMONAL DRUGS

Glucagon / 25% Dextrose

Hyperglycaemic agents — emergency treatment of hypoglycaemia

Overview. Glucagon mobilises liver glycogen and is given IM/SC when IV access is not available in severe hypoglycaemia. In hospital, IV dextrose is the treatment of choice.

Indications

- Severe hypoglycaemia with unconsciousness or inability to swallow
- Beta-blocker or calcium-channel-blocker overdose (glucagon IV)

Check before giving

- Capillary glucose
- Airway, position (lateral — vomiting common)
- IV access availability
- Cause (insulin, sulfonylurea, alcohol)

Dose and administration	Detail
Glucagon	1 mg IM/SC (0.5 mg if <25 kg); repeat once after 15 min if needed
IV dextrose	25% dextrose 50–100 mL (or 50% 25–50 mL; 10% 150–200 mL) — flush well
After recovery	Oral complex carbohydrate

Adverse effect / risk	Nursing action
Nausea, vomiting after glucagon	Lateral position; suction ready
Ineffective in starvation, liver disease, alcohol	Use IV dextrose
Dextrose extravasation (sclerosant)	Large vein; check patency
Rebound hypoglycaemia	Recheck glucose every 15–60 min

Hold the dose and inform the doctor if

- Glucose not rising after treatment
- Patient not regaining consciousness
- Hypoglycaemia due to sulfonylurea (prolonged)

Patient and family teaching

- Family to learn glucagon kit use
- Eat once awake
- Identify cause

Clinical pearls

Once the patient wakes, give a long-acting carbohydrate — the effect of glucagon or dextrose lasts only 30–60 minutes.

Further reading — tap to open (free) ► DailyMed label: Glucagon · National Formulary of India (IPC)

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Emergency Physician's ECG Manual
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DRUG 44 · ENDOCRINE & HORMONAL DRUGS

Levothyroxine

Thyroid hormone (T4) replacement

Overview. Levothyroxine replaces thyroid hormone in hypothyroidism. Hypothyroidism is common in Indian women; correct timing on an empty stomach is essential for absorption.

Indications

- Hypothyroidism
- After thyroidectomy
- TSH suppression in thyroid cancer
- Myxoedema coma (IV)

Check before giving

- TSH (6–8 weeks after dose change)
- Heart rate; angina in elderly (start low)
- Pregnancy (dose increases ~30%)
- Interacting drugs: iron, calcium, antacids, PPIs

Dose and administration	Detail
Oral	25–200 µg once daily (≈1.6 µg/kg); elderly/cardiac start 12.5–25 µg
Timing	**First thing in the morning, empty stomach, 30–60 min before breakfast/tea**
Separation	4 h from iron or calcium

Adverse effect / risk	Nursing action
Over-replacement — palpitations, tremor, insomnia, weight loss, heat intolerance	Report; check TSH
Angina, AF in elderly	Start low, go slow
Osteoporosis (long-term excess)	Monitor TSH
Under-replacement	Fatigue, weight gain, constipation persist

Hold the dose and inform the doctor if

- Pulse >100/min or chest pain
- Palpitations, tremor
- Pregnancy confirmed (inform for dose increase)

Patient and family teaching

- Take daily on empty stomach with water
- Do not switch brands without advice
- Lifelong therapy
- Separate from iron/calcium by 4 hours

Clinical pearls

Taking levothyroxine with tea or breakfast is the commonest reason for a persistently high TSH.

Further reading — tap to open (free) ► DailyMed label: Levothyroxine · National Formulary of India (IPC)

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DRUG 45 · ENDOCRINE & HORMONAL DRUGS

Carbimazole / Propylthiouracil (PTU)

Thionamide antithyroid drugs

Overview. Thionamides block thyroid hormone synthesis. Carbimazole/methimazole is first-line; PTU is preferred in the first trimester of pregnancy and in thyroid storm.

Indications

- Hyperthyroidism (Graves disease, toxic nodules)
- Thyroid storm (PTU)
- Preparation for thyroidectomy or radioiodine

Check before giving

- Baseline CBC and LFT
- Pregnancy status
- Heart rate (beta-blocker often added)

Dose and administration	Detail
Carbimazole	15–40 mg/day, then 5–15 mg/day maintenance
PTU	100–150 mg three times daily; thyroid storm 200–250 mg 4-hourly
Duration	12–18 months

Adverse effect / risk	Nursing action
Agranulocytosis (sore throat, fever, mouth ulcers)	Stop immediately; urgent CBC
Hepatotoxicity (especially PTU)	Report jaundice, dark urine; LFT
Rash, itching, arthralgia	Antihistamine; report
Hypothyroidism (over-treatment)	TFT monitoring

Hold the dose and inform the doctor if

- Sore throat, fever or mouth ulcers
- Jaundice
- Neutrophils <1,500/mm³

Patient and family teaching

- Report sore throat or fever at once and get a blood count
- Report yellow eyes or dark urine
- Take regularly; do not stop without advice

Clinical pearls

A sore throat in a patient on carbimazole is agranulocytosis until a blood count proves otherwise.

Further reading — tap to open (free) ► DailyMed label: Carbimazole · National Formulary of India (IPC)

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CBME-BASED INTERNAL MEDICINE
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DRUG 46 · ENDOCRINE & HORMONAL DRUGS

Desmopressin (DDAVP)

Synthetic vasopressin (ADH) analogue

Overview. Desmopressin acts on renal V2 receptors to concentrate urine. It treats central diabetes insipidus and nocturnal enuresis and raises factor VIII in haemophilia A and von Willebrand disease.

Indications

- Central diabetes insipidus (after pituitary surgery, head injury)
- Nocturnal enuresis
- Haemophilia A, von Willebrand disease (bleeding)

Check before giving

- Serum sodium, urine output and specific gravity
- Daily weight
- Fluid intake pattern
- Elderly, heart failure (hyponatraemia risk)

Dose and administration	Detail
Intranasal	10–40 µg/day in 1–3 doses
Oral	100–200 µg two to three times daily; melt 120 µg
IV/SC	1–4 µg daily (DI); 0.3 µg/kg IV over 30 min (bleeding)

Adverse effect / risk	Nursing action
Water intoxication, hyponatraemia (headache, confusion, seizures)	Restrict fluids; check Na^+; report
Fluid retention, weight gain	Daily weight
Nasal irritation	Alternate nostrils
Flushing, hypotension (IV)	Infuse slowly

Hold the dose and inform the doctor if

- Na^+ <130 mmol/L
- Headache, confusion or seizure
- Weight gain >1 kg/day

Patient and family teaching

- Limit fluids in the evening (enuresis)
- Report headache or nausea
- Weigh daily

Clinical pearls

In DI after neurosurgery, watch hourly urine output and sodium — the condition can switch to SIADH (triphasic response).

Further reading — tap to open (free) ► DailyMed label: Desmopressin · National Formulary of India (IPC)

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Prednisolone / Hydrocortisone / Dexamethasone

Systemic corticosteroids (glucocorticoids)

Overview. Corticosteroids are powerful anti-inflammatory and immunosuppressive drugs. Long-term use suppresses the adrenal glands, so they must be tapered and never stopped suddenly.

Indications

- Asthma/COPD exacerbation, allergy, anaphylaxis (adjunct)
- Autoimmune and inflammatory disease
- Adrenal insufficiency (hydrocortisone)
- Cerebral oedema (dexamethasone), fetal lung maturity

Check before giving

- Blood glucose (rises within hours)
- BP, weight, oedema
- Infection signs (masked)
- Mood, sleep
- Duration of therapy (taper if >3 weeks)

Dose and administration	Detail
Prednisolone oral	5–60 mg once daily in the morning with food
Hydrocortisone IV	100–200 mg (acute adrenal crisis, anaphylaxis, asthma)
Dexamethasone IV/IM	4–8 mg; antenatal 6 mg IM 12-hourly ×4
Methylprednisolone	0.5–1 g IV pulse

Adverse effect / risk	Nursing action
Hyperglycaemia	Glucose monitoring; insulin as needed
Infection, delayed wound healing	Asepsis; watch fever may be absent
GI ulceration	Give with food; PPI cover
Fluid retention, hypertension, hypokalaemia	BP, weight, K^+
Mood change, insomnia, psychosis	Morning dosing; report
Osteoporosis, cataract, muscle wasting, Cushingoid features (long-term)	Calcium, vitamin D
Adrenal crisis if stopped suddenly	Taper; steroid card

Hold the dose and inform the doctor if

- Blood glucose >300 mg/dL
- Signs of infection or GI bleeding
- Severe mood change
- Missed doses in long-term users (adrenal crisis risk)

Patient and family teaching

- Take in the morning with food
- Do not stop suddenly — taper as directed
- Carry steroid card; extra dose during illness (sick-day rule)
- Report fever, black stools

Clinical pearls

Equivalent doses: hydrocortisone 20 mg = prednisolone 5 mg = methylprednisolone 4 mg = dexamethasone 0.75 mg.

Further reading — tap to open (free) ► DailyMed label: Prednisolone · National Formulary of India (IPC)

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Handbook of Antibiotics
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DRUG 48 · ENDOCRINE & HORMONAL DRUGS

Fludrocortisone

Mineralocorticoid

Overview. Fludrocortisone mimics aldosterone, retaining sodium and water and excreting potassium. It replaces mineralocorticoid in Addison disease and treats orthostatic hypotension.

Indications

- Primary adrenal insufficiency (Addison disease, with hydrocortisone)
- Congenital adrenal hyperplasia
- Orthostatic hypotension

Check before giving

- BP lying and standing
- Serum Na^+ and K^+
- Weight and oedema
- Heart failure (fluid overload)

Dose and administration	Detail
Oral	50–200 µg once daily (usually 100 µg)
With	Hydrocortisone 15–25 mg/day in divided doses (Addison)

Adverse effect / risk	Nursing action
Hypertension, oedema, weight gain	Monitor BP and weight; reduce dose
Hypokalaemia	K^+ monitoring; potassium-rich diet
Heart failure	Report breathlessness
Under-replacement	Postural dizziness, salt craving, high renin

Hold the dose and inform the doctor if

- BP >150/90 or oedema
- K^+ <3.5 mmol/L
- Breathlessness

Patient and family teaching

- Take every day; never stop
- Carry steroid card and emergency hydrocortisone
- Weigh regularly

Clinical pearls

In Addison disease, double the hydrocortisone dose during febrile illness — fludrocortisone usually does not need changing.

Further reading — tap to open (free) ► DailyMed label: Fludrocortisone · National Formulary of India (IPC)

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Gastrointestinal Drugs

Overview and one-page summary table

Acid suppressants, antiemetics and laxatives are given to most hospitalised patients. Know which drugs prolong the QT interval, which cause extrapyramidal reactions, and why lactulose is titrated to bowel movements in liver disease.

#	Drug	Key point	Page
49	Pantoprazole / Omeprazole	PPIs irreversibly block the gastric H+/K+-ATPase, profoundly reducing acid	60
50	Famotidine / Ranitidine	H2 blockers reduce gastric acid by blocking histamine-2 receptors on parietal cells	61
51	Ondansetron	Ondansetron blocks serotonin receptors in the gut and brainstem	62
52	Metoclopramide / Domperidone	Metoclopramide increases gastric emptying and blocks dopamine in the chemoreceptor trigger zone	63
53	Docusate / Bisacodyl / Senna / Polyethylene Glycol	Constipation is common in hospital due to immobility, opioids and iron	64
54	Lactulose	Lactulose is fermented by colonic bacteria to acids that trap ammonia (NH4+) and draw water into the bowel	65
55	Loperamide	Loperamide slows gut transit	66
56	Pancreatic Enzymes (Pancrelipase)	Pancrelipase supplies lipase, amylase and protease to digest food in exocrine pancreatic insufficiency — chronic pancr…	67
57	Sulfasalazine / Mesalazine (5-ASA)	Aminosalicylates act locally on the colonic mucosa in ulcerative colitis	68

Tap a name or page number to open its full page.

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DRUG 49 · GASTROINTESTINAL DRUGS

Pantoprazole / Omeprazole

Proton pump inhibitor (PPI)

Overview. PPIs irreversibly block the gastric H^+/K^+-ATPase, profoundly reducing acid. They are among the most overprescribed drugs in hospitals.

Indications

- Peptic ulcer, GERD
- Upper GI bleed (IV)
- H. pylori eradication (with antibiotics)
- Gastroprotection with NSAIDs, dual antiplatelets, steroids

Check before giving

- Indication and duration (avoid indefinite use)
- Interacting drugs (omeprazole–clopidogrel)
- Magnesium on long-term use

Dose and administration	Detail
Oral	Pantoprazole 40 mg / omeprazole 20 mg once daily, 30–60 min before breakfast
IV (GI bleed)	Pantoprazole 80 mg bolus, then 8 mg/h infusion or 40 mg 12-hourly
Do not crush	Enteric-coated tablets

Adverse effect / risk	Nursing action
Headache, diarrhoea	Usually mild
***C. difficile* infection, pneumonia**	Report persistent diarrhoea
Hypomagnesaemia, B12 deficiency, fractures (long-term)	Review need periodically
Reduced absorption of iron, ketoconazole, atazanavir	Check interactions

Hold the dose and inform the doctor if

- Black stools or haematemesis (needs evaluation)
- Persistent diarrhoea

Patient and family teaching

- Take before breakfast
- Swallow whole
- Report black stools
- Do not use long-term without review

Clinical pearls

Deprescribe: many inpatients started on a PPI for "stress ulcer prophylaxis" are discharged on it for years without indication.

Further reading — tap to open (free) ► DailyMed label: Pantoprazole · National Formulary of India (IPC)

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DRUG 50 · GASTROINTESTINAL DRUGS

Famotidine / Ranitidine

H2 receptor antagonist

Overview. H2 blockers reduce gastric acid by blocking histamine-2 receptors on parietal cells. Ranitidine was withdrawn (NDMA impurity); famotidine is now preferred.

Indications

- Dyspepsia, GERD (mild)
- Stress-ulcer prophylaxis
- Pre-anaesthetic (aspiration prophylaxis)
- Urticaria (adjunct)

Check before giving

- Renal function (reduce dose)
- Mental status in elderly

Dose and administration	Detail
Oral	Famotidine 20–40 mg once or twice daily
IV	20 mg 12-hourly
Renal failure (CrCl <50)	50% dose

Adverse effect / risk	Nursing action
Confusion, delirium (elderly, renal failure)	Report; reduce dose
Headache, dizziness	Monitor
Thrombocytopenia (rare)	CBC if bleeding

Hold the dose and inform the doctor if

- New confusion
- Platelets falling

Patient and family teaching

- Take at bedtime for night symptoms
- Avoid smoking and NSAIDs

Clinical pearls

In an elderly patient with new delirium, review drugs — H2 blockers, anticholinergics and benzodiazepines are common culprits.

Further reading — tap to open (free) ► DailyMed label: Famotidine · National Formulary of India (IPC)

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Emergency Physician's ECG Manual
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DRUG 51 · GASTROINTESTINAL DRUGS

Ondansetron

5-HT3 receptor antagonist — antiemetic

Overview. Ondansetron blocks serotonin receptors in the gut and brainstem. It is effective for post-operative, chemotherapy-induced and gastroenteritis-associated vomiting.

Indications

- Post-operative nausea and vomiting
- Chemotherapy and radiotherapy-induced vomiting
- Gastroenteritis vomiting (oral dissolving)
- Hyperemesis (selected)

Check before giving

- QT interval, other QT-prolonging drugs
- K^+ and Mg^{2+}
- Constipation

Dose and administration	Detail
IV/IM	4–8 mg slowly over 2–5 min (max 16 mg single IV dose)
Oral / ODT	4–8 mg 8–12-hourly
Child	0.1–0.15 mg/kg

Adverse effect / risk	Nursing action
QT prolongation, arrhythmia	ECG if risk factors; correct electrolytes
Headache	Analgesic
Constipation	Fluids, fibre, laxative
Serotonin syndrome (with SSRIs, rare)	Report agitation, fever, clonus

Hold the dose and inform the doctor if

- QTc >500 ms
- Palpitations or syncope
- Severe constipation, abdominal distension

Patient and family teaching

- Place ODT on tongue to dissolve
- Report palpitations

Clinical pearls

Vomiting is a symptom — always look for the cause (obstruction, raised ICP, DKA, MI) before simply suppressing it.

Further reading — tap to open (free) ► DailyMed label: Ondansetron · National Formulary of India (IPC)

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DRUG 52 · GASTROINTESTINAL DRUGS

Metoclopramide / Domperidone

Dopamine D2 antagonist — prokinetic antiemetic

Overview. Metoclopramide increases gastric emptying and blocks dopamine in the chemoreceptor trigger zone. It crosses the blood–brain barrier and causes extrapyramidal reactions, especially in young women and children.

Indications

- Nausea and vomiting
- Gastroparesis
- Before emergency anaesthesia (gastric emptying)
- Migraine-associated vomiting

Check before giving

- Age (avoid in children and young adults where possible)
- Bowel obstruction (contraindicated)
- Parkinson disease
- Seizure disorder

Dose and administration	Detail
IV/IM/oral	10 mg up to three times daily (max 30 mg/day, 5 days)
IV	Over at least 3 min
Domperidone	10 mg up to three times daily (QT risk; avoid high doses)

Adverse effect / risk	Nursing action
Acute dystonia (oculogyric crisis, torticollis), akathisia	Stop; procyclidine or diphenhydramine/promethazine IV
Tardive dyskinesia (prolonged use)	Limit to 5 days
Drowsiness, depression	Monitor
NMS (rare)	Fever, rigidity — urgent

Hold the dose and inform the doctor if

- Abnormal movements or restlessness
- Abdominal distension, no bowel sounds (obstruction)
- Fever with rigidity

Patient and family teaching

- Report abnormal movements
- Short course only

Clinical pearls

Metoclopramide is contraindicated in mechanical bowel obstruction — increasing peristalsis against an obstruction can perforate the bowel.

Further reading — tap to open (free) ▶ DailyMed label: Metoclopramide · National Formulary of India (IPC)

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CBME-BASED INTERNAL MEDICINE
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DRUG 53 · GASTROINTESTINAL DRUGS

Docusate / Bisacodyl / Senna / Polyethylene Glycol

Laxatives — stool softener, stimulant and osmotic

Overview. Constipation is common in hospital due to immobility, opioids and iron. Stool softeners (docusate) help hard stool; stimulants (bisacodyl, senna) and osmotics (PEG, lactulose) increase bowel movements.

Indications

- Opioid-induced constipation (prophylaxis)
- Constipation, faecal loading
- Bowel preparation (PEG)
- Avoid straining (post-MI, hernia, haemorrhoids)

Check before giving

- Bowel sounds, last bowel movement
- Abdominal pain, distension (exclude obstruction)
- Hydration

Dose and administration	Detail
Docusate	100 mg once or twice daily
Bisacodyl	5–10 mg oral at night; 10 mg suppository
Senna	7.5–15 mg at night
PEG (macrogol)	1–2 sachets in water daily

Adverse effect / risk	Nursing action
Cramping	Reduce dose
Diarrhoea, dehydration, hypokalaemia	Stop; fluids
Dependence with chronic stimulant use	Fibre, fluid, activity
Obstruction or impaction masked	Assess before giving

Hold the dose and inform the doctor if

- Abdominal distension, vomiting, absent bowel sounds
- Rectal bleeding
- Diarrhoea

Patient and family teaching

- Drink 2–3 litres of fluid if allowed
- Increase fibre and activity
- Respond to urge to defecate

Clinical pearls

Every patient started on regular opioids should be prescribed a laxative (stimulant + softener) at the same time.

Further reading — tap to open (free) ► DailyMed label: Docusate · National Formulary of India (IPC)

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DRUG 54 · GASTROINTESTINAL DRUGS

Lactulose

Osmotic laxative; ammonia-lowering agent

Overview. Lactulose is fermented by colonic bacteria to acids that trap ammonia ($NH4^+$) and draw water into the bowel. It is the first-line treatment of hepatic encephalopathy.

Indications

- Hepatic encephalopathy (treatment and prevention)
- Chronic constipation

Check before giving

- Mental status, asterixis, orientation
- Number and consistency of stools
- Electrolytes, hydration

Dose and administration	Detail
Hepatic encephalopathy	15–30 mL 2–4 times daily, titrate to **2–3 soft stools per day**
Retention enema	300 mL in 700 mL water, retain 30–60 min
Constipation	15–30 mL once or twice daily

Adverse effect / risk	Nursing action
Diarrhoea, dehydration, hypokalaemia, hypernatraemia	Reduce dose; electrolytes
Bloating, flatulence, cramps	Usually settle
Excessively sweet taste	Mix with juice or water

Hold the dose and inform the doctor if

- More than 4 loose stools/day
- Worsening confusion
- Electrolyte imbalance

Patient and family teaching

- Take regularly even when well (prevention)
- Count stools — aim for 2–3 soft motions daily
- Report confusion or drowsiness

Clinical pearls

Underdosing lactulose (fewer than 2 stools a day) is a common precipitant of encephalopathy in cirrhosis; rifaximin is added for recurrence.

Further reading — tap to open (free) ► DailyMed label: Lactulose · National Formulary of India (IPC)

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Handbook of Antibiotics
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DRUG 55 · GASTROINTESTINAL DRUGS

Loperamide

Opioid-receptor agonist — antidiarrhoeal (peripheral)

Overview. Loperamide slows gut transit. It is useful for non-infective diarrhoea but dangerous in dysentery, C. difficile and children.

Indications

- Acute non-infective diarrhoea in adults
- Chronic diarrhoea (IBS, post-resection)
- High-output stoma

Check before giving

- Fever, blood in stool (avoid)
- Recent antibiotics (C. difficile risk)
- Age (avoid <12 years)
- Hydration status

Dose and administration	Detail
Oral	4 mg initially, then 2 mg after each loose stool (max 16 mg/day)
Rehydration	ORS remains the mainstay

Adverse effect / risk	Nursing action
Toxic megacolon in infective/inflammatory colitis	Avoid in bloody diarrhoea, fever
Constipation, abdominal distension	Stop
Cardiac arrhythmias (very high doses, misuse)	Do not exceed dose

Hold the dose and inform the doctor if

- Bloody diarrhoea or fever
- Abdominal distension
- No improvement in 48 h

Patient and family teaching

- Drink ORS
- Stop when stools form
- Seek care for blood in stool or high fever

Clinical pearls

In diarrhoea, oral rehydration solution and zinc (children) save lives — antidiarrhoeals only treat symptoms.

Further reading — tap to open (free) ► DailyMed label: Loperamide · National Formulary of India (IPC)

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DRUG 56 · GASTROINTESTINAL DRUGS

Pancreatic Enzymes (Pancrelipase)

Pancreatic enzyme replacement therapy

Overview. Pancrelipase supplies lipase, amylase and protease to digest food in exocrine pancreatic insufficiency — chronic pancreatitis (common in South India), cystic fibrosis and after pancreatic surgery.

Indications

- Chronic pancreatitis with steatorrhoea
- Cystic fibrosis
- After pancreatectomy

Check before giving

- Stool (fatty, foul-smelling), weight
- Nutritional status
- Pork allergy/religious preference (porcine origin)

Dose and administration	Detail
Oral	25,000–50,000 lipase units with each meal, 10,000–25,000 with snacks
Timing	**With every meal and snack**
Capsules	Swallow whole; or open and sprinkle on acidic food — do not crush or chew

Adverse effect / risk	Nursing action
Abdominal pain, nausea	Adjust dose
Mouth ulcers (if chewed)	Swallow whole
Fibrosing colonopathy (very high doses)	Avoid excess
Hyperuricaemia	Monitor

Hold the dose and inform the doctor if

- Persistent steatorrhoea despite enzymes
- Abdominal pain, obstruction

Patient and family teaching

- Take with every meal and snack
- Do not crush or chew
- PPI may be added to improve effect

Clinical pearls

Enzymes taken between meals are wasted — they must be in the stomach together with food.

Further reading — tap to open (free) ► DailyMed label: Pancreatic Enzymes · National Formulary of India (IPC)

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DRUG 57 · GASTROINTESTINAL DRUGS

Sulfasalazine / Mesalazine (5-ASA)

Aminosalicylates — anti-inflammatory for inflammatory bowel disease

Overview. Aminosalicylates act locally on the colonic mucosa in ulcerative colitis. Sulfasalazine is also used in rheumatoid arthritis.

Indications

- Ulcerative colitis (induction and maintenance)
- Rheumatoid arthritis, ankylosing spondylitis (sulfasalazine)

Check before giving

- Sulfa and aspirin allergy
- CBC, LFT, renal function
- G6PD (sulfasalazine)

Dose and administration	Detail
Sulfasalazine	1–2 g twice daily with food
Mesalazine	2.4–4.8 g/day oral; suppositories/enemas for distal disease
Folic acid	Supplement with sulfasalazine

Adverse effect / risk	Nursing action
Orange-yellow discoloration of urine, skin, contact lenses	Reassure (sulfasalazine)
Agranulocytosis, haemolysis	CBC monitoring; report sore throat
Nephrotoxicity (mesalazine)	Creatinine monitoring
Rash, oligospermia (reversible)	Report

Hold the dose and inform the doctor if

- Sore throat, fever, bruising
- Rash
- Rising creatinine

Patient and family teaching

- Drink plenty of fluids
- Take with food
- Expect orange urine
- Do not stop during remission without advice

Clinical pearls

Sulfasalazine causes reversible male infertility — tell young men planning a family.

Further reading — tap to open (free) ► DailyMed label: Sulfasalazine · National Formulary of India (IPC)

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Antibiotics & Antimicrobials

Overview and one-page summary table

Give the first dose of antibiotic on time — in sepsis within one hour — after taking cultures. Check allergy, renal function, compatibility and infusion rate. Stewardship means the right drug, dose and duration, and stopping on time.

#	Drug	Key point	Page
58	Amoxicillin / Amoxicillin–Clavulanate	Amoxicillin inhibits bacterial cell-wall synthesis	70
59	Ceftriaxone	Ceftriaxone is a broad-spectrum cephalosporin given once daily — among the most used antibiotics in Indian hospitals (…	71
60	Vancomycin	Vancomycin treats serious Gram-positive infections including MRSA	72
61	Doxycycline	Doxycycline inhibits bacterial protein synthesis	73
62	Azithromycin	Azithromycin covers atypical organisms and is given once daily for short courses	74
63	Gentamicin / Amikacin	Aminoglycosides are bactericidal against Gram-negative bacteria	75
64	Co-trimoxazole (Trimethoprim–Sulfamethoxazole)	Co-trimoxazole blocks two steps of bacterial folate synthesis	76
65	Ciprofloxacin / Levofloxacin	Fluoroquinolones inhibit bacterial DNA gyrase	77
66	Metronidazole	Metronidazole covers anaerobes and protozoa (amoebiasis, giardiasis, trichomoniasis)	78
67	Isoniazid (H)	Isoniazid kills actively dividing M	79
68	Rifampicin (R)	Rifampicin is the most potent sterilising TB drug and a powerful enzyme inducer, reducing the effect of many drugs.	80
69	Fluconazole	Fluconazole treats candida and cryptococcal infections	81
70	Acyclovir / Valacyclovir	Acyclovir inhibits herpes virus DNA polymerase	82

Tap a name or page number to open its full page.

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DRUG 58 · ANTIBIOTICS & ANTIMICROBIALS

Amoxicillin / Amoxicillin–Clavulanate

Aminopenicillin (beta-lactam) ± beta-lactamase inhibitor

Overview. Amoxicillin inhibits bacterial cell-wall synthesis. Co-amoxiclav adds clavulanate to overcome beta-lactamase producing organisms.

Indications

- Respiratory tract infections, otitis, sinusitis
- Urinary tract infection
- Skin, dental infections
- H. pylori (amoxicillin)

Check before giving

- **Penicillin allergy history** (type of reaction)
- Renal function
- Cultures before first dose (serious infection)

Dose and administration	Detail
Amoxicillin oral	500 mg–1 g three times daily
Co-amoxiclav oral	625 mg three times daily or 1 g twice daily with food
Co-amoxiclav IV	1.2 g 8-hourly

Adverse effect / risk	Nursing action
Anaphylaxis	Observe after first dose; adrenaline ready
Rash (maculopapular; common with EBV infection)	Report — distinguish from urticaria
Diarrhoea, C. difficile	Report persistent watery stools
Cholestatic jaundice (co-amoxiclav)	LFT if jaundice

Hold the dose and inform the doctor if

- Urticaria, wheeze, swelling — anaphylaxis
- Severe diarrhoea
- Jaundice

Patient and family teaching

- Complete the full course
- Report rash
- Take co-amoxiclav with food

Clinical pearls

A history of "penicillin allergy" is wrong in most patients — clarify the reaction, because true anaphylaxis excludes all penicillins.

Further reading — tap to open (free) ► DailyMed label: Amoxicillin · National Formulary of India (IPC)

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DRUG 59 · ANTIBIOTICS & ANTIMICROBIALS

Ceftriaxone

Third-generation cephalosporin (beta-lactam)

Overview. Ceftriaxone is a broad-spectrum cephalosporin given once daily — among the most used antibiotics in Indian hospitals (meningitis, enteric fever, pneumonia).

Indications

- Community-acquired pneumonia
- Meningitis
- Enteric fever
- Pyelonephritis, gonorrhoea, surgical prophylaxis

Check before giving

- Allergy — cross-reactivity with penicillin anaphylaxis (low)
- **Calcium-containing IV fluids (Ringer lactate) — do not mix in the same line**
- Neonates with jaundice (avoid)

Dose and administration	Detail
IV/IM	1–2 g once daily (meningitis 2 g 12-hourly)
IV infusion	Over 30 min (bolus over 2–4 min acceptable)
IM	Reconstitute with 1% lidocaine (never give lidocaine solution IV)

Adverse effect / risk	Nursing action
Precipitation with calcium (fatal in neonates)	Flush line between; never mix with Ringer lactate/calcium
Allergy, rash	Observe
Diarrhoea, C. difficile	Report
Biliary sludge (pseudolithiasis)	Report RUQ pain
Pain at IM site	Lidocaine diluent

Hold the dose and inform the doctor if

- Anaphylaxis signs
- Severe diarrhoea
- Neonate on calcium infusion

Patient and family teaching

- Complete the course
- Report diarrhoea or rash

Clinical pearls

Ceftriaxone reconstituted with lidocaine is for IM use only — giving it IV can cause cardiac toxicity.

Further reading — tap to open (free) ► DailyMed label: Ceftriaxone · National Formulary of India (IPC)

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CBME-BASED INTERNAL MEDICINE
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DRUG 60 · ANTIBIOTICS & ANTIMICROBIALS

Vancomycin

Glycopeptide antibiotic

Overview. Vancomycin treats serious Gram-positive infections including MRSA. It is given by slow IV infusion with trough-level (or AUC) monitoring; oral vancomycin treats C. difficile.

Indications

- MRSA infections (bacteraemia, pneumonia, skin)
- Infective endocarditis, CNS shunt infections
- C. difficile colitis (oral)
- Febrile neutropenia (selected)

Check before giving

- Renal function before and during
- Trough level before 4th dose (target 10–20 mg/L)
- Hearing
- Infusion rate on pump

Dose and administration	Detail
IV	15–20 mg/kg 8–12-hourly (loading 25–30 mg/kg in sepsis)
Infusion	At least 60 min per 1 g (≤10 mg/min); dilute to ≤5 mg/mL
Oral (C. difficile)	125 mg four times daily ×10 days

Adverse effect / risk	Nursing action
Vancomycin infusion reaction ("red man" — flushing, itch, hypotension)	Slow the infusion; antihistamine; not an allergy
Nephrotoxicity	Creatinine daily; trough levels
Ototoxicity	Report tinnitus
Thrombophlebitis	Dilute adequately; rotate site
Neutropenia (prolonged)	CBC

Hold the dose and inform the doctor if

- Trough >20 mg/L
- Rising creatinine or falling urine output
- Tinnitus

Patient and family teaching

- Report ringing in ears, flushing

Clinical pearls

Draw the trough level just before the next dose (within 30 min) — a level drawn at the wrong time leads to wrong dose changes.

Further reading — tap to open (free) ► DailyMed label: Vancomycin · National Formulary of India (IPC)

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DRUG 61 · ANTIBIOTICS & ANTIMICROBIALS

Doxycycline

Tetracycline antibiotic

Overview. Doxycycline inhibits bacterial protein synthesis. In India it is the drug of choice for scrub typhus and leptospirosis and is used in rickettsial infections, acne and malaria prophylaxis.

Indications

- Scrub typhus, rickettsial fevers
- Leptospirosis
- Atypical pneumonia, chlamydia
- Malaria prophylaxis, acne, brucellosis (combination)

Check before giving

- Pregnancy, breastfeeding, children <8 years (avoid — teeth, bone)
- Antacids, iron, calcium, milk (reduce absorption)

Dose and administration	Detail
Oral	100 mg twice daily (first day 200 mg)
IV	100 mg 12-hourly
Administration	**With a full glass of water, sitting upright for 30 min**; not at bedtime

Adverse effect / risk	Nursing action
Oesophageal ulceration	Full glass of water, remain upright
Photosensitivity	Sunscreen, cover skin
GI upset	May take with food (not milk)
Tooth discoloration in children	Avoid <8 years
Benign intracranial hypertension	Report headache, visual change

Hold the dose and inform the doctor if

- Pregnancy
- Severe headache or visual disturbance
- Retrosternal pain on swallowing

Patient and family teaching

- Take with plenty of water, stay upright
- Avoid sun exposure
- Separate from milk, antacids, iron by 2–3 h

Clinical pearls

Fever in scrub typhus usually settles within 48 hours of doxycycline — persisting fever should prompt a search for another diagnosis.

Further reading — tap to open (free) ► DailyMed label: Doxycycline · National Formulary of India (IPC)

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Handbook of Antibiotics
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Azithromycin

Macrolide antibiotic

Overview. Azithromycin covers atypical organisms and is given once daily for short courses. It is widely used in respiratory infections, enteric fever and STIs.

Indications

- Community-acquired pneumonia (atypicals)
- Enteric fever (uncomplicated)
- Chlamydia, trachoma
- Cholera, Shigella
- Scrub typhus in pregnancy

Check before giving

- QT interval and QT-prolonging drugs
- Liver disease
- Myasthenia gravis (worsens)

Dose and administration	Detail
Oral	500 mg once daily ×3 days, or 500 mg day 1 then 250 mg ×4 days
Enteric fever	1 g once daily ×5–7 days
IV	500 mg once daily over ≥60 min (1–2 mg/mL)

Adverse effect / risk	Nursing action
QT prolongation, arrhythmia	ECG in cardiac patients
GI upset, diarrhoea	Usually mild
Hepatotoxicity	Report jaundice
Hearing loss (high doses)	Report

Hold the dose and inform the doctor if

- Palpitations, syncope
- Jaundice
- Muscle weakness in myasthenia

Patient and family teaching

- Complete the short course
- Take antacids 2 h apart

Clinical pearls

IV azithromycin must be diluted and infused over at least an hour — rapid infusion causes pain and phlebitis.

Further reading — tap to open (free) ► DailyMed label: Azithromycin · National Formulary of India (IPC)

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DRUG 63 · ANTIBIOTICS & ANTIMICROBIALS

Gentamicin / Amikacin

Aminoglycoside antibiotics

Overview. Aminoglycosides are bactericidal against Gram-negative bacteria. They are given once daily, but are nephrotoxic and ototoxic and need level monitoring.

Indications

- Serious Gram-negative infections, sepsis (combination)
- Pyelonephritis
- Neonatal sepsis
- Endocarditis (synergy), MDR-TB (amikacin)

Check before giving

- Creatinine and urine output
- Hearing and balance
- Weight (dose per kg)
- Concurrent nephrotoxic/ototoxic drugs (furosemide, vancomycin)

Dose and administration	Detail
Gentamicin IV	5–7 mg/kg once daily (infuse over 30–60 min)
Amikacin IV	15–20 mg/kg once daily
Levels	Trough <1 mg/L (gentamicin) before next dose; extend interval if high

Adverse effect / risk	Nursing action
Nephrotoxicity	Daily creatinine, output; hydrate
Ototoxicity (irreversible — tinnitus, deafness, vertigo)	Report early
Neuromuscular blockade (rare)	Caution after anaesthesia, myasthenia
Hypomagnesaemia	Monitor

Hold the dose and inform the doctor if

- Rising creatinine or oliguria
- Trough above target
- Tinnitus, vertigo or hearing loss

Patient and family teaching

- Report ringing in ears, dizziness
- Drink fluids if allowed

Clinical pearls

Ototoxicity is permanent — limit courses to the shortest possible time and stop at the first symptom.

Further reading — tap to open (free) ▶ DailyMed label: Gentamicin · National Formulary of India (IPC)

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Co-trimoxazole (Trimethoprim–Sulfamethoxazole)

Sulfonamide combination antibiotic

Overview. Co-trimoxazole blocks two steps of bacterial folate synthesis. It is used in UTIs, Pneumocystis pneumonia and prophylaxis in HIV.

Indications

- Urinary tract infection
- Pneumocystis pneumonia (treatment and prophylaxis in HIV)
- Toxoplasmosis prophylaxis
- Nocardia, some MRSA skin infections

Check before giving

- Sulfa allergy
- Renal function, K^+
- G6PD deficiency
- Pregnancy (first trimester, near term)

Dose and administration	Detail
Oral	960 mg (1 DS tablet) twice daily (UTI)
HIV prophylaxis	960 mg once daily
PCP treatment	15–20 mg/kg/day trimethoprim in 3–4 doses

Adverse effect / risk	Nursing action
Rash; Stevens–Johnson syndrome	Stop at first rash with mucosal involvement
Hyperkalaemia	K^+ monitoring, especially with ACE inhibitors
Bone-marrow suppression	CBC
Crystalluria	Encourage fluids
Raised creatinine	Monitor

Hold the dose and inform the doctor if

- Any rash, blistering or mouth ulcers
- K^+ >5.5 mmol/L
- Sore throat, bruising

Patient and family teaching

- Drink 2 litres of fluid daily
- Report rash immediately
- Avoid sun

Clinical pearls

Stevens–Johnson syndrome often starts with fever and mouth/eye soreness before the rash — stop the drug at the first sign.

Further reading — tap to open (free) ► DailyMed label: Co-trimoxazole · National Formulary of India (IPC)

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DRUG 65 · ANTIBIOTICS & ANTIMICROBIALS

Ciprofloxacin / Levofloxacin

Fluoroquinolone antibiotics

Overview. Fluoroquinolones inhibit bacterial DNA gyrase. Resistance is now high in India (enteric fever, E. coli), and serious adverse effects limit their use.

Indications

- Complicated UTI, prostatitis
- Bone and joint infection
- Pneumonia (levofloxacin)
- MDR-TB (levofloxacin, moxifloxacin)

Check before giving

- Age >60, steroid use (tendon rupture)
- QT-prolonging drugs
- Myasthenia gravis
- Pregnancy, children (avoid)

Dose and administration	Detail
Ciprofloxacin	500–750 mg oral twice daily; 400 mg IV 12-hourly
Levofloxacin	500–750 mg once daily
Spacing	Separate from antacids, iron, calcium, dairy by 2 h before/6 h after

Adverse effect / risk	Nursing action
Tendinitis, tendon rupture (Achilles)	Stop at first tendon pain; rest
QT prolongation	ECG in risk patients
Peripheral neuropathy, CNS effects (confusion, seizures)	Report
Dysglycaemia	Glucose in diabetics
Photosensitivity, C. difficile	Sun protection; report diarrhoea

Hold the dose and inform the doctor if

- Tendon pain
- Confusion or seizures
- Palpitations

Patient and family teaching

- Do not take with milk or antacids
- Report tendon pain immediately
- Avoid strong sunlight

Clinical pearls

Fluoroquinolones carry a boxed warning for tendon rupture, neuropathy and CNS effects — not for uncomplicated infections when alternatives exist.

Further reading — tap to open (free) ► DailyMed label: Ciprofloxacin · National Formulary of India (IPC)

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Emergency Physician's ECG Manual
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DRUG 66 · ANTIBIOTICS & ANTIMICROBIALS

Metronidazole

Nitroimidazole antibacterial and antiprotozoal

Overview. Metronidazole covers anaerobes and protozoa (amoebiasis, giardiasis, trichomoniasis). It is used in abdominal and pelvic infections and C. difficile.

Indications

- Anaerobic and intra-abdominal infections
- Amoebic liver abscess, amoebic dysentery, giardiasis
- Bacterial vaginosis, trichomoniasis
- C. difficile (mild)

Check before giving

- Alcohol use (including alcohol-containing syrups)
- Liver disease
- Warfarin (raises INR)

Dose and administration	Detail
Oral	400–500 mg three times daily
IV	500 mg 8-hourly over 20–30 min
Amoebic liver abscess	800 mg three times daily ×7–10 days

Adverse effect / risk	Nursing action
Disulfiram-like reaction with alcohol (flushing, vomiting)	No alcohol during and 48–72 h after
Metallic taste, nausea	Take with food
Peripheral neuropathy, seizures (prolonged use)	Report tingling
Dark urine	Reassure

Hold the dose and inform the doctor if

- Tingling or numbness
- Seizure
- INR rising (on warfarin)

Patient and family teaching

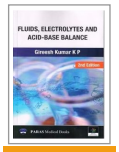
- Absolutely no alcohol during and for 3 days after
- Expect metallic taste and dark urine
- Complete course; treat partner (trichomoniasis)

Clinical pearls

Metronidazole markedly increases warfarin effect — check the INR within a few days of starting.

Further reading — tap to open (free) ► DailyMed label: Metronidazole · National Formulary of India (IPC)

Section: Antibiotics & Antimicrobials · Summary table on page 69 · Contents


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DRUG 67 · ANTIBIOTICS & ANTIMICROBIALS

Isoniazid (H)

First-line antitubercular drug

Overview. Isoniazid kills actively dividing M. tuberculosis. It is part of every first-line regimen in the National TB Elimination Programme (NTEP) and is used alone for TB preventive therapy.

Indications

- Tuberculosis (with R, Z, E)
- TB preventive therapy (6H, 3HP)

Check before giving

- LFT at baseline (alcohol, liver disease, HIV, elderly)
- Peripheral neuropathy risk — diabetes, alcohol, malnutrition, pregnancy, HIV
- Adherence (Nikshay, 99DOTS)

Dose and administration	Detail
Oral	5 mg/kg (max 300 mg) daily as part of weight-band FDC
With	Pyridoxine 10–25 mg daily (50–100 mg if neuropathy)
Timing	Empty stomach

Adverse effect / risk	Nursing action
Hepatitis (anorexia, nausea, jaundice)	Stop all ATT if jaundice or ALT >3–5× ULN; report
Peripheral neuropathy	Pyridoxine; report tingling
Rash, drug fever	Report
Seizures in overdose	Pyridoxine IV (antidote)

Hold the dose and inform the doctor if

- Jaundice, vomiting, abdominal pain
- Severe rash
- Tingling numbness

Patient and family teaching

- Take daily without missing — notify via Nikshay
- Avoid alcohol
- Report yellow eyes, loss of appetite
- Take pyridoxine

Clinical pearls

Nikshay Poshan Yojana provides nutritional support to TB patients — nurses should ensure patients are registered.

Further reading — tap to open (free) ▶ DailyMed label: Isoniazid · National Formulary of India (IPC)

Section: Antibiotics & Antimicrobials · Summary table on page 69 · Contents

CBME-BASED INTERNAL MEDICINE
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DRUG 68 · ANTIBIOTICS & ANTIMICROBIALS

Rifampicin (R)

First-line antitubercular (rifamycin)

Overview. Rifampicin is the most potent sterilising TB drug and a powerful enzyme inducer, reducing the effect of many drugs.

Indications

- Tuberculosis
- Leprosy (MDT)
- Prophylaxis of meningococcal contacts
- Brucellosis, MRSA (combination)

Check before giving

- LFT
- Interacting drugs: oral contraceptives, warfarin, ART (dolutegravir dose doubled), antidiabetics, steroids
- Platelet count if bleeding

Dose and administration	Detail
Oral	10 mg/kg (max 600 mg) daily on empty stomach
Form	Weight-band fixed-dose combination tablets

Adverse effect / risk	Nursing action
Orange-red urine, sweat, tears	Reassure; stains soft contact lenses
Hepatotoxicity	LFT if symptoms
Flu-like syndrome, thrombocytopenia (intermittent dosing)	Report bleeding
Reduced effect of other drugs	Review all medicines

Hold the dose and inform the doctor if

- Jaundice
- Bleeding, purpura
- Contraceptive failure risk (inform)

Patient and family teaching

- Expect orange urine and tears
- Use barrier contraception (pills fail)
- Avoid soft contact lenses
- Take on empty stomach

Clinical pearls

Rifampicin makes oral contraceptives, warfarin and many other drugs less effective — always review the patient's full medicine list.

Further reading — tap to open (free) ► DailyMed label: Rifampicin · National Formulary of India (IPC)

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DRUG 69 · ANTIBIOTICS & ANTIMICROBIALS

Fluconazole

Triazole antifungal

Overview. Fluconazole treats candida and cryptococcal infections. It inhibits CYP enzymes and interacts with many drugs.

Indications

- Oral, oesophageal, vaginal candidiasis
- Candidaemia (susceptible species)
- Cryptococcal meningitis (consolidation, maintenance)
- Antifungal prophylaxis

Check before giving

- LFT
- QT-prolonging drugs
- Interacting drugs (warfarin, phenytoin, sulfonylureas)
- Pregnancy (avoid high doses)

Dose and administration	Detail
Oral/IV	150 mg single dose (vaginal); 100–400 mg daily (mucosal); 400–800 mg daily (systemic)
Renal failure	50% dose if CrCl <50

Adverse effect / risk	Nursing action
Hepatotoxicity	LFT; report jaundice
QT prolongation	ECG if risk
Drug interactions (bleeding, hypoglycaemia)	Monitor INR, glucose
GI upset, rash	Report

Hold the dose and inform the doctor if

- Jaundice
- Palpitations
- INR rise or hypoglycaemia

Patient and family teaching

- Complete the course
- Report yellow eyes or rash

Clinical pearls

Fluconazole doubles the effect of warfarin and sulfonylureas — monitor INR and glucose closely.

Further reading — tap to open (free) ► DailyMed label: Fluconazole · National Formulary of India (IPC)

Section: Antibiotics & Antimicrobials · Summary table on page 69 · Contents

Handbook of Antibiotics
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DRUG 70 · ANTIBIOTICS & ANTIMICROBIALS

Acyclovir / Valacyclovir

Antiviral — nucleoside analogue

Overview. Acyclovir inhibits herpes virus DNA polymerase. IV acyclovir is life-saving in herpes encephalitis; valacyclovir is a better-absorbed oral pro-drug.

Indications

- Herpes simplex (genital, labial, encephalitis)
- Herpes zoster (shingles), chickenpox in adults/immunocompromised
- Prophylaxis in transplant/chemotherapy

Check before giving

- Renal function (dose adjust)
- Hydration
- Weight for IV dose

Dose and administration	Detail
IV	5–10 mg/kg 8-hourly over 1 h (encephalitis 10 mg/kg)
Oral acyclovir	400 mg TDS (HSV); 800 mg five times daily ×7 days (zoster)
Valacyclovir	1 g TDS ×7 days (zoster)

Adverse effect / risk	Nursing action
Crystal nephropathy, AKI	**Infuse over at least 1 h; ensure good hydration**; creatinine monitoring
Neurotoxicity (confusion, tremor) in renal failure	Dose adjust; report
Phlebitis (alkaline pH)	Large vein; dilute
Nausea, headache	Mild

Hold the dose and inform the doctor if

- Rising creatinine, low urine output
- Confusion or tremor

Patient and family teaching

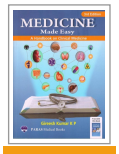
- Start early (within 72 h of rash) for best effect
- Drink plenty of fluids
- Avoid contact with pregnant women and infants while lesions are active

Clinical pearls

In suspected herpes encephalitis (fever, confusion, seizures), give IV acyclovir immediately — do not wait for the MRI or PCR.

Further reading — tap to open (free) ► DailyMed label: Acyclovir · National Formulary of India (IPC)

Section: Antibiotics & Antimicrobials · Summary table on page 69 · Contents



Psychiatric & Neurological Drugs

Overview and one-page summary table

Psychotropic and anticonvulsant drugs need attention to therapeutic levels, suicide risk, sedation and falls, and dangerous syndromes — serotonin syndrome, neuroleptic malignant syndrome and lithium toxicity.

#	Drug	Key point	Page
71	Fluoxetine / Escitalopram	SSRIs are first-line for depression and anxiety disorders	84
72	Sertraline	Sertraline is a widely used SSRI with few interactions, safe after myocardial infarction and in breastfeeding	85
73	Amitriptyline	Amitriptyline is now used mainly in low doses for neuropathic pain, migraine prophylaxis and insomnia	86
74	Phenelzine (MAO Inhibitors)	MAOIs are rarely used now but remain examination favourites	87
75	Lithium Carbonate	Lithium prevents manic and depressive relapses in bipolar disorder and reduces suicide	88
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77	Olanzapine / Clozapine	Atypical antipsychotics cause fewer movement disorders but more metabolic effects	90
78	Lorazepam / Diazepam / Midazolam	Benzodiazepines enhance GABA, causing anxiolysis, sedation, muscle relaxation and anticonvulsant effects	91
79	Buspirone	Buspirone treats generalised anxiety without sedation, dependence or withdrawal, but takes 2–4 weeks to work and is no…	92
80	Zolpidem	Zolpidem acts on the benzodiazepine site of the GABA receptor for short-term treatment of insomnia	93
81	Phenytoin / Fosphenytoin	Phenytoin is used for focal and generalised seizures and status epilepticus	94
82	Carbamazepine	Carbamazepine treats focal epilepsy, trigeminal neuralgia and bipolar disorder	95
83	Sodium Valproate	Valproate is effective for generalised epilepsy and bipolar mania but is hepatotoxic and highly teratogenic — it shoul…	96
84	Levetiracetam	Levetiracetam is widely used because it has few interactions, needs no level monitoring and can be given IV	97
85	Levodopa–Carbidopa	Levodopa is converted to dopamine in the brain; carbidopa prevents peripheral conversion	98
86	Benztropine / Trihexyphenidyl	Anticholinergics treat tremor in Parkinson disease and drug-induced extrapyramidal symptoms (dystonia, parkinsonism) f…	99
87	Donepezil	Donepezil increases brain acetylcholine and modestly improves cognition and function in Alzheimer dementia	100

Tap a name or page number to open its full page.



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Fluoxetine / Escitalopram

Selective serotonin reuptake inhibitor (SSRI)

Overview. SSRIs are first-line for depression and anxiety disorders. Benefit takes 2–6 weeks, while early side effects and activation can briefly increase suicidal thoughts in young people.

Indications

- Depression
- Generalised anxiety, panic disorder
- Obsessive–compulsive disorder
- PTSD, bulimia

Check before giving

- Suicide risk assessment
- Other serotonergic drugs (tramadol, linezolid, MAOI)
- Bleeding risk with NSAIDs/anticoagulants
- Sodium in elderly

Dose and administration	Detail
Fluoxetine	20 mg once daily in the morning (max 60 mg)
Escitalopram	5–20 mg once daily
Sertraline	50–200 mg once daily

Adverse effect / risk	Nursing action
Increased suicidal thoughts early (under 25 y)	Close observation in first weeks
Nausea, headache, insomnia, agitation	Usually transient; morning dosing
Sexual dysfunction	Discuss openly
Hyponatraemia (elderly)	Check Na^+
Serotonin syndrome	See sertraline page
Discontinuation symptoms	Taper (less with fluoxetine)

Hold the dose and inform the doctor if

- Suicidal ideation or agitation
- Confusion, Na^+ <130
- Signs of serotonin syndrome

Patient and family teaching

- Effect takes 2–6 weeks — keep taking
- Do not stop suddenly
- Avoid alcohol
- Report thoughts of self-harm immediately

Clinical pearls

Ask directly about suicidal thoughts at every contact — asking does not increase risk, and it is the first step to keeping the patient safe.

Further reading — tap to open (free) ► DailyMed label: Fluoxetine · National Formulary of India (IPC)

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Sertraline

SSRI antidepressant

Overview. Sertraline is a widely used SSRI with few interactions, safe after myocardial infarction and in breastfeeding. Combining serotonergic drugs risks serotonin syndrome.

Indications

- Depression (including post-MI, postpartum)
- Anxiety, panic, OCD, PTSD

Check before giving

- Serotonergic co-medication (tramadol, ondansetron, linezolid, St John's wort, MAOI)
- Suicide risk
- Bleeding risk

Dose and administration	Detail
Oral	50 mg once daily, increase by 50 mg every 1–2 weeks to max 200 mg
MAOI washout	14 days between MAOI and sertraline

Adverse effect / risk	Nursing action
Serotonin syndrome — agitation, tremor, clonus, hyperreflexia, fever, diarrhoea	Stop serotonergic drugs; cool; benzodiazepine; urgent review
GI upset, diarrhoea	With food
Insomnia, sweating	Morning dose
Sexual dysfunction	Discuss

Hold the dose and inform the doctor if

- Clonus, fever, agitation
- Suicidal thoughts
- Bleeding

Patient and family teaching

- Avoid St John's wort and do not combine with other antidepressants
- Report shaking, sweating, fever

Clinical pearls

Serotonin syndrome develops within hours of adding a second serotonergic drug — tramadol and linezolid are common hospital culprits.

Further reading — tap to open (free) ► DailyMed label: Sertraline · National Formulary of India (IPC)

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Emergency Physician's ECG Manual
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DRUG 73 · PSYCHIATRIC & NEUROLOGICAL DRUGS

Amitriptyline

Tricyclic antidepressant (TCA)

Overview. Amitriptyline is now used mainly in low doses for neuropathic pain, migraine prophylaxis and insomnia. In overdose it is cardiotoxic and frequently fatal.

Indications

- Neuropathic pain, diabetic neuropathy
- Migraine and tension headache prophylaxis
- Depression (higher doses, less used)

Check before giving

- ECG (QRS, QT) in cardiac disease
- Glaucoma, prostatism, elderly (anticholinergic)
- Suicide risk — quantity dispensed

Dose and administration	Detail
Oral (pain)	10–25 mg at night, up to 75 mg
Depression	75–150 mg/day
Elderly	Start 10 mg

Adverse effect / risk	Nursing action
Anticholinergic — dry mouth, constipation, urinary retention, blurred vision, confusion	Fluids, fibre; monitor voiding
Sedation, orthostatic hypotension	Night dose; fall precautions
Weight gain	Diet
Overdose — arrhythmias, seizures, coma (QRS >100 ms)	Emergency; IV sodium bicarbonate

Hold the dose and inform the doctor if

- Urinary retention
- Confusion in elderly
- Palpitations, syncope
- Any intentional overdose

Patient and family teaching

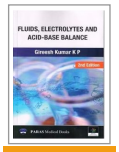
- Take at night
- Rise slowly
- Do not drive if drowsy
- Keep limited supply (family to hold tablets if risk)

Clinical pearls

In TCA overdose, a QRS duration over 100 ms predicts seizures and arrhythmias — sodium bicarbonate is the antidote.

Further reading — tap to open (free) ► DailyMed label: Amitriptyline · National Formulary of India (IPC)

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DRUG 74 · PSYCHIATRIC & NEUROLOGICAL DRUGS

Phenelzine (MAO Inhibitors)

Monoamine oxidase inhibitor (MAOI) antidepressant

Overview. MAOIs are rarely used now but remain examination favourites. They prevent breakdown of noradrenaline, serotonin and dietary tyramine, causing hypertensive crisis with tyramine-rich food.

Indications

- Treatment-resistant depression
- Atypical depression
- (Selegiline/rasagiline — Parkinson disease)

Check before giving

- Diet history and understanding of restrictions
- All co-medications (decongestants, pethidine, SSRIs, tramadol)
- BP

Dose and administration	Detail
Oral	Phenelzine 15 mg three times daily
Washout	2 weeks before starting another antidepressant (5 weeks after fluoxetine)

Adverse effect / risk	Nursing action
Hypertensive crisis — occipital headache, palpitations, neck stiffness, sweating	Check BP; hold drug; urgent treatment (phentolamine)
Orthostatic hypotension	Rise slowly
Serotonin syndrome with SSRIs, pethidine	Avoid combination
Insomnia, weight gain	Monitor

Hold the dose and inform the doctor if

- Severe headache or BP >180/110
- Planned anaesthesia or new drug
- Ingested tyramine-rich food

Patient and family teaching

- Avoid aged cheese, fermented/soy sauce, cured meats, pickled fish, red wine, beer on tap, overripe bananas
- Avoid cold/cough remedies with decongestants
- Carry a warning card

Clinical pearls

Patients on MAOIs need a dietary list in writing — the restrictions continue for 2 weeks after stopping the drug.

Further reading — tap to open (free) ► DailyMed label: Phenelzine · National Formulary of India (IPC)

Section: Psychiatric & Neurological Drugs · Summary table on page 83 · Contents

CBME-BASED INTERNAL MEDICINE
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Lithium Carbonate

Mood stabiliser

Overview. Lithium prevents manic and depressive relapses in bipolar disorder and reduces suicide. Its therapeutic range is narrow (0.6–1.0 mmol/L) and toxicity follows dehydration or interacting drugs.

Indications

- Bipolar disorder (acute mania, maintenance)
- Treatment-resistant depression (augmentation)

Check before giving

- Serum level 12 h after last dose
- Creatinine, TFT, calcium (baseline, 6-monthly)
- Sodium and fluid intake
- Interacting drugs: NSAIDs, ACE inhibitors, ARBs, diuretics

Dose and administration	Detail
Oral	400–1,200 mg/day (once at night or divided)
Target level	0.6–1.0 mmol/L (maintenance 0.6–0.8)
Levels	Weekly after dose change until stable, then every 3 months

Adverse effect / risk	Nursing action
Toxicity — coarse tremor, vomiting, diarrhoea, ataxia, confusion, seizures (>1.5 mmol/L)	Hold; urgent level; IV fluids; haemodialysis if severe
Fine tremor, polyuria, thirst	Common — report changes
Hypothyroidism, hyperparathyroidism	Periodic TFT, calcium
Renal impairment, nephrogenic DI	Creatinine monitoring
Teratogenic (Ebstein anomaly)	Pregnancy planning

Hold the dose and inform the doctor if

- Level >1.0 (or >1.2) mmol/L
- Vomiting, diarrhoea, fever, dehydration
- Coarse tremor, unsteadiness, confusion
- New NSAID, diuretic, ACE inhibitor

Patient and family teaching

- Drink 2–3 litres daily and keep salt intake steady
- Avoid NSAIDs (use paracetamol)
- Stop and seek help during vomiting/diarrhoea
- Regular blood tests

Clinical pearls

A patient on lithium who develops diarrhoea and vomiting is at high risk of toxicity — check a level the same day.

Further reading — tap to open (free) ► DailyMed label: Lithium Carbonate · National Formulary of India (IPC)

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DRUG 76 · PSYCHIATRIC & NEUROLOGICAL DRUGS

Haloperidol

Typical (first-generation) antipsychotic — butyrophenone

Overview. Haloperidol blocks dopamine D2 receptors. It is used for acute agitation, psychosis and delirium (with caution), and frequently causes extrapyramidal side effects.

Indications

- Acute agitation, psychosis, mania
- Schizophrenia
- Delirium (low dose, short-term)
- Intractable nausea and vomiting (palliative)

Check before giving

- ECG — QT prolongation (especially IV)
- Parkinson disease, Lewy body dementia (avoid)
- Baseline temperature, muscle tone
- Elderly with dementia (increased mortality)

Dose and administration	Detail
Oral	0.5–5 mg two to three times daily
IM (rapid tranquillisation)	2–5 mg, often with promethazine or lorazepam
Delirium (elderly)	0.5–1 mg
Depot (decanoate)	Deep IM monthly

Adverse effect / risk	Nursing action
Acute dystonia, akathisia, parkinsonism	Promethazine/procyclidine/benztropine; report
Neuroleptic malignant syndrome — fever, rigidity, confusion, raised CK	Stop; cool; urgent ICU; dantrolene/bromocriptine
QT prolongation, torsades	ECG
Sedation, hypotension, falls	Monitor
Tardive dyskinesia (long-term)	Report involuntary movements

Hold the dose and inform the doctor if

- Temperature >38 °C with rigidity
- Muscle spasms of neck, eyes, tongue
- QTc >500 ms
- Severe sedation

Patient and family teaching

- Report stiffness, restlessness, abnormal movements
- Avoid dehydration and heat
- Do not stop suddenly

Clinical pearls

Neuroleptic malignant syndrome is a medical emergency with ~10% mortality — hyperthermia plus "lead-pipe" rigidity in a patient on an antipsychotic.

Further reading — tap to open (free) ► DailyMed label: Haloperidol · National Formulary of India (IPC)

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Handbook of Antibiotics
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Olanzapine / Clozapine

Atypical (second-generation) antipsychotics

Overview. Atypical antipsychotics cause fewer movement disorders but more metabolic effects. Clozapine is the most effective drug in resistant schizophrenia but can cause fatal agranulocytosis.

Indications

- Schizophrenia (clozapine for treatment-resistant)
- Bipolar mania (olanzapine)
- Agitation (olanzapine IM)

Check before giving

- Weight, BMI, glucose, lipids
- **Clozapine — absolute neutrophil count before and weekly for 18 weeks, then monthly**
- Heart rate, ECG (clozapine myocarditis)
- Bowel habit (clozapine constipation)

Dose and administration	Detail
Olanzapine	5–20 mg once daily
Clozapine	12.5 mg once or twice, titrate slowly to 200–450 mg/day
Missed clozapine >48 h	Re-titrate from start

Adverse effect / risk	Nursing action
Agranulocytosis (clozapine) — sore throat, fever	Urgent CBC; stop if ANC <1,000
Myocarditis (first weeks)	Tachycardia, chest pain, fever — ECG, troponin
Severe constipation, ileus (clozapine)	Laxatives; monitor bowels
Weight gain, diabetes, dyslipidaemia	Metabolic monitoring
Seizures, hypersalivation, sedation	Report

Hold the dose and inform the doctor if

- ANC below threshold or sore throat/fever
- Chest pain, tachycardia >120
- No bowel movement for 3 days
- Seizure

Patient and family teaching

- Report sore throat or fever at once
- Keep all blood test appointments
- Eat healthy diet; exercise
- Prevent constipation

Clinical pearls

Clozapine-induced constipation kills more patients than agranulocytosis — ask about bowels at every visit.

Further reading — tap to open (free) ► DailyMed label: Olanzapine · National Formulary of India (IPC)

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DRUG 78 · PSYCHIATRIC & NEUROLOGICAL DRUGS

Lorazepam / Diazepam / Midazolam

Benzodiazepines

Overview. Benzodiazepines enhance GABA, causing anxiolysis, sedation, muscle relaxation and anticonvulsant effects. They are first-line in status epilepticus and alcohol withdrawal.

Indications

- Status epilepticus, seizures
- Alcohol withdrawal
- Acute anxiety, agitation
- Procedural sedation (midazolam)

Check before giving

- Respiratory rate, SpO_2, level of consciousness
- Other CNS depressants (opioids, alcohol)
- Elderly, COPD, sleep apnoea
- Flumazenil and airway equipment ready

Dose and administration	Detail
Status epilepticus	Lorazepam 4 mg IV (0.1 mg/kg) or diazepam 10 mg IV; midazolam 10 mg IM/buccal; repeat once after 5–10 min
Anxiety	Lorazepam 0.5–2 mg oral 2–3 times daily
Alcohol withdrawal	Chlordiazepoxide/diazepam symptom-triggered (CIWA-Ar)

Adverse effect / risk	Nursing action
Respiratory depression (especially with opioids)	Monitor RR, SpO_2; support airway; flumazenil 0.2 mg IV (caution — seizures)
Excess sedation, falls, confusion in elderly	Fall precautions; lowest dose
Dependence, withdrawal seizures	Short courses; taper
Paradoxical agitation	Report

Hold the dose and inform the doctor if

- RR <10/min or SpO_2 <92%
- Unrousable
- Elderly confused or falling

Patient and family teaching

- Do not drive
- Avoid alcohol
- Short-term use only; do not stop suddenly after long use

Clinical pearls

Flumazenil can precipitate seizures in long-term benzodiazepine users and mixed overdoses — support the airway first.

Further reading — tap to open (free) ► DailyMed label: Lorazepam · National Formulary of India (IPC)

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DRUG 79 · PSYCHIATRIC & NEUROLOGICAL DRUGS

Buspirone

Non-benzodiazepine anxiolytic (5-HT1A partial agonist)

Overview. Buspirone treats generalised anxiety without sedation, dependence or withdrawal, but takes 2–4 weeks to work and is not useful for acute panic.

Indications

- Generalised anxiety disorder
- Augmentation in depression

Check before giving

- Expectation of delayed effect
- MAOI use (avoid)
- Liver/renal impairment

Dose and administration	Detail
Oral	5 mg two to three times daily, up to 20–30 mg/day in divided doses
Food	Take consistently with or without food

Adverse effect / risk	Nursing action
Dizziness, headache, nausea	Usually mild
Restlessness	Report
Serotonin syndrome with MAOIs/serotonergic drugs	Avoid combination

Hold the dose and inform the doctor if

- Severe dizziness
- No benefit after 4–6 weeks (review)

Patient and family teaching

- Effect takes weeks — take regularly, not as needed
- Avoid grapefruit juice

Clinical pearls

Patients switching from a benzodiazepine must taper the benzodiazepine — buspirone does not prevent benzodiazepine withdrawal.

Further reading — tap to open (free) ► DailyMed label: Buspirone · National Formulary of India (IPC)

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DRUG 80 · PSYCHIATRIC & NEUROLOGICAL DRUGS

Zolpidem

Non-benzodiazepine sedative-hypnotic ("Z-drug")

Overview. Zolpidem acts on the benzodiazepine site of the GABA receptor for short-term treatment of insomnia. Complex sleep behaviours and next-day impairment are important risks.

Indications

- Short-term insomnia (2–4 weeks)

Check before giving

- Sleep hygiene first
- Elderly, falls risk
- Other sedatives, alcohol
- History of complex sleep behaviours

Dose and administration	Detail
Oral	5 mg at bedtime (women and elderly), up to 10 mg (men)
Timing	Immediately before bed when 7–8 hours of sleep are possible

Adverse effect / risk	Nursing action
Complex sleep behaviours (sleepwalking, sleep-driving)	Stop permanently
Next-morning drowsiness	Avoid driving
Falls, confusion in elderly	Bed rails, night light
Dependence, rebound insomnia	Short-term use

Hold the dose and inform the doctor if

- Sleepwalking or unusual night behaviour
- Falls
- Respiratory depression with opioids

Patient and family teaching

- Take only when going to bed
- Do not drive next morning if drowsy
- No alcohol
- Practise sleep hygiene

Clinical pearls

For hospital insomnia, try non-drug measures first — light, noise, pain control and night-time interruptions are the usual causes.

Further reading — tap to open (free) ► DailyMed label: Zolpidem · National Formulary of India (IPC)

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Emergency Physician's ECG Manual
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DRUG 81 · PSYCHIATRIC & NEUROLOGICAL DRUGS

Phenytoin / Fosphenytoin

Anticonvulsant — sodium-channel blocker

Overview. Phenytoin is used for focal and generalised seizures and status epilepticus. It has saturable (non-linear) kinetics, a narrow therapeutic range (10–20 mg/L) and causes tissue injury if extravasated.

Indications

- Status epilepticus (second line, after benzodiazepine)
- Focal and generalised tonic–clonic seizures
- Seizure prophylaxis in head injury

Check before giving

- ECG and BP monitoring during IV loading
- Serum level, albumin
- Large vein; **saline only (precipitates in dextrose)**
- Interacting drugs (many)

Dose and administration	Detail
IV loading	15–20 mg/kg at ≤50 mg/min (≤25 mg/min in elderly/cardiac) in normal saline with in-line filter
Fosphenytoin	20 mg PE/kg at up to 150 mg PE/min
Maintenance	300–400 mg/day oral; level 10–20 mg/L

Adverse effect / risk	Nursing action
Hypotension, bradycardia, arrhythmia (fast infusion)	Slow infusion; ECG
Purple glove syndrome, extravasation	Large vein; check site
Toxicity — nystagmus, ataxia, slurred speech, drowsiness	Hold; check level
Gingival hyperplasia, hirsutism, coarse features	Oral hygiene
SJS rash, teratogenic, folate deficiency	Report rash

Hold the dose and inform the doctor if

- Level >20 mg/L or nystagmus/ataxia
- HR <60 or SBP <90 during infusion
- Rash

Patient and family teaching

- Good dental hygiene
- Do not switch brands
- Report rash, unsteadiness
- Carry epilepsy card; avoid alcohol

Clinical pearls

Flush with normal saline before and after IV phenytoin — it crystallises in glucose solutions.

Further reading — tap to open (free) ► DailyMed label: Phenytoin · National Formulary of India (IPC)

Section: Psychiatric & Neurological Drugs · Summary table on page 83 · Contents

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Carbamazepine

Anticonvulsant and mood stabiliser

Overview. Carbamazepine treats focal epilepsy, trigeminal neuralgia and bipolar disorder. It induces its own metabolism and that of many drugs and can cause serious skin reactions.

Indications

- Focal seizures
- Trigeminal neuralgia
- Bipolar disorder

Check before giving

- HLA-B*1502 testing in people of Asian ancestry (SJS risk)
- CBC, LFT, sodium
- Interacting drugs (contraceptives, warfarin)
- Pregnancy plan

Dose and administration	Detail
Oral	100–200 mg once or twice daily, increase slowly to 400–1,200 mg/day
Levels	4–12 mg/L
Retard tablets	Swallow whole

Adverse effect / risk	Nursing action
SJS/TEN	Stop at first rash; urgent review
Bone-marrow suppression, agranulocytosis	CBC; report sore throat, bruising
Hyponatraemia (SIADH)	Check Na^+
Dizziness, diplopia, ataxia	Dose-related; report
Auto-induction — levels fall after 2–4 weeks	Recheck level

Hold the dose and inform the doctor if

- Rash, mouth ulcers, fever
- Sore throat or bruising
- Na^+ <130 or confusion

Patient and family teaching

- Report rash immediately
- Use non-hormonal contraception
- Avoid grapefruit
- Do not stop suddenly

Clinical pearls

Carbamazepine reduces the effectiveness of oral contraceptives — women need effective alternative contraception and folic acid.

Further reading — tap to open (free) ► DailyMed label: Carbamazepine · National Formulary of India (IPC)

Section: Psychiatric & Neurological Drugs · Summary table on page 83 · Contents

CBME-BASED INTERNAL MEDICINE
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Sodium Valproate

Broad-spectrum anticonvulsant and mood stabiliser

Overview. Valproate is effective for generalised epilepsy and bipolar mania but is hepatotoxic and highly teratogenic — it should be avoided in girls and women who could become pregnant.

Indications

- Generalised epilepsy (absence, myoclonic, tonic–clonic)
- Status epilepticus (IV)
- Bipolar mania
- Migraine prophylaxis

Check before giving

- LFT and platelets at baseline
- Pregnancy potential — Pregnancy Prevention Programme
- Ammonia if drowsy
- Interacting drugs (carbapenems drastically lower levels)

Dose and administration	Detail
Oral	500 mg–2 g/day in divided doses
IV (status)	20–40 mg/kg over 10 min
Levels	50–100 mg/L

Adverse effect / risk	Nursing action
Hepatotoxicity	LFT; report jaundice, vomiting, lethargy
Pancreatitis	Report abdominal pain
Thrombocytopenia, bleeding	Platelets
Hyperammonaemic encephalopathy	Check ammonia if drowsy/confused
Weight gain, tremor, hair loss	Monitor
Neural tube defects, developmental delay	Avoid in pregnancy

Hold the dose and inform the doctor if

- Jaundice, vomiting, abdominal pain
- Bruising or bleeding
- Drowsiness, confusion
- Pregnancy

Patient and family teaching

- Women: use effective contraception; plan pregnancy with doctor
- Report abdominal pain, yellow eyes
- Do not stop suddenly

Clinical pearls

Carbapenem antibiotics (meropenem) reduce valproate levels by up to 90% within a day — seizures may recur.

Further reading — tap to open (free) ► DailyMed label: Sodium Valproate · National Formulary of India (IPC)

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DRUG 84 · PSYCHIATRIC & NEUROLOGICAL DRUGS

Levetiracetam

Broad-spectrum anticonvulsant (SV2A modulator)

Overview. Levetiracetam is widely used because it has few interactions, needs no level monitoring and can be given IV. Behavioural side effects are its main problem.

Indications

- Focal and generalised epilepsy
- Status epilepticus (second line)
- Seizure prophylaxis (head injury, neurosurgery)
- Epilepsy in pregnancy (preferred option)

Check before giving

- Renal function (dose adjust)
- Mood and psychiatric history

Dose and administration	Detail
Oral/IV	500 mg twice daily, up to 1,500 mg twice daily
Status epilepticus	60 mg/kg IV (max 4.5 g) over 10–15 min
Renal	Reduce if CrCl <80

Adverse effect / risk	Nursing action
Irritability, aggression, depression, suicidal thoughts	Report; dose change or switch
Somnolence, dizziness	Fall precautions
Infections (nasopharyngitis)	Monitor

Hold the dose and inform the doctor if

- Aggression or suicidal thoughts
- Excess sedation

Patient and family teaching

- Report mood changes
- Do not stop suddenly
- Avoid alcohol

Clinical pearls

Levetiracetam IV and oral doses are the same — conversion is simple and it is ideal when patients are nil by mouth.

Further reading — tap to open (free) ► DailyMed label: Levetiracetam · National Formulary of India (IPC)

Section: Psychiatric & Neurological Drugs · Summary table on page 83 · Contents

Handbook of Antibiotics
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DRUG 85 · PSYCHIATRIC & NEUROLOGICAL DRUGS

Levodopa–Carbidopa

Dopamine precursor with decarboxylase inhibitor — antiparkinsonian

Overview. Levodopa is converted to dopamine in the brain; carbidopa prevents peripheral conversion. It is the most effective treatment for Parkinson disease motor symptoms.

Indications

- Parkinson disease

Check before giving

- **Timing — give at the exact prescribed times** (delays cause "off" periods)
- Orthostatic BP
- Swallowing (aspiration risk)
- Protein intake around doses

Dose and administration	Detail
Oral	Levodopa 100 mg + carbidopa 25 mg three times daily, titrated
Timing	30–60 min before meals; avoid high-protein meals at dose times
NPO patient	Do not omit — seek alternative route (NG tube, rotigotine patch)

Adverse effect / risk	Nursing action
Nausea, vomiting	Take with small carbohydrate snack; domperidone (not metoclopramide)
Orthostatic hypotension	Rise slowly; fall precautions
Dyskinesia, "on–off" fluctuations	Report pattern
Hallucinations, confusion, impulse-control disorders	Report
Neuroleptic-like syndrome if stopped abruptly	Never stop suddenly

Hold the dose and inform the doctor if

- Severe dyskinesia or hallucinations
- Dose missed or patient NPO
- Fever with rigidity after stopping

Patient and family teaching

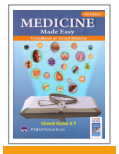
- Take at exact times
- Avoid high-protein meals with doses
- Rise slowly
- Never stop suddenly

Clinical pearls

Missing Parkinson doses in hospital causes rigidity, inability to swallow and aspiration — "get it on time".

Further reading — tap to open (free) ► DailyMed label: Levodopa–Carbidopa · National Formulary of India (IPC)

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DRUG 86 · PSYCHIATRIC & NEUROLOGICAL DRUGS

Benztropine / Trihexyphenidyl

Centrally acting anticholinergic

Overview. Anticholinergics treat tremor in Parkinson disease and drug-induced extrapyramidal symptoms (dystonia, parkinsonism) from antipsychotics. Trihexyphenidyl is commonly used in India.

Indications

- Drug-induced extrapyramidal symptoms (acute dystonia, parkinsonism)
- Parkinson tremor (younger patients)

Check before giving

- Glaucoma, urinary retention, prostatism
- Elderly — confusion
- Bowel sounds
- Heat exposure

Dose and administration	Detail
Benztropine	1–2 mg IM/IV for acute dystonia; 1–4 mg/day oral
Trihexyphenidyl	1–2 mg two to three times daily (max 15 mg/day)

Adverse effect / risk	Nursing action
Dry mouth, constipation, urinary retention	Fluids; bladder check
Blurred vision	Safety
Confusion, hallucinations (elderly)	Avoid in elderly
Heat stroke (reduced sweating)	Avoid heat
Misuse (euphoria)	Monitor

Hold the dose and inform the doctor if

- Urinary retention
- Confusion or hallucinations
- Eye pain

Patient and family teaching

- Avoid hot environments
- Sips of water for dry mouth
- Report difficulty passing urine

Clinical pearls

Acute dystonia after haloperidol or metoclopramide resolves within minutes of IV/IM benztropine or promethazine.

Further reading — tap to open (free) ► DailyMed label: Benztropine · National Formulary of India (IPC)

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DRUG 87 · PSYCHIATRIC & NEUROLOGICAL DRUGS

Donepezil

Acetylcholinesterase inhibitor

Overview. Donepezil increases brain acetylcholine and modestly improves cognition and function in Alzheimer dementia. Vagal effects can cause bradycardia and syncope.

Indications

- Alzheimer disease (mild to severe)
- Dementia with Lewy bodies, Parkinson disease dementia

Check before giving

- Heart rate (bradycardia, heart block)
- History of syncope, peptic ulcer, asthma
- Weight

Dose and administration	Detail
Oral	5 mg at bedtime, increase to 10 mg after 4–6 weeks
Rivastigmine patch	4.6–9.5 mg/24 h
Memantine	Added in moderate–severe disease

Adverse effect / risk	Nursing action
Nausea, vomiting, diarrhoea, anorexia	Take with food; slow titration
Bradycardia, syncope, falls	Check pulse; report HR <55
Vivid dreams, insomnia	Morning dose
GI bleeding (with NSAIDs)	Report

Hold the dose and inform the doctor if

- HR <55/min or fainting
- Weight loss, persistent vomiting

Patient and family teaching

- Caregivers: give regularly; report fainting
- Realistic expectations — slows decline, does not cure

Clinical pearls

Donepezil and beta-blockers together can cause marked bradycardia — check the pulse in older patients on both.

Further reading — tap to open (free) ► DailyMed label: Donepezil · National Formulary of India (IPC)

Section: Psychiatric & Neurological Drugs · Summary table on page 83 · Contents

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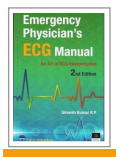
Analgesics, Anaesthesia & Critical Care

Overview and one-page summary table

Pain relief is a nursing responsibility and a patient right. Opioids are high-alert drugs: assess sedation and respiratory rate, have naloxone ready, and prescribe laxatives. Paracetamol overdose and NSAID kidney injury are common preventable harms.

#	Drug	Key point	Page
88	Paracetamol (Acetaminophen)	Paracetamol is the safest first-line analgesic and antipyretic, and the drug of choice for fever in dengue	102
89	Ibuprofen / Diclofenac	NSAIDs inhibit cyclo-oxygenase, reducing pain, inflammation and fever	103
90	Morphine	Morphine is the standard strong opioid for severe pain, palliative care and acute pulmonary oedema (selected)	104
91	Tramadol	Tramadol is widely used in India for moderate pain	105
92	Fentanyl	Fentanyl is about 100 times as potent as morphine	106
93	Naloxone	Naloxone reverses opioid respiratory depression within 1–2 minutes IV	107
94	Suxamethonium (Succinylcholine)	Suxamethonium produces rapid (30–60 s), short (5–10 min) paralysis for rapid-sequence intubation	108
95	Propofol	Propofol causes rapid sedation and anaesthesia with quick recovery	109
96	Ketamine	Ketamine provides analgesia and anaesthesia while preserving airway reflexes and blood pressure — valuable in trauma, …	110

Tap a name or page number to open its full page.



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Paracetamol (Acetaminophen)

Non-opioid analgesic and antipyretic

Overview. Paracetamol is the safest first-line analgesic and antipyretic, and the drug of choice for fever in dengue. Overdose causes delayed, potentially fatal liver failure.

Indications

- Mild–moderate pain
- Fever (including dengue)
- Multimodal analgesia (with NSAIDs, opioids)

Check before giving

- Total daily dose from all sources (combination tablets, syrups)
- Weight <50 kg, liver disease, alcohol, malnutrition (reduce)
- Time of last dose

Dose and administration	Detail
Oral	500 mg–1 g every 4–6 h (max 4 g/day; 3 g in elderly, alcohol, liver disease)
IV	1 g over 15 min every 6 h (15 mg/kg if <50 kg)
Child	15 mg/kg every 4–6 h (max 60 mg/kg/day)

Adverse effect / risk	Nursing action
Hepatotoxicity in overdose (initially few symptoms; liver failure at 72–96 h)	Paracetamol level at 4 h; N-acetylcysteine antidote
Rash (rare)	Report
Hypotension with rapid IV infusion	Infuse over 15 min

Hold the dose and inform the doctor if

- Total dose would exceed maximum
- Jaundice or suspected overdose
- Liver failure

Patient and family teaching

- Check labels — many products contain paracetamol
- Do not exceed 8 tablets (500 mg) a day
- Avoid alcohol

Clinical pearls

In paracetamol overdose, start N-acetylcysteine without waiting for the level if more than 8 hours have passed or the dose is clearly toxic.

Further reading — tap to open (free) ► DailyMed label: Paracetamol · National Formulary of India (IPC)

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DRUG 89 · ANALGESICS, ANAESTHESIA & CRITICAL CARE

Ibuprofen / Diclofenac

Non-steroidal anti-inflammatory drugs (NSAIDs)

Overview. NSAIDs inhibit cyclo-oxygenase, reducing pain, inflammation and fever. They cause GI bleeding, kidney injury and fluid retention, especially in the elderly and dehydrated.

Indications

- Musculoskeletal pain, arthritis
- Dysmenorrhoea, renal colic, post-operative pain
- Fever (not in dengue)

Check before giving

- Renal function, hydration
- GI ulcer history, anticoagulants
- Heart failure, hypertension
- Asthma (aspirin-sensitive)
- Pregnancy (avoid third trimester)

Dose and administration	Detail
Ibuprofen	200–400 mg three times daily after food (max 1.2 g OTC, 2.4 g prescribed)
Diclofenac	50 mg two to three times daily; 75 mg IM (renal colic)
Duration	Shortest possible

Adverse effect / risk	Nursing action
GI ulceration, bleeding	Give with food; PPI in high risk; report black stools
Acute kidney injury	Avoid in dehydration; monitor output, creatinine
Fluid retention, raised BP, heart failure	Monitor
Bronchospasm	Avoid in sensitive asthma
Increased CV risk	Lowest dose

Hold the dose and inform the doctor if

- Black stools, vomiting blood
- Reduced urine output
- Wheeze
- Dengue or suspected dengue

Patient and family teaching

- Take after food
- Avoid with other NSAIDs or aspirin
- Drink adequate fluids
- Do not use in dengue fever

Clinical pearls

"Triple whammy" — NSAID + ACE inhibitor/ARB + diuretic — is a leading cause of acute kidney injury.

Further reading — tap to open (free) ► DailyMed label: Ibuprofen · National Formulary of India (IPC)

Section: Analgesics, Anaesthesia & Critical Care · Summary table on page 101 · Contents

CBME-BASED INTERNAL MEDICINE
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Morphine

Opioid agonist analgesic (high-alert)

Overview. Morphine is the standard strong opioid for severe pain, palliative care and acute pulmonary oedema (selected). Respiratory depression is the dangerous effect; sedation precedes it.

Indications

- Severe acute pain (trauma, post-operative, MI)
- Cancer and palliative pain, breathlessness
- Patient-controlled analgesia (PCA)

Check before giving

- **Sedation score and respiratory rate before and after doses**
- Pain score
- Renal function (metabolites accumulate)
- Other CNS depressants
- Naloxone available

Dose and administration	Detail
IV	1–2.5 mg increments every 5 min titrated to pain (max ~10 mg)
SC/IM	5–10 mg every 4 h
Oral IR	5–10 mg every 4 h; SR twice daily
Elderly/renal	Lower doses, longer intervals

Adverse effect / risk	Nursing action
Respiratory depression	Hold if RR <10/min or sedation score 3; naloxone; oxygen
Sedation	Score every hour after IV doses
Constipation	Regular laxative from start
Nausea, vomiting	Antiemetic
Hypotension, urinary retention, pruritus	Monitor; bladder scan

Hold the dose and inform the doctor if

- RR <10/min (some protocols <12)
- Sedation — hard to rouse
- SpO_2 <92%
- Pinpoint pupils with drowsiness

Patient and family teaching

- Report pain early; use pain scale
- Do not drive
- Take laxatives regularly
- Keep away from children

Clinical pearls

Sedation comes before respiratory depression — a sleepy patient on opioids needs a sedation score and a respiratory rate, not more opioid.

Further reading — tap to open (free) ► DailyMed label: Morphine · National Formulary of India (IPC)

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DRUG 91 · ANALGESICS, ANAESTHESIA & CRITICAL CARE

Tramadol

Weak opioid agonist with serotonin/noradrenaline reuptake inhibition

Overview. Tramadol is widely used in India for moderate pain. It lowers the seizure threshold and causes serotonin syndrome with antidepressants; it is also misused.

Indications

- Moderate pain (post-operative, musculoskeletal)
- Neuropathic pain (adjunct)

Check before giving

- Seizure history
- SSRIs, TCAs, MAOIs
- Renal/hepatic impairment
- Elderly (confusion)

Dose and administration	Detail
Oral/IV/IM	50–100 mg every 4–6 h (max 400 mg/day; 300 mg in elderly)
IV	Slowly over 2–3 min
Renal failure	12-hourly

Adverse effect / risk	Nursing action
Seizures	Avoid in epilepsy; do not exceed dose
Serotonin syndrome with SSRIs	Avoid combination
Nausea, dizziness, sweating	Antiemetic
Respiratory depression (less than morphine)	Monitor
Dependence, misuse	Short course

Hold the dose and inform the doctor if

- Seizure
- Agitation, tremor, fever
- Excess drowsiness

Patient and family teaching

- Do not combine with antidepressants without advice
- Avoid alcohol
- Short-term use

Clinical pearls

Tramadol is not "safe because it is weak" — seizures, serotonin syndrome and hypoglycaemia occur, especially in the elderly.

Further reading — tap to open (free) ► DailyMed label: Tramadol · National Formulary of India (IPC)

Section: Analgesics, Anaesthesia & Critical Care · Summary table on page 101 · Contents

Handbook of Antibiotics
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Fentanyl

Potent synthetic opioid (high-alert)

Overview. Fentanyl is about 100 times as potent as morphine. It is used IV for procedural analgesia and ICU sedation, and as transdermal patches for chronic cancer pain in opioid-tolerant patients.

Indications

- Procedural and ICU analgesia
- Chronic cancer pain (patch — opioid-tolerant only)
- Anaesthesia adjunct

Check before giving

- Opioid tolerance before patch
- RR, sedation, SpO_2
- Heat over patch (increases absorption)
- Naloxone ready

Dose and administration	Detail
IV	25–100 µg (0.5–1 µg/kg) slowly; infusion 25–200 µg/h in ICU
Patch	12–100 µg/h, changed every 72 h; onset 12–24 h
Rigid chest	Avoid rapid large IV boluses

Adverse effect / risk	Nursing action
Respiratory depression, apnoea	Monitor; naloxone
Chest-wall rigidity (rapid IV)	Give slowly; support ventilation
Bradycardia	Monitor
Patch overdose with fever, heating pads	Avoid heat; remove patch
Accidental exposure (children, pets)	Fold used patch sticky sides together and dispose safely

Hold the dose and inform the doctor if

- RR <10/min or drowsiness
- Fever (patch absorption ↑)
- Patch not needed — remove

Patient and family teaching

- Do not apply heat over patch
- Write date on patch; remove old one
- Fold used patch and dispose safely

Clinical pearls

Effects of a fentanyl patch continue for 12–24 hours after removal — monitor after taking it off.

Further reading — tap to open (free) ▶ DailyMed label: Fentanyl · National Formulary of India (IPC)

Section: Analgesics, Anaesthesia & Critical Care · Summary table on page 101 · Contents

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Naloxone

Opioid receptor antagonist (antidote)

Overview. Naloxone reverses opioid respiratory depression within 1–2 minutes IV. Its duration (30–90 min) is shorter than most opioids, so re-sedation is common.

Indications

- Opioid overdose with respiratory depression
- Reversal of opioid sedation post-operatively
- Neonatal opioid depression (selected)

Check before giving

- Airway and ventilation first (bag–mask)
- RR, SpO_2, consciousness
- Opioid-dependent patient (withdrawal risk) — titrate small doses

Dose and administration	Detail
IV	0.04–0.4 mg every 2–3 min, titrated to breathing (overdose up to 2 mg; max ~10 mg)
IM/SC/intranasal	0.4–2 mg IM; 4 mg nasal
Infusion	2/3 of the effective bolus dose per hour (long-acting opioids)

Adverse effect / risk	Nursing action
Re-sedation as naloxone wears off	Observe ≥2 h (longer for methadone, SR opioids)
Acute withdrawal — agitation, vomiting, tachycardia, pain	Titrate small doses
Pulmonary oedema, arrhythmia (rare)	Monitor
Return of severe pain	Plan alternative analgesia

Hold the dose and inform the doctor if

- No response (consider other causes)
- Re-sedation
- Severe agitation or vomiting with aspiration risk

Patient and family teaching

- Family of patients on opioids can learn to use naloxone kits

Clinical pearls

The aim is adequate breathing, not full wakefulness — titrated small IV doses avoid painful, violent withdrawal.

Further reading — tap to open (free) ► DailyMed label: Naloxone · National Formulary of India (IPC)

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Suxamethonium (Succinylcholine)

Depolarising neuromuscular blocker

Overview. Suxamethonium produces rapid (30–60 s), short (5–10 min) paralysis for rapid-sequence intubation. It can cause dangerous hyperkalaemia and trigger malignant hyperthermia.

Indications

- Rapid-sequence intubation
- Short procedures (ECT, laryngospasm)

Check before giving

- K^+ (avoid if raised) — burns >24 h, crush, spinal injury, prolonged immobility, renal failure
- Personal/family history of malignant hyperthermia or pseudocholinesterase deficiency
- Sedation/induction agent given first
- Airway equipment and ventilation ready

Dose and administration	Detail
IV	1–1.5 mg/kg rapid bolus
Storage	Refrigerate 2–8 °C (stable 14 days at room temperature)
Always after	An induction agent — never in a conscious patient

Adverse effect / risk	Nursing action
Malignant hyperthermia — rising $EtCO_2$, rigidity, tachycardia, hyperthermia	Stop triggers; dantrolene 2.5 mg/kg IV; cool; call help
Hyperkalaemia, cardiac arrest	Avoid in risk groups; calcium, insulin–dextrose
Bradycardia (repeat doses, children)	Atropine
Prolonged apnoea (pseudocholinesterase deficiency)	Ventilate until recovery
Myalgia, raised IOP/ICP	Monitor

Hold the dose and inform the doctor if

- Hyperkalaemia risk factors present
- History of malignant hyperthermia

Patient and family teaching

- Explain paralysis is temporary and patient is sedated (to family)

Clinical pearls

A paralysed patient cannot breathe or signal pain — neuromuscular blockers are given only by trained staff with airway control and sedation.

Further reading — tap to open (free) ► DailyMed label: Suxamethonium · National Formulary of India (IPC)

Section: Analgesics, Anaesthesia & Critical Care · Summary table on page 101 · Contents

BUY NOW ›

Propofol

IV general anaesthetic / sedative

Overview. Propofol causes rapid sedation and anaesthesia with quick recovery. It is a lipid emulsion that supports bacterial growth, so strict asepsis and tubing changes are essential.

Indications

- Induction and maintenance of anaesthesia
- ICU sedation of ventilated patients
- Procedural sedation (by trained staff)

Check before giving

- Airway and ventilation support available
- BP (causes hypotension)
- Triglycerides on prolonged infusion
- Egg/soy allergy (usually safe; check policy)

Dose and administration	Detail
Induction	1.5–2.5 mg/kg IV (less in elderly)
ICU sedation	0.3–4 mg/kg/h (5–50 µg/kg/min)
Asepsis	Discard opened ampoule/syringe after 6 h; **change tubing every 6–12 h** per policy

Adverse effect / risk	Nursing action
Hypotension, bradycardia	Fluids; vasopressor; reduce rate
Respiratory depression, apnoea	Ventilation support
Propofol infusion syndrome (high dose >48 h) — acidosis, rhabdomyolysis, arrhythmia	Monitor lactate, CK, TG
Pain on injection	Large vein; lidocaine
Infection (lipid)	Aseptic handling
Green urine	Benign

Hold the dose and inform the doctor if

- MAP <65 mmHg
- Rising lactate, CK or triglycerides
- Over-sedation (daily sedation hold)

Patient and family teaching

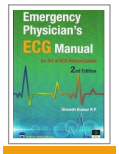
- Explain sedation and daily awakening trial to family

Clinical pearls

Daily sedation interruption ("sedation holiday") reduces ventilator days — coordinate it with the spontaneous breathing trial.

Further reading — tap to open (free) ► DailyMed label: Propofol · National Formulary of India (IPC)

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DRUG 96 · ANALGESICS, ANAESTHESIA & CRITICAL CARE

Ketamine

Dissociative anaesthetic (NMDA antagonist)

Overview. Ketamine provides analgesia and anaesthesia while preserving airway reflexes and blood pressure — valuable in trauma, burns dressings and resource-limited settings.

Indications

- Induction in shock or asthma
- Procedural sedation (children, burns)
- Analgesia (sub-dissociative)
- Refractory status asthmaticus

Check before giving

- Airway equipment, suction
- BP (raises it), HR
- Psychosis history
- Raised intracranial pressure concerns (now considered safe in most)

Dose and administration	Detail
Induction IV	1–2 mg/kg
IM	4–5 mg/kg
Analgesia	0.1–0.3 mg/kg IV
Infusion	0.1–0.5 mg/kg/h

Adverse effect / risk	Nursing action
Emergence reactions — hallucinations, agitation	Quiet environment; midazolam
Hypersalivation	Suction; atropine/glycopyrrolate
Hypertension, tachycardia	Monitor
Laryngospasm (rare)	Airway management
Vomiting on recovery	Lateral position

Hold the dose and inform the doctor if

- Severe agitation on emergence
- Airway obstruction
- BP >180/110

Patient and family teaching

- Explain dreams may occur; reassure family

Clinical pearls

Ketamine is ideal for painful dressing changes in burns — the patient breathes spontaneously and BP is maintained.

Further reading — tap to open (free) ► DailyMed label: Ketamine · National Formulary of India (IPC)

Section: Analgesics, Anaesthesia & Critical Care · Summary table on page 101 · Contents

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Women's Health & Obstetric Drugs

Overview and one-page summary table

Obstetric emergencies — postpartum haemorrhage and eclampsia — remain leading causes of maternal death in India. Oxytocin and magnesium sulfate are high-alert drugs that nurses and midwives must master.

#	Drug	Key point	Page
97	Oxytocin	Oxytocin stimulates uterine contractions	112
98	Magnesium Sulfate	Magnesium sulfate prevents and treats eclamptic seizures and protects the preterm fetal brain	113
99	Tocolytics (Nifedipine / Terbutaline)	Tocolytics delay preterm delivery for 48 hours to allow antenatal corticosteroids to work and transfer to a centre wit…	114
100	Anti-D Immunoglobulin (Rho(D) Immune Globulin)	Anti-D destroys Rh-positive fetal red cells in an Rh-negative mother before she forms antibodies, preventing haemolyti…	115

Tap a name or page number to open its full page.

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Oxytocin

Uterotonic — posterior pituitary hormone

Overview. Oxytocin stimulates uterine contractions. It is used for induction and augmentation of labour and is the first-line drug for prevention and treatment of postpartum haemorrhage (PPH).

Indications

- Active management of third stage of labour (AMTSL)
- Treatment of PPH
- Induction/augmentation of labour
- Incomplete or missed abortion (selected)

Check before giving

- Fetal heart rate and contraction pattern (CTG)
- Infusion pump with independent double check
- Fluid balance (antidiuretic effect)
- Uterine scar, malpresentation (induction)

Dose and administration	Detail
AMTSL	10 IU IM within 1 min of birth
PPH	10 IU IV slowly or IM, then infusion 20–40 IU in 1 L at 125–250 mL/h
Induction	Start 1–2 mU/min, increase by 1–2 mU/min every 30 min (max 20–32 mU/min)

Adverse effect / risk	Nursing action
Uterine tachysystole (>5 contractions/10 min), fetal distress	Stop infusion; left lateral; oxygen; inform obstetrician
Uterine rupture	Watch for scar pain, bleeding, fetal distress
Water intoxication, hyponatraemia (prolonged high doses)	Strict intake–output; limit fluids
Hypotension (rapid IV bolus)	Give slowly

Hold the dose and inform the doctor if

- >5 contractions in 10 min or contractions lasting >90 s
- Abnormal FHR
- Headache, confusion (water intoxication)

Patient and family teaching

- Explain contractions and monitoring
- Report severe pain or bleeding

Clinical pearls

Store oxytocin in the refrigerator (2–8 °C) — heat-degraded oxytocin is a hidden cause of PPH; heat-stable carbetocin is an alternative.

Further reading — tap to open (free) ► DailyMed label: Oxytocin · National Formulary of India (IPC)

Section: Women's Health & Obstetric Drugs · Summary table on page 111 · Contents

Clinical Medicine In 30 Hours
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DRUG 98 · WOMEN'S HEALTH & OBSTETRIC DRUGS

Magnesium Sulfate

Anticonvulsant (in eclampsia) and neuroprotectant

Overview. Magnesium sulfate prevents and treats eclamptic seizures and protects the preterm fetal brain. Toxicity causes loss of reflexes, respiratory depression and cardiac arrest — calcium gluconate is the antidote.

Indications

- Severe pre-eclampsia (seizure prophylaxis)
- Eclampsia
- Fetal neuroprotection <32 weeks
- Severe asthma, torsades de pointes, hypomagnesaemia

Check before giving

- **Patellar reflex, respiratory rate, urine output before each dose and hourly**
- Renal function
- Calcium gluconate 10% at bedside

Dose and administration	Detail
Pritchard (IM)	4 g IV over 15–20 min + 10 g IM (5 g each buttock); then 5 g IM 4-hourly in alternate buttocks
Zuspan (IV)	4 g IV over 15–20 min, then 1 g/h infusion
Duration	24 h after delivery or last seizure
Recurrent seizure	Further 2 g IV

Adverse effect / risk	Nursing action
Toxicity — loss of patellar reflex (>7 mEq/L), respiratory depression (>10), cardiac arrest (>15)	Hold dose; calcium gluconate 1 g (10 mL of 10%) IV over 10 min
Flushing, warmth, nausea	Expected; reassure
Oliguria → accumulation	Hold if urine <30 mL/h (100 mL in 4 h)
Pain at IM site	Add 1 mL of 2% lignocaine

Hold the dose and inform the doctor if

- **Absent patellar reflex**
- RR <16/min
- Urine output <30 mL/h
- SpO_2 <95% or chest pain

Patient and family teaching

- Explain the warm, flushed feeling
- Report breathlessness or weakness

Clinical pearls

Check the patellar reflex before every dose — if absent, withhold magnesium sulfate. In epidural analgesia use the biceps reflex.

Further reading — tap to open (free) ► DailyMed label: Magnesium Sulfate · National Formulary of India (IPC)

Section: Women's Health & Obstetric Drugs · Summary table on page 111 · Contents

Handbook of Antibiotics
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DRUG 99 · WOMEN'S HEALTH & OBSTETRIC DRUGS

Tocolytics (Nifedipine / Terbutaline)

Uterine relaxants for preterm labour

Overview. Tocolytics delay preterm delivery for 48 hours to allow antenatal corticosteroids to work and transfer to a centre with NICU. Nifedipine is preferred; terbutaline is used for acute uterine hyperstimulation.

Indications

- Preterm labour 24–34 weeks (to allow steroids)
- Uterine tachysystole during labour (terbutaline single dose)
- External cephalic version (terbutaline)

Check before giving

- Maternal pulse, BP, chest auscultation
- FHR and contractions
- Contraindications: chorioamnionitis, APH, fetal distress, heart disease (terbutaline)
- Antenatal steroids given

Dose and administration	Detail
Nifedipine	10–20 mg oral, repeat every 20 min ×3, then 10–20 mg every 4–6 h for 48 h
Terbutaline	0.25 mg SC (single dose for hyperstimulation)
With	Dexamethasone 6 mg IM 12-hourly ×4

Adverse effect / risk	Nursing action
Maternal tachycardia, palpitations, tremor (terbutaline)	Hold if HR >120
Pulmonary oedema (beta-agonists, fluids)	Restrict fluids; auscultate chest
Hypotension, headache, flushing (nifedipine)	Monitor BP
Hyperglycaemia, hypokalaemia (terbutaline)	Glucose monitoring

Hold the dose and inform the doctor if

- Maternal HR >120/min
- Breathlessness or chest pain
- SBP <90 mmHg
- Fetal distress

Patient and family teaching

- Report palpitations, breathlessness
- Bed rest only as advised

Clinical pearls

Tocolysis buys time for steroids — the steroids, not the tocolytic, improve neonatal survival.

Further reading — tap to open (free) ► DailyMed label: Tocolytics · National Formulary of India (IPC)

Section: Women's Health & Obstetric Drugs · Summary table on page 111 · Contents

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Anti-D Immunoglobulin (Rho(D) Immune Globulin)

Immunoglobulin — prevention of Rh isoimmunisation

Overview. Anti-D destroys Rh-positive fetal red cells in an Rh-negative mother before she forms antibodies, preventing haemolytic disease in future pregnancies.

Indications

- Rh-negative, antibody-negative mother: at 28 weeks
- Within 72 h after delivery of Rh-positive baby
- After abortion, ectopic, amniocentesis, antepartum haemorrhage, abdominal trauma, ECV

Check before giving

- Mother Rh-negative and indirect Coombs (antibody) negative
- Baby's blood group after delivery
- Consent; blood product checks
- Kleihauer test for large feto-maternal bleed

Dose and administration	Detail
Antenatal	300 µg (1,500 IU) IM at 28 weeks
Postpartum	300 µg IM within 72 h (if baby Rh-positive)
First trimester events	50–120 µg IM
Route	Deep IM (deltoid); IV preparations for large bleeds

Adverse effect / risk	Nursing action
Injection-site pain	Reassure
Allergic reaction (rare)	Observe 20 min
Ineffective if mother already sensitised	Check antibody before giving
Missed dose	Give up to 10 days postpartum rather than not at all

Hold the dose and inform the doctor if

- Mother already has anti-D antibodies
- Baby Rh-negative (not needed)

Patient and family teaching

- Inform future caregivers that you are Rh-negative
- Carry blood group card

Clinical pearls

Never give anti-D to the baby — it is given to the Rh-negative mother only.

Further reading — tap to open (free) ▶ DailyMed label: Anti-D Immunoglobulin · National Formulary of India (IPC)

Section: Women's Health & Obstetric Drugs · Summary table on page 111 · Contents



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Physical Assessment & Vital Signs

Overview and one-page summary table

Accurate observations are the foundation of nursing care and early warning scores. Correct technique, correct equipment and prompt escalation of abnormal values save lives.

#	Procedure	Key point	Page
1	Measuring the Apical Pulse	To count the heart rate directly over the apex for a full minute — the most accurate method, essential before digoxin …	117
2	Manual Blood Pressure Measurement	To measure arterial BP accurately with a sphygmomanometer and stethoscope using Korotkoff sounds.	118
3	Assessing Orthostatic (Postural) Vital Signs	To detect a fall in BP and rise in pulse on standing, indicating hypovolaemia, autonomic dysfunction or drug effect.	119
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10	Auscultating Bowel Sounds	To assess bowel motility, especially after surgery and in suspected obstruction or ileus.	126
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12	Assessing Pitting Oedema	To assess and grade fluid accumulation in tissues.	128

Tap a name or page number to open its full page.

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Measuring the Apical Pulse

Purpose. To count the heart rate directly over the apex for a full minute — the most accurate method, essential before digoxin and in irregular rhythms, infants and cardiac patients.

Indications

- Before digoxin and beta-blockers
- Irregular radial pulse, atrial fibrillation
- Infants and children <2 years
- Pulse deficit assessment

Equipment

- Stethoscope (cleaned)
- Watch with second hand
- Alcohol swab
- Chart

#	Nursing action	Rationale
1	Identify patient, explain, ensure privacy; perform hand hygiene	Consent and infection control
2	Position supine or sitting; expose left chest	Access to apex
3	Locate the apex: 5th intercostal space, left mid-clavicular line	Point of maximal impulse in adults (4th ICS lateral in infants)
4	Warm the diaphragm; listen for "lub-dub" as one beat	Avoid startling; correct counting
5	Count for one full minute; note rhythm and strength	Irregular rhythms need 60 s for accuracy
6	For pulse deficit, a second nurse counts radial pulse simultaneously	Deficit = apical − radial; indicates ineffective beats
7	Clean stethoscope; hand hygiene; document	Prevent cross-infection

Risk / complication	Prevention / action
Wrong count from 15-s sampling in irregular rhythm	Always count 60 s
Hold digoxin unnoticed	Hold if <60/min (adult) and inform
Exposure, chilling infant	Keep covered except chest

Document

Rate, rhythm (regular/irregular), any pulse deficit, action taken (e.g. digoxin held), time.

Clinical pearls

Normal adult apical rate is 60–100/min; newborn 120–160/min. A pulse deficit suggests atrial fibrillation.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — BP measurement

Section: Physical Assessment & Vital Signs · Summary table on page 116 · Contents

Emergency Physician's ECG Manual
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Manual Blood Pressure Measurement

Purpose. To measure arterial BP accurately with a sphygmomanometer and stethoscope using Korotkoff sounds.

Indications
- Routine vital signs
- Hypertension screening
- Before antihypertensives
- Validation of automated readings, shock assessment

Equipment
- Sphygmomanometer with correct cuff size
- Stethoscope
- Chart

#	Nursing action	Rationale
1	Patient seated 5 min, back supported, feet flat, arm at heart level, no talking	Posture and activity alter readings
2	Choose cuff: bladder width 40% and length 80% of arm circumference	Small cuff overestimates; large cuff underestimates
3	Wrap cuff 2–3 cm above antecubital fossa, bladder centred over brachial artery	Correct compression of artery
4	Palpate radial pulse, inflate until it disappears; add 30 mmHg	Estimates systolic; avoids auscultatory gap
5	Place stethoscope bell/diaphragm over brachial artery; deflate 2–3 mmHg per second	Slow deflation gives accuracy
6	Systolic = first tapping sound (phase I); diastolic = disappearance (phase V)	Korotkoff sounds
7	Wait 1–2 min before repeating; record both arms at first visit	Arm differences >15 mmHg are significant

Risk / complication	Prevention / action
Wrong cuff size	Measure arm circumference
Auscultatory gap missed (falsely low systolic)	Palpatory estimate first
Measuring on arm with AV fistula, lymphoedema, IV line or mastectomy side	Use the other arm
Rapid deflation	2–3 mmHg/s

Document
BP value, arm, position, cuff size if non-standard, time, action taken for abnormal values.

Clinical pearls
In shock, the radial pulse is usually felt at SBP ≥80, femoral ≥70 and carotid ≥60 mmHg (rough guide only).

Further reading — tap to open (free) ► Indian Nursing Council · AHA — BP measurement

Section: Physical Assessment & Vital Signs · Summary table on page 116 · Contents

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PROCEDURE 3 · PHYSICAL ASSESSMENT & VITAL SIGNS

Assessing Orthostatic (Postural) Vital Signs

Purpose. To detect a fall in BP and rise in pulse on standing, indicating hypovolaemia, autonomic dysfunction or drug effect.

Indications

- Dizziness, syncope, falls
- Dehydration, GI bleed
- Elderly on antihypertensives
- Parkinson disease, diabetes (autonomic neuropathy)

Equipment

- BP apparatus
- Watch
- Assistant for safety
- Chair/bed

#	Nursing action	Rationale
1	Explain; ensure a second person or bed close for safety	Patient may faint
2	Patient lies supine for 5 min; record BP and pulse	Baseline
3	Patient sits for 1–2 min; record (optional)	Gradual change
4	Patient stands; record BP and pulse at 1 and 3 min	Orthostatic change appears within 3 min
5	Stop and lie patient down if symptomatic	Prevent fall
6	Positive test: SBP fall ≥20 or DBP fall ≥10 mmHg, or HR rise ≥30	Diagnostic criteria

Risk / complication	Prevention / action
Fall/syncope during test	Stand beside patient; gait belt
Unable to stand	Sitting values; document

Document

Lying, sitting, standing BP and pulse with times; symptoms during test; interpretation.

Clinical pearls

Postural hypotension in an elderly patient is often caused by drugs — review diuretics, alpha-blockers, nitrates and antipsychotics.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — BP measurement

Section: Physical Assessment & Vital Signs · Summary table on page 116 · Contents

CBME-BASED INTERNAL MEDICINE
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Assessing Deep Tendon Reflexes (DTR)

Purpose. To assess the reflex arc and detect magnesium toxicity or neurological disease.

Indications

- Magnesium sulfate therapy (patellar reflex before each dose)
- Neurological assessment, spinal injury
- Pre-eclampsia (hyperreflexia, clonus)

Equipment

- Reflex hammer
- Chart

#	Nursing action	Rationale
1	Explain; patient relaxed with legs dangling or knees supported	Relaxation is essential
2	Strike the patellar tendon briskly just below the patella	Elicits knee jerk (L3–L4)
3	Observe quadriceps contraction and leg extension	Response grading
4	Use reinforcement (Jendrassik — clench teeth, pull hands) if absent	Distraction increases response
5	Check ankle clonus (dorsiflex foot sharply)	Clonus suggests hyperexcitability (eclampsia risk)
6	Grade 0 (absent) to 4+ (hyperactive with clonus)	Standard scale

Risk / complication	Prevention / action
Absent reflex on $MgSO_4$	Withhold dose; check RR, urine output; inform; calcium gluconate ready
Hyperreflexia, clonus in pre-eclampsia	Inform — impending eclampsia

Document

Reflex grade both sides, clonus (beats), time, action taken.

Clinical pearls

With an epidural block, test the biceps reflex instead of the patellar reflex.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — BP measurement

Section: Physical Assessment & Vital Signs · Summary table on page 116 · Contents

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Neurological Assessment — Glasgow Coma Scale

Purpose. To measure the level of consciousness objectively and detect deterioration in head injury, stroke and other neurological conditions.

Indications
- Head injury, stroke, CNS infection
- Post-neurosurgery
- Poisoning, metabolic coma
- Sedated patients (with sedation score)

Equipment
- GCS chart
- Pen torch
- Watch

#	Nursing action	Rationale
1	Speak to patient; observe spontaneous eye opening (E4)	Eye-opening (E1–4)
2	If none, speak; then apply central painful stimulus (trapezius pinch/supraorbital pressure)	Standardised stimulus
3	Assess verbal response: oriented (5), confused (4), inappropriate words (3), sounds (2), none (1)	V1–5; record "T" if intubated
4	Assess best motor: obeys (6), localises (5), withdraws (4), abnormal flexion (3), extension (2), none (1)	M1–6 — most predictive
5	Total = E + V + M (3–15); record components	e.g. E2V3M5 = 10
6	Check pupils, limb power and vital signs together	Full neuro observations

Risk / complication	Prevention / action
Drop of ≥2 points or a fall in motor score	Urgent medical review
GCS ≤8	Airway at risk — call for help
Peripheral painful stimulus causing spinal reflex	Use central stimulus

Document
E, V, M components and total, pupils, limb movements, vital signs, time; who was informed.

Clinical pearls
"GCS 8 — intubate" is a useful rule: patients with GCS ≤8 cannot reliably protect their airway.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — BP measurement

Section: Physical Assessment & Vital Signs · Summary table on page 116 · Contents

Handbook of Antibiotics
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Cranial Nerve Assessment (CN I–XII)

Purpose. To screen cranial nerve function in neurological patients, stroke and head injury.

Indications
- Stroke, head injury, brain tumour
- Meningitis, Guillain–Barré
- Baseline neurological assessment

Equipment
- Pen torch
- Snellen chart
- Cotton wisp, tongue depressor
- Tuning fork, familiar odours (coffee)

#	Nursing action	Rationale
1	I Olfactory — identify familiar smell, each nostril	Smell
2	II Optic — visual acuity, fields by confrontation	Vision
3	III, IV, VI — eye movements in H pattern; pupils, ptosis	Extra-ocular movements
4	V Trigeminal — facial sensation; clench jaw	Sensation and mastication
5	VII Facial — raise eyebrows, close eyes tight, smile, puff cheeks	Upper vs lower motor neuron palsy
6	VIII — whisper test; Rinne/Weber	Hearing
7	IX, X — say "ah", uvula midline, gag; XI — shrug shoulders; XII — protrude tongue	Swallow safety and motor function

Risk / complication	Prevention / action
Impaired gag/swallow	Keep NPO; swallow screen before oral intake
Corneal exposure (CN VII palsy)	Eye protection, lubricant

Document
Normal/abnormal findings per nerve, side, comparison with previous.

Clinical pearls
Always do a bedside swallow screen before giving oral food, fluids or tablets to a stroke patient.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — BP measurement

Section: Physical Assessment & Vital Signs · Summary table on page 116 · Contents

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Pupillary Assessment (PERRLA)

Purpose. To assess pupil size, shape, equality and reaction — a key sign of raised intracranial pressure and drug effects.

Indications

- Head injury, stroke, neurosurgery
- Overdose (opioids — pinpoint; anticholinergics — dilated)
- Organophosphate poisoning (pinpoint)

Equipment

- Pen torch
- Pupil gauge (mm)

#	Nursing action	Rationale
1	Dim the room light	Pupils dilate for easier observation
2	Note size (mm) and shape of each pupil at rest	Baseline 2–5 mm
3	Bring light from the side into one eye; watch direct response	Direct reflex
4	Watch the other pupil (consensual response)	Tests both pathways
5	Repeat for the other eye	Compare
6	Test accommodation: focus far, then near — pupils constrict	Completes PERRLA

Risk / complication	Prevention / action
New unilateral dilated, non-reactive pupil	Emergency — tentorial herniation; inform immediately
Eye drops, prosthesis, cataract surgery may alter pupils	Note history

Document

Size (mm), shape, reaction (brisk/sluggish/fixed) for each eye, time.

Clinical pearls

PERRLA = Pupils Equal, Round, Reactive to Light and Accommodation.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — BP measurement

Section: Physical Assessment & Vital Signs · Summary table on page 116 · Contents

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Auscultating Lung Sounds

Purpose. To assess breath sounds and detect added sounds (crackles, wheeze, rub) systematically.

Indications

- Respiratory symptoms, pneumonia, heart failure
- Post-operative assessment
- After chest tube, NG tube placement

Equipment

- Stethoscope (diaphragm)
- Privacy

#	Nursing action	Rationale
1	Patient sitting upright; explain; ask to breathe slowly through open mouth	Better sound transmission
2	Auscultate on bare skin, comparing side to side in a ladder pattern	Detect asymmetry
3	Anterior: apices to bases; lateral: axillae; posterior: apices to bases avoiding scapulae	Covers all lobes
4	Listen to a full inspiration and expiration at each site	Timing of sounds
5	Identify normal vesicular, bronchial, bronchovesicular sounds	Baseline
6	Identify added sounds: crackles (fluid), wheeze (narrowing), stridor (upper airway), pleural rub	Clinical significance

Risk / complication	Prevention / action
Hyperventilation, dizziness	Allow rest
Listening through clothing	Always on skin
Stridor	Emergency — call help

Document

Breath sounds, added sounds and location, work of breathing, SpO_2, RR.

Clinical pearls

Stridor (inspiratory high-pitched sound) indicates upper airway obstruction — an emergency, not a lung finding.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — BP measurement

Section: Physical Assessment & Vital Signs · Summary table on page 116 · Contents

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Auscultating Heart Sounds

Purpose. To listen to heart sounds at the five auscultatory areas to identify S1, S2, extra sounds and murmurs.

Indications
- Cardiac assessment
- Fever with new murmur (endocarditis)
- Rheumatic heart disease follow-up

Equipment
- Stethoscope (diaphragm and bell)
- Quiet room

#	Nursing action	Rationale
1	Supine with head raised 30°; expose chest	Access
2	Aortic area: 2nd right ICS at sternal border	Aortic valve sounds
3	Pulmonic area: 2nd left ICS	Pulmonary valve
4	Erb's point: 3rd left ICS	Aortic and pulmonary murmurs
5	Tricuspid: 4th–5th left ICS at sternal border	Tricuspid valve
6	Mitral (apex): 5th ICS mid-clavicular line; bell for low sounds; left lateral position for mitral stenosis	Mitral valve
7	Identify S1 (lub, louder at apex) and S2 (dub, louder at base); note S3, S4, murmurs, rubs	Interpretation

Risk / complication	Prevention / action
Missing murmur because of noise	Quiet environment
Confusing breath sounds	Ask patient to hold breath briefly

Document
Rate, rhythm, S1/S2, extra sounds, murmurs (location, timing).

Clinical pearls
Mitral stenosis — common in India from rheumatic heart disease — is best heard with the bell at the apex in the left lateral position.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — BP measurement

Section: Physical Assessment & Vital Signs · Summary table on page 116 · Contents

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Auscultating Bowel Sounds

Purpose. To assess bowel motility, especially after surgery and in suspected obstruction or ileus.

Indications
- Post-operative recovery
- Abdominal pain, distension, vomiting
- Before starting enteral feeding

Equipment
- Stethoscope (diaphragm)
- Warm hands

#	Nursing action	Rationale
1	Patient supine, knees slightly flexed, bladder empty	Relaxed abdomen
2	Inspect first, then auscultate before palpating or percussing	Palpation alters bowel sounds
3	Listen in all four quadrants, starting right lower quadrant	Ileocaecal area — sounds most constant
4	Normal: 5–30 gurgles per minute; listen at least 1 min per quadrant	Normal motility
5	Absent sounds: listen 5 min in each quadrant before concluding	Paralytic ileus
6	High-pitched tinkling or rushes	Early mechanical obstruction

Risk / complication	Prevention / action
Feeding a patient with ileus	Confirm bowel function before feeding
Missed obstruction	Combine with distension, vomiting, no flatus

Document
Presence and character of sounds, distension, flatus, last bowel movement.

Clinical pearls
Passing flatus is a more reliable sign of returning bowel function after surgery than bowel sounds alone.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — BP measurement

Section: Physical Assessment & Vital Signs · Summary table on page 116 · Contents

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Bladder Scanning

Purpose. To measure bladder urine volume non-invasively by portable ultrasound, avoiding unnecessary catheterisation.

Indications

- Urinary retention (post-operative, post-catheter removal)
- Post-void residual measurement
- Low urine output assessment

Equipment

- Bladder scanner
- Ultrasound gel
- Tissue/wipes

#	Nursing action	Rationale
1	Explain; ask patient to void first if measuring post-void residual (within 10 min)	Accurate residual
2	Supine position; select male/female mode (female mode after hysterectomy uses male)	Correct algorithm
3	Apply gel 2–3 cm above the symphysis pubis	Acoustic coupling
4	Aim probe toward the bladder (slightly towards coccyx); scan	Bladder centred on screen
5	Repeat 2–3 times; take the highest consistent reading	Accuracy
6	Clean gel and probe	Infection control

Risk / complication	Prevention / action
Falsely high readings — ascites, cysts, pregnancy	Interpret with clinical picture
Unnecessary catheterisation	Catheterise only if volume >400–500 mL or symptomatic per policy

Document

Volume, time since void, action (void, in–out catheter).

Clinical pearls

Post-void residual >200 mL suggests incomplete emptying and needs medical review.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — BP measurement

Section: Physical Assessment & Vital Signs · Summary table on page 116 · Contents

CBME-BASED INTERNAL MEDICINE
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Assessing Pitting Oedema

Purpose. To assess and grade fluid accumulation in tissues.

Indications
- Heart failure, renal and liver disease
- Pregnancy (pre-eclampsia)
- DVT (unilateral)
- Fluid therapy monitoring

Equipment
- Measuring tape
- Good light

#	Nursing action	Rationale
1	Inspect both legs for swelling, symmetry, skin changes	Unilateral oedema suggests DVT
2	Press firmly with thumb for 5 s over tibia, dorsum of foot or medial malleolus	Tests pitting
3	Remove and observe depth and time to rebound	Grading
4	Grade: 1+ (2 mm, immediate), 2+ (4 mm, <15 s), 3+ (6 mm, 10–30 s), 4+ (8 mm, >30 s)	Standard scale
5	In bed-bound patients check the sacrum	Dependent area
6	Measure calf/ankle circumference at a marked point daily	Objective trend

Risk / complication	Prevention / action
Missing DVT	Report unilateral, painful, warm swelling
Pressure injury over oedematous skin	Reposition, skin care

Document
Grade, site, extent (to ankle/knee/thigh/sacrum), circumference, daily weight.

Clinical pearls
Daily weight is a better measure of fluid change than oedema grading.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — BP measurement

Section: Physical Assessment & Vital Signs · Summary table on page 116 · Contents

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Medication Administration

Overview and one-page summary table

Safe medication administration depends on the "rights", two patient identifiers, correct technique for each route, accurate calculations and documentation immediately after giving.

#	Procedure	Key point	Page
13	Verifying Patient Identity	To ensure the right patient receives the right care — the first step of every procedure, medication, blood transfusion…	130
14	Subcutaneous Injection	To deliver drugs into subcutaneous fat for slow, steady absorption — insulin, heparin, enoxaparin, vaccines.	131
15	Intramuscular Injection — Z-Track Technique	To deliver drugs into muscle and prevent leakage into subcutaneous tissue, staining or irritation (iron, haloperidol d…	132
16	Intradermal Injection	To inject a small volume into the dermis — tuberculin (Mantoux) test, allergy and drug sensitivity tests, BCG vaccine.	133
17	Administering Eye Drops and Ointment	To instil ophthalmic medication safely without contamination or systemic absorption.	134
18	Administering Ear Drops	To instil medication into the external auditory canal.	135
19	Administering Metered-Dose Inhalers (with Spacer)	To deliver inhaled drugs effectively to the lungs — technique determines how much drug reaches the airways.	136
20	Priming and Programming an IV Infusion Pump	To deliver IV fluids and drugs at a precise rate.	137
21	Mixing Regular and NPH Insulin in One Syringe	To give a premixed dose of short- and intermediate-acting insulin in a single injection without contaminating the clea…	138
22	Calculating IV Drip Rates (including µg/kg/min)	To calculate infusion rates accurately for gravity sets and for weight-based critical-care drugs.	139
23	Administering Medications via NG or Gastrostomy Tube	To give oral medications safely through enteral tubes without blocking the tube or altering drug action.	140
24	Applying Transdermal Patches	To deliver drug steadily through the skin (fentanyl, nitroglycerin, nicotine, rivastigmine, buprenorphine, hormones).	141

Tap a name or page number to open its full page.

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PROCEDURE 13 · MEDICATION ADMINISTRATION

Verifying Patient Identity

Purpose. To ensure the right patient receives the right care — the first step of every procedure, medication, blood transfusion and specimen collection.

Indications

- Every medication, procedure, specimen and transfusion
- Patient transfer and handover

Equipment

- Identification band
- Medication chart/order
- Barcode scanner (where available)

#	Nursing action	Rationale
1	Ask the patient to state their full name and date of birth (open questions)	Active identification; never "Are you Mr X?"
2	Compare with the ID band and the prescription/order	Two identifiers from two sources
3	For unconscious, confused or children, check ID band with a relative/second nurse	Patient cannot confirm
4	Check allergy band and allergy status	Prevent allergic reactions
5	Never use bed number or room as an identifier	Patients move
6	Replace missing or illegible ID bands immediately	Continuous safety

Risk / complication	Prevention / action
Same or similar names on the ward	Name alert; use hospital number
ID band missing	Do not proceed until replaced

Document

Identity verified before every intervention (as per checklist).

Clinical pearls

Wrong-patient errors are among the commonest — especially when two patients have similar names.

Further reading — tap to open (free) ► Indian Nursing Council · WHO — Medication Without Harm

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Subcutaneous Injection

Purpose. To deliver drugs into subcutaneous fat for slow, steady absorption — insulin, heparin, enoxaparin, vaccines.

Indications

- Insulin
- Heparin, enoxaparin
- Some vaccines, erythropoietin, terbutaline

Equipment

- Syringe (insulin syringe or 1 mL) and 25–27 G needle (4–8 mm pen needle)
- Medication
- Alcohol swab (if policy)
- Sharps container

#	Nursing action	Rationale
1	Verify prescription and patient; hand hygiene	Rights of administration
2	Choose site: abdomen (5 cm from umbilicus), outer upper arm, anterior thigh; rotate	Prevent lipohypertrophy
3	Pinch a fold of skin	Lifts fat away from muscle
4	Insert at 90° (45° if thin or long needle)	Correct depth
5	Inject slowly; for pens hold 10 s before withdrawing	Full dose delivered
6	Do not aspirate; do not massage (especially heparin)	Prevent haematoma and altered absorption
7	Dispose of sharps immediately without recapping	Needle-stick prevention

Risk / complication	Prevention / action
Lipohypertrophy from repeated sites	Rotate and inspect sites
Bruising (heparin, enoxaparin)	No rubbing; ice before
Needle-stick injury	No recapping; sharps box at bedside

Document

Drug, dose, site, time, signature; blood glucose for insulin.

Clinical pearls

Insulin absorption is fastest from the abdomen and slowest from the thigh — keep the region consistent for each time of day.

Further reading — tap to open (free) ► Indian Nursing Council · WHO — Medication Without Harm

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Intramuscular Injection — Z-Track Technique

Purpose. To deliver drugs into muscle and prevent leakage into subcutaneous tissue, staining or irritation (iron, haloperidol depot, irritants).

Indications

- Irritant or staining drugs
- Vaccines, antibiotics, vitamin B12
- Depot antipsychotics, oxytocin, $MgSO_4$

Equipment

- Syringe, 21–23 G needle (25–38 mm)
- Medication
- Alcohol swab
- Gloves, sharps container

#	Nursing action	Rationale
1	Verify order and patient; hand hygiene; gloves	Safety and asepsis
2	Select site: ventrogluteal (preferred), vastus lateralis (infants), deltoid (≤1 mL)	Avoids nerves and vessels
3	Pull skin 2.5–3.5 cm laterally and hold	Creates the Z-track
4	Insert needle at 90° quickly	Reaches muscle
5	Aspirate if dorsogluteal or per policy; inject slowly (10 s/mL)	Reduce pain
6	Wait 10 s, withdraw, then release the skin	Seals the track
7	Do not massage; apply light pressure; dispose sharps	Prevent leakage

Risk / complication	Prevention / action
Sciatic nerve injury (dorsogluteal)	Prefer ventrogluteal site
Abscess, haematoma	Asepsis; rotate sites
Wrong volume for site	Deltoid ≤1 mL; gluteal ≤3–5 mL

Document

Drug, dose, site, technique, time, patient response.

Clinical pearls

The ventrogluteal site is free of major nerves and vessels — the safest site for adult IM injections.

Further reading — tap to open (free) ► Indian Nursing Council · WHO — Medication Without Harm

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Intradermal Injection

Purpose. To inject a small volume into the dermis — tuberculin (Mantoux) test, allergy and drug sensitivity tests, BCG vaccine.

Indications
- Mantoux (tuberculin skin test)
- Drug sensitivity test (as per policy)
- BCG vaccination

Equipment
- Tuberculin syringe, 26–27 G needle
- Solution (e.g. 5 TU PPD 0.1 mL)
- Alcohol swab
- Pen

#	Nursing action	Rationale
1	Verify order and patient; hand hygiene	Safety
2	Site: inner (volar) forearm, 4 fingers below elbow, hair-free	Easy reading
3	Stretch skin taut; insert needle bevel up at 10–15°	Just under epidermis
4	Inject slowly to form a 6–10 mm pale wheal (bleb)	Confirms intradermal placement
5	Withdraw; do not massage or cover	Prevent dispersal
6	Mark site; read Mantoux at 48–72 h measuring induration (not redness)	Correct interpretation

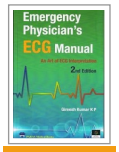
Risk / complication	Prevention / action
Injection too deep (no wheal)	Repeat at another site
Anaphylaxis with sensitivity tests	Emergency drugs ready

Document
Drug, dose, site, time; Mantoux reading in mm of induration.

Clinical pearls
Mantoux ≥10 mm is positive in general; ≥5 mm is positive in people with HIV.

Further reading — tap to open (free) ► Indian Nursing Council · WHO — Medication Without Harm

Section: Medication Administration · Summary table on page 129 · Contents



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Administering Eye Drops and Ointment

Purpose. To instil ophthalmic medication safely without contamination or systemic absorption.

Indications
- Eye infections, glaucoma
- Post-cataract surgery
- Mydriatics before examination

Equipment
- Prescribed drops/ointment (check eye — right/left)
- Sterile cotton or gauze
- Gloves

#	Nursing action	Rationale
1	Verify drug, eye (R/L), patient; hand hygiene	Rights
2	Clean lids from inner to outer canthus	Remove discharge away from tear duct
3	Tilt head back; ask to look up; pull lower lid down to form a pocket	Conjunctival sac
4	Instil drop into the sac — not on cornea; do not touch eye with tip	Prevent pain and contamination
5	Ask to close eye gently; press inner canthus (nasolacrimal duct) for 1–2 min	Reduce systemic absorption (e.g. timolol)
6	Wait 5 min between different drops; ointment last	Each drug absorbed
7	Ointment: thin ribbon along lower lid from inner to outer canthus	Even spread

Risk / complication	Prevention / action
Cross-infection between eyes	Separate bottles per eye if infected
Systemic effects (beta-blocker drops — bradycardia, asthma)	Punctal occlusion
Blurred vision after ointment	Warn patient

Document
Drug, eye, time, response.

Clinical pearls
One drop is enough — the conjunctival sac holds only about one drop; extra just runs down the cheek.

Further reading — tap to open (free) ► Indian Nursing Council · WHO — Medication Without Harm

Section: Medication Administration · Summary table on page 129 · Contents

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Administering Ear Drops

Purpose. To instil medication into the external auditory canal.

Indications
- Otitis externa
- Wax softening
- Post-ear-surgery (as prescribed)

Equipment
- Ear drops at room temperature
- Cotton ball
- Gloves

#	Nursing action	Rationale
1	Verify drug, ear, patient	Rights
2	Warm drops in hand (cold drops cause vertigo)	Prevent dizziness
3	Patient lies with affected ear up	Gravity
4	Adult/child >3 y: pull pinna **up and back**; child <3 y: **down and back**	Straightens the canal
5	Instil drops along the canal wall; do not touch ear	Avoid contamination
6	Press tragus gently; remain lying 2–5 min	Distributes drops
7	Loose cotton plug if ordered	Retain medicine

Risk / complication	Prevention / action
Vertigo, nausea	Warm drops
Perforated eardrum	Check before ototoxic drops

Document
Drug, ear, time, response.

Clinical pearls
Never instil drops forcefully — pressure on a perforated drum causes pain and middle-ear contamination.

Further reading — tap to open (free) ► Indian Nursing Council · WHO — Medication Without Harm

Section: Medication Administration · Summary table on page 129 · Contents

CBME-BASED INTERNAL MEDICINE
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PROCEDURE 19 · MEDICATION ADMINISTRATION

Administering Metered-Dose Inhalers (with Spacer)

Purpose. To deliver inhaled drugs effectively to the lungs — technique determines how much drug reaches the airways.

Indications
- Asthma, COPD
- Reliever (salbutamol) and controller (steroid) inhalers

Equipment
- MDI
- Spacer with mouthpiece or mask
- Glass of water (for rinse)

#	Nursing action	Rationale
1	Check drug, dose; shake MDI and remove cap	Mix suspension
2	Insert MDI into spacer	Spacer reduces oropharyngeal deposition
3	Breathe out fully away from spacer	Room for deep breath
4	Seal lips around mouthpiece; press canister once	One puff at a time
5	Breathe in slowly and deeply (or 4–6 tidal breaths); hold breath 10 s	Deposition in airways
6	Wait 30–60 s before second puff	Repeat cleanly
7	After steroid inhaler: rinse mouth, gargle, spit	Prevent thrush and hoarseness

Risk / complication	Prevention / action
Poor coordination	Always use spacer; mask for children
Thrush with steroids	Rinse after use
Empty inhaler	Track dose counter

Document
Drug, number of puffs, technique checked, response (RR, SpO_2, wheeze).

Clinical pearls
A spacer with an MDI is as effective as a nebuliser in most acute asthma attacks.

Further reading — tap to open (free) ► Indian Nursing Council · WHO — Medication Without Harm

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PROCEDURE 20 · MEDICATION ADMINISTRATION

Priming and Programming an IV Infusion Pump

Purpose. To deliver IV fluids and drugs at a precise rate.

Indications

- High-alert infusions (insulin, heparin, vasopressors, potassium)
- Infusions in children
- Any rate-critical fluid

Equipment

- Infusion pump/syringe driver
- Compatible administration set
- Prescribed fluid/drug with label
- Alcohol swab

#	Nursing action	Rationale
1	Verify order, patient, drug, concentration	Rights
2	Label infusion bag/syringe with drug, dose, date, time, signature	Identification
3	Prime the set slowly, removing all air bubbles	Prevent air embolism
4	Load set into pump per manufacturer; close door	Prevent free flow
5	Programme rate, volume to be infused (or use drug library); second nurse checks high-alert drugs	Prevent ten-fold errors
6	Connect to patient after checking cannula patency; start; observe first minutes	Safe start
7	Respond to alarms promptly; check site hourly	Detect occlusion, infiltration

Risk / complication	Prevention / action
Free-flow when set removed	Use anti-free-flow sets; clamp first
Wrong rate entry (decimal errors)	Independent double check; drug library
Occlusion alarm ignored	Check line and site

Document

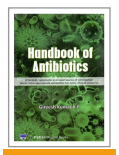
Fluid/drug, concentration, rate, volume infused hourly, checks done.

Clinical pearls

Siphoning from a syringe driver positioned above the patient can deliver a bolus — keep syringe drivers at patient level.

Further reading — tap to open (free) ► Indian Nursing Council · WHO — Medication Without Harm

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PROCEDURE 21 · MEDICATION ADMINISTRATION

Mixing Regular and NPH Insulin in One Syringe

Purpose. To give a premixed dose of short- and intermediate-acting insulin in a single injection without contaminating the clear insulin.

Indications

- Patients prescribed regular + NPH in one injection

Equipment

- Insulin syringe (U-100)
- Regular (clear) and NPH (cloudy) vials
- Alcohol swabs

#	Nursing action	Rationale
1	Verify doses and patient; roll NPH vial to mix (do not shake)	Uniform suspension
2	Clean both vial tops	Asepsis
3	Inject air equal to NPH dose into NPH vial; withdraw needle (do not draw)	Pressurises cloudy vial without contamination
4	Inject air equal to regular dose into regular vial; invert and draw regular dose	"Clear first"
5	Insert into NPH vial; draw the NPH dose carefully (total = sum)	Prevent cloudy insulin entering clear vial
6	Second nurse verifies total dose	High-alert check
7	Inject subcutaneously immediately	Mixture changes on standing

Risk / complication	Prevention / action
Contaminating regular vial with NPH	Always clear before cloudy
Over-drawing NPH	If excess, discard and restart
Mixing glargine	Never mix glargine or detemir with any insulin

Document

Doses of each insulin, total, site, glucose, double-check signature.

Clinical pearls

"Air into cloudy, air into clear, draw clear, then cloudy" — RN (Regular then NPH).

Further reading — tap to open (free) ► Indian Nursing Council · WHO — Medication Without Harm

Section: Medication Administration · Summary table on page 129 · Contents

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Calculating IV Drip Rates (including µg/kg/min)

Purpose. To calculate infusion rates accurately for gravity sets and for weight-based critical-care drugs.

Indications
- Gravity IV fluids
- Vasopressors, inotropes (µg/kg/min)
- Heparin, insulin infusions

Equipment
- Calculator
- Prescription
- Drug concentration
- Patient weight

#	Nursing action	Rationale
1	Gravity drops/min = volume (mL) × drop factor ÷ time (min)	Macro set 15 or 20 drops/mL; micro set 60 drops/mL
2	Example: 1,000 mL over 8 h with 20 drop set = 1,000 × 20 ÷ 480 ≈ 42 drops/min	Worked example
3	mL/h = total volume ÷ hours	Pump rate
4	µg/kg/min → mL/h = dose (µg/kg/min) × weight (kg) × 60 ÷ concentration (µg/mL)	Weight-based infusion formula
5	Example: noradrenaline 0.1 µg/kg/min, 70 kg, 80 µg/mL → 0.1 × 70 × 60 ÷ 80 = 5.25 mL/h	Worked example
6	Second nurse recalculates independently	Error trap

Risk / complication	Prevention / action
Decimal and unit errors (mg vs µg)	Write units in full; double check
Wrong drop factor	Read set packaging

Document
Calculation, rate set, double-check signature.

Clinical pearls
With a micro-drip (60 drops/mL) set, drops per minute equal mL per hour.

Further reading — tap to open (free) ► Indian Nursing Council · WHO — Medication Without Harm

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PROCEDURE 23 · MEDICATION ADMINISTRATION

Administering Medications via NG or Gastrostomy Tube

Purpose. To give oral medications safely through enteral tubes without blocking the tube or altering drug action.

Indications
- Patients unable to swallow (stroke, ICU, head and neck surgery)

Equipment
- Enteral (oral/ENFit) syringes 50 mL
- Water
- Mortar and pestle or pill crusher
- Gloves, pH strip

#	Nursing action	Rationale
1	Check tube position (pH ≤5.5 or as policy) and patency	Prevent administration into lungs
2	Use liquid forms where possible; check which tablets must not be crushed (SR, enteric-coated)	Altered absorption, toxicity
3	Stop feed; flush with 30 mL water	Clear tube
4	Crush each tablet separately; dissolve in 10–15 mL water	Prevent interactions and blockage
5	Give each drug separately, flushing 5–10 mL water between	Avoid incompatibility
6	Final flush 30 mL; restart feed (hold feed for phenytoin/levothyroxine as directed)	Patency and absorption
7	Never use IV syringes for enteral drugs	Prevent wrong-route errors

Risk / complication	Prevention / action
Tube blockage	Adequate flushing; warm water
Crushing modified-release tablets	Pharmacist advice
Aspiration	Head end elevated 30–45°

Document
Each drug, dose, time, flush volumes, tube position check.

Clinical pearls

Use enteral (purple/ENFit) syringes only — they cannot connect to IV lines, preventing fatal wrong-route errors.

Further reading — tap to open (free) ► Indian Nursing Council · WHO — Medication Without Harm

Section: Medication Administration · Summary table on page 129 · Contents


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Applying Transdermal Patches

Purpose. To deliver drug steadily through the skin (fentanyl, nitroglycerin, nicotine, rivastigmine, buprenorphine, hormones).

Indications

- Chronic pain (fentanyl, buprenorphine)
- Angina prophylaxis (GTN)
- Nicotine replacement, dementia (rivastigmine)

Equipment

- Patch
- Gloves
- Pen
- Disposal bag

#	Nursing action	Rationale
1	Verify order; wear gloves	Avoid absorbing drug yourself
2	Remove old patch; fold sticky sides together; dispose safely	Prevent double dosing and accidental exposure
3	Clean, dry, hair-free intact skin on upper arm, chest or back; clip (not shave) hair	Consistent absorption
4	Rotate sites; avoid irritated or scarred skin	Prevent irritation
5	Press firmly 30 s	Adhesion
6	Write date, time, initials on patch	Tracking
7	Avoid heat (heating pads, hot baths) over patch; check fever	Heat increases absorption — overdose

Risk / complication	Prevention / action
Double dosing from forgotten old patch	Check whole body for old patches
MRI burns (metallic patches)	Remove before MRI
Child or pet exposure	Safe disposal

Document

Drug, dose, site, time, removal of old patch.

Clinical pearls

Search the whole body for old patches on admission — overlapping fentanyl patches cause respiratory depression.

Further reading — tap to open (free) ► Indian Nursing Council · WHO — Medication Without Harm

Section: Medication Administration · Summary table on page 129 · Contents

Emergency Physician's ECG Manual
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IV Access & Vascular Care

Overview and one-page summary table

Vascular access devices are essential and dangerous: phlebitis, infiltration, bloodstream infection and air embolism are preventable with aseptic technique, correct flushing and frequent site assessment.

#	Procedure	Key point	Page
25	Peripheral IV Cannulation	To establish peripheral venous access for fluids, drugs and blood products.	143
26	IV Site Assessment and Maintenance (VIP Score)	To detect phlebitis, infiltration and extravasation early using the Visual Infusion Phlebitis (VIP) score.	144
27	Flushing a Central Venous Access Device	To maintain patency of central lines and prevent occlusion and drug incompatibility.	145
28	Central Line Dressing Change	To prevent central line-associated bloodstream infection (CLABSI) using sterile technique.	146
29	Blood Culture Collection	To identify bacteraemia — taken before antibiotics with strict asepsis to avoid contamination.	147
30	Accessing an Implanted Port (Port-a-Cath)	To access a totally implanted venous port with a non-coring (Huber) needle under sterile conditions.	148
31	Discontinuing a Peripheral IV Cannula	To remove a peripheral cannula safely when no longer needed or when complications occur.	149

Tap a name or page number to open its full page.

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Peripheral IV Cannulation

Purpose. To establish peripheral venous access for fluids, drugs and blood products.

Indications

- IV fluids and medications
- Blood transfusion
- Emergency access, contrast studies

Equipment

- Cannula (size by purpose: 18 G for blood/emergency, 20–22 G routine)
- Tourniquet
- Chlorhexidine 2%-alcohol swab
- Sterile transparent dressing
- Primed extension set, saline flush
- Gloves, sharps box

#	Nursing action	Rationale
1	Verify order and patient; explain; hand hygiene; gloves	Safety
2	Select vein: forearm preferred, avoid joints, affected arm (fistula, mastectomy)	Comfort, fewer complications
3	Apply tourniquet 10 cm above site	Vein distension
4	Clean with chlorhexidine-alcohol for 30 s; allow to dry; do not re-palpate	Asepsis
5	Anchor vein; insert bevel up at 10–30°; watch flashback	Venepuncture
6	Advance cannula off the needle; release tourniquet; press over tip; remove needle into sharps	Prevent blood spill and needle-stick
7	Connect, flush 5–10 mL saline; secure with sterile dressing; label date	Patency and securement

Risk / complication	Prevention / action
Phlebitis, infection	Aseptic insertion; assess every shift (VIP score); remove when not needed
Infiltration/extravasation	Check site; stop if swelling
Needle-stick	Safety cannulas; immediate disposal

Document

Date, time, site, gauge, attempts, flush, VIP score; replace per policy (clinically indicated).

Clinical pearls

Remove any cannula that is not being used — an idle cannula is only an infection risk.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — infection control guidelines

Section: IV Access & Vascular Care · Summary table on page 142 · Contents

CBME-BASED INTERNAL MEDICINE
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IV Site Assessment and Maintenance (VIP Score)

Purpose. To detect phlebitis, infiltration and extravasation early using the Visual Infusion Phlebitis (VIP) score.

Indications
• Every peripheral cannula at least once per shift and before each drug

Equipment
• VIP score chart
• Saline flush
• Dressing supplies

#	Nursing action	Rationale
1	Inspect and palpate the site through the transparent dressing	Early detection
2	Score VIP: 0 = healthy; 1 = slight pain or redness; 2 = two of pain, erythema, swelling	Early phlebitis — resite
3	Score 3 = pain along path, erythema, induration	Medium phlebitis — remove, consider treatment
4	Scores 4–5 = palpable venous cord, pyrexia	Advanced phlebitis/thrombophlebitis — remove, treat
5	Check for infiltration: swelling, coolness, blanching, leakage	Stop infusion, remove, elevate
6	Flush 5–10 mL saline before and after drugs (push-pause technique)	Patency

Risk / complication	Prevention / action
Extravasation of vesicants (noradrenaline, chemotherapy, calcium, dextrose 25–50%)	Stop, aspirate, remove, elevate, antidote per policy; inform
Catheter-related bloodstream infection	Remove; blood cultures

Document
VIP score each shift, action taken, dressing condition.

Clinical pearls
A VIP score of 2 or more means the cannula should be removed and resited.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — infection control guidelines

Section: IV Access & Vascular Care · Summary table on page 142 · Contents

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Flushing a Central Venous Access Device

Purpose. To maintain patency of central lines and prevent occlusion and drug incompatibility.

Indications

- Before and after medications, blood sampling, TPN
- Lines not in use (per policy)

Equipment

- Pre-filled 10 mL saline syringes (or larger)
- Chlorhexidine-alcohol swabs
- Gloves
- Heparin lock if prescribed

#	Nursing action	Rationale
1	Hand hygiene; gloves; identify lumen	Asepsis
2	Scrub the needle-free connector for 15 s; allow to dry	Prevent bloodstream infection ("scrub the hub")
3	Use a 10 mL or larger syringe	Smaller syringes generate high pressure — catheter rupture
4	Check for blood return before use (do not force)	Confirms patency
5	Flush with 10 mL saline using push-pause (pulsatile) technique	Turbulence clears the lumen
6	Clamp while instilling the last 0.5 mL (positive pressure)	Prevents blood reflux
7	Heparin lock only if prescribed/policy	Many units use saline only

Risk / complication	Prevention / action
Resistance to flush	Never force — check clamps, kinks; report possible occlusion
Air embolism	Clamp lumen when open; Valsalva/head down during disconnection
CLABSI	Scrub the hub every access

Document

Lumen flushed, solution, blood return, problems.

Clinical pearls

Never use a syringe smaller than 10 mL on a central line — it can rupture the catheter.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — infection control guidelines

Section: IV Access & Vascular Care · Summary table on page 142 · Contents

Handbook of Antibiotics
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Central Line Dressing Change

Purpose. To prevent central line-associated bloodstream infection (CLABSI) using sterile technique.

Indications

- Transparent dressing every 7 days, gauze every 2 days
- Dressing damp, loose or soiled

Equipment

- Sterile dressing pack, sterile gloves, mask
- Chlorhexidine 2% in alcohol applicator
- Transparent semipermeable dressing (± chlorhexidine sponge)
- Securement device

#	Nursing action	Rationale
1	Hand hygiene; mask for nurse and patient (turn head away)	Reduce droplet contamination
2	Remove old dressing toward the insertion site with clean gloves	Prevent dislodgement
3	Inspect site for redness, discharge, tenderness; measure external length	Detect infection and migration
4	Hand hygiene; sterile gloves	Asepsis
5	Clean with chlorhexidine-alcohol with back-and-forth friction for 30 s; dry completely	Most effective antisepsis
6	Apply sterile transparent dressing; secure lines without tension	Visibility and protection
7	Label with date and initials	Track next change

Risk / complication	Prevention / action
CLABSI	Bundle: hand hygiene, maximal barrier at insertion, chlorhexidine, daily review of need
Catheter migration	Measure external length
Skin reaction to chlorhexidine	Report; alternative antiseptic

Document

Date, site appearance, external length, dressing type.

Clinical pearls

Every day, ask "does this patient still need the central line?" — removal is the best prevention of CLABSI.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — infection control guidelines

Section: IV Access & Vascular Care · Summary table on page 142 · Contents

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Blood Culture Collection

Purpose. To identify bacteraemia — taken before antibiotics with strict asepsis to avoid contamination.

Indications

- Fever with suspected sepsis
- Suspected endocarditis (3 sets)
- Line infection

Equipment

- Aerobic and anaerobic culture bottles
- Chlorhexidine-alcohol swabs
- Blood culture collection set or sterile syringe, needle
- Sterile gloves

#	Nursing action	Rationale
1	Identify patient; check antibiotics not yet given	Antibiotics reduce yield
2	Hand hygiene; remove bottle caps; disinfect bottle tops (alcohol)	Prevent contamination
3	Apply tourniquet; clean skin with chlorhexidine-alcohol 30 s; dry; do not re-palpate	Skin antisepsis
4	Draw 8–10 mL per bottle (adults) — volume matters most	Higher yield
5	Inoculate aerobic bottle first with butterfly set (anaerobic first with syringe)	Avoid air entering anaerobic bottle
6	Take two sets from two separate sites	Distinguish contaminants
7	Label at bedside with time and site; send promptly; start antibiotics within 1 h in sepsis	Accurate processing

Risk / complication	Prevention / action
Contamination (skin flora)	Strict asepsis; avoid drawing from existing cannula
Delay of antibiotics	Cultures should not delay treatment beyond an hour

Document

Sets drawn, sites, time, antibiotics start time.

Clinical pearls

The volume of blood is the single most important factor in detecting bacteraemia — underfilled bottles miss infections.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — infection control guidelines

Section: IV Access & Vascular Care · Summary table on page 142 · Contents



BUY NOW ›

Accessing an Implanted Port (Port-a-Cath)

Purpose. To access a totally implanted venous port with a non-coring (Huber) needle under sterile conditions.

Indications
- Chemotherapy, long-term IV therapy
- Blood sampling
- Monthly maintenance flush

Equipment
- Huber (non-coring) needle with extension
- Sterile gloves, mask, drape
- Chlorhexidine-alcohol
- 10 mL saline syringes
- Transparent dressing

#	Nursing action	Rationale
1	Explain; local anaesthetic cream 1 h before if desired	Comfort
2	Palpate the port septum and borders	Locate
3	Hand hygiene; mask; sterile gloves; clean skin outward 30 s	Asepsis
4	Stabilise port with thumb and fingers; insert Huber needle at 90° until it touches the base	Correct placement
5	Aspirate for blood return; flush 10 mL saline push-pause	Confirm patency
6	Secure needle; apply transparent dressing; change needle every 7 days	Prevent dislodgement
7	De-access: flush, lock per policy, remove needle with positive pressure	Maintain patency

Risk / complication	Prevention / action
Extravasation (needle not in port)	Check blood return before vesicants; observe chest wall
Infection	Sterile technique
Occlusion	Do not force; report

Document
Needle size, blood return, flush, site, dressing date.

Clinical pearls
Always confirm a brisk blood return before giving chemotherapy through a port.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — infection control guidelines

Section: IV Access & Vascular Care · Summary table on page 142 · Contents

BUY NOW ›

Discontinuing a Peripheral IV Cannula

Purpose. To remove a peripheral cannula safely when no longer needed or when complications occur.

Indications
- Therapy completed
- Phlebitis, infiltration
- Routine resite per policy

Equipment
- Gloves
- Sterile gauze
- Tape/plaster
- Sharps/clinical waste container

#	Nursing action	Rationale
1	Verify order; explain; hand hygiene; gloves	Safety
2	Stop infusion; clamp tubing	Prevent spillage
3	Remove dressing gently, stabilising cannula	Avoid trauma
4	Withdraw cannula smoothly along the vein; apply pressure with gauze 1–2 min (longer on anticoagulants)	Haemostasis
5	Inspect the tip is intact	Detect catheter fracture/embolism
6	Apply dressing; dispose of materials	Infection control
7	Send tip for culture only if infection suspected	Diagnosis

Risk / complication	Prevention / action
Catheter fragment missing	Tourniquet above site, inform immediately
Bleeding, haematoma	Firm pressure; elevate

Document
Time removed, tip intact, site condition, reason.

Clinical pearls
Do not flex the elbow over gauze to stop bleeding — direct pressure with the arm straight reduces bruising.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — infection control guidelines

Section: IV Access & Vascular Care · Summary table on page 142 · Contents

Emergency Physician's ECG Manual
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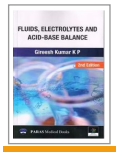
Infection Control & Wound Care

Overview and one-page summary table

Hand hygiene is the single most effective way to prevent healthcare-associated infection. Sterile technique, correct PPE and evidence-based wound care prevent infection and speed healing.

#	Procedure	Key point	Page
32	Donning and Doffing PPE	To protect staff and patients from transmission during contact, droplet and airborne precautions.	151
33	Surgical Hand Scrub	To remove transient and reduce resident flora before sterile procedures and surgery.	152
34	Establishing and Maintaining a Sterile Field	To create a sterile working area for invasive procedures.	153
35	Sterile Gloving (Open Method)	To put on sterile gloves without contaminating their outer surface.	154
36	Dry Wound Dressing Change	To clean a wound and apply a sterile dressing, protecting it from infection.	155
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42	Obtaining a Wound Culture Swab	To identify organisms causing wound infection and guide antibiotic therapy.	161

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Donning and Doffing PPE

Purpose. To protect staff and patients from transmission during contact, droplet and airborne precautions.

Indications

- Contact precautions (MRSA, C. difficile)
- Droplet (influenza, meningococcus)
- Airborne (TB, measles, varicella, COVID-19 aerosol procedures)

Equipment

- Gown
- Surgical mask or N95 respirator
- Goggles/face shield
- Gloves
- Alcohol hand rub

#	Nursing action	Rationale
1	Hand hygiene	Start clean
2	Don gown — tie at neck and waist	Body protection
3	Don mask/respirator; fit-check N95 (seal check)	Respiratory protection
4	Don goggles or face shield	Eye protection
5	Don gloves over gown cuffs	Complete barrier
6	Doffing: remove gloves (glove-in-glove), then gown (roll inside out), hand hygiene	Most contaminated first
7	Remove goggles by the strap, then mask by ties without touching the front; hand hygiene	Prevent self-contamination

Risk / complication	Prevention / action
Self-contamination during doffing	Slow, observed doffing; hand hygiene between steps
Poor N95 seal	Fit testing and seal check
Re-using single-use PPE	Discard after each patient

Document

Isolation type on chart and door sign.

Clinical pearls

Donning order: gown, mask, goggles, gloves. Doffing order: gloves, gown, (hand hygiene) goggles, mask — the mask comes off last, outside the room.

Further reading — tap to open (free) ► WHO — hand hygiene and IPC · Indian Nursing Council

Section: Infection Control & Wound Care · Summary table on page 150 · Contents

CBME-BASED INTERNAL MEDICINE
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Surgical Hand Scrub

Purpose. To remove transient and reduce resident flora before sterile procedures and surgery.

Indications

• Before surgery and invasive sterile procedures

Equipment

• Antiseptic (chlorhexidine 4% or povidone-iodine 7.5%) or alcohol-based surgical rub
• Nail cleaner
• Sterile towel

#	Nursing action	Rationale
1	Remove jewellery; nails short; cap and mask on	Reduce bacterial reservoir
2	Wash hands and forearms with soap; clean under nails	Remove debris
3	Scrub each side of each finger, hand and arm to 5 cm above elbow (3–5 min)	Systematic coverage
4	Keep hands above elbows at all times	Water drains from clean to less clean
5	Rinse from fingertips to elbows	Prevent recontamination
6	Dry with sterile towel, one side per arm, fingertips to elbow	Maintain asepsis
7	Alternative: alcohol surgical rub per WHO technique after initial wash	Equally effective

Risk / complication	Prevention / action
Contamination by touching taps or non-sterile items	Elbow/foot-operated taps; start again if touched
Skin dermatitis	Moisturise; report

Document

Not routinely documented (theatre checklist).

Clinical pearls

WHO "5 moments" for hand hygiene: before patient contact, before aseptic task, after body-fluid exposure, after patient contact, after touching surroundings.

Further reading — tap to open (free) ► WHO — hand hygiene and IPC · Indian Nursing Council

Section: Infection Control & Wound Care · Summary table on page 150 · Contents

BUY NOW ›

Establishing and Maintaining a Sterile Field

Purpose. To create a sterile working area for invasive procedures.

Indications
- Dressings, catheterisation, central line insertion
- Surgical and invasive procedures

Equipment
- Sterile pack/drape
- Sterile items
- Clean, dry, waist-level surface

#	Nursing action	Rationale
1	Check package integrity, expiry, sterilisation indicator	Ensure sterility
2	Clean surface at waist height; hand hygiene	Workspace
3	Open the outer flap away from you first, then sides, last flap toward you	Avoid reaching over sterile field
4	Drop items onto field from 15 cm without touching; pour solutions without splashing	Maintain sterility
5	The 2.5 cm (1 inch) border is considered non-sterile	Edges contaminated
6	Never turn your back on the field or leave it unattended; keep above waist	Out of sight = contaminated
7	If contaminated — discard and start again	When in doubt, throw it out

Risk / complication	Prevention / action
Moisture strike-through	Wet field = contaminated
Talking/coughing over field	Mask, minimise talking

Document
Procedure performed under aseptic technique.

Clinical pearls
"If in doubt, it is not sterile."

Further reading — tap to open (free) ► WHO — hand hygiene and IPC · Indian Nursing Council

Section: Infection Control & Wound Care · Summary table on page 150 · Contents

Handbook of Antibiotics
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Sterile Gloving (Open Method)

Purpose. To put on sterile gloves without contaminating their outer surface.

Indications
• Sterile procedures: catheterisation, dressings, central line, suctioning (ETT)

Equipment
• Correct-size sterile gloves

#	Nursing action	Rationale
1	Hand hygiene; open glove package on a clean dry surface	Asepsis
2	Pick up first glove by the folded cuff (inside) with non-dominant hand	Touch only the inside
3	Slide dominant hand in, leaving cuff folded	Gloved hand sterile
4	Slide gloved fingers under the cuff of second glove	Sterile-to-sterile
5	Insert other hand; pull glove on without touching skin	Maintain sterility
6	Unfold cuffs by sliding fingers under them	Complete
7	Keep hands above waist and in view	Prevent contamination

Risk / complication	Prevention / action
Torn or contaminated glove	Replace immediately
Latex allergy	Use nitrile

Document
Not usually separate documentation.

Clinical pearls

Sterile gloves never replace hand hygiene — clean hands before and after.

Further reading — tap to open (free) ► WHO — hand hygiene and IPC · Indian Nursing Council

Section: Infection Control & Wound Care · Summary table on page 150 · Contents

BUY NOW ›

Dry Wound Dressing Change

Purpose. To clean a wound and apply a sterile dressing, protecting it from infection.

Indications
- Surgical incisions
- Clean wounds with minimal exudate

Equipment
- Sterile dressing pack, sterile gloves
- Normal saline
- Sterile gauze/dressing
- Tape
- Clean gloves, waste bag

#	Nursing action	Rationale
1	Check order; explain; give analgesia 30 min before if needed	Comfort
2	Hand hygiene; clean gloves; remove soiled dressing (moisten if stuck)	Avoid trauma
3	Assess wound: size, edges, exudate, odour, signs of infection	Monitor healing
4	Hand hygiene; open sterile pack; sterile gloves	Asepsis
5	Clean from cleanest to least clean area (incision to outer skin), one swab per stroke	Prevent contamination
6	Dry surrounding skin; apply dressing; secure	Protection
7	Dispose of waste; hand hygiene; document	Infection control

Risk / complication	Prevention / action
Wound infection — redness, warmth, pus, fever	Swab, inform
Dehiscence	Cover with sterile moist dressing; inform surgeon urgently

Document
Wound appearance, exudate, dressing applied, patient tolerance.

Clinical pearls
Most clean surgical wounds can be left covered for 48 hours — unnecessary dressing changes increase infection risk.

Further reading — tap to open (free) ► WHO — hand hygiene and IPC · Indian Nursing Council

Section: Infection Control & Wound Care · Summary table on page 150 · Contents

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Damp-to-Dry and Moist Wound Packing

Purpose. To pack a deep or cavity wound — damp-to-dry for mechanical debridement (now less used); moist dressings for healing.

Indications

- Cavity wounds, abscess cavities
- Wounds needing debridement (damp-to-dry)

Equipment

- Sterile dressing pack and gloves
- Saline-moistened gauze or packing ribbon
- Dry gauze, secondary dressing
- Sterile probe, measuring guide

#	Nursing action	Rationale
1	Pre-medicate for pain; explain	Removal is painful
2	Remove old dressing; note amount of packing removed	Ensure no retained gauze
3	Irrigate cavity with saline	Clean
4	Measure depth and undermining with sterile probe	Assess healing
5	Moisten gauze (wrung out — damp, not wet)	Wet gauze macerates skin
6	Loosely fill the cavity, not overpacked; leave a tail visible	Allows drainage and easy removal
7	Cover with dry dressing; count pieces in and out	Prevent retained packing

Risk / complication	Prevention / action
Retained packing causing abscess	Record number of pieces
Damage to healthy tissue on removal	Prefer modern moist dressings (alginate, foam)
Maceration	Protect wound edges

Document

Wound size, depth, packing material and number of pieces, exudate.

Clinical pearls

Write the number of gauze pieces inserted on the dressing and in the chart.

Further reading — tap to open (free) ► WHO — hand hygiene and IPC · Indian Nursing Council

Section: Infection Control & Wound Care · Summary table on page 150 · Contents

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Wound Irrigation

Purpose. To clean debris and bacteria from a wound with a gentle stream of solution.

Indications

- Contaminated or traumatic wounds
- Cavity wounds
- Before dressing chronic wounds

Equipment

- Sterile 35 mL syringe with 19 G angiocath or irrigation tip
- Warmed sterile saline
- Basin, waterproof pad
- Sterile gloves, goggles, gown

#	Nursing action	Rationale
1	Explain; analgesia; position so solution flows from wound into basin	Gravity drainage
2	Wear PPE including eye protection	Splash risk
3	Warm saline to body temperature	Comfort, avoid vasoconstriction
4	Hold syringe 2.5 cm from wound; irrigate gently (4–15 psi)	Effective without tissue damage
5	Irrigate from clean to dirty area until solution runs clear	Remove debris
6	Dry surrounding skin; apply dressing	Protect skin

Risk / complication	Prevention / action
Excessive pressure driving bacteria deeper	Use recommended syringe/needle
Splash exposure	Goggles, gown
Cold solution — pain	Warm saline

Document

Solution, volume, wound appearance, patient tolerance.

Clinical pearls

A 35 mL syringe with a 19 G cannula delivers about 8 psi — ideal irrigation pressure.

Further reading — tap to open (free) ► WHO — hand hygiene and IPC · Indian Nursing Council

Section: Infection Control & Wound Care · Summary table on page 150 · Contents

Emergency Physician's ECG Manual
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Managing a Jackson-Pratt (JP) Drain

Purpose. To empty and maintain a closed-suction bulb drain and measure output.

Indications

- Post-operative drainage (breast, abdominal, neck surgery)

Equipment

- Measuring container
- Gloves
- Alcohol swab
- Chart

#	Nursing action	Rationale
1	Hand hygiene; gloves	Infection control
2	Open the port; invert bulb and empty into measuring container	Measure output
3	Clean port with alcohol	Asepsis
4	Squeeze bulb flat and close the port while compressed	Re-establish suction
5	Secure drain to dressing/clothing below the insertion site	Prevent pulling
6	Measure, note colour and character; empty when half full	Suction declines as bulb fills
7	Inspect site for leakage, redness	Detect infection

Risk / complication	Prevention / action
Loss of suction (bulb re-expanded)	Recompress; check for air leak
Sudden large bloody output	Inform surgeon — haemorrhage
Accidental removal	Cover site; inform

Document

Volume, colour (serous, serosanguinous, sanguineous), site condition, each emptying time.

Clinical pearls

Drains are usually removed when output falls below about 25–50 mL in 24 hours — accurate measurement guides the decision.

Further reading — tap to open (free) ► WHO — hand hygiene and IPC · Indian Nursing Council

Section: Infection Control & Wound Care · Summary table on page 150 · Contents

BUY NOW ›

Managing a Hemovac (Spring Suction) Drain

Purpose. To maintain a spring-loaded closed suction drain after orthopaedic or abdominal surgery.

Indications

• Post-operative drainage (orthopaedic joint replacement, large wounds)

Equipment

• Measuring container
• Gloves
• Alcohol swab

#	Nursing action	Rationale
1	Hand hygiene; gloves	Asepsis
2	Open drainage plug; tilt and empty contents into measuring container	Measure output
3	Place device on a flat surface; compress the top and bottom together	Creates negative pressure
4	Close the plug while compressed	Maintain suction
5	Check tubing for kinks; secure below wound	Patency
6	Record output; empty every shift or when half full	Monitor bleeding

Risk / complication	Prevention / action
Expanded device = lost suction	Recompress; check connections
Excessive drainage	Inform surgeon
Infection at site	Report redness

Document

Volume, character, suction maintained, site.

Clinical pearls

Large blood loss after joint replacement is first seen in the drain — report output above the surgeon's set threshold.

Further reading — tap to open (free) ► WHO — hand hygiene and IPC · Indian Nursing Council

Section: Infection Control & Wound Care · Summary table on page 150 · Contents

CBME-BASED INTERNAL MEDICINE
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Suture and Staple Removal

Purpose. To remove skin closures once the wound has healed sufficiently.

Indications

• Healed incision as ordered (face 3–5 days; scalp 7; trunk 7–10; limbs, joints 10–14 days)

Equipment

• Sterile suture removal kit (forceps, stitch cutter) or staple remover
• Antiseptic
• Steri-strips
• Sterile gauze

#	Nursing action	Rationale
1	Verify order; explain; hand hygiene	Safety
2	Clean incision with antiseptic	Reduce infection
3	Sutures: lift knot with forceps, cut close to skin under the knot, pull through toward the incision	No external (contaminated) thread pulled through tissue
4	Staples: place remover under staple, squeeze handles fully, lift out vertically	Painless removal
5	Remove alternate sutures/staples first; check wound edges remain together	Detect dehiscence early
6	Apply steri-strips if edges gape slightly; then remove rest	Support wound
7	Teach wound care and signs of infection	Self-care

Risk / complication	Prevention / action
Wound separation	Stop; steri-strips; inform surgeon
Retained suture material	Count against record

Document

Number removed, wound condition, steri-strips applied.

Clinical pearls

If the wound begins to open after removing alternate sutures, leave the rest in and inform the surgeon.

Further reading — tap to open (free) ► WHO — hand hygiene and IPC · Indian Nursing Council

Section: Infection Control & Wound Care · Summary table on page 150 · Contents

BUY NOW ›

Obtaining a Wound Culture Swab

Purpose. To identify organisms causing wound infection and guide antibiotic therapy.

Indications

• Signs of wound infection (pus, spreading redness, odour, delayed healing)

Equipment

• Sterile swab with transport medium
• Sterile saline
• Gloves
• Label, request form

#	Nursing action	Rationale
1	Collect before starting antibiotics where possible	Better yield
2	Remove dressing; clean wound with sterile saline (not antiseptic)	Remove surface exudate and contaminants
3	Do not swab pus or dead tissue alone	Surface organisms mislead
4	Use Levine technique: rotate swab over 1 cm² of viable tissue with enough pressure to express fluid, for 5 s	Samples tissue bacteria
5	Place swab in transport medium; label at bedside	Prevent drying and errors
6	Send to lab promptly (within 2 h)	Organism viability

Risk / complication	Prevention / action
Contamination by skin flora	Clean first
Swab of necrotic tissue — misleading results	Swab viable base; tissue biopsy is best

Document

Site, time, wound appearance, antibiotics if already started.

Clinical pearls

A tissue sample or aspirate of pus gives more accurate results than a swab.

Further reading — tap to open (free) ► WHO — hand hygiene and IPC · Indian Nursing Council

Section: Infection Control & Wound Care · Summary table on page 150 · Contents

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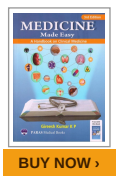
Perioperative & Advanced Skills

Overview and one-page summary table

Safe surgery starts on the ward. The pre-operative checklist, VTE prevention, breathing exercises and skilled assistance with bedside procedures prevent complications.

#	Procedure	Key point	Page
43	Pre-operative Checklist Verification	To ensure the patient is physically and legally prepared for surgery and that nothing is missed before transfer to the…	163
44	Applying Sequential Compression Devices (SCDs)	To prevent deep vein thrombosis by intermittent pneumatic compression of the legs.	164
45	Teaching Incentive Spirometry and Deep Breathing	To promote lung expansion and prevent post-operative atelectasis and pneumonia.	165
46	Assisting with Central Line Insertion	To support the doctor during central venous catheter insertion while maintaining maximal sterile barrier and patient s…	166
47	Assisting with a Lumbar Puncture	To help obtain CSF safely for diagnosis (meningitis, subarachnoid haemorrhage) or therapy.	167
48	Assisting with a Thoracentesis (Pleural Tap)	To help aspirate pleural fluid for diagnosis or relief of breathlessness.	168
49	Assisting with an Abdominal Paracentesis	To help remove ascitic fluid for diagnosis or relief of tense ascites.	169

Tap a name or page number to open its full page.



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Pre-operative Checklist Verification

Purpose. To ensure the patient is physically and legally prepared for surgery and that nothing is missed before transfer to theatre.

Indications

- Every patient going for surgery or a procedure under anaesthesia

Equipment

- Pre-operative checklist
- Consent form
- Investigation reports
- ID band, site marking

#	Nursing action	Rationale
1	Verify identity with two identifiers and ID band	Right patient
2	Check informed consent signed, procedure and site correct	Legal and ethical
3	Confirm NPO: solids 6 h, clear fluids 2 h (per anaesthetist)	Aspiration prevention
4	Check site marking, allergies, investigations (Hb, group & crossmatch, ECG, CXR)	Readiness
5	Remove jewellery, dentures, nail polish, make-up, hearing aids, prosthesis (or document)	Safety, monitoring
6	Give pre-medication, antibiotic prophylaxis as ordered; record vital signs, voiding	Preparation
7	Check medications held/given (anticoagulants, insulin, antihypertensives)	Avoid complications

Risk / complication	Prevention / action
Wrong-site surgery	Site marking, time-out in theatre
Aspiration	NPO compliance
Missed blood availability	Check crossmatch

Document

Completed checklist signed by ward nurse and received by theatre nurse.

Clinical pearls

Clear fluids up to 2 hours before anaesthesia are safe and reduce discomfort — prolonged fasting is harmful.

Further reading — tap to open (free) ► Indian Nursing Council · WHO Surgical Safety Checklist

Section: Perioperative & Advanced Skills · Summary table on page 162 · Contents



BUY NOW ›

Applying Sequential Compression Devices (SCDs)

Purpose. To prevent deep vein thrombosis by intermittent pneumatic compression of the legs.

Indications
- Surgical patients
- Immobile medical patients
- Patients with bleeding risk (when anticoagulants contraindicated)

Equipment
- SCD pump
- Correct-size leg sleeves (calf/thigh)
- Tape measure

#	Nursing action	Rationale
1	Check order; exclude contraindications (existing DVT, severe PAD, leg wounds, heart failure)	Avoid embolism/ischaemia
2	Measure leg; choose sleeve size	Correct fit
3	Wrap sleeves snugly — two fingers fit between sleeve and leg	Effective, not too tight
4	Connect tubing, align arrows; switch on	Correct function
5	Check pump cycle and alarms	Proper operation
6	Remove every shift to inspect skin and circulation; keep on when in bed	Prevent pressure injury
7	Combine with early mobilisation and pharmacological prophylaxis as ordered	Best prevention

Risk / complication	Prevention / action
Applying on a leg with existing DVT	Assess and report calf pain, swelling first
Skin breakdown	Inspect skin each shift
Non-compliance	Explain purpose

Document
Device applied, settings, skin checks.

Clinical pearls
SCDs only work when worn — check they are on and functioning every hour during rounds.

Further reading — tap to open (free) ► Indian Nursing Council · WHO Surgical Safety Checklist

Section: Perioperative & Advanced Skills · Summary table on page 162 · Contents

BUY NOW ›

Teaching Incentive Spirometry and Deep Breathing

Purpose. To promote lung expansion and prevent post-operative atelectasis and pneumonia.

Indications

- Post-operative patients (abdominal, thoracic)
- Rib fractures
- Immobile patients

Equipment

- Incentive spirometer
- Pillow for splinting
- Tissue

#	Nursing action	Rationale
1	Explain purpose; teach pre-operatively if possible	Better compliance
2	Sit upright; hold device upright	Lung expansion
3	Exhale normally; seal lips around mouthpiece	Prepare
4	Inhale slowly and deeply to raise the piston/ball to target	Sustained maximal inspiration
5	Hold breath 3–5 s; exhale slowly	Alveolar recruitment
6	Repeat 10 times every hour while awake	Frequency matters
7	Cough with pillow splinted over incision	Clear secretions with less pain

Risk / complication	Prevention / action
Pain limiting effort	Adequate analgesia first
Dizziness from hyperventilation	Rest between breaths

Document

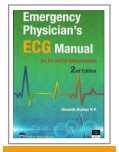
Volume achieved, frequency, cough effectiveness, lung sounds.

Clinical pearls

Good analgesia is the best "lung physiotherapy" — patients in pain will not breathe deeply.

Further reading — tap to open (free) ► Indian Nursing Council · WHO Surgical Safety Checklist

Section: Perioperative & Advanced Skills · Summary table on page 162 · Contents



BUY NOW ›

Assisting with Central Line Insertion

Purpose. To support the doctor during central venous catheter insertion while maintaining maximal sterile barrier and patient safety.

Indications
- Vasopressors, TPN, irritant drugs
- CVP monitoring
- Poor peripheral access

Equipment
- CVC kit, ultrasound with sterile cover
- Full sterile drapes, sterile gown, gloves, cap, mask
- Chlorhexidine 2%-alcohol
- Local anaesthetic
- Saline flushes, transducer
- Sterile dressing

#	Nursing action	Rationale
1	Verify consent, coagulation, patient identity; explain	Safety
2	Position: supine/Trendelenburg for jugular/subclavian; head turned away	Vein distension, prevents air embolism
3	Use CLABSI insertion checklist; anyone may stop the procedure for a breach	Prevent infection
4	Help with hand hygiene, sterile gown, full-body drape; open supplies aseptically	Maximal barrier precautions
5	Monitor ECG (arrhythmias as guidewire enters heart), SpO_2, patient comfort	Early detection
6	After insertion: confirm blood return, flush, sterile dressing; chest X-ray for position and pneumothorax	Confirm placement
7	Do not use line until position confirmed (unless emergency)	Safety

Risk / complication	Prevention / action
Pneumothorax	Watch SpO_2, breathlessness; CXR
Arrhythmia	ECG monitoring
Air embolism	Trendelenburg; occlude hubs
Arterial puncture, bleeding	Pressure

Document
Date, site, catheter type, length at skin, CXR confirmation, checklist completed.

Clinical pearls
You are empowered to stop the procedure if sterile technique is broken — this is part of the CLABSI bundle.

Further reading — tap to open (free) ► Indian Nursing Council · WHO Surgical Safety Checklist

Section: Perioperative & Advanced Skills · Summary table on page 162 · Contents

BUY NOW ›

Assisting with a Lumbar Puncture

Purpose. To help obtain CSF safely for diagnosis (meningitis, subarachnoid haemorrhage) or therapy.

Indications

- Suspected meningitis/encephalitis
- Subarachnoid haemorrhage (CT negative)
- Intrathecal drugs, pressure measurement

Equipment

- LP tray, spinal needles
- Sterile gloves, drapes, antiseptic
- Local anaesthetic
- Manometer
- Sterile CSF tubes (labelled 1–4)

#	Nursing action	Rationale
1	Verify consent; CT brain if indicated; check coagulation and platelets	Avoid herniation and bleeding
2	Ask patient to void	Comfort
3	Position lateral, back at bed edge, knees to chest, chin to chest (fetal position) or sitting leaning forward	Opens interspinous spaces
4	Support patient, keep still, reassure	Prevent needle injury
5	Hand sterile items; label tubes in order of collection	Correct analysis
6	Measure opening pressure with legs relaxed	Accurate pressure
7	Apply dressing; monitor neuro signs, puncture site; send samples promptly	Safety

Risk / complication	Prevention / action
Post-LP headache	Use atraumatic needle; fluids; analgesia (bed rest not proven)
Herniation in raised ICP	CT first if focal signs, papilloedema
Bleeding, infection	Check platelets, asepsis

Document

Time, opening pressure, CSF appearance, samples sent, patient tolerance.

Clinical pearls

Send CSF to the laboratory immediately — cell counts fall and glucose changes with delay.

Further reading — tap to open (free) ► Indian Nursing Council · WHO Surgical Safety Checklist

Section: Perioperative & Advanced Skills · Summary table on page 162 · Contents

CBME-BASED INTERNAL MEDICINE
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Assisting with a Thoracentesis (Pleural Tap)

Purpose. To help aspirate pleural fluid for diagnosis or relief of breathlessness.

Indications

- Pleural effusion (diagnosis, symptomatic relief)
- Empyema
- Malignant effusion

Equipment

- Thoracentesis kit or cannula, three-way tap, 50 mL syringe
- Sterile gloves, drapes, antiseptic
- Local anaesthetic
- Specimen containers
- Ultrasound

#	Nursing action	Rationale
1	Verify consent, side (ultrasound marking), coagulation	Right side, safety
2	Position: sitting upright, leaning forward over a bedside table with pillows	Fluid pools posteriorly; ribs spread
3	Monitor SpO_2, pulse; reassure; ask not to cough or move	Prevent lung puncture
4	Assist with sterile set-up	Asepsis
5	Do not remove more than 1–1.5 L at one time	Prevent re-expansion pulmonary oedema
6	Measure, describe fluid; label specimens (protein, LDH, cytology, ADA, culture)	Diagnosis
7	Dressing; chest X-ray after; observe breathing	Detect pneumothorax

Risk / complication	Prevention / action
Pneumothorax	Breathlessness, chest pain — CXR, inform
Re-expansion pulmonary oedema, cough, hypotension	Stop drainage at 1–1.5 L or if coughing
Vasovagal syncope	Monitor; atropine ready

Document

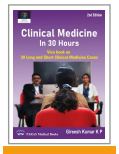
Volume, appearance, samples, vital signs, post-procedure CXR.

Clinical pearls

Persistent coughing or chest tightness during the tap signals lung re-expansion — stop draining.

Further reading — tap to open (free) ► Indian Nursing Council · WHO Surgical Safety Checklist

Section: Perioperative & Advanced Skills · Summary table on page 162 · Contents



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Assisting with an Abdominal Paracentesis

Purpose. To help remove ascitic fluid for diagnosis or relief of tense ascites.

Indications

- New-onset ascites (diagnostic)
- Tense ascites causing breathlessness
- Suspected spontaneous bacterial peritonitis

Equipment

- Paracentesis needle/catheter, drainage bag
- Sterile gloves, antiseptic, drapes
- Local anaesthetic
- Specimen bottles, blood culture bottles
- Albumin if large volume

#	Nursing action	Rationale
1	Verify consent; ask patient to **empty bladder**	Avoid bladder puncture
2	Baseline vital signs, weight, abdominal girth	Comparison
3	Position supine with head raised or slightly to the side	Fluid gathers in flanks
4	Assist with sterile set-up; site usually left lower quadrant	Avoid inferior epigastric artery
5	Send samples: cell count, albumin (SAAG), culture in blood culture bottles	Diagnose SBP
6	Large-volume drainage: give albumin 6–8 g per litre removed (>5 L)	Prevent circulatory dysfunction
7	Monitor BP, pulse, site leakage; record volume	Safety

Risk / complication	Prevention / action
Hypotension after large drainage	Albumin, slow drainage, monitor
Persistent leakage	Stoma bag, Z-track technique
Bleeding, bowel perforation	Monitor abdomen

Document

Volume removed, fluid character, samples sent, albumin given, vital signs.

Clinical pearls

Inoculate ascitic fluid into blood culture bottles at the bedside — this doubles the yield in SBP.

Further reading — tap to open (free) ► Indian Nursing Council · WHO Surgical Safety Checklist

Section: Perioperative & Advanced Skills · Summary table on page 162 · Contents

Handbook of Antibiotics
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Respiratory & Airway Management

Overview and one-page summary table

Airway and breathing come first in every emergency. Oxygen is a drug — prescribe and titrate it. Suctioning, tracheostomy care and chest drain management require sterile technique and constant vigilance.

#	Procedure	Key point	Page
50	Administering Oxygen Therapy	To correct hypoxaemia using the right device and flow to reach the target SpO2.	171
51	Oral and Oropharyngeal Suctioning (Yankauer)	To clear secretions, blood or vomit from the mouth and oropharynx.	172
52	Nasopharyngeal Suctioning	To remove secretions from the nasopharynx in patients who cannot cough effectively.	173
53	Endotracheal / Tracheostomy Suctioning	To clear secretions from the artificial airway and trachea using sterile technique (open or closed in-line).	174
54	Tracheostomy Care	To keep the stoma clean, the inner cannula patent and ties secure, preventing infection and blockage.	175
55	Tracheostomy / ETT Cuff Pressure Management	To keep cuff pressure in the safe range to prevent aspiration and tracheal injury.	176
56	Setting Up and Monitoring a Chest Drain (Underwater Seal)	To manage an intercostal chest drain draining air or fluid from the pleural space.	177
57	Managing Chest Tube Dislodgement	To respond immediately if a chest drain falls out or becomes disconnected.	178
58	Assisting with Endotracheal Intubation	To prepare equipment, drugs and patient for safe intubation and confirm tube placement.	179
59	Extubation Care	To remove the endotracheal tube safely and monitor for post-extubation complications.	180
60	Bag–Valve–Mask Ventilation	To provide manual ventilation for a patient who is apnoeic or breathing inadequately.	181

Tap a name or page number to open its full page.

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Administering Oxygen Therapy

Purpose. To correct hypoxaemia using the right device and flow to reach the target SpO_2.

Indications

- Hypoxaemia (SpO_2 <94%, or <88% in COPD at risk of CO_2 retention)
- Shock, trauma, carbon monoxide poisoning (high flow)

Equipment

- Oxygen source (wall/cylinder) and flowmeter
- Nasal cannula, simple face mask, venturi mask, non-rebreather mask
- Humidifier (if >4 L/min long-term)
- Pulse oximeter

#	Nursing action	Rationale
1	Check prescription and target SpO_2 (94–98%; 88–92% in COPD risk)	Oxygen is a drug
2	Nasal cannula: 1–4 L/min (FiO_2 ~24–40%)	Mild hypoxaemia
3	Simple face mask: 5–10 L/min (FiO_2 40–60%); never <5 L/min	Prevent CO_2 rebreathing
4	Venturi mask: fixed FiO_2 24–60% with set flow	Precise oxygen in COPD
5	Non-rebreather with reservoir: 15 L/min, bag inflated before applying (FiO_2 ~60–90%)	Emergencies
6	Monitor SpO_2, RR, work of breathing, consciousness; titrate down	Avoid hyperoxia
7	Fire safety: no smoking, oils, open flames	Oxygen supports combustion

Risk / complication	Prevention / action
CO_2 retention in COPD (drowsiness)	Controlled oxygen; ABG
Pressure sores on ears/nose	Padding; check skin
Empty cylinder during transfer	Check contents before transport

Document

Device, flow/FiO_2, SpO_2 and RR before and after, target range.

Clinical pearls

In a critically ill patient, start high-flow oxygen first and titrate — never withhold oxygen from a hypoxic patient.

Further reading — tap to open (free) ► Indian Nursing Council · BTS oxygen guideline

Section: Respiratory & Airway Management · Summary table on page 170 · Contents



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Oral and Oropharyngeal Suctioning (Yankauer)

Purpose. To clear secretions, blood or vomit from the mouth and oropharynx.

Indications

- Patients unable to clear secretions (stroke, decreased consciousness)
- Vomiting with aspiration risk
- Before and after airway procedures

Equipment

- Suction source and canister
- Yankauer (rigid) catheter
- Gloves, goggles
- Water to flush
- Oxygen

#	Nursing action	Rationale
1	Explain; position semi-Fowler or lateral (unconscious)	Prevent aspiration
2	Check suction pressure 100–150 mmHg (adult)	Effective without trauma
3	Pre-oxygenate if hypoxic	Prevent desaturation
4	Insert Yankauer along the side of the mouth without suction applied; avoid the back of the throat	Prevent gagging, vomiting
5	Apply suction while moving the tip; limit to 10–15 s	Reduce hypoxia and mucosal trauma
6	Flush catheter with water; repeat if needed after rest	Clear tubing
7	Provide mouth care; reassess breathing	Comfort

Risk / complication	Prevention / action
Gagging, vomiting	Avoid posterior pharynx
Hypoxia	Oxygen, short suction
Mucosal bleeding	Gentle technique

Document

Amount, colour, consistency of secretions; patient tolerance; SpO_2.

Clinical pearls

Keep a working suction with a Yankauer catheter ready at every bedside where airway compromise is possible.

Further reading — tap to open (free) ► Indian Nursing Council · BTS oxygen guideline

Section: Respiratory & Airway Management · Summary table on page 170 · Contents

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Nasopharyngeal Suctioning

Purpose. To remove secretions from the nasopharynx in patients who cannot cough effectively.

Indications

- Ineffective cough with audible secretions
- Infants with nasal congestion
- Specimen collection (NPA)

Equipment

- Sterile suction catheter (adult 12–14 Fr)
- Sterile gloves
- Water-soluble lubricant
- Suction set at 100–150 mmHg
- Oxygen, oximeter

#	Nursing action	Rationale
1	Explain; position semi-Fowler; pre-oxygenate	Prevent hypoxia
2	Measure catheter length: nose tip to earlobe	Reach nasopharynx
3	Lubricate catheter; insert gently along floor of nostril without suction	Avoid trauma
4	Apply intermittent suction while withdrawing with rotation, ≤15 s	Effective, less hypoxia
5	Re-oxygenate; allow rest before repeating (max 3 passes)	Recovery
6	Discard catheter; mouth care	Infection control

Risk / complication	Prevention / action
Epistaxis	Lubricate; gentle; avoid in bleeding disorders
Vagal bradycardia	Stop; oxygen
Laryngospasm	Stop; oxygen; call for help

Document

Secretions, passes made, SpO_2, tolerance.

Clinical pearls

A nasopharyngeal airway can be left in place to reduce trauma when frequent nasal suctioning is needed.

Further reading — tap to open (free) ► Indian Nursing Council · BTS oxygen guideline

Section: Respiratory & Airway Management · Summary table on page 170 · Contents

Emergency Physician's ECG Manual
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Endotracheal / Tracheostomy Suctioning

Purpose. To clear secretions from the artificial airway and trachea using sterile technique (open or closed in-line).

Indications

- Visible or audible secretions in tube
- Rising airway pressures, falling SpO_2
- Coarse crackles over trachea

Equipment

- Sterile suction catheter (size ≤ half the tube internal diameter) or closed in-line system
- Sterile gloves, goggles
- Suction 80–150 mmHg
- Oxygen (100% for pre-oxygenation)
- Sterile water

#	Nursing action	Rationale
1	Suction only when needed, not routinely	Reduce trauma and infection
2	Pre-oxygenate with 100% O_2 for 30–60 s	Prevent hypoxaemia
3	Insert catheter without suction until resistance (carina), withdraw 1 cm	Avoid carinal trauma
4	Apply suction while withdrawing; ≤10–15 s per pass	Limit hypoxia
5	Hyperoxygenate between passes; max 2–3 passes	Recovery
6	Do not instil saline routinely	Increases infection, hypoxia
7	Closed system: keep catheter sleeve intact; flush after use	Maintains PEEP, reduces contamination

Risk / complication	Prevention / action
Hypoxia, bradycardia, arrhythmia	Stop; oxygenate
Tracheal mucosal trauma, bleeding	Correct pressure and depth
Infection (VAP)	Sterile technique; VAP bundle

Document

Secretions (amount, colour, consistency), SpO_2, HR, tolerance.

Clinical pearls

Catheter diameter should not exceed half the internal diameter of the tube — e.g. 12 Fr for an 8.0 mm tube.

Further reading — tap to open (free) ► Indian Nursing Council · BTS oxygen guideline

Section: Respiratory & Airway Management · Summary table on page 170 · Contents

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Tracheostomy Care

Purpose. To keep the stoma clean, the inner cannula patent and ties secure, preventing infection and blockage.

Indications

• All patients with tracheostomy (at least every 8 h and as needed)

Equipment

• Sterile tracheostomy care kit
• Sterile saline
• Spare inner cannula
• New tracheostomy ties/holder
• Pre-cut tracheostomy gauze dressing
• **Emergency kit at bedside: spare tubes (same size and one smaller), obturator, dilator**

#	Nursing action	Rationale
1	Explain; suction first if needed; pre-oxygenate	Clear airway
2	Remove and clean or replace the inner cannula	Prevent blockage
3	Clean stoma with saline from stoma outwards; dry	Prevent infection
4	Apply pre-cut (non-fraying) dressing	Avoid fibres entering the airway
5	Change ties with an assistant holding the tube; one finger fits under ties	Prevent accidental decannulation
6	Check cuff pressure (20–30 cmH_2O)	Prevent aspiration and tracheal injury
7	Ensure emergency equipment is at the bedside	Rapid response to displacement

Risk / complication	Prevention / action
Accidental decannulation	Call for help; oxygen to face and stoma; replace with obturator if trained
Blocked tube	Remove inner cannula; suction; emergency algorithm
Stoma infection	Swab; report

Document

Stoma appearance, secretions, cuff pressure, ties changed, emergency kit checked.

Clinical pearls

Never cut gauze to make a tracheostomy dressing — loose fibres can be inhaled.

Further reading — tap to open (free) ► Indian Nursing Council · BTS oxygen guideline

Section: Respiratory & Airway Management · Summary table on page 170 · Contents

CBME-BASED INTERNAL MEDICINE
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Tracheostomy / ETT Cuff Pressure Management

Purpose. To keep cuff pressure in the safe range to prevent aspiration and tracheal injury.

Indications
• Cuffed endotracheal and tracheostomy tubes (every shift and after position change)

Equipment
• Cuff pressure manometer
• Syringe

#	Nursing action	Rationale
1	Attach manometer to pilot balloon	Measure
2	Maintain 20–30 cmH_2O (≤25 mmHg)	Below capillary perfusion pressure
3	Inflate or deflate to range	Correction
4	Listen for air leak at the mouth	Detect under-inflation
5	Check after repositioning, transfer, procedures	Pressure changes
6	Document readings	Trend

Risk / complication	Prevention / action
Over-inflation — tracheal necrosis, stenosis, fistula	Keep ≤30 cmH_2O
Under-inflation — aspiration, VAP, air leak	Keep ≥20 cmH_2O
Pilot balloon damage	Report; tube change

Document
Cuff pressure each shift, adjustments.

Clinical pearls
Feeling the pilot balloon by hand is unreliable — always use a manometer.

Further reading — tap to open (free) ► Indian Nursing Council · BTS oxygen guideline

Section: Respiratory & Airway Management · Summary table on page 170 · Contents

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Setting Up and Monitoring a Chest Drain (Underwater Seal)

Purpose. To manage an intercostal chest drain draining air or fluid from the pleural space.

Indications

- Pneumothorax
- Haemothorax, empyema, large effusion
- After cardiothoracic surgery

Equipment

- Underwater seal drainage bottle/system
- Sterile water
- Tubing connectors
- Two tubing clamps at bedside
- Suction (if ordered)

#	Nursing action	Rationale
1	Fill water-seal chamber to the 2 cm mark (tube tip 2 cm under water)	One-way valve
2	Keep drainage bottle below chest level at all times	Prevent backflow
3	Check for swinging (tidalling) of fluid with breathing	Confirms patency
4	Check for bubbling (air leak); continuous bubbling may mean system leak	Assess pneumothorax
5	Measure and mark drainage; report >100–200 mL/h of blood	Detect haemorrhage
6	Secure tube; avoid loops and kinks; do not milk routinely	Patency
7	Encourage deep breathing, mobilisation; analgesia	Lung re-expansion

Risk / complication	Prevention / action
Clamping a bubbling drain — tension pneumothorax	Do not clamp without order
Disconnection	Clamp briefly near chest or submerge tube in water; reconnect
Rapid fluid drainage — re-expansion oedema	Limit drainage rate as ordered

Document

Drainage volume and character, swing, bubbling, suction, site, respiratory status.

Clinical pearls

No swinging may mean the lung is re-expanded — or the tube is blocked or kinked. Assess the patient and check the tubing.

Further reading — tap to open (free) ► Indian Nursing Council · BTS oxygen guideline

Section: Respiratory & Airway Management · Summary table on page 170 · Contents

Handbook of Antibiotics
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Managing Chest Tube Dislodgement

Purpose. To respond immediately if a chest drain falls out or becomes disconnected.

Indications

- Accidental removal of chest drain
- Disconnection of tubing

Equipment

- Sterile occlusive dressing (petroleum gauze/vented chest seal)
- Tape
- Oxygen
- Emergency call system

#	Nursing action	Rationale
1	Tube pulled out: immediately cover the site with gloved hand	Prevent air entry
2	Apply a sterile occlusive dressing taped on three sides	Flutter valve — lets air out, not in
3	Call for help/doctor immediately	New drain likely needed
4	Give oxygen; monitor SpO_2, RR, BP, trachea	Detect tension pneumothorax
5	If signs of tension (hypotension, distress, tracheal shift), lift one corner of dressing	Release trapped air
6	Disconnection: submerge tube end in sterile water or clamp briefly and reconnect	Re-establish seal
7	Prepare for chest X-ray and reinsertion	Definitive care

Risk / complication	Prevention / action
Tension pneumothorax	Recognise; needle decompression by doctor
Infection at site	Sterile dressing

Document

Time of event, actions, vital signs, who was informed.

Clinical pearls

Keep a sterile occlusive dressing and two clamps at the bedside of every patient with a chest drain.

Further reading — tap to open (free) ► Indian Nursing Council · BTS oxygen guideline

Section: Respiratory & Airway Management · Summary table on page 170 · Contents

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Assisting with Endotracheal Intubation

Purpose. To prepare equipment, drugs and patient for safe intubation and confirm tube placement.

Indications

- Airway protection (GCS ≤8), respiratory failure
- Cardiac arrest
- Surgery under general anaesthesia

Equipment

- Laryngoscope (checked light), ET tubes (7.0–8.0 adult) with stylet/bougie
- 10 mL syringe, tube tie/holder
- Suction (Yankauer)
- Bag–valve–mask, oxygen
- Waveform capnography
- Drugs (induction, paralytic), difficult airway kit

#	Nursing action	Rationale
1	Check equipment: suction working, laryngoscope bright, cuff tested	Prevent failure
2	Position: sniffing position (ramp if obese)	Best laryngeal view
3	Pre-oxygenate with 100% O_2 for 3 min	Increases safe apnoea time
4	Prepare and label drugs; give as ordered; monitor ECG, SpO_2, BP	RSI safety
5	Hand equipment; apply cricoid/BURP if requested	Assist operator
6	Confirm placement with **waveform capnography**, chest rise, breath sounds	Gold standard confirmation
7	Inflate cuff, secure tube, note length at teeth; chest X-ray	Prevent displacement

Risk / complication	Prevention / action
Oesophageal intubation	No capnography trace = tube out
Hypoxia during attempts	Limit attempts; re-oxygenate
Hypotension after induction	Fluids, vasopressor ready

Document

Tube size, length at teeth, confirmation method, drugs given, vital signs.

Clinical pearls

"No trace = wrong place" — absence of a capnography waveform means the tube is not in the trachea.

Further reading — tap to open (free) ► Indian Nursing Council · BTS oxygen guideline

Section: Respiratory & Airway Management · Summary table on page 170 · Contents

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Extubation Care

Purpose. To remove the endotracheal tube safely and monitor for post-extubation complications.

Indications

- Patient meeting weaning criteria after a successful spontaneous breathing trial

Equipment

- Suction (Yankauer and catheter)
- Syringe to deflate cuff
- Oxygen mask/HFNC/NIV ready
- Re-intubation equipment

#	Nursing action	Rationale
1	Confirm order and readiness (awake, cough, minimal secretions)	Reduce failure
2	Position upright 45°; explain	Better ventilation
3	Suction ETT and mouth	Remove pooled secretions
4	Pre-oxygenate; deflate cuff fully	Prevent trauma
5	Ask patient to cough as tube is removed smoothly at end-inspiration	Clear secretions
6	Apply oxygen; encourage deep breathing and coughing	Support breathing
7	Monitor RR, SpO_2, voice, stridor for 1–2 h; NPO until swallow assessed	Detect failure and aspiration

Risk / complication	Prevention / action
Stridor (laryngeal oedema)	Nebulised adrenaline, steroids; call for help
Respiratory failure	NIV/HFNC; re-intubation
Aspiration	Swallow assessment before feeding

Document

Time, tolerance, oxygen therapy, stridor, respiratory status.

Clinical pearls

Post-extubation stridor usually appears within the first hour — stay close to the patient.

Further reading — tap to open (free) ► Indian Nursing Council · BTS oxygen guideline

Section: Respiratory & Airway Management · Summary table on page 170 · Contents

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Bag–Valve–Mask Ventilation

Purpose. To provide manual ventilation for a patient who is apnoeic or breathing inadequately.

Indications
- Respiratory arrest, cardiac arrest
- Inadequate breathing before intubation
- Pre-oxygenation

Equipment
- Self-inflating bag with reservoir and oxygen 15 L/min
- Correctly sized face mask
- Oropharyngeal and nasopharyngeal airways
- Suction

#	Nursing action	Rationale
1	Open the airway: head tilt–chin lift (jaw thrust in trauma)	Relieve tongue obstruction
2	Insert oropharyngeal airway (measure incisor to angle of jaw) in unconscious patient	Maintain patency
3	Select mask covering nose and mouth	Good seal
4	Two-person technique: one holds mask with both hands (E-C grip), other squeezes bag	More effective seal
5	Give each breath over 1 s, just enough to see chest rise	Avoid gastric inflation
6	Rate: 10 breaths/min (1 every 6 s) with advanced airway; 30:2 in CPR without	Correct ventilation
7	Watch chest rise, SpO_2, capnography	Confirm effectiveness

Risk / complication	Prevention / action
Gastric inflation, vomiting	Gentle volume; suction ready
Poor seal	Two-person technique, airway adjunct
Hyperventilation	Count; avoid excess rate

Document
Indication, rate, oxygen, response, airway adjuncts used.

Clinical pearls
Over-ventilation during CPR raises intrathoracic pressure and reduces coronary perfusion — slow down.

Further reading — tap to open (free) ► Indian Nursing Council · BTS oxygen guideline

Section: Respiratory & Airway Management · Summary table on page 170 · Contents

Emergency Physician's ECG Manual
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Gastrointestinal & Nutritional Support

Overview and one-page summary table

Enteral tubes, feeding, stoma care and bowel procedures are daily nursing tasks. Correct tube placement checks prevent fatal feeding into the lungs.

#	Procedure	Key point	Page
61	Inserting a Nasogastric (NG) Tube	To pass a tube through the nose into the stomach for feeding, medication or decompression.	183
62	Verifying NG Tube Placement	To confirm the NG tube tip is in the stomach before every feed, medication and after any displacement.	184
63	Administering Enteral Tube Feeds	To provide nutrition safely via NG, NJ or gastrostomy tube.	185
64	Removing a Nasogastric Tube	To remove an NG tube safely when no longer required.	186
65	Caring for a PEG (Gastrostomy) Tube	To maintain the gastrostomy tube and surrounding skin and prevent complications.	187
66	Administering Total Parenteral Nutrition (TPN)	To provide complete IV nutrition when the gut cannot be used.	188
67	Capillary Blood Glucose Monitoring	To measure blood glucose at the bedside with a glucometer.	189
68	Pouching and Caring for a Colostomy/Ileostomy	To empty and change a stoma appliance, protect the skin and assess the stoma.	190
69	Administering a Cleansing Enema	To introduce fluid into the rectum and colon to relieve constipation or prepare the bowel.	191
70	Digital Removal of Faecal Impaction	To manually remove hard impacted stool from the rectum when other measures fail.	192

Tap a name or page number to open its full page.

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Inserting a Nasogastric (NG) Tube

Purpose. To pass a tube through the nose into the stomach for feeding, medication or decompression.

Indications

- Enteral feeding when swallowing unsafe
- Gastric decompression (obstruction, ileus)
- Gastric lavage (selected poisoning)

Equipment

- NG tube (feeding 8–12 Fr; decompression 14–18 Fr Ryle's)
- Water-soluble lubricant
- Glass of water and straw (if safe)
- pH strips, 50 mL enteral syringe
- Tape/securement, gloves, towel

#	Nursing action	Rationale
1	Explain; agree a stop signal; sit upright, head neutral	Cooperation, straight passage
2	Measure NEX: **nose tip** → **earlobe** → **xiphisternum**; mark tube	Reaches stomach
3	Check nostril patency; lubricate tip	Easier insertion
4	Insert along nasal floor; when it reaches the pharynx ask patient to swallow (sips of water if safe)	Swallowing closes the airway
5	Advance with each swallow to the mark	Into stomach
6	Stop if coughing, cyanosis or inability to speak; withdraw	Tube in airway
7	Secure; confirm position before use (pH or X-ray)	Prevent feeding into lungs

Risk / complication	Prevention / action
Tracheal placement	Never rely on air insufflation ("whoosh") test
Epistaxis, trauma	Gentle technique
Base-of-skull fracture	Contraindicated — orogastric route

Document

Tube type, size, nostril, external length at nose, method of confirmation.

Clinical pearls

The "whoosh test" (auscultation of air) is unreliable and should not be used to confirm NG position.

Further reading — tap to open (free) ► Indian Nursing Council · ESPEN guidelines

Section: Gastrointestinal & Nutritional Support · Summary table on page 182 · Contents

CBME-BASED INTERNAL MEDICINE
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Verifying NG Tube Placement

Purpose. To confirm the NG tube tip is in the stomach before every feed, medication and after any displacement.

Indications

- After insertion
- Before each feed/medication
- After vomiting, coughing bouts, suctioning
- If external length changes

Equipment

- Enteral syringe
- pH indicator strips (CE-marked, 0.5 gradations)
- X-ray request (if needed)

#	Nursing action	Rationale
1	Check external length mark at nostril against insertion record	Detect migration
2	Aspirate 0.5–1 mL gastric contents	Sample
3	Test pH: **pH 1–5.5** confirms gastric placement	Safe to use
4	If pH >5.5 or no aspirate: reposition patient, wait 15–30 min, retry; do not feed	Acid suppressants or feed may raise pH
5	If still unconfirmed: chest/abdominal X-ray interpreted by trained person	Gold standard
6	Document result before use	Accountability

Risk / complication	Prevention / action
Feeding into lung — pneumonia, death	Never feed without confirmation
Misreading X-ray	Trained interpretation; tube must bisect carina, cross diaphragm, tip below left hemidiaphragm

Document

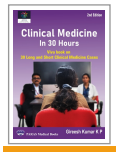
pH value or X-ray confirmation, external length, decision.

Clinical pearls

Never use blue litmus paper or the "whoosh" test — use pH strips and X-ray only.

Further reading — tap to open (free) ► Indian Nursing Council · ESPEN guidelines

Section: Gastrointestinal & Nutritional Support · Summary table on page 182 · Contents



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Administering Enteral Tube Feeds

Purpose. To provide nutrition safely via NG, NJ or gastrostomy tube.

Indications

- Patients unable to eat enough (stroke, ICU, head and neck cancer)
- Functioning GI tract

Equipment

- Prescribed feed (formula or blenderised)
- Feeding pump or 50 mL enteral syringe (bolus)
- Water for flushing
- pH strips

#	Nursing action	Rationale
1	Verify feed prescription and patient; hand hygiene	Rights
2	Elevate head of bed ≥30–45° during and 30–60 min after feed	Prevent aspiration
3	Confirm tube position (pH) before feeding	Safety
4	Flush with 30 mL water before and after feeds and medicines	Patency
5	Give bolus slowly by gravity or set pump rate; start low and increase	Tolerance
6	Check gastric residual volume if policy (hold if >250–500 mL)	Assess tolerance
7	Monitor glucose, electrolytes (refeeding syndrome), bowel function, weight	Metabolic safety

Risk / complication	Prevention / action
Aspiration pneumonia	HOB elevation, position check
Refeeding syndrome (low PO_4, K^+, Mg)	Start slowly in malnourished; thiamine; monitor electrolytes
Diarrhoea	Review rate, drugs, C. difficile; hang time limits
Tube blockage	Regular flushing

Document

Feed type, volume/rate, residuals, flushes, tolerance, HOB angle.

Clinical pearls

Refeeding syndrome can be fatal — in severely malnourished patients, check phosphate, potassium and magnesium daily during the first week.

Further reading — tap to open (free) ► Indian Nursing Council · ESPEN guidelines

Section: Gastrointestinal & Nutritional Support · Summary table on page 182 · Contents

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Removing a Nasogastric Tube

Purpose. To remove an NG tube safely when no longer required.

Indications

- Feeding/decompression no longer needed
- Tube blocked or displaced

Equipment

- Gloves
- Towel
- Tissues
- Clinical waste bag

#	Nursing action	Rationale
1	Verify order; explain; sit upright	Safety
2	Stop feed; flush tube with 20 mL water or air	Clear contents to prevent aspiration
3	Remove tape/securement	Release
4	Ask patient to take a deep breath and hold it	Closes epiglottis
5	Withdraw steadily and smoothly in one motion, covering tube with towel	Minimise discomfort and spillage
6	Provide mouth and nose care	Comfort
7	Monitor for nausea, distension, swallowing	Tolerance

Risk / complication	Prevention / action
Aspiration of residual contents	Flush first; breath-hold
Epistaxis	Gentle withdrawal

Document

Time removed, tube intact, patient tolerance, drainage volume.

Clinical pearls

After removal of a decompression tube, watch for returning nausea and distension — the obstruction may not have resolved.

Further reading — tap to open (free) ► Indian Nursing Council · ESPEN guidelines

Section: Gastrointestinal & Nutritional Support · Summary table on page 182 · Contents

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Caring for a PEG (Gastrostomy) Tube

Purpose. To maintain the gastrostomy tube and surrounding skin and prevent complications.

Indications

• Long-term enteral feeding (stroke, motor neurone disease, head and neck cancer)

Equipment

• Saline or water, gauze
• Gloves
• Mild soap
• Measuring guide

#	Nursing action	Rationale
1	Clean site daily with water or saline, dry thoroughly	Prevent infection and maceration
2	Check external fixation plate position; note centimetre mark	Detect migration
3	After 2 weeks (tract healed): rotate tube 360° and push in 2–3 cm then back daily, as per type	Prevent buried bumper syndrome
4	Keep head end elevated during feeds	Prevent aspiration
5	Flush with 30–50 mL water before/after feeds and medicines	Patency
6	Inspect for redness, leakage, granulation tissue	Early complication detection

Risk / complication	Prevention / action
Buried bumper	Daily advance and rotate (if permitted)
Site infection, leakage	Swab, report
Tube dislodged	Cover; inform urgently — tract closes within hours

Document

Site condition, tube mark, rotation, flushes, feeds.

Clinical pearls

If a new PEG falls out within 4 weeks, do not reinsert blindly — the tract is immature and may cause peritonitis.

Further reading — tap to open (free) ► Indian Nursing Council · ESPEN guidelines

Section: Gastrointestinal & Nutritional Support · Summary table on page 182 · Contents

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Administering Total Parenteral Nutrition (TPN)

Purpose. To provide complete IV nutrition when the gut cannot be used.

Indications

- Non-functioning GI tract (short bowel, obstruction, high-output fistula)
- Severe malnutrition when enteral feeding impossible

Equipment

- TPN bag (check label against prescription)
- Dedicated central line lumen
- Infusion pump
- Filter set (1.2 µm for lipids/all-in-one; 0.2 µm for aqueous)

#	Nursing action	Rationale
1	Check bag against prescription, patient, expiry; inspect for cracking/precipitates	Safety
2	Strict asepsis; use a dedicated lumen — no other drugs or blood	Prevent infection and incompatibility
3	Use infusion pump and correct filter	Accurate rate
4	Start at prescribed rate; do not "catch up" if behind	Avoid hyperglycaemia
5	Monitor capillary glucose 4–6 hourly, daily electrolytes, weekly LFT, triglycerides	Metabolic complications
6	Change administration set every 24 h; bag hang time ≤24 h	Infection prevention
7	If TPN stops suddenly, run 10% dextrose and check glucose	Prevent rebound hypoglycaemia

Risk / complication	Prevention / action
Catheter-related bloodstream infection	Asepsis; fever → blood cultures
Hyper/hypoglycaemia	Glucose monitoring; insulin per protocol
Refeeding syndrome	Gradual start; electrolytes
Fluid overload, liver dysfunction	Weight, LFT

Document

Bag number, rate, line, glucose, weight, intake–output.

Clinical pearls

TPN is an excellent culture medium — any fever in a patient on TPN is line sepsis until proved otherwise.

Further reading — tap to open (free) ► Indian Nursing Council · ESPEN guidelines

Section: Gastrointestinal & Nutritional Support · Summary table on page 182 · Contents


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Capillary Blood Glucose Monitoring

Purpose. To measure blood glucose at the bedside with a glucometer.

Indications

- Diabetes, insulin therapy
- DKA, TPN, steroids
- Altered consciousness, seizures, suspected hypoglycaemia

Equipment

- Glucometer (calibrated, QC done)
- Test strips (in date)
- Single-use lancet
- Gloves, cotton
- Sharps box

#	Nursing action	Rationale
1	Hand hygiene; patient washes and dries hands (warm water)	Remove sugar residue
2	Choose side of fingertip (not pad); rotate fingers	Less painful, fewer nerve endings
3	Prick; wipe first drop if policy; gently milk (do not squeeze hard)	Avoid tissue fluid dilution
4	Apply drop to strip; read result	Measurement
5	Apply pressure; dispose lancet in sharps box	Safety
6	Act on result (hypoglycaemia protocol; insulin) and document	Treatment

Risk / complication	Prevention / action
Falsely high from sugar on fingers	Wash hands
Inaccurate in shock, poor perfusion, severe anaemia	Send venous sample
Cross-infection	Single-use lancets; clean meter

Document

Value, time, relation to meals, action taken.

Clinical pearls

Treat any glucose below 70 mg/dL in a diabetic patient as hypoglycaemia — use the "rule of 15".

Further reading — tap to open (free) ► Indian Nursing Council · ESPEN guidelines

Section: Gastrointestinal & Nutritional Support · Summary table on page 182 · Contents

Emergency Physician's ECG Manual
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Pouching and Caring for a Colostomy/Ileostomy

Purpose. To empty and change a stoma appliance, protect the skin and assess the stoma.

Indications
- Colostomy, ileostomy, urostomy
- Pouch leaking or due for change

Equipment
- One- or two-piece pouch and barrier
- Measuring guide, scissors
- Warm water, soft gauze (no soap with oils)
- Adhesive remover, barrier paste/ring
- Disposal bag, gloves

#	Nursing action	Rationale
1	Empty pouch when one-third to half full	Prevent leakage and weight pulling
2	Remove old appliance gently, pushing skin away (adhesive remover)	Protect skin
3	Clean stoma and skin with warm water; pat dry	Adhesion
4	Inspect stoma: moist, pink-red; note colour, swelling, retraction	Detect ischaemia
5	Measure stoma; cut barrier opening 2–3 mm larger than stoma	Protect skin without constricting
6	Apply barrier and pouch; hold hand over it for 1 min	Warmth improves adhesion
7	Teach self-care, diet (ileostomy: fluids, salt), signs of problems	Independence

Risk / complication	Prevention / action
Dusky or black stoma (ischaemia)	Report immediately
Skin excoriation from effluent	Correct opening size; barrier products
Dehydration with high-output ileostomy	Intake–output; oral rehydration

Document
Stoma appearance, output (type, volume), skin condition, appliance changed.

Clinical pearls
An ileostomy output over 1.5–2 L/day causes dehydration and kidney injury — record output accurately.

Further reading — tap to open (free) ► Indian Nursing Council · ESPEN guidelines

Section: Gastrointestinal & Nutritional Support · Summary table on page 182 · Contents

BUY NOW ›

Administering a Cleansing Enema

Purpose. To introduce fluid into the rectum and colon to relieve constipation or prepare the bowel.

Indications

- Constipation not relieved by laxatives
- Bowel preparation for procedures (as ordered)

Equipment

- Enema solution (e.g. phosphate enema or prescribed volume) at body temperature
- Rectal tube/applicator
- Lubricant
- Gloves, bed protector, bedpan/commode

#	Nursing action	Rationale
1	Verify order; explain; ensure toilet/commode available	Dignity and readiness
2	Position in left lateral (Sims) position with right knee flexed	Follows sigmoid colon anatomy
3	Lubricate tip; ask patient to breathe out as you insert 7–10 cm (adult), directed toward the umbilicus	Relaxes anal sphincter; follows rectal angle
4	Instil slowly; stop if cramping and resume after a pause	Comfort
5	Ask patient to retain solution 5–15 min	Effectiveness
6	Assist to toilet; observe result	Safety
7	Hand hygiene; document	Record

Risk / complication	Prevention / action
Rectal perforation	Never force; stop if resistance
Vagal stimulation (bradycardia)	Slow instillation; monitor
Fluid/electrolyte imbalance (phosphate enema in renal failure, children)	Check prescription

Document

Solution, volume, result, patient tolerance.

Clinical pearls

Avoid phosphate enemas in renal failure and in the elderly with dehydration — they can cause severe hyperphosphataemia.

Further reading — tap to open (free) ► Indian Nursing Council · ESPEN guidelines

Section: Gastrointestinal & Nutritional Support · Summary table on page 182 · Contents

CBME-BASED INTERNAL MEDICINE
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Digital Removal of Faecal Impaction

Purpose. To manually remove hard impacted stool from the rectum when other measures fail.

Indications

- Faecal impaction not relieved by laxatives/enemas
- Spinal cord injury bowel programme (digital stimulation)

Equipment

- Gloves (double)
- Lubricant
- Bed protector, bedpan
- Monitor (pulse)

#	Nursing action	Rationale
1	Verify order and policy; explain; obtain consent	Invasive, uncomfortable
2	Check baseline pulse; avoid in cardiac patients without supervision	Vagal risk
3	Left lateral position; lubricate gloved finger	Comfort
4	Insert finger gently; break up and remove small pieces of stool	Avoid trauma
5	Allow rests; monitor pulse and patient response	Detect vagal reaction
6	Stop if bradycardia, pain, bleeding or faintness	Safety
7	Clean perianal area; plan bowel regimen	Prevent recurrence

Risk / complication	Prevention / action
Vasovagal bradycardia, syncope	Stop; lie flat; monitor
Rectal bleeding, mucosal tear	Gentle technique; report
Autonomic dysreflexia (spinal injury above T6)	Use anaesthetic gel; monitor BP

Document

Amount and consistency removed, pulse, tolerance, bowel plan.

Clinical pearls

Prevention — regular laxatives with opioids, fluids, mobility — is far better than digital removal.

Further reading — tap to open (free) ► Indian Nursing Council · ESPEN guidelines

Section: Gastrointestinal & Nutritional Support · Summary table on page 182 · Contents

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Genitourinary Care

Overview and one-page summary table

Urinary catheters are the commonest source of hospital-acquired infection. Insert only when indicated, use strict asepsis, maintain a closed system and remove as early as possible.

#	Procedure	Key point	Page
71	Inserting an Indwelling Urinary Catheter (Female)	To drain the bladder with a Foley catheter using sterile technique.	194
72	Inserting an Indwelling Urinary Catheter (Male)	To catheterise a male patient aseptically and avoid urethral trauma.	195
73	Continuous Bladder Irrigation (CBI)	To irrigate the bladder continuously through a three-way catheter to prevent clots after prostate or bladder surgery.	196
74	Collecting a Midstream (Clean-Catch) Urine Specimen	To obtain an uncontaminated urine sample for microscopy and culture.	197
75	Collecting a 24-Hour Urine Sample	To collect all urine over exactly 24 hours for protein, creatinine clearance or hormone measurement.	198
76	Removing a Urinary Catheter (Trial Without Catheter)	To remove an indwelling catheter and monitor return of normal voiding.	199
77	Applying a Condom (External) Catheter	To manage male urinary incontinence non-invasively, avoiding an indwelling catheter.	200

Tap a name or page number to open its full page.

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PROCEDURE 71 · GENITOURINARY CARE

Inserting an Indwelling Urinary Catheter (Female)

Purpose. To drain the bladder with a Foley catheter using sterile technique.

Indications

- Acute urinary retention
- Accurate hourly output in critically ill
- Perioperative (selected surgery)
- Comfort in end-of-life care

Equipment

- Sterile catheterisation pack
- Foley catheter (12–14 Fr), sterile water-filled syringe (10 mL)
- Sterile gloves
- Antiseptic/sterile saline
- Sterile lubricant/lidocaine gel
- Closed drainage bag
- Light source

#	Nursing action	Rationale
1	Confirm indication and order; explain; privacy; perineal hygiene	Reduce CAUTI
2	Position supine, knees flexed and apart (dorsal recumbent)	Access
3	Hand hygiene; open sterile pack; sterile gloves; drape	Asepsis
4	Separate labia with non-dominant hand (now non-sterile) and keep apart	Visualise meatus
5	Clean front to back, meatus outward, one swab per stroke	Remove contaminants
6	Insert lubricated catheter 5–7 cm until urine flows, then 2–3 cm more	Ensure balloon in bladder
7	Inflate balloon with sterile water to stated volume; pull gently; attach bag; secure to thigh	Retention without urethral trauma

Risk / complication	Prevention / action
Catheter in vagina	Leave it as a landmark; use a new sterile catheter
CAUTI	Asepsis, closed system, bag below bladder, daily review
Pain on balloon inflation	Stop, deflate, advance further

Document

Indication, catheter type/size, balloon volume, urine volume and appearance, date (removal plan).

Clinical pearls

Each day ask: does this patient still need the catheter? Every extra day increases infection risk by 3–7%.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — CAUTI prevention

Section: Genitourinary Care · Summary table on page 193 · Contents



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PROCEDURE 72 · GENITOURINARY CARE

Inserting an Indwelling Urinary Catheter (Male)

Purpose. To catheterise a male patient aseptically and avoid urethral trauma.

Indications

- Acute retention (e.g. benign prostatic hyperplasia)
- Hourly output monitoring
- Perioperative

Equipment

- As for female, plus lidocaine 2% gel (local anaesthetic)
- Catheter 14–16 Fr (coudé tip for prostatic obstruction if trained)

#	Nursing action	Rationale
1	Explain; privacy; position supine; hand hygiene; sterile field	Dignity and asepsis
2	Hold penis with non-dominant hand; retract foreskin; clean meatus outward	Prevent infection
3	Instil lidocaine gel and wait 3–5 min	Anaesthesia and lubrication
4	Hold penis perpendicular (90°) to the body; insert catheter 15–20 cm	Straightens urethra
5	Advance **to the bifurcation (Y-port)** after urine flows, then inflate balloon	Avoid inflating in the prostatic urethra
6	Lower penis; connect bag; secure to thigh/abdomen	Reduce traction
7	**Replace foreskin**	Prevent paraphimosis

Risk / complication	Prevention / action
Paraphimosis	Always replace foreskin
False passage, bleeding	Never force; stop at resistance; call urologist
Balloon inflated in urethra	Advance to hub before inflating

Document

Size, balloon volume, residual volume, ease of insertion, foreskin replaced.

Clinical pearls

If resistance is felt, do not force — ask the patient to cough or relax; persistent resistance needs a urologist.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — CAUTI prevention

Section: Genitourinary Care · Summary table on page 193 · Contents



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PROCEDURE 73 · GENITOURINARY CARE

Continuous Bladder Irrigation (CBI)

Purpose. To irrigate the bladder continuously through a three-way catheter to prevent clots after prostate or bladder surgery.

Indications

- After TURP, bladder tumour resection
- Haematuria with clots

Equipment

- Three-way catheter (in place)
- Irrigation solution (normal saline 3 L bags)
- Irrigation set
- Large drainage bag
- Bladder syringe (for clots)

#	Nursing action	Rationale
1	Hang irrigation bag; prime tubing; connect to the irrigation port	Closed system
2	Adjust rate to keep drainage light pink/rosé, clot-free	Titrate to bleeding
3	Keep drainage bag below bladder; empty frequently	Prevent backflow and overflow
4	Calculate true urine output = total drainage − irrigation volume infused	Accurate fluid balance
5	Monitor for bladder distension, pain, reduced outflow	Detect clot retention
6	If blocked: stop irrigation, check tubing, gentle bladder washout per order	Relieve obstruction
7	Watch for TUR syndrome (hyponatraemia): confusion, bradycardia, hypertension	Fluid absorption

Risk / complication	Prevention / action
Clot retention, bladder rupture	Never continue inflow when outflow stops
TUR syndrome	Check sodium; report confusion
Bladder spasms	Antispasmodic as ordered

Document

Irrigation in, total drainage out, true urine output, colour, clots.

Clinical pearls

If the drainage stops but irrigation continues, the bladder can rupture — stop inflow first.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — CAUTI prevention

Section: Genitourinary Care · Summary table on page 193 · Contents

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Collecting a Midstream (Clean-Catch) Urine Specimen

Purpose. To obtain an uncontaminated urine sample for microscopy and culture.

Indications
- Suspected UTI
- Pregnancy screening (asymptomatic bacteriuria)
- Before antibiotics

Equipment
- Sterile container
- Cleansing wipes/water
- Label, request form

#	Nursing action	Rationale
1	Explain clearly; give written/pictorial instructions	Correct technique
2	Wash hands; clean genitals (women: separate labia, front to back; men: retract foreskin)	Reduce contamination
3	Pass the first part of the stream into the toilet	Flushes urethral organisms
4	Collect the middle part into the container without touching inside	Representative sample
5	Finish voiding in the toilet; close container	Avoid contamination
6	Label and send within 2 h (or refrigerate up to 24 h)	Prevent bacterial overgrowth

Risk / complication	Prevention / action
Contamination (mixed growth)	Repeat with better technique
Delay in transport	Refrigerate

Document
Time, method, sent to lab.

Clinical pearls
For catheterised patients, take the sample from the sampling port with a sterile syringe — never from the drainage bag.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — CAUTI prevention

Section: Genitourinary Care · Summary table on page 193 · Contents

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PROCEDURE 75 · GENITOURINARY CARE

Collecting a 24-Hour Urine Sample

Purpose. To collect all urine over exactly 24 hours for protein, creatinine clearance or hormone measurement.

Indications

- Proteinuria quantification
- Creatinine clearance
- Catecholamines, cortisol, calcium

Equipment

- Large container (with preservative if required)
- Label with start and end times
- Sign on bed/toilet

#	Nursing action	Rationale
1	Explain; inform all staff; place notice	Avoid missed samples
2	At start time, ask patient to void and **discard** this urine; note time	Bladder empty at start
3	Collect all urine for the next 24 h into the container	Complete collection
4	Keep container cool/on ice if required	Preserve analytes
5	At the end time, ask patient to void and **add** this urine	Completes 24 h
6	Label and send immediately	Accuracy
7	If any urine is discarded, restart the collection	Incomplete sample invalid

Risk / complication	Prevention / action
Incomplete collection	Restart
Preservative (acid) contact with skin	Warn patient

Document

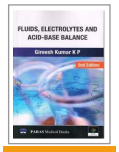
Start and end times, total volume, any missed void.

Clinical pearls

"Discard the first, keep the last" — the first morning void belongs to the previous day.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — CAUTI prevention

Section: Genitourinary Care · Summary table on page 193 · Contents



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PROCEDURE 76 · GENITOURINARY CARE

Removing a Urinary Catheter (Trial Without Catheter)

Purpose. To remove an indwelling catheter and monitor return of normal voiding.

Indications
- Catheter no longer indicated
- Planned trial without catheter

Equipment
- 10 mL syringe
- Gloves
- Waterproof pad
- Measuring jug, bladder scanner

#	Nursing action	Rationale
1	Verify order; explain; hand hygiene; gloves	Safety
2	Empty and record drainage	Final output
3	Attach syringe to balloon port; allow passive deflation (do not pull back hard)	Complete deflation; avoid cuffing
4	Confirm volume removed equals volume inserted	Balloon empty
5	Ask patient to breathe out; withdraw catheter gently	Comfort
6	Encourage fluids; record time and volume of each void	Monitor voiding
7	Bladder scan if no void in 6 h or discomfort	Detect retention

Risk / complication	Prevention / action
Balloon will not deflate	Do not cut valve without advice; inform urologist
Retention	Bladder scan; re-catheterise per order
Dysuria, frequency	Reassure; check for UTI

Document
Time removed, balloon volume, first void time and volume, residuals.

Clinical pearls
Remove catheters early in the morning so the patient's voiding can be assessed during the day.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — CAUTI prevention

Section: Genitourinary Care · Summary table on page 193 · Contents

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PROCEDURE 77 · GENITOURINARY CARE

Applying a Condom (External) Catheter

Purpose. To manage male urinary incontinence non-invasively, avoiding an indwelling catheter.

Indications

- Male incontinence with normal bladder emptying
- Reduce CAUTI risk

Equipment

- Correct-size condom catheter (measuring guide)
- Drainage bag (leg or night)
- Warm water, towel
- Gloves, scissors (to trim hair)

#	Nursing action	Rationale
1	Explain; privacy; wash and dry penis; trim (not shave) hair	Adhesion and comfort
2	Measure penis diameter; select size	Prevent leakage or constriction
3	Roll sheath onto penis leaving 2–3 cm gap at tip	Prevents irritation and kinking
4	Press gently for adhesion; do not apply tape around penis	Avoid constriction
5	Connect to drainage bag; keep below bladder	Free drainage
6	Check skin and circulation regularly; change daily	Prevent skin breakdown

Risk / complication	Prevention / action
Penile oedema or ischaemia from tight sheath	Correct size; check circulation
Skin breakdown, maceration	Daily change; skin care
Retention not treated	Only for patients who empty bladder

Document

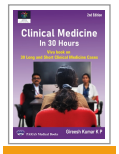
Size, skin condition, drainage, change time.

Clinical pearls

Never use adhesive tape around the penis — it can strangulate the shaft.

Further reading — tap to open (free) ► Indian Nursing Council · CDC — CAUTI prevention

Section: Genitourinary Care · Summary table on page 193 · Contents



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Fluid, Electrolyte & Blood Product Management

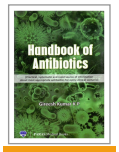
Overview and one-page summary table

Wrong blood transfusions are almost always due to identification errors at the bedside. Accurate fluid balance and secondary infusions demand attention to detail.

#	Procedure	Key point	Page
78	Verifying and Starting a Blood Transfusion	To ensure the right blood component is given to the right patient — two-person bedside verification.	202
79	Monitoring a Blood Transfusion	To detect transfusion reactions early and complete the transfusion safely.	203
80	Managing an Acute Transfusion Reaction	To respond immediately to a suspected acute haemolytic, anaphylactic or septic transfusion reaction.	204
81	Setting Up a Secondary (Piggyback) IV Infusion	To give intermittent IV drugs through the primary line without disconnecting it.	205
82	Measuring Strict Intake and Output (Fluid Balance)	To record all fluid entering and leaving the body to guide fluid therapy.	206

Tap a name or page number to open its full page.

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Verifying and Starting a Blood Transfusion

Purpose. To ensure the right blood component is given to the right patient — two-person bedside verification.

Indications
- Symptomatic anaemia, haemorrhage
- Platelets, FFP, cryoprecipitate as ordered

Equipment
- Blood component and compatibility label/form
- Blood administration set with 170–200 µm filter
- Normal saline
- Large-bore cannula (18–20 G)
- Vital-signs chart

#	Nursing action	Rationale
1	Confirm consent and prescription; baseline vital signs (T, P, R, BP) within 60 min	Reference for reactions
2	Collect blood from bank only when ready; start within 30 min of removal	Prevent bacterial growth
3	At the bedside, two staff check: patient name, ID number, DOB on ID band vs bag label vs form; ABO/Rh; unit number; expiry	Prevent ABO incompatibility
4	Inspect bag: leaks, clots, discoloration	Product integrity
5	Prime set with the component (or saline); never add drugs or dextrose	Haemolysis prevention
6	Use only normal saline with blood	Dextrose causes haemolysis; calcium causes clotting
7	Complete each red-cell unit within 4 h	Infection risk

Risk / complication	Prevention / action
Wrong blood (ABO)	Bedside check — never at the nursing station
Bacterial contamination	Start within 30 min; finish within 4 h
Circulatory overload (TACO)	Slow rate in elderly, cardiac; diuretic if ordered

Document
Pre-transfusion checks signed by both staff, unit number, start time, vital signs.

Clinical pearls
The final identity check must be done at the bedside against the patient's ID band — not from the chart.

Further reading — tap to open (free) ► Indian Nursing Council · NACO/NBTC — blood transfusion guidelines

Section: Fluid, Electrolyte & Blood Product Management · Summary table on page 201 · Contents

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Monitoring a Blood Transfusion

Purpose. To detect transfusion reactions early and complete the transfusion safely.

Indications
• Every transfusion

Equipment
• Vital-signs chart
• Infusion pump/gravity set
• Emergency drugs (adrenaline, hydrocortisone, antihistamine)

#	Nursing action	Rationale
1	Start slowly (e.g. 2 mL/min) for the first 15 min; **stay with the patient**	Most severe reactions occur early
2	Recheck vital signs at 15 min, then per policy (hourly) and at the end	Detect reaction
3	Increase to prescribed rate if stable (red cells over 1.5–4 h)	Complete in time
4	Watch for fever, chills, rash, back pain, breathlessness, hypotension, dark urine	Reaction signs
5	Ensure patient can call for help; inform patient what to report	Early detection
6	After completion: flush with saline; record volume; check vital signs	Documentation

Risk / complication	Prevention / action
Febrile non-haemolytic reaction	Stop, assess, antipyretic; restart only if mild and per doctor
Allergic urticaria	Antihistamine; continue if mild
TACO/TRALI	Breathlessness — stop, sit up, oxygen, inform

Document
Vital signs at each interval, rate, start/end times, volume, any reaction.

Clinical pearls
Fever with a rise of 2 °C, hypotension, back pain or dark urine suggests acute haemolysis — stop immediately.

Further reading — tap to open (free) ► Indian Nursing Council · NACO/NBTC — blood transfusion guidelines

Section: Fluid, Electrolyte & Blood Product Management · Summary table on page 201 · Contents



BUY NOW ›

Managing an Acute Transfusion Reaction

Purpose. To respond immediately to a suspected acute haemolytic, anaphylactic or septic transfusion reaction.

Indications

• Fever, rigors, hypotension, back/chest pain, breathlessness, haemoglobinuria, anaphylaxis during transfusion

Equipment

• Normal saline and new administration set
• Emergency drugs
• Oxygen
• Blood sample tubes, urine container
• Reaction report form

#	Nursing action	Rationale
1	**Stop the transfusion immediately**; do not discard the bag	Limit exposure; investigation
2	Keep the IV line open with normal saline via a new set	Access for treatment
3	Call the doctor; assess ABC, vital signs; oxygen	Resuscitation
4	Recheck patient identity against bag and form	Detect misidentification
5	Treat as ordered: fluids, adrenaline for anaphylaxis, diuretics, vasopressors	Supportive care
6	Send bag, set, post-transfusion blood samples (and first urine) to blood bank	Investigation
7	Report through haemovigilance programme	System learning

Risk / complication	Prevention / action
Disseminated intravascular coagulation, AKI	Monitor urine output, coagulation
Recurrence	Never restart the same unit

Document

Time of reaction, symptoms, vital signs, actions, samples sent, report filed.

Clinical pearls

Report every transfusion reaction to the Haemovigilance Programme of India.

Further reading — tap to open (free) ► Indian Nursing Council · NACO/NBTC — blood transfusion guidelines

Section: Fluid, Electrolyte & Blood Product Management · Summary table on page 201 · Contents

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Setting Up a Secondary (Piggyback) IV Infusion

Purpose. To give intermittent IV drugs through the primary line without disconnecting it.

Indications

- Intermittent IV antibiotics and drugs compatible with the primary fluid

Equipment

- Secondary bag (e.g. 100 mL antibiotic) and secondary set
- Extension hook
- Alcohol swab
- Pump

#	Nursing action	Rationale
1	Verify drug and compatibility with primary fluid	Prevent precipitation
2	Label and prime secondary set	Safety
3	Clean upper Y-port of primary set; connect secondary set	Asepsis
4	Hang secondary bag **higher** than the primary (lower primary with hook)	Higher pressure makes secondary run first; check valve stops primary
5	Programme pump for secondary rate/volume	Accurate delivery
6	After completion, primary resumes; check	Continuity
7	Flush and change secondary set per policy (24–96 h)	Infection control

Risk / complication	Prevention / action
Incompatibility	Check charts; flush between
Primary runs instead of secondary	Correct heights
Wrong rate	Pump double-check

Document

Drug, dose, time, rate, compatibility checked.

Clinical pearls

If the secondary bag is not higher than the primary, the primary runs and the antibiotic is not given.

Further reading — tap to open (free) ► Indian Nursing Council · NACO/NBTC — blood transfusion guidelines

Section: Fluid, Electrolyte & Blood Product Management · Summary table on page 201 · Contents

Emergency Physician's ECG Manual
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Measuring Strict Intake and Output (Fluid Balance)

Purpose. To record all fluid entering and leaving the body to guide fluid therapy.

Indications
- Heart and renal failure
- Sepsis, critical illness, burns
- Post-operative, DKA
- Diuretic or IV fluid therapy

Equipment
- Fluid balance chart
- Graduated measuring jugs
- Urometer (hourly urine)
- Scale for weights

#	Nursing action	Rationale
1	Explain to patient and family; place chart at bedside	Cooperation
2	Record all intake: oral, IV fluids, drugs in volume, enteral/TPN feeds, flushes	Complete intake
3	Record all output: urine, vomitus, drains, NG aspirate, stool (liquid), wound losses	Complete output
4	Measure at eye level in graduated containers; never estimate	Accuracy
5	Total every hour (ICU) and every 24 h; calculate balance	Trend
6	Add insensible losses (~500–800 mL/day; more with fever) in interpretation	True balance
7	Correlate with daily weight	Validation

Risk / complication	Prevention / action
Inaccurate charting	Educate; measure
Hourly urine <0.5 mL/kg/h	Report — oliguria

Document
Hourly/24-h totals, balance, weight.

Clinical pearls
Urine output below 0.5 mL/kg/hour for 2 hours is an early warning of shock or kidney injury.

Further reading — tap to open (free) ► Indian Nursing Council · NACO/NBTC — blood transfusion guidelines

Section: Fluid, Electrolyte & Blood Product Management · Summary table on page 201 · Contents

BUY NOW ›

Patient Mobility, Safety & Skin Integrity

Overview and one-page summary table

Falls, pressure injuries and manual-handling injuries are largely preventable. Use equipment, enough staff and validated risk assessments.

#	Procedure	Key point	Page
83	Patient Transfer Using a Mechanical Hoist	To transfer a dependent patient safely between bed, chair and commode without lifting by hand.	208
84	Logrolling a Patient	To turn a patient as a single unit, keeping the spine aligned.	209
85	Assisting Ambulation with a Cane or Walker	To help patients walk safely with mobility aids and prevent falls.	210
86	Managing a Falling Patient (Controlled Descent)	To guide a falling patient safely to the floor and reduce injury to patient and nurse.	211
87	Applying and Monitoring Physical Restraints	To use physical restraint only as a last resort to prevent serious harm, with the least restrictive method and close m…	212
88	Repositioning to Prevent Pressure Injuries	To relieve pressure on bony prominences and maintain skin integrity in immobile patients.	213
89	Applying Negative Pressure Wound Therapy (Wound VAC)	To apply sub-atmospheric pressure to a wound with foam and a sealed film to promote healing.	214
90	Skin Assessment Using the Braden Scale	To predict pressure-injury risk systematically and guide prevention.	215

Tap a name or page number to open its full page.



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Patient Transfer Using a Mechanical Hoist

Purpose. To transfer a dependent patient safely between bed, chair and commode without lifting by hand.

Indications

- Patients unable to bear weight
- Heavy or dependent patients

Equipment

- Mechanical (Hoyer) hoist — checked, charged
- Correct-size sling
- At least two trained staff

#	Nursing action	Rationale
1	Check patient weight within hoist limit; check sling integrity	Safety
2	Explain; two staff present	Never alone
3	Roll patient to position sling under them (head to thighs)	Correct placement
4	Position hoist; lock bed wheels; attach sling loops evenly	Balanced lift
5	Raise slowly until clear of bed; one staff guides patient	Prevent swinging
6	Move hoist with wheels unlocked; lower gently into chair	Controlled transfer
7	Remove sling (unless policy); make comfortable	Comfort, skin protection

Risk / complication	Prevention / action
Fall from hoist	Correct sling size and attachment
Skin shear	Smooth sling placement
Staff back injury	Never manual lift

Document

Hoist and sling size used, staff number, tolerance.

Clinical pearls

Manual lifting of a fully dependent adult is unsafe for both patient and nurse — use equipment.

Further reading — tap to open (free) ► Indian Nursing Council · NPIAP — pressure injury

Section: Patient Mobility, Safety & Skin Integrity · Summary table on page 207 · Contents

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Logrolling a Patient

Purpose. To turn a patient as a single unit, keeping the spine aligned.

Indications
- Suspected or confirmed spinal injury
- After spinal surgery
- Examining the back of trauma patients

Equipment
- At least 4 staff (5 with cervical spine)
- Pillows, slide sheet
- Spinal board/linen

#	Nursing action	Rationale
1	Explain; team leader at head holds head and neck in line	Cervical alignment
2	Place patient's arms across chest; pillow between knees	Keep body aligned
3	Staff positioned at shoulders, hips and legs on the same side	Coordinated turn
4	Leader counts ("ready, steady, roll"); all turn together	Move as one unit
5	Examine back, clean, change linen; place pillows to support	Care and inspection
6	Return supine on command	Coordination
7	Reassess neurological status	Detect deterioration

Risk / complication	Prevention / action
Spinal cord injury from twisting	Leader commands every movement
Pressure injury	Regular turns as ordered

Document
Turn performed, staff number, skin condition, neuro status.

Clinical pearls
The person at the head always gives the commands during a logroll.

Further reading — tap to open (free) ► Indian Nursing Council · NPIAP — pressure injury

Section: Patient Mobility, Safety & Skin Integrity · Summary table on page 207 · Contents

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Assisting Ambulation with a Cane or Walker

Purpose. To help patients walk safely with mobility aids and prevent falls.

Indications

- Weakness, post-operative mobilisation
- Stroke, arthritis, after joint replacement

Equipment

- Cane/walker of correct height
- Gait belt
- Non-slip footwear
- Clear pathway

#	Nursing action	Rationale
1	Check device height: handle at wrist crease, elbow flexed 15–30°	Correct posture
2	Apply gait belt; non-slip shoes	Safety
3	Cane: held in hand **opposite** the weak leg; move cane and weak leg together	Wider base of support
4	Walker: move walker forward, step with weak leg, then strong leg	Stability
5	Nurse stands slightly behind on the patient's **weak side**, holding gait belt	Support where likely to fall
6	Stairs: up with good leg, down with bad (cane goes with bad)	"Up with the good, down with the bad"
7	Short distance first; observe for dizziness	Gradual progression

Risk / complication	Prevention / action
Fall	Gait belt; controlled descent technique
Orthostatic hypotension	Sit on edge of bed first
Incorrect device height	Measure

Document

Distance, device, assistance level, tolerance.

Clinical pearls

Always stand on the patient's weak (affected) side when assisting walking.

Further reading — tap to open (free) ► Indian Nursing Council · NPIAP — pressure injury

Section: Patient Mobility, Safety & Skin Integrity · Summary table on page 207 · Contents

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Managing a Falling Patient (Controlled Descent)

Purpose. To guide a falling patient safely to the floor and reduce injury to patient and nurse.

Indications
- Patient collapsing or losing balance while walking/standing

Equipment
- Gait belt (if in use)
- Call bell
- Help

#	Nursing action	Rationale
1	Do not try to hold the patient upright	Prevents injury to both
2	Widen your stance; bend knees; keep back straight	Stable base
3	Pull patient close to your body, holding gait belt or around the waist	Control
4	Slide patient down your leg to the floor, protecting the head	Controlled descent
5	Call for help; do not lift alone	Safety
6	Assess: ABC, consciousness, injuries, glucose, vital signs before moving	Detect injury
7	Use hoist/team to return to bed; inform doctor; incident report	Follow-up

Risk / complication	Prevention / action
Head injury (especially on anticoagulants)	Neuro observations; CT as ordered
Hip fracture	Leg shortening, external rotation — do not mobilise
Recurrent falls	Falls risk assessment and plan

Document
Time, circumstances, injuries, assessment, actions, incident report.

Clinical pearls
After any fall in a patient on anticoagulants, start neurological observations even if they "feel fine".

Further reading — tap to open (free) ► Indian Nursing Council · NPIAP — pressure injury

Section: Patient Mobility, Safety & Skin Integrity · Summary table on page 207 · Contents

BUY NOW ›

Applying and Monitoring Physical Restraints

Purpose. To use physical restraint only as a last resort to prevent serious harm, with the least restrictive method and close monitoring.

Indications

- Imminent risk of self-harm or harm to others when alternatives fail
- Preventing removal of life-sustaining devices (short-term)

Equipment

- Approved padded restraints
- Doctor's order (time-limited)
- Monitoring chart

#	Nursing action	Rationale
1	Try alternatives first: reorientation, family presence, treat pain/delirium, diversion	Least restrictive
2	Obtain written order with reason and duration; inform family	Legal and ethical (Mental Healthcare Act 2017)
3	Apply padded restraint; two fingers fit under; tie with quick-release knot to bed frame (not side rails)	Safety; quick removal
4	Keep bed low; call bell in reach	Prevent injury
5	Check circulation, skin, comfort every 15–30 min; release and range-of-motion every 2 h	Prevent injury
6	Offer fluids, food, toileting; reassess need regularly	Dignity
7	Remove as soon as safe	Minimise restraint

Risk / complication	Prevention / action
Strangulation, asphyxia	Never restrain in prone position; never tie to side rails
Skin and nerve injury	Padding, checks
Psychological trauma	Explanation, debrief

Document

Reason, alternatives tried, order, type, checks, release times, behaviour.

Clinical pearls

Restraint is a clinical decision with legal implications — never a convenience for staffing.

Further reading — tap to open (free) ► Indian Nursing Council · NPIAP — pressure injury

Section: Patient Mobility, Safety & Skin Integrity · Summary table on page 207 · Contents

BUY NOW ›

Repositioning to Prevent Pressure Injuries

Purpose. To relieve pressure on bony prominences and maintain skin integrity in immobile patients.

Indications

- Immobile, bed-bound or sedated patients
- Braden score ≤18
- Existing pressure injuries

Equipment

- Pillows, wedges
- Slide sheet
- Pressure-redistribution mattress
- Turning chart

#	Nursing action	Rationale
1	Assess skin and risk (Braden) on admission and daily	Plan care
2	Turn at least every 2 h (individualised; more often if high risk)	Restore blood flow
3	Use 30° lateral tilt rather than 90° side-lying	Avoid trochanter pressure
4	Use slide sheets — do not drag	Prevent shear and friction
5	Keep head of bed ≤30° unless contraindicated	Reduce sacral shear
6	Float heels off the bed with a pillow under calves	Heels are high risk
7	Inspect bony prominences at each turn; do not massage red areas	Detect early injury

Risk / complication	Prevention / action
Pressure injury	Stage it, document, dressings, inform
Shear injury	Lift, do not drag
Moisture damage	Continence care, barrier cream

Document

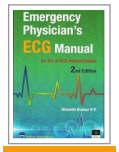
Position changes with times, skin findings (turning chart).

Clinical pearls

Non-blanching redness is a stage 1 pressure injury — relieve pressure immediately and do not massage.

Further reading — tap to open (free) ► Indian Nursing Council · NPIAP — pressure injury

Section: Patient Mobility, Safety & Skin Integrity · Summary table on page 207 · Contents



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Applying Negative Pressure Wound Therapy (Wound VAC)

Purpose. To apply sub-atmospheric pressure to a wound with foam and a sealed film to promote healing.

Indications
- Complex, large or cavity wounds
- Diabetic foot after debridement
- Dehisced surgical wounds
- Skin graft fixation

Equipment
- NPWT unit and canister
- Foam (black/white) or gauze
- Transparent adhesive drape
- Tubing with track pad
- Sterile scissors, skin protectant

#	Nursing action	Rationale
1	Check order; give analgesia; explain	Comfort
2	Remove old dressing; count foam pieces removed	Prevent retained foam
3	Clean wound; protect periwound skin	Prevent maceration
4	Cut foam to wound shape; place without overlapping skin	Effective therapy
5	Seal with drape 3–5 cm beyond wound; cut 2 cm hole; apply track pad	Airtight seal
6	Connect and set pressure (usually −125 mmHg continuous); foam collapses	Confirms seal
7	Check unit every 2 h; change dressing every 48–72 h	Effectiveness

Risk / complication	Prevention / action
Bleeding (anticoagulants, exposed vessels)	Contraindication — monitor canister for blood
Air leak	Patch the drape
Retained foam	Count pieces
Therapy off >2 h	Replace with conventional dressing

Document
Pressure setting, foam pieces, wound appearance, exudate volume.

Clinical pearls
Never leave a VAC dressing in place switched off for more than 2 hours — it becomes an occlusive bacterial reservoir.

Further reading — tap to open (free) ► Indian Nursing Council · NPIAP — pressure injury

Section: Patient Mobility, Safety & Skin Integrity · Summary table on page 207 · Contents

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Skin Assessment Using the Braden Scale

Purpose. To predict pressure-injury risk systematically and guide prevention.

Indications

• All patients on admission and daily (and with change in condition)

Equipment

• Braden scale chart
• Good lighting
• Gloves

#	Nursing action	Rationale
1	Score sensory perception 1–4	Ability to feel pressure discomfort
2	Score moisture 1–4	Skin exposure to moisture
3	Score activity 1–4 and mobility 1–4	Ability to relieve pressure
4	Score nutrition 1–4	Usual food intake
5	Score friction and shear 1–3	Sliding in bed
6	Total 6–23: ≤9 very high, 10–12 high, 13–14 moderate, 15–18 mild risk	Risk category
7	Inspect skin head to toe, especially sacrum, heels, hips, occiput	Detect existing injury

Risk / complication	Prevention / action
Underestimating risk in ICU	Reassess with changes
Device-related injury (masks, tubes)	Check under devices

Document

Braden score, skin findings, prevention plan.

Clinical pearls

A lower Braden score means higher risk — act on every score of 18 or below.

Further reading — tap to open (free) ► Indian Nursing Council · NPIAP — pressure injury

Section: Patient Mobility, Safety & Skin Integrity · Summary table on page 207 · Contents

CBME-BASED INTERNAL MEDICINE
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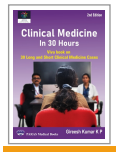
Emergency, Critical Care & Post-mortem Care

Overview and one-page summary table

Nurses are usually the first to find a deteriorating or collapsed patient. High-quality CPR, early defibrillation and recognition of lethal rhythms save lives; dignified care continues after death.

#	Procedure	Key point	Page
91	Cardiopulmonary Resuscitation (Adult BLS)	To maintain circulation and oxygenation in cardiac arrest until defibrillation and advanced care.	217
92	Using an Automated External Defibrillator (AED)	To analyse the heart rhythm and deliver a shock for VF/pulseless VT as early as possible.	218
93	Relieving Foreign-Body Airway Obstruction (Choking)	To clear a choking adult or child's airway using back blows and abdominal thrusts.	219
94	Defibrillation (Manual) in Cardiac Arrest	To deliver an unsynchronised shock for ventricular fibrillation and pulseless VT.	220
95	Synchronised Cardioversion	To deliver a shock timed to the R wave to terminate unstable tachyarrhythmias with a pulse.	221
96	Arterial Line Set-up and Levelling	To set up an arterial pressure monitoring system for continuous BP and blood sampling.	222
97	Zeroing a Pressure Transducer	To calibrate invasive pressure monitoring (arterial, CVP) to atmospheric pressure.	223
98	Continuous Cardiac Monitoring and Recognising Lethal Rhythms	To monitor the ECG continuously and recognise life-threatening arrhythmias immediately.	224
99	Recording a 12-Lead ECG	To record an accurate 12-lead electrocardiogram with correct electrode placement.	225
100	Post-mortem Care (Last Offices)	To care for the body after death with dignity, respecting religious and cultural practices, and to support the family.	226

Tap a name or page number to open its full page.



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Cardiopulmonary Resuscitation (Adult BLS)

Purpose. To maintain circulation and oxygenation in cardiac arrest until defibrillation and advanced care.

Indications

• Unresponsive patient not breathing normally (or only gasping)

Equipment

• Firm surface/backboard
• Bag–valve–mask with oxygen
• Defibrillator/AED
• Emergency trolley

#	Nursing action	Rationale
1	Check safety; check response; shout for help and call code/108; get AED	Early activation
2	Check breathing and carotid pulse (≤10 s)	Confirm arrest
3	Start compressions: centre of chest, **5–6 cm deep, 100–120/min**, full recoil	Effective perfusion
4	Minimise interruptions (<10 s)	Coronary perfusion pressure
5	30 compressions : 2 breaths (each over 1 s, visible chest rise)	Oxygenation
6	Attach defibrillator as soon as available; shock if indicated, resume CPR immediately	Defibrillation saves VF/VT
7	Rotate compressor every 2 min; continue until ROSC or decision to stop	Prevent fatigue

Risk / complication	Prevention / action
Rib fractures	Expected; continue
Poor-quality CPR	Feedback device; rotate compressors
Delayed defibrillation	Attach pads early

Document

Time of arrest, CPR start, rhythm, shocks, drugs, ROSC/outcome, team members.

Clinical pearls

"Push hard, push fast, allow full recoil, minimise interruptions, avoid over-ventilation."

Further reading — tap to open (free) ► Indian Nursing Council · AHA — CPR & ECC guidelines

Section: Emergency, Critical Care & Post-mortem Care · Summary table on page 216 · Contents

Handbook of Antibiotics
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Using an Automated External Defibrillator (AED)

Purpose. To analyse the heart rhythm and deliver a shock for VF/pulseless VT as early as possible.

Indications
- Cardiac arrest (unresponsive, not breathing normally)

Equipment
- AED with adult (and paediatric) pads
- Razor, towel

#	Nursing action	Rationale
1	Switch on AED; follow voice prompts	Guided use
2	Expose chest; dry if wet; shave excessive hair; remove medication patches	Good pad contact
3	Place pads: right below clavicle and left mid-axillary line (apex)	Current crosses the heart
4	Stand clear while AED analyses — no one touching	Accurate analysis
5	If shock advised: shout "Stand clear", check, press shock	Safety
6	Immediately resume CPR for 2 min; follow prompts	Minimise interruptions
7	Avoid pads over implanted pacemaker (place 8 cm away)	Device damage

Risk / complication	Prevention / action
Shocking someone in contact	Visual and verbal clear check
Water, oxygen near chest	Dry chest; move oxygen away during shock

Document
Time of AED attachment, shocks delivered, rhythm, outcome.

Clinical pearls

Every minute without defibrillation in VF reduces survival by about 10%.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — CPR & ECC guidelines

Section: Emergency, Critical Care & Post-mortem Care · Summary table on page 216 · Contents

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Relieving Foreign-Body Airway Obstruction (Choking)

Purpose. To clear a choking adult or child's airway using back blows and abdominal thrusts.

Indications
• Conscious patient choking with ineffective cough (cannot speak or breathe)

Equipment
• None (call for help)

#	Nursing action	Rationale
1	Ask "Are you choking?"; if effective cough — encourage coughing	Coughing is best
2	If ineffective: give up to 5 back blows between shoulder blades, leaning forward	Dislodge object
3	Then up to 5 abdominal thrusts (Heimlich): fist above umbilicus, pull inward and upward	Raise intrathoracic pressure
4	Alternate 5 back blows and 5 thrusts until relieved or unconscious	Repeat cycle
5	Pregnant/obese: chest thrusts instead; infants: 5 back blows and 5 chest thrusts	Safe technique
6	If unconscious: lower to floor, call for help, start CPR (look in mouth before breaths)	Compressions may dislodge object
7	After success: medical review (internal injury from thrusts)	Safety

Risk / complication	Prevention / action
Abdominal injury from thrusts	Medical assessment afterwards
Blind finger sweeps	Avoid — may push object deeper

Document
Event, manoeuvres used, outcome, review.

Clinical pearls

Never perform abdominal thrusts on infants under 1 year — use back blows and chest thrusts.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — CPR & ECC guidelines

Section: Emergency, Critical Care & Post-mortem Care · Summary table on page 216 · Contents

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Defibrillation (Manual) in Cardiac Arrest

Purpose. To deliver an unsynchronised shock for ventricular fibrillation and pulseless VT.

Indications

- VF and pulseless VT (shockable rhythms)

Equipment

- Manual defibrillator
- Pads or paddles with gel
- Monitor
- Emergency drugs

#	Nursing action	Rationale
1	Confirm shockable rhythm on monitor (VF/pVT) while CPR continues	Correct indication
2	Apply pads (sternal–apical); select energy: biphasic 120–200 J (per device), monophasic 360 J	Adequate energy
3	Charge while compressions continue	Minimise pause
4	Remove oxygen from chest area; "Stand clear — oxygen away" — visual check	Safety
5	Deliver shock; resume CPR immediately for 2 min without pulse check	Minimise interruptions
6	Adrenaline 1 mg after 2nd shock and every 3–5 min; amiodarone 300 mg after 3rd shock	ACLS algorithm
7	Asystole/PEA are not shockable — CPR and adrenaline	Correct pathway

Risk / complication	Prevention / action
Burns, sparks with oxygen	Gel pads; oxygen away
Shocking staff	Clear check
Prolonged pauses	Charge during CPR

Document

Rhythm, energy, time of each shock, drugs, outcome.

Clinical pearls

Shock first, then CPR — do not stop to check the pulse immediately after a shock.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — CPR & ECC guidelines

Section: Emergency, Critical Care & Post-mortem Care · Summary table on page 216 · Contents

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Synchronised Cardioversion

Purpose. To deliver a shock timed to the R wave to terminate unstable tachyarrhythmias with a pulse.

Indications

- Unstable SVT, atrial fibrillation/flutter or VT with a pulse (hypotension, chest pain, shock, altered consciousness)
- Elective cardioversion of AF

Equipment

- Defibrillator with SYNC mode
- Pads
- Sedation drugs, airway equipment, oxygen, suction
- ECG monitoring

#	Nursing action	Rationale
1	Consent (if conscious); IV access; NPO if elective; anticoagulation status for AF	Safety and stroke prevention
2	Pre-oxygenate; sedate as ordered	Painful procedure
3	Apply pads; connect monitoring leads	Rhythm detection
4	Press **SYNC**; confirm markers on each R wave	Avoid shock on T wave (VF)
5	Select energy (e.g. 120–200 J biphasic; flutter/SVT 50–100 J)	Rhythm-specific
6	Clear; press and hold shock button until discharge	Synchronised delivery
7	Reassess rhythm; re-select SYNC for repeat shocks (many devices default off)	Correct mode

Risk / complication	Prevention / action
VF if shock unsynchronised	Check sync markers; defibrillate if VF occurs
Thromboembolism in AF	Anticoagulation per protocol
Respiratory depression from sedation	Airway support

Document

Rhythm before/after, energy, number of shocks, sedation, vital signs.

Clinical pearls

Many defibrillators revert to unsynchronised mode after each shock — re-press SYNC before every cardioversion attempt.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — CPR & ECC guidelines

Section: Emergency, Critical Care & Post-mortem Care · Summary table on page 216 · Contents

Emergency Physician's ECG Manual
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Arterial Line Set-up and Levelling

Purpose. To set up an arterial pressure monitoring system for continuous BP and blood sampling.

Indications
- Unstable BP, vasopressor therapy
- Frequent ABG sampling
- Major surgery, ICU

Equipment
- Pressure transducer set
- Pressure bag inflated to 300 mmHg
- Normal saline 500 mL (heparinised per policy)
- Monitor cable
- Labels (red "ARTERIAL")

#	Nursing action	Rationale
1	Prime the transducer set with saline, removing all air bubbles	Air causes damping and embolism
2	Place saline in pressure bag at 300 mmHg (continuous flush 3 mL/h)	Patency
3	Mount transducer at the **phlebostatic axis** (4th ICS, mid-axillary line)	Accurate pressures
4	Zero the transducer (see next procedure)	Calibration
5	Connect to arterial cannula; observe waveform; perform square-wave (fast flush) test	Check damping
6	Label line clearly as ARTERIAL; never inject drugs	Prevent intra-arterial injection
7	Check limb perfusion (colour, warmth, capillary refill) hourly	Detect ischaemia

Risk / complication	Prevention / action
Disconnection — rapid haemorrhage	Luer-lock connections; visible site; alarms on
Intra-arterial drug injection	Labels; no drugs
Ischaemia, infection	Hourly checks; Allen test before radial

Document
Site, zeroing, levelling, waveform, limb perfusion.

Clinical pearls
Level the transducer every time the patient's position changes — every 2.5 cm error changes readings by about 2 mmHg.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — CPR & ECC guidelines

Section: Emergency, Critical Care & Post-mortem Care · Summary table on page 216 · Contents



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Zeroing a Pressure Transducer

Purpose. To calibrate invasive pressure monitoring (arterial, CVP) to atmospheric pressure.

Indications

- After setting up an arterial or CVP line
- Every shift, after disconnection, when readings are doubtful

Equipment

- Pressure monitoring system
- Monitor

#	Nursing action	Rationale
1	Position patient (supine or as documented)	Consistent readings
2	Level the transducer air–fluid interface to the phlebostatic axis	Reference point
3	Turn the stopcock off to the patient and open to air (remove cap)	Expose to atmosphere
4	Press "Zero" on the monitor; wait for confirmation (0)	Calibration
5	Close stopcock to air, replace sterile cap, open to patient	Restore monitoring
6	Check waveform and value	Confirm accuracy

Risk / complication	Prevention / action
Contaminating the open port	Sterile cap
Leaving stopcock off to patient	No waveform — check
Zeroing at wrong height	Level first

Document

Time zeroed, reference level.

Clinical pearls

Zeroing removes atmospheric pressure; levelling removes hydrostatic error — both are needed.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — CPR & ECC guidelines

Section: Emergency, Critical Care & Post-mortem Care · Summary table on page 216 · Contents

CBME-BASED INTERNAL MEDICINE
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Continuous Cardiac Monitoring and Recognising Lethal Rhythms

Purpose. To monitor the ECG continuously and recognise life-threatening arrhythmias immediately.

Indications

- ACS, arrhythmias, cardiac drugs (amiodarone, digoxin)
- ICU, post-cardiac surgery
- Electrolyte disturbances

Equipment

- Cardiac monitor
- Electrodes (3 or 5 lead)
- Skin preparation materials

#	Nursing action	Rationale
1	Prepare skin (clean, dry, clip hair); place electrodes (RA, LA, LL; V lead for 5-lead)	Clear signal
2	Select lead II (best P waves) and set alarm limits appropriately	Detection
3	**VF**: chaotic irregular waveform, no QRS — CPR + defibrillate	Shockable
4	**VT**: wide regular QRS >100/min — check pulse; pulseless → defibrillate; with pulse → assess stability	Shockable if pulseless
5	**Asystole**: flat line — check leads and gain; CPR + adrenaline	Non-shockable
6	**PEA**: organised rhythm without pulse — CPR, adrenaline, treat reversible causes (4 H, 4 T)	Non-shockable
7	Always assess the patient, not just the monitor	Artefact vs arrest

Risk / complication	Prevention / action
Alarm fatigue	Individualise alarms; never silence without checking
Artefact mimicking VF	Check patient and leads

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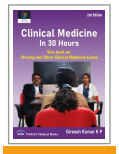
Rhythm strips for events, interventions.

Clinical pearls

Treat the patient, not the monitor — a "VF" trace in a talking patient is a loose electrode.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — CPR & ECC guidelines

Section: Emergency, Critical Care & Post-mortem Care · Summary table on page 216 · Contents



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Recording a 12-Lead ECG

Purpose. To record an accurate 12-lead electrocardiogram with correct electrode placement.

Indications
- Chest pain (within 10 min of arrival)
- Palpitations, syncope, breathlessness
- Electrolyte disturbance, drug monitoring

Equipment
- ECG machine
- 10 electrodes
- Skin preparation (alcohol, razor)
- Privacy screen

#	Nursing action	Rationale
1	Identify patient; explain; privacy; supine, relaxed, warm	Reduce muscle artefact
2	Prepare skin; place limb electrodes on wrists/ankles (or proximal limbs): RA, LA, RL, LL	Limb leads
3	V1: 4th ICS right sternal edge; V2: 4th ICS left sternal edge	Correct chest placement
4	V4: 5th ICS mid-clavicular line; V3 midway between V2 and V4	Anterior leads
5	V5: anterior axillary line, same level as V4; V6: mid-axillary line	Lateral leads
6	Check settings (25 mm/s, 10 mm/mV); record; check quality	Standard recording
7	Label with name, date, time, symptoms; show to doctor immediately if chest pain	STEMI recognition

Risk / complication	Prevention / action
Lead misplacement (limb reversal)	Check placement; compare
Artefact	Relax, warm patient
Delay in STEMI	Door-to-ECG ≤10 min

Document
Time recorded, symptoms at time, shown to whom.

Clinical pearls
For suspected posterior or right ventricular infarction, add V7–V9 and right-sided V4R leads.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — CPR & ECC guidelines

Section: Emergency, Critical Care & Post-mortem Care · Summary table on page 216 · Contents

Handbook of Antibiotics
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Post-mortem Care (Last Offices)

Purpose. To care for the body after death with dignity, respecting religious and cultural practices, and to support the family.

Indications
- After death has been confirmed and certified by a doctor

Equipment
- Gloves, apron
- Washing materials, clean linen
- ID tags (wrist, ankle, shroud)
- Dressings, bags for belongings
- Body bag if infectious

#	Nursing action	Rationale
1	Confirm death certified; note time; inform family sensitively	Legal and compassionate
2	Ask family about religious/cultural wishes (Hindu, Muslim, Christian, Sikh practices) and whether they wish to participate	Respect beliefs
3	Lay body flat, limbs straight, one pillow under head; close eyes and mouth	Before rigor mortis (2–4 h)
4	Remove tubes and lines unless medicolegal case (then leave in situ)	Medicolegal requirements
5	Wash body, insert dentures, cover wounds, dress or shroud	Dignity
6	Attach identification tags (wrist, ankle, outside shroud); list and hand over belongings	Correct identification
7	Allow family time; transfer to mortuary; complete documentation	Support and records

Risk / complication	Prevention / action
Medicolegal cases (MLC)	Leave all lines/tubes; inform police per hospital policy
Infection risk	Standard precautions; body bag if required
Wrong identification	Two-person check of tags

Document
Time of death, certifying doctor, family informed, belongings, tags, transfer time.

Clinical pearls
Care after death is the last act of nursing care — treat the body with the same respect as a living patient.

Further reading — tap to open (free) ► Indian Nursing Council · AHA — CPR & ECC guidelines

Section: Emergency, Critical Care & Post-mortem Care · Summary table on page 216 · Contents

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REFERENCE 1

Drug Calculations Every Nurse Must Know

Formulas, conversions and worked examples

Calculation	Formula	Worked example
Tablets / liquid	Dose required ÷ stock strength × volume	Need 250 mg; syrup 125 mg/5 mL → 250/125 × 5 = 10 mL
Weight-based dose	Dose (mg/kg) × weight (kg)	Gentamicin 5 mg/kg, 60 kg → 300 mg
IV rate (mL/h)	Volume (mL) ÷ time (h)	1,000 mL over 8 h → 125 mL/h
Drops per minute	Volume × drop factor ÷ time (min)	500 mL over 4 h, 20 drops/mL → 500 × 20 ÷ 240 ≈ 42/min
Micro-drip (60 drops/mL)	drops/min = mL/h	50 mL/h = 50 micro-drops/min
µg/kg/min → mL/h	Dose × weight × 60 ÷ concentration (µg/mL)	Dopamine 5 µg/kg/min, 70 kg, 4,000 µg/mL → 5.25 mL/h
Units/h → mL/h	Units per hour ÷ units per mL	Heparin 1,000 units/h; 25,000 units in 50 mL (500/mL) → 2 mL/h
Percentage solutions	X% = X g per 100 mL	Dextrose 25% = 25 g/100 mL; 1:1,000 = 1 mg/mL
Paediatric (Clark rule — approximate)	Weight (kg) ÷ 70 × adult dose	Always prefer mg/kg from formulary
Body surface area (Mosteller)	√(height cm × weight kg ÷ 3,600)	170 cm, 70 kg → 1.82 m²
Creatinine clearance (Cockcroft–Gault)	(140 − age) × weight ÷ (72 × serum creatinine mg/dL) [×0.85 female]	60 y, 70 kg, creatinine 1.2 → 65 mL/min

Conversion	Equivalent
1 g	1,000 mg
1 mg	1,000 µg (micrograms — write "micrograms" in full)
1 L	1,000 mL
1 kg	2.2 lb
1 teaspoon	5 mL
1 tablespoon	15 mL
°F → °C	(°F − 32) × 5/9

Safe calculation habits

- Never use a trailing zero (5 mg, not 5.0 mg); always a leading zero (0.5 mg, not .5 mg)
- Write "units" and "micrograms" in full
- Ask a second nurse to recalculate independently for high-alert drugs and children
- If the answer means giving many tablets or ampoules, stop and recheck



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REFERENCE 2

High-alert Medications and Antidotes

Drugs that cause the most harm when used in error — and their reversal agents

High-alert medication	Main danger	Safeguard
Insulin (all types)	Hypoglycaemia, ten-fold dosing errors	"Units" in full; insulin syringes/pens only; double check
Heparin, LMWH, warfarin, DOACs	Bleeding	Check strength; aPTT/INR; double check infusions
Opioids (morphine, fentanyl)	Respiratory depression	Sedation score, RR; naloxone available
Concentrated potassium chloride	Cardiac arrest if given undiluted	Never IV push; pre-diluted bags; max 10–20 mmol/h peripheral
Vasopressors, inotropes	Arrhythmia, extravasation necrosis	Central line; pump; dedicated lumen
Neuromuscular blockers	Apnoea in unventilated patient	Segregated storage; warning labels
Magnesium sulfate	Respiratory arrest	Reflex, RR, urine checks; calcium gluconate ready
Chemotherapy	Toxicity, extravasation	Trained staff; independent verification
Hypertonic saline (3%), 25–50% dextrose	Osmotic injury, extravasation	Large/central vein; pump
Oxytocin	Uterine hyperstimulation, rupture	Pump; CTG; double check
Sedatives (midazolam, propofol)	Respiratory depression	Monitoring, airway equipment

Drug / poison	Antidote	Dose (adult)
Opioids	Naloxone	0.04–0.4 mg IV, titrate
Benzodiazepines	Flumazenil (caution)	0.2 mg IV, repeat 0.1 mg
Heparin	Protamine sulfate	1 mg per 100 units (max 50 mg)
Warfarin	Vitamin K ± PCC/FFP	5–10 mg IV slowly
Paracetamol	N-acetylcysteine	21-h IV regimen (weight-based)
Organophosphates	Atropine (+ pralidoxime)	Atropine 1.8–3 mg IV, double every 5 min
Digoxin	Digoxin-specific Fab	Per level/amount ingested
Beta-blockers	Glucagon	5–10 mg IV
Calcium-channel blockers	Calcium gluconate 10%; insulin	30 mL (3 g) IV
Magnesium sulfate	Calcium gluconate 10%	10 mL (1 g) IV over 10 min
Insulin, sulfonylureas	Dextrose 25%, glucagon (octreotide)	50–100 mL IV; glucagon 1 mg IM
Methanol, ethylene glycol	Fomepizole or ethanol	Per protocol
Iron	Desferrioxamine	15 mg/kg/h IV
TCA overdose	Sodium bicarbonate 8.4%	50–100 mL IV
Malignant hyperthermia	Dantrolene	2.5 mg/kg IV
Snake bite (Indian big four)	Polyvalent anti-snake venom	10 vials IV (per national protocol)


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REFERENCE 3

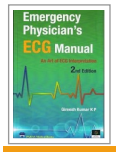
Normal Values and Therapeutic Drug Levels

Adult reference ranges (may vary by laboratory)

Vital sign / test	Normal adult range	Act if
Heart rate	60–100/min	<50 or >120
Respiratory rate	12–20/min	<10 or >24
Blood pressure	<120/80 mmHg (optimal)	SBP <90 or >180
SpO_2	94–98% (88–92% in COPD risk)	<92%
Temperature	36.5–37.5 °C	<36 or >38.3 °C
Urine output	≥0.5 mL/kg/h	<0.5 mL/kg/h for 2 h
GCS	15	Fall ≥2 or ≤8
Capillary refill	<2 s	>3 s

Laboratory test	Normal range	Test	Normal range
Sodium	135–145 mmol/L	Haemoglobin	M 13–17; F 12–15 g/dL
Potassium	3.5–5.0 mmol/L	WBC	4,000–11,000/mm³
Calcium (total)	8.5–10.5 mg/dL	Platelets	1.5–4.0 lakh/mm³
Magnesium	1.7–2.4 mg/dL	INR (no anticoagulant)	0.8–1.2
Glucose (fasting)	70–100 mg/dL	aPTT	25–35 s
HbA1c	<5.7% (diabetes ≥6.5%)	Creatinine	0.6–1.2 mg/dL
Urea	15–40 mg/dL	Bilirubin (total)	0.3–1.2 mg/dL
ABG pH	7.35–7.45	$PaCO_2$	35–45 mmHg
PaO_2	80–100 mmHg	HCO_3^-	22–26 mmol/L
Lactate	<2 mmol/L	Troponin	Below lab 99th centile

Drug	Therapeutic level	Toxic signs
Digoxin	0.5–2.0 ng/mL (HF 0.5–0.9)	Nausea, visual halos, bradycardia, arrhythmia
Lithium	0.6–1.0 mmol/L	Coarse tremor, vomiting, ataxia, confusion
Phenytoin	10–20 mg/L	Nystagmus, ataxia, slurred speech
Theophylline	10–20 µg/mL	Vomiting, tachycardia, seizures
Vancomycin (trough)	10–20 mg/L	Nephrotoxicity, ototoxicity
Gentamicin (trough, once daily)	<1 mg/L	Nephro- and ototoxicity
Valproate	50–100 mg/L	Drowsiness, hyperammonaemia
Carbamazepine	4–12 mg/L	Diplopia, ataxia
Magnesium (pre-eclampsia)	4–7 mEq/L	Loss of reflexes >7; respiratory arrest >10



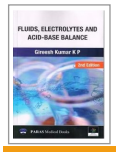
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REFERENCE 4

Abbreviations

Terms used in this book

- **ABG** arterial blood gas
- **ACS** acute coronary syndrome
- **AED** automated external defibrillator
- **AF** atrial fibrillation
- **AKI** acute kidney injury
- **aPTT** activated partial thromboplastin time
- **ARB** angiotensin receptor blocker
- **BD** twice daily
- **BMI** body mass index
- **BP** blood pressure
- **CAUTI** catheter-associated UTI
- **CBC** complete blood count
- **CBI** continuous bladder irrigation
- **CLABSI** central line-associated bloodstream infection
- **COPD** chronic obstructive pulmonary disease
- **CPR** cardiopulmonary resuscitation
- **CrCl** creatinine clearance
- **CVAD** central venous access device
- **CVP** central venous pressure
- **DKA** diabetic ketoacidosis
- **DOAC** direct oral anticoagulant
- **DTR** deep tendon reflex
- **DVT** deep vein thrombosis
- **ECG** electrocardiogram
- **EPS** extrapyramidal symptoms
- **ETT** endotracheal tube
- **FFP** fresh frozen plasma
- **GCS** Glasgow Coma Scale
- **HOB** head of bed
- **HR** heart rate
- **ICP** intracranial pressure
- **ID** intradermal
- **IM** intramuscular
- **INR** international normalised ratio
- **IV** intravenous
- **LFT** liver function tests
- **LMWH** low-molecular-weight heparin
- **LP** lumbar puncture
- **MAP** mean arterial pressure
- **MDI** metered-dose inhaler
- **MI** myocardial infarction
- **NG** nasogastric
- **NMS** neuroleptic malignant syndrome
- **NPO** nil per os (nothing by mouth)
- **NPWT** negative pressure wound therapy
- **NSAID** non-steroidal anti-inflammatory drug
- **NTEP** National TB Elimination Programme
- **OD** once daily
- **PCC** prothrombin complex concentrate
- **PEG** percutaneous endoscopic gastrostomy
- **PPE** personal protective equipment
- **PPH** postpartum haemorrhage
- **PPI** proton pump inhibitor
- **PRN** as required
- **QT** QT interval on ECG
- **ROSC** return of spontaneous circulation
- **RR** respiratory rate
- **SC** subcutaneous
- **SCD** sequential compression device
- **SJS** Stevens–Johnson syndrome
- **SpO_2** oxygen saturation
- **SSRI** selective serotonin reuptake inhibitor
- **TACO** transfusion-associated circulatory overload
- **TDS** three times daily
- **TPN** total parenteral nutrition
- **TURP** transurethral resection of prostate
- **UTI** urinary tract infection
- **VAP** ventilator-associated pneumonia
- **VF / VT** ventricular fibrillation / tachycardia
- **VIP** visual infusion phlebitis score



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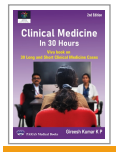
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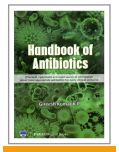
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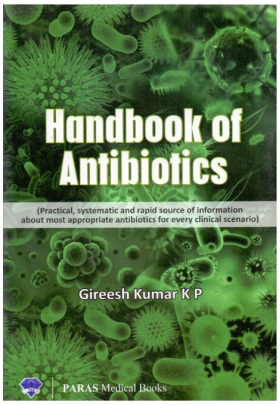


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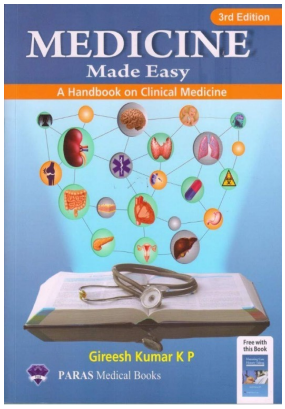
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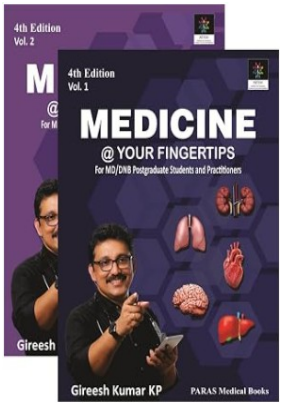
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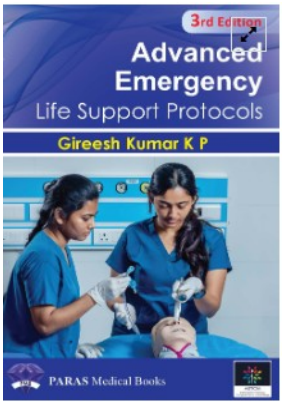
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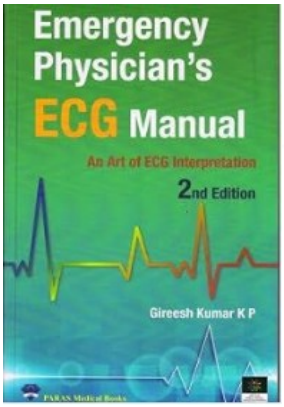
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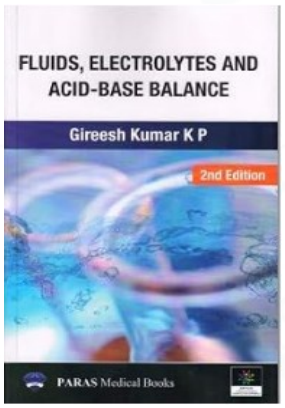
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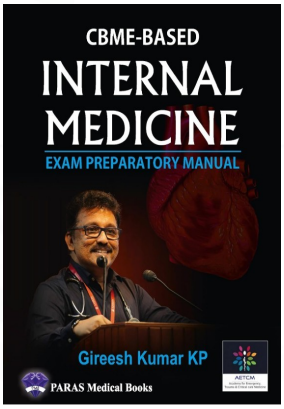
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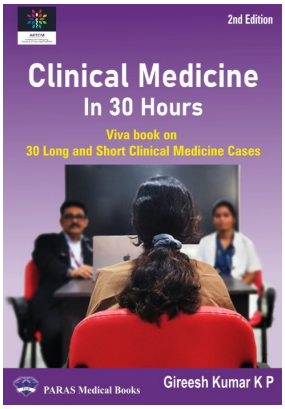
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