PREFACE

Medicine has been an ever evolving yet integral part of human civilization. The enormity and complexity of the subject has made it one of the most challenging but satisfying professions one can chose. As a CRRI , the medical student is on the cusp of becoming a medical professional , a full fledged doctor. The practice of medicine is an art, a discipline and most importantly a passion! As a newly initiated CRRI one hopes you will feel the same way as have many generations of doctors before you who have walked the hallowed halls and corridors of the ---------- Hospital, and one day become a legend in your own right.

As a CRRI one will have the opportunity to work in all the various departments and acquire a taste of what one's forte is, and help you assess which field you will eventually shine in. CRRI stands for "compulsory rotatory residential internship" .The next 1 year will be an integral part of your training and the first step in your life long journey as a doctor.

As a CRRI, you are expected to attend op clinics, manage wards and attain basic skills of each department that you are posted in. Each CRRI is expected to maintain a log book which is proof of his /her work in the department and completion from respected unit chiefs within the stipulated date is mandatory. A Completion certificate will be issued after finishing every posting.

In conclusion, one hopes you will enjoy the roller coaster ride that is internship, with a myriad of emotions and accomplishments; and the words vinivedivici (I came, I saw, I conquered !!) on your lips. All the best!!!

COMPULSORY ROTATORY RESIDENTAL INTERNSHIP

GENERAL OBJECTIVE:

The overall goal of Undergraduate Medical Education Programme is, at the end of the course a medical graduate should possess requisite knowledge skills attitude values and responsiveness. so that he or she function appropriately and effectively as a Physician.

SPECIFIC OBJECTIVES :

At the end of the Internship training the medical graduate should

a) be competent in diagnosis and management of common health problems of the individual and the community

b) understand and promote preventive, promotive, curative palliative and holistic carewith compassion

c) appreciate rationale for different therapeutic modalities be familiar with the administration of essential drugs and common side effect and reporting of these side effects to the Pharmacovigilance center of the institute

d) manage all types of emergencies-medical surgical obstetric neonatal paediatric by rendering primary level care

e) be familiar with basic factors which are essential for the implementation of the National Health Programmes including Practical aspects of the following

- Family Welfare and Maternal and Child Health
- Sanitation and Water Supply
- Prevention and control of communicable and non-communicable diseases
- Immunization
- Health

f) develop leadership qualities to function effectively as a leader and member of the health care team and systemwith capabilities to collest analyze synthesize and communicate health data appropriately

g) be a lifelong learner committed to continuous improvement of skillis and knowledge

h) be a professional who is committed to excellence is ethical responsive and All efforts must be made to equip the medical graduate to acquire the skills detailed in the Appendix.

TIME DISTRIBUTION

COMPULSORYPOSTINGS

a) Community Medicine - 2 months

b) Medicine (including 15 days of Psychiatry) - 2 months

c) Surgery (including 15 days of Anaesthesia) - 2 months

d) Obstetrics &Gynaecology (including PW planning)- 2 months

e) Paediatrics - 1 months

f) Orthopaedics (including PMR) - 1 months

g) Ophthalmology -15 days

h) ENT - 15 days

i) Casualty including CPR - 15 days

ELECTIVE POSTINGS - 15 days

In the following departments

a) Dermatology & Sexually transmitted diseases

b) Psychiatry

c) Tuberculosis & Respiratory diseases

d) Radiodiagnosis

e) Forensic Medicine & Toxicology

f) Blood Bank & Transfusion department

ASSESSMENT OF INTERNSHIP

a) The intern shall maintain a record of work which is to be verified and certified by the medical teacher under whom he works. Apart from scrutiny of the record of work, assessment and evaluation training shall be undertaken by an objectives approach using situation tests in knowledge, skills and attitude , during and at the end of each period of posting. Based on the record of work and periodic assessment, the Dean/Principal shall issue a certificate of satisfactory completion of training, following which the University shall award the MBBS degree or declare him eligible for it. The graduate is then qualified for full registration with the State Medical Council.

b) Satisfactory completion of each posting shall be determined on the basis of the following:

1. Proficiency of knowledge -Score 0 to 10
2. Competency in skills as acquired by -Score 0 to 10
   i. Performing procedure
   ii. Assisting procedure
   iii. Observing procedure
3. Others -Score 0 to 10

i) Responsibility, Punctuality, Initiative

ii) Research aptitude

iii) Capacity to work in a team, behaviour with colleagues, nursing staff and relationship with paramedical staff

iv) Participation in discussions

TOTAL SCORE - 0 to 30

Performance may be graded under each head as follows:

Below Average:	< 5
Average	5 and above
Above Average	7 and above
Excellent	9 to 10

The intern shall be required to have a minimum score of 5 in each of the 3 heads mentioned above, failing which the concerned posting shall be taken as unsatisfactory. Each area of unsatisfactory score shall result in the repetition of the total period of posting of the concerned subject.

CONTENTS

DEPARTMENT OF GENERAL MEDICINE

GUIDELINES FOR CRRI

KEYS FOR A SUCCESSFUL OUTCOME

Before entering an ICU

1. Hand scrub before entering any ICU - do not touch anything after hand scrub.

   Hand wash mandatory after examining each patient - If not possible at least use a hand sanitizer (sterillium/spirit).

2. Appropriate gown/mask/cap/slippers.

A

1. Look at the patient - check the **ALERTNESS**/consciousness of the patient before you proceed any further.
2. Check **AIRWAY** patency - look for tongue fall due to altered sensorium, drowsiness, deteriorating GCS.
3. Rule out over use of sedation in the ICU or in the previous ward/hospital from where the patient has been transferred .
4. If already on ET tube - check the tube depth/placement and size.
5. For an average Indian adult male the tube size of **8 - 8.5** are ideal and fixing at **21-22cms** would be appropriate.
6. For an average Indian adult female the tube size of **7.5 - 8** are idealand fixing at **20-21cms** would be appropriate
7. Always manually secure the ET tube while suctioning.
8. Alarms in the ventilators should be on and should be checked every time by the doctor before turning down.
9. Incase of any alarm from the ventilator, always rule out **DOPE.**

D - Displacement of the tube.

O- Obstruction of the tube-Tube block/patient biting the tube/secretions.

P - Pneumothorax - spontaneous/high PEEP/Pressure control - mode of Ventilation.

E - Equipment failure - consider changing the ventilator.

B

1. Assess the **BREATHING** pattern - look for any subtle signs of distress like use of accessory muscles of respiration, intercostal muscleindrawing, respiratory rate, cyanosis, drowsiness.
2. Decide on NIV (BiPAP/ CPAP) or intubation depending upon the patient status.
3. Whenindoubt always intubate the patient.
4. Check the plethysmography while checking the monitor for saturation and Respiratory Rate or blood pressure.

C

1. **CIRCULATION:**Though the patients in the ICU are in continuous BP monitoring (Invasive or Noninvasive) by the nurses, it is mandatory that the doctors in charge of the ICU should check BP manually during their shifts and during shift change overs.
2. Maintain at least 2 IV lines whenever there is no central line in place.
3. External Jugular Vein (EJV) is a peripheral access which could be easily and quickly gained in patients with difficult peripheral venous cannulation.

4. Central venous access should be obtained whenever possible as most of the patients in the ICU are on hyperosmolar drugs/fluids/inotropes and parenteral nutrition, all of which pose a significant risk in extravasation, swelling and pain if given through peripheral lines.

5. Do not prefer non compressible sites like subclavianvein for central venous accesses in patients with altered coagulation parameters /thrombocytopenia and risk of bleeding. Internal jugular or femoral vein access could be ideal in those situations. In emergency femoral vein access is preferred because it does not interfere with CPR.

6. Prefer the same side for central venous cannulation for those who are diagnosed to have Pneumothorax and / or ICD.

7. Check for thrombophlebitis at the peripheral cannula sites on each shift.

8. Remove any unwanted / non patent lines immediately.

9. Flush all peripheral lines at least twice a day with heparin-saline.

10. In case of Hypotension-rule out hypovolemia before considering inotropic support.

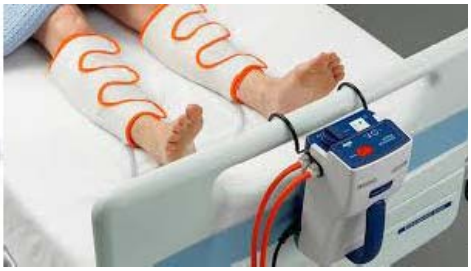
11. **CENTRAL VENOUS PRESSURE** (CVP) monitoring during fluid therapy- Normalrange : 6-10 mmHg.

12. **C**ode BLUE – call for help in emergency.

13. Apply **C**RITERIA wherever possible to assess the staging and prognosis.

D

1. **DVTPROPHYLAXIS** to be considered at the earliest to all the patients in the ICU who are expected to have prolonged stay and to prevent pulmonary embolism
2. Start with Unfractionated heparin 5000U scBDor Low Molecular Weight Heparin -Enoxaparin 0.4ml(40mg) scOD.
3. Mechanical prophylaxis by Compression stockings or Intermittent pneumatic compression pump



E

1. **ELECTROLYTE** checking and correction daily is mandatory for all the critically ill patients as they are treated with fluids/diuretics and many patients with primary pathology in the CNS leading to electrolyte abnormalities.
2. ECG Monitoring is a must for all the patients in the ICU.
3. Any suspected change in the ECG pattern in the monitor should be followed by a 12 lead ECG.

F

IV FLUID FLOW RATE CALCULATION

For routine IV set 1ml =15 drops

For micro drip IV set 1ml =60 drops

$$\text{FlowRate} = \frac{\text{Amount of fluid} \times \text{drops/milliliter}(15)}{\text{Hours to administer} \times \text{minutes/hour}(60)}$$

Example ; 1000ml in 10 hrs

$$\frac{1000 \times 15}{10 \times 60} = \frac{15000}{600} = 25 \text{ drops / minute}$$

CALCULATING DRIP RATES FOR DRUGS

The strength of the drug refers to the dose of drug in each amp/vial e.g.: Dopamine - 200mg, Dobutamine -250 mg, Noradrenaline-4mg

Example : How to start dopamine 10 mcg /kg/min for **60** kg man with 200mg dopamine in 50ml NS infusion?

$$\text{ml/hr} = \frac{\text{mcg/kg/min} \times \text{body weight} \times \text{dilution} \times 60}{\text{strength of the drug} \times 100}$$

$$\text{ml/ hr} = \frac{10 \times 60 \times 50 \times 60}{200 \times 1000} = 9\text{ml/hr}$$

G

1. **GENERAL EYE CARE**-close the eyes when the patients are paralyzed.
2. DO NOT close the eyes with gauze pieces as it would not be possible to know whether the eye lid is completely closed or opened below.
3. Always use methylcellulose (MOISOL) drops before closing the eyes or preferably eye ointment than drops as the action is longer.
4. General mouth care twice a day is a must to prevent infections due to micro aspiration, ventilator associated pneumonia.

5. Back care daily helps in examining for the presence of any development of bedsore and also helps preventing it.

6. Hair band in the ICU patient should be in the center top so that head can be maintained in a neutral position (Vortex).

7. Boxing gloves for combative patients is an effective alternative than restraining the patients, as restraining a patient in altered sensorium increases the risk of aspiration and causes sores in the wrist and ankle region.

8. Stress ulcer prophylaxis is a must for all the patients as there are more chances of stress ulcers and drug induced gastritis leading to UGI bleed.

9. Alpha bed to prevent bed sores should be advised for all the patients who are paralyzed and are not mobile.

10. **G**olden hour for stroke increased from 3 to 4.5hours.

G vitals —ABG/ECG/USG/CBC

1. Arterial Blood Gas (ABG) Analysis in an appropriate situation

2. Electrocardiogram (ECG) -Continuous monitoring is a must.

3. Ultrasonogram (USG) -is also reliable in diagnosing Pneumothorax/pulmonary edema/fluid status and for central venous access.

4. USG guided Central Venous Access in most preferred method now as it offers distinct advantage over blind procedures.

5. Complete Hemogram (CHG) measurement at least once daily in all the patients is mandatory and can be needed in increase frequency andvary with each patient and condition.

H

1. **HEAD END ELEVATION**(20-30°) to prevent micro aspiration or aspiration.

2. **HYDRATION** status of the patient - must be assessed with multiple parameters like urine colour/ urine output per hr/Central venous pressure (CVP) / Blood pressure (BP) / Inferior vena cava (IVC) diameter etc.

3. Do not rely on only one parameter to assess the fluid status.

I

1. **INFECTIONCONTROL**

   Use sterile gloves and proper sterile techniques to avoid iatrogenic infections.

   Hand wash before and after all the procedures.

   Periodical fumigation of the ICU.

   Proper ICU waste disposable systems.

2. **INSULIN**

   Consider insulin infusion in critically ill for glycemic control.

   Blood Glucose to be maintained between 100 to 150 mg/dl

J

1. **J**ust **K**eepthe **L**imbs **M**oving- Try to maintain the patient status as close to the normal natural activities.
2. If the patient can walk / sit - allow him.
3. Encourage and mobilize the patient at the earliest.
4. Chest and limb physiotherapy for all bedridden patients.

N

1. **NUTRITIONAL** support at the earliest.
2. Enteral nutrition is always better than parenteral nutrition.
3. Nutritional supplements whenever necessary and parenteral nutrition for patients for whom the feeds are not getting absorbed.
4. No NPO unnecessarily.

   Required Kcal/day = 30 - 35 Kcal/kg body weight

   - Additional 10 %for thermogenic action of food
   - Additional 10 % if patient with fever
   - Additional 10 % if patient is on ventilator
   - Minus 10% if patient is paralysed

O

1. **OXYGEN** cylinder back up is needed even though the ICU is well equipped withcentral supplies and for shifting the patients.
2. Additional suction unit backups are needed in case of failure of central vacuum.

P

1. **PHYSIOTHERAPY**- Chest and limb physiotherapyis a must for all bedridden patients.
2. **CHEST PHYSIOTHERAPY**byCUPPING or CLAPPING- whenever necessary to improve respiratory efficiency and eliminatesecretions from the respiratory system.
3. **PAPER/PLASTIC GLOVES**are a cheaper alternative for unsterile procedures.

Q

1. **QUICK ACCESS**to emergency kit/tray/trolley.
2. Intubation tray to be kept ready along with difficult intubationkits, short handle scopes, Laryngeal Mask Airway(LMA),various size tubes, elastic bougie.
3. All surgical trays - emergency tracheostomy/ICD to be kept ready.

R

1. **REASSESS** the patient frequently.
2. Repeated hand wash/cleaning with antiseptic hand wash.

S

1. **STERILITY** during all procedures, sterile gloves, hand wash.
2. Hand sanitation by antiseptic solutions before moving on to the next patient.
3. **STOMACH WASH-**contraindicated incorrosives, coma, children, celphos, and paraquat poisoning.

T

1. **TRACHEOSTOMY** at the earliest for those who require prolonged ventilator support and for better tracheal toileting.
2. Temperature control, especially in those with intracranial injury/pathology - tepid sponging/ice packs/drugs.
3. Core temperature to be monitored by a rectal thermometer.

U

URINE OUTPUT monitoring is amount along with and maintaining adequate output (0.5 -2m1/kg/hr).

V

Keep the hub of the **CENTRAL VENOUS LINES** closed and handle the central lines with sterile equipments / hands

W

WATCH - BUT DON'T WAIT - WHEN IN DOUBT INTUBATION is the ideal option.

X

1. Once daily **X-RAY** for all intubated patients in the ICU.

2. ET tube position should be confirmed and readjusted if necessary.
3. Normal ET tip opposite to T3-T4 Vertebra.

Y

1. **YOUR VALUABLE COUNSELING**is necessary at least once in a day with the patient's relatives.
2. Counseling / explanations about the possible poor prognosis should not be near the bed side of the patient. You cannot assume that the patient might not hear you.

Z

ZIG ZAG PRACTICEshould be avoided at time of emergency and teach adequate skills necessary like CPR training/Defibrillation training/Intubation training with mannequins.

POISONING AND TOXICOLOGY

GASTRIC LAVAGE (STOMACH WASH)

Indications

- Gastric lavage is recommended for most of the toxin ingestion at life threatening doses.
- Peak effect is when administered at the earliest, preferably within 1-2 hours of toxin ingestion.
- It may be effective even after 2 hours post toxin ingestion in case of delayed gastric emptying and sustained release tablets.
- Solutions for gastric lavage include
    - 25% Sodium thiosulfate for cyanide poisoning
    - Calcium gluconate for oxalate poisoning
    - Coconut oil 200ml followed by sodium bicarbonate 4-5 ampoules for aluminium phosphide poisoning.

Contraindications

Absolute Contraindications:

- An unprotected airway in patients with decreased level of consciousness, obtunded or convulsing patients. So first intubate (protect the airway) and do gastric lavage.
- Clinically significant gastrointestinal hemorrhage.
- Gastrointestinal perforation due to pathology, recent surgery or present medical state.
- Ingestion of corrosive agents (acid or alkali).

- Ingestion of petroleum distillates.
- Ingestion of sharp substances or any other foreign body.
- Use of water for gastric lavage should be avoided in aluminium Phosphide poisoning.
- Marked hypothermia.

Relative Contraindications:

- Hemorrhagic diathesis.
- Advanced pregnancy

ACTIVATED CHARCOAL

It is an expandable, absorbing powder. It absorbs the poisoning material in the gut and facilitates excretion.

Indications

- Peak effect when administrated at the earliest, preferably within an hour of toxin ingestion.

Adsorption by Activated Charcoal	Drugs and Toxins
Well Adsorbed	Large quantity ingestion of Amphetamines, Antidepressants, Antiepileptics, Antihistamines, Atropine, Barbiturates, Benzodiazepines, Beta Blockers, Carbamates, Chloroquine, Dapsone, Digitalis, NSAIDs, Opioids, Organophosphates, Phenothiazines, Quinine, Strychnine, Tetracycline and Theophylline.
Moderately Adsorbed	Anti-diabetic Agents, Paracetamol, Phenol and Salicylates
Not Adsorbed	Mnemonic **CHARCOAL** **C**- Corrosives (Acid and Alkali), **H**-Heavy Metals, Hydrocarbons, **A**-Alcohols, **R**-Rapid onset-Cyanide,**C**-Chlorine,**O**-Others(Iron), **A**-Aliphatic hydrocarbon,**L**- Lithium

Dosing Regimen for Activated Charcoal

- 1 gm/kg body weight (usually 50-100g in an adult)
- After gastric lavage, activated charcoal mix with 4 -8 times the quantity of water, make a stirring and administer through ryles tube.

MULTI - DOSE ACTIVATED CHARCOAL (MDAC)

Indications

- Peak effect when administrated at the earliest, preferably within an hour of toxin ingestion.

Drugs and Toxins Eliminated by Multi -Dose Activated Charcoal
Amitriptyline, Benzodiazepines, Carbamazepine, Dapsone, Dextropropoxyphene, Digitoxin, Digoxin, Disopyramide, Glutethimide, Nadolol, Piroxicam, Phenobarbitone, Phenylbuazone, Plant poisoning,Salicylates, Sotalol, Theophylline and Quinine

Dosing Regimen for Multi- Dose Activated Charcoal

- Activated charcoal 30 gm (0.5 gm/kg) every 8 hours for 24 – 48 hours.

CONTRAINDICATIONS FOR

ACTIVATED CHARCOAL

Absolute Contraindications:

- Clinically significant gastrointestinal hemorrhage.
- Gastrointestinal perforation due to pathology, recent surgery or present medical state.
- Small bowel obstruction
- Ingestion of corrosive agents (acid or alkali)
- Ingestion of petroleum distillates.
- Activated charcoal with sorbitol or mannitol should not be administered to young children or elderly because of the tendency to cause fluid and electrolyte imbalance.
- Abdominal distension.

Relative Contraindications:

- Decreased peristalsis associated with opioid or anti-cholinergic overdose.
- Proven ileus.
- Absence of bowel sounds.

WHOLE BOWEL IRRIGATION

Whole bowel irrigation is a gut decontamination procedure and it is a rapid method to empty the gut in 4- 6 hours.

Indications

Whole Bowel Irrigation-Very Effective (Enhanced Elimination) in
Large quantity ingestion of Carbamates, Heavy Metals, Iron, Lithium, Organophosphates and Potassium.
Ingestion of large quantity toxic drugs in patients presenting late (more than 2 hours post ingestion)
Overdose of sustained release or enteric coated drugs like Aspirin, Diltiazem, Theophylline, Valproic acid, Verapamil and other dangerous drugs.
Ingestion of foreign bodies like cocaine filled packets or condoms (Body stuffers), button cells and paint chips.

Dosing Regimen

- Whole bowel irrigation is done using special lavage solutions like PEG-ELS (Polyerthylene glycol and electrolyte lavage solution).
- Adolescents and adults: 2 litre/hour administer through mouth or nasogastric tube

CONTRAINDICATIONS

Absolute Contraindications:

- Clinically significant gastrointestinal hemorrhage.
- Gastrointestinal perforation due to pathology, recent surgery or present medical state.
- Small bowel obstruction.
- Abdominal distension.

Relative Contraindications:

- Decreased peristalsis associated with opioid or anti-cholinergic overdose.
- Proven ileus.
- Hemodynamically unstable patients.
- Uncontrollable intractable vomiting.

FORCED ALKALINE DIURESIS(FAD)

Urine Alkalinization is the administration of intravenous sodium bicarbonate to maintain a urine pH > 7.5 for enhancing toxin elimination.

Indications

Very Effective	SUPERVASMOL- 33 (Hair dye), Phenobarbital, Salicylates,Lithium,Chlorpropamide,2,4dichlorophenoxyaceti c acid, Fluorides and Methotrexate

FAD Method;

500 ml of NS over 1 hour

↓

followed by
400 ml of 5% Dextrose with 100 ml of sodium bicarbonate over 1hour

↓

followed by
500 ml NS with 10 meq of Kcl over 1 hour

↓

If Urine Output < 100 ml / hr-Give Inj.LASIX20mgiv

If Urine Output is not increasing -Give another dose of Inj.LASIX20mg iv

If Urine Output < 100 ml / hr – **Stop FAD- Plan for hemodialysis**

If Urine Output>100 ml / hr – **Continue FAD**

- **On DAY-1:** 8 cycles over 24 hours
- **On DAY-2:**6 cycles -continue **FAD** till clear urine
- In association with Rhabdomyolysis reduce the dose of KCL from 10meq to 5meq

CONTRAINDICATIONS

Absolute Contraindications:

- Established or early renal failure.

Relative Contraindications:

- Significant pre-existing heart disease.

Complications

- Severe alkalosis.
- Hypokalemia.
- Hypocalcemia.

GENERAL MANAGEMENT IN POISONS

./ **ABC**

Airway & Breathing

- Intubate when low GCS (8 or <8), signs of upper airway edema or hemodynamic instability.
- Elective intubation in case of hair dye poisoning and endosulphan

Circulation

- ECHO and Inferior Vena Cava (IVC) diameter guided fluid therapy and vasopressors
- Refractory hypotension – Glucose Insulin Potassium (GIK) regimen and Intra-aortic balloon pump (IABP)

./ Gather information

./ Decontamination – Skin / Eye / Gut

./ Prevention of re exposure

./ Antidotes

./ Standardized ICU care which includes DVT prophylaxis, stress ulcer prophylaxis, nutritional supplementation, infection control and other supportive care.

History

- Circumstances of consumption of poison
- Mental illness / Suicidal attempts
- Reason for overdose
  - Recreational
  - Self harm
  - Depression

Investigations

- Do
  - ABG
  - CBC
  - ECG
  - USG
- RFT, LFT, Electrolytes

Disposition

- Never discharge without Psychiatric counseling
- Treat the patient & not just the poison alone

GENERAL MANAGEMENT OF PLANT POISONS

./**ABC**

AB

- Intubate when the patient is having low GCS, signs of upper airway edema or hemodynamic instability

C

- ECHO and IVC diameter guided fluid therapy and Vasopressors

./Multi Dose Activated charcoal

./N acetyl cysteine (NAC) if suspected of Multi Organ Dysfunction Syndrome (MODS)

- NAC dosage 140 mg/kg over 1 hour followed by 70 mg/kg every 4 hours up to 72 hours

<u>If cardio toxic</u>

Bradycardia:
Refer oleander seed poisoning

Toxic myocarditis:
Vasopressors, GIK,IABP

<u>If Coagulation abnormality present</u>

Fresh frozen plasma
Vitamin K

<u>Suspected to cause MODS</u>

N acetyl cysteine and appropriate supportive care

In Acute kidney injury or metabolic acidosis or hyperkalemia

Initiate Hemodialysis/ Continuous Renal Replacement Therapy(CRRT)

MANAGEMENT OF OLEANDER SEED POISONING

History of Ingestion of oleander seed

ABC-Airway, Breathing, Circulation care
Gastric lavage
Multidose activated charcoal× 72 hours

MONITOR

HEART RATE
ECG
S.POTASSIUM
ABG

Bradycardia, and Heart Blocks

Initially atropine to be given

If ineffective,
Dopamine Infusion (up to 20 mcg /kg/min)
or
Epinephrine infusion (2-10 mcg/min)
or
Transcutaneous pacing

(Refer page no:49)

Tachyarrhythmia

Membrane stabilizing agent

Lignocaine
Magnesium sulphate may be beneficial

~~If Hyperkalemia~~

Glucose Insulin (25% dextrose 100 ml with 10 units of regular insulin over 30 minutes)

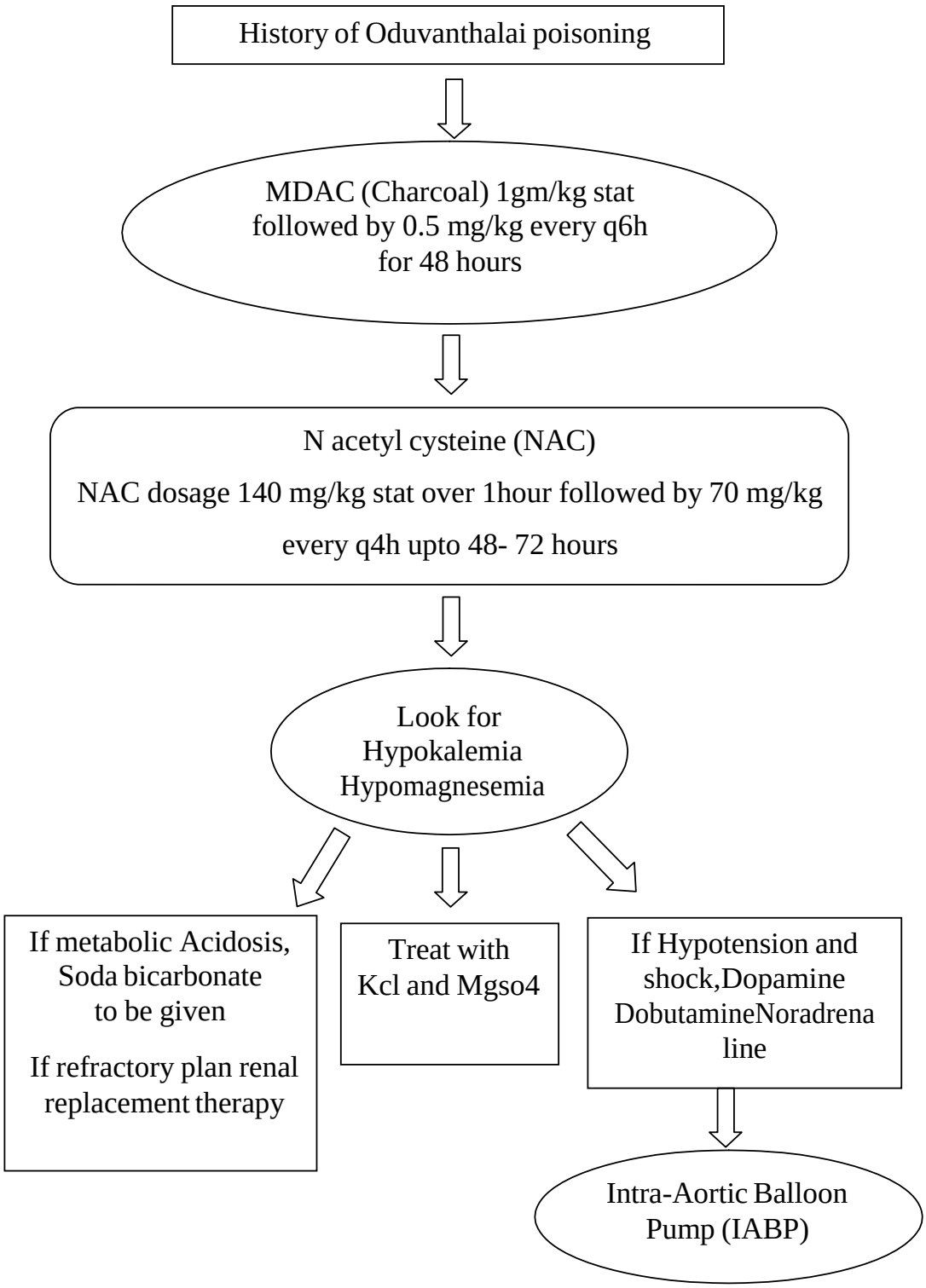
Salbutamol nebulization
Lasix
Soda bicarbonate

Renal replacement therapy
No calcium gluconate

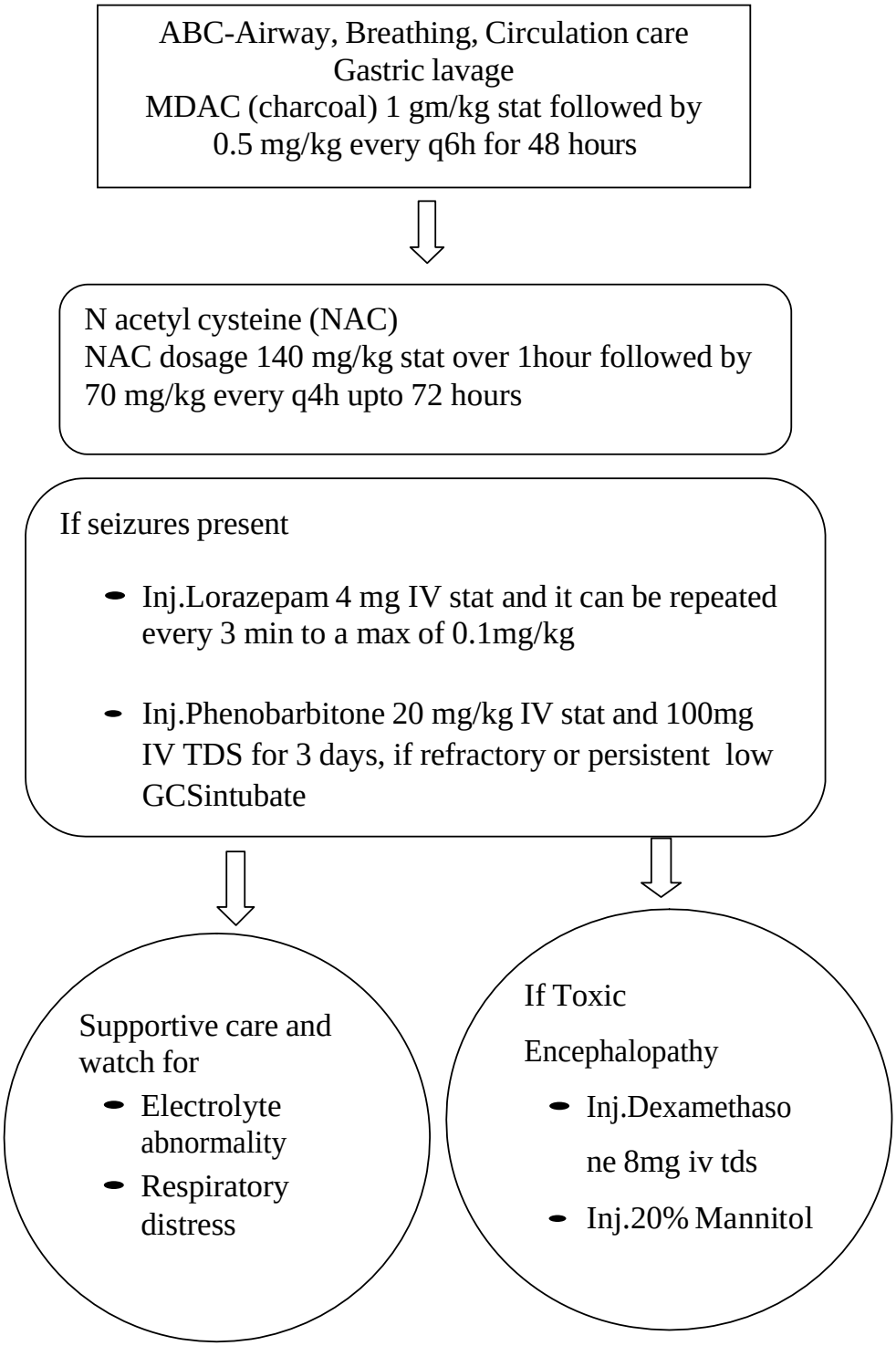
(Refer page no: 89)

MANAGEMENT OF ODUVANTHALAI

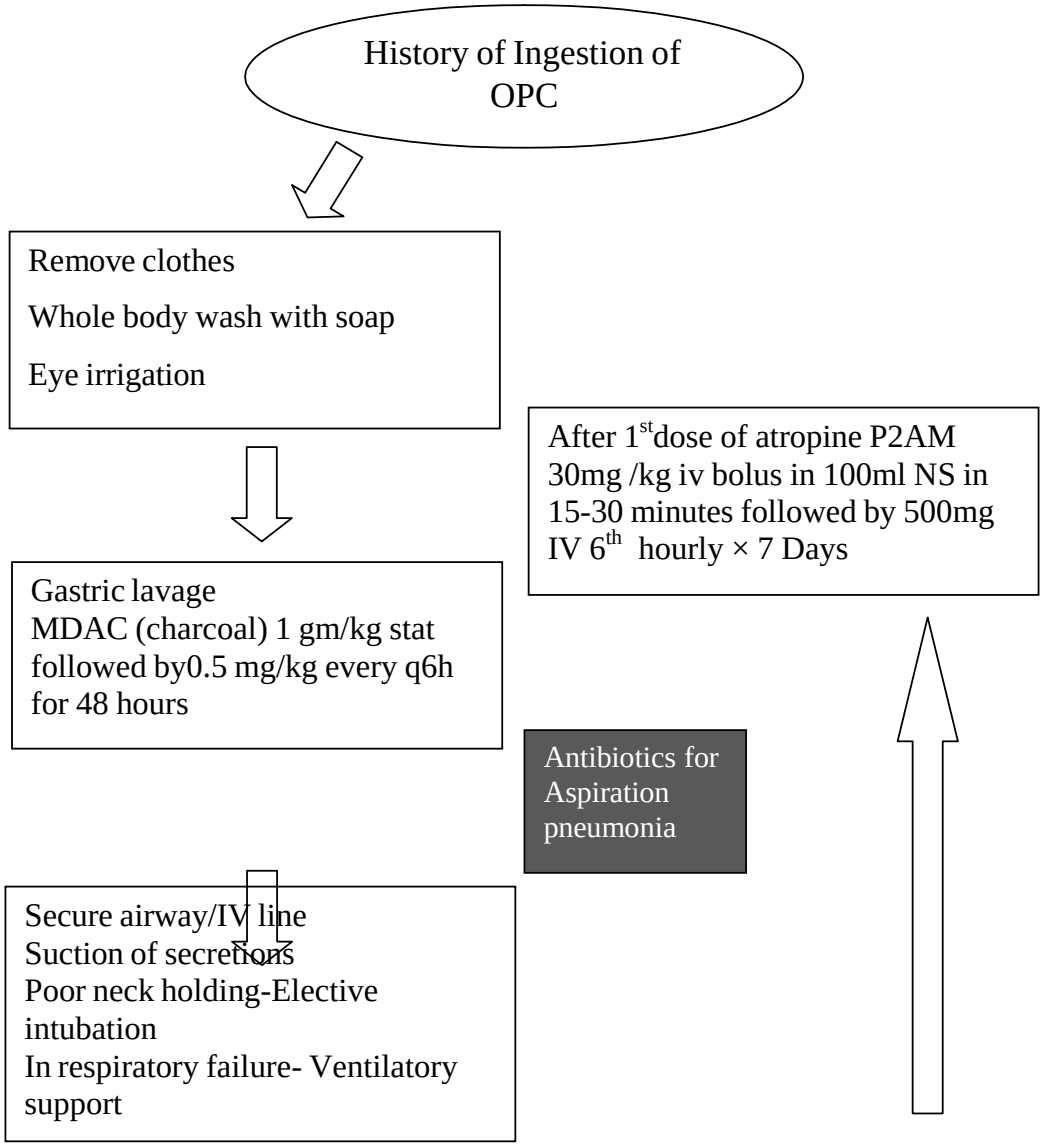
(CLIESTANTUS COLLINUS) POISONING

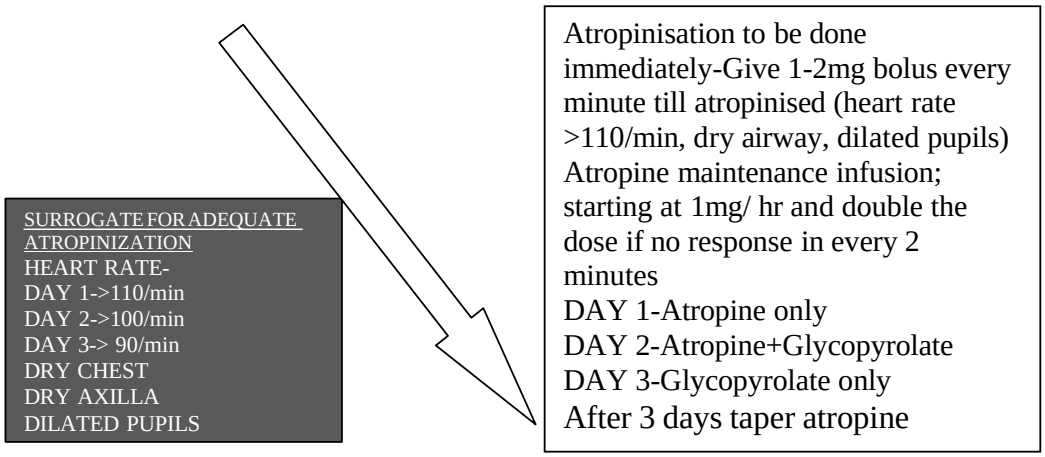


MANAGEMENT OF YELLOW COLOURING POWDER POISONING



MANAGEMENT OF ORGANOPHOSPHORUS POISONING




SURROGATE FOR ADEQUATE ATROPINIZATION
HEART RATE-
DAY 1->110/min
DAY 2->100/min
DAY 3-> 90/min
DRY CHEST
DRY AXILLA
DILATED PUPILS
Atropinisation to be done immediately-Give 1-2mg bolus every minute till atropinised (heart rate >110/min, dry airway, dilated pupils)
Atropine maintenance infusion; starting at 1mg/ hr and double the dose if no response in every 2 minutes
DAY 1-Atropine only
DAY 2-Atropine+Glycopyrolate
DAY 3-Glycopyrolate only
After 3 days taper atropine

PERADENIYA ORGANOPHOSPHOROUS POISONING (POP)

	Clinical criteria	Score
Pupil Size	>2 mm	0
	< 2 mm	1
	Pin – Point	2
Respiratory rate	<20/min	0
	>20/min	1
	>20/min with central cyanosis	2
Heart Rate	>60/min	0
	41-60/min	1
	<40/min	2
Fasciculations	None	0
	Present, generalized or continuous	1
	Both, generalized and continuous	2
Level of consciousness	Conscious and rationale	0
	Impaired response to verbal commands	1
	No response to verbal commands	2
Seizures	Absent	0
	Present	1

POP SCALE to be assessed at the time of admission for its severity

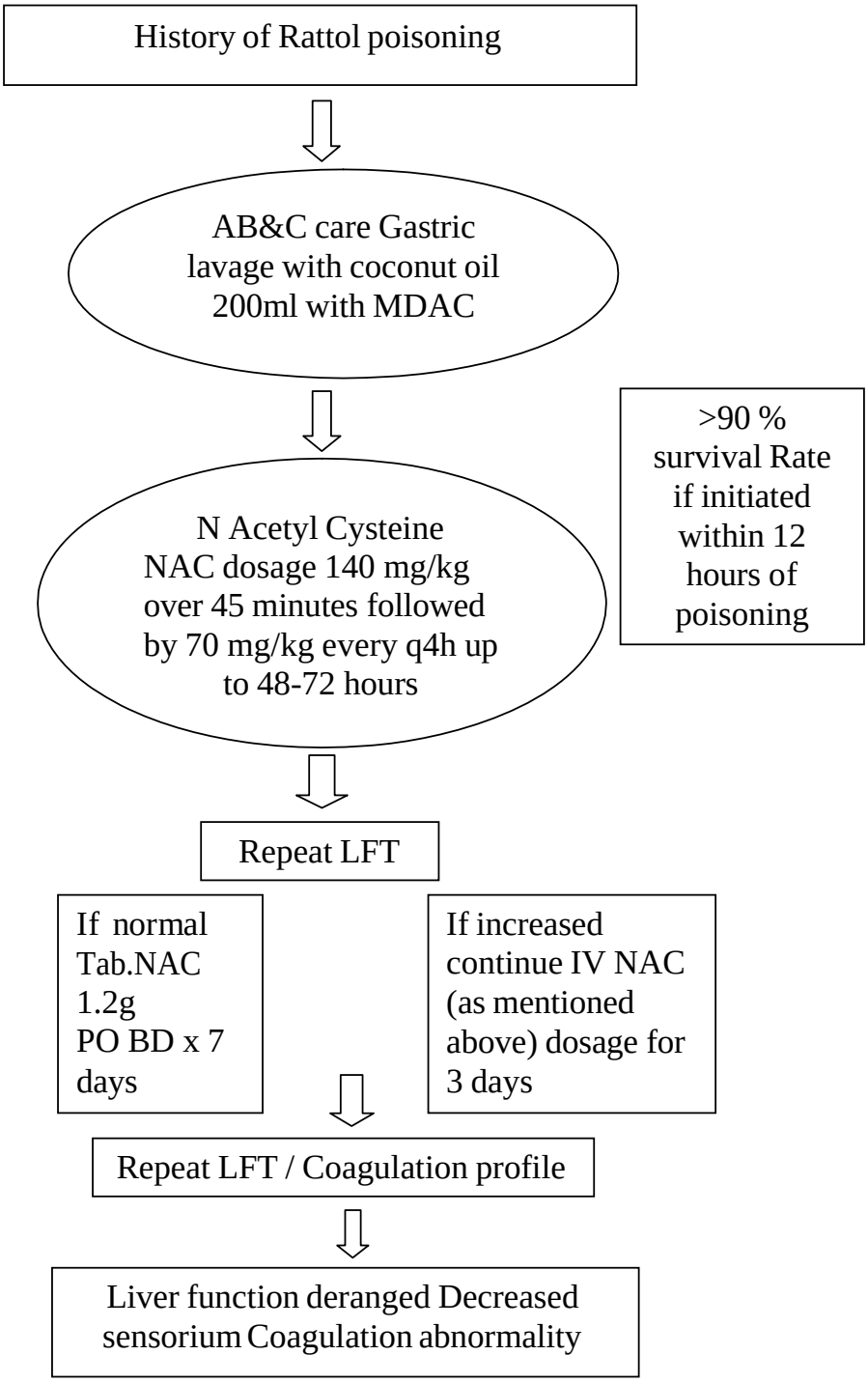
If score **0-3** - Mild poisoning

4-7 - Moderate poisoning

8-11- Severe poisoning

MANAGEMENT OFRATTOL POISONING

(YELLOW PHOSPHOROUS)



FFP / Vitamin K

Plan for Liver Transplantation

MANAGEMENT OF HAIR DYE (SUPER VASMOL) POISONING

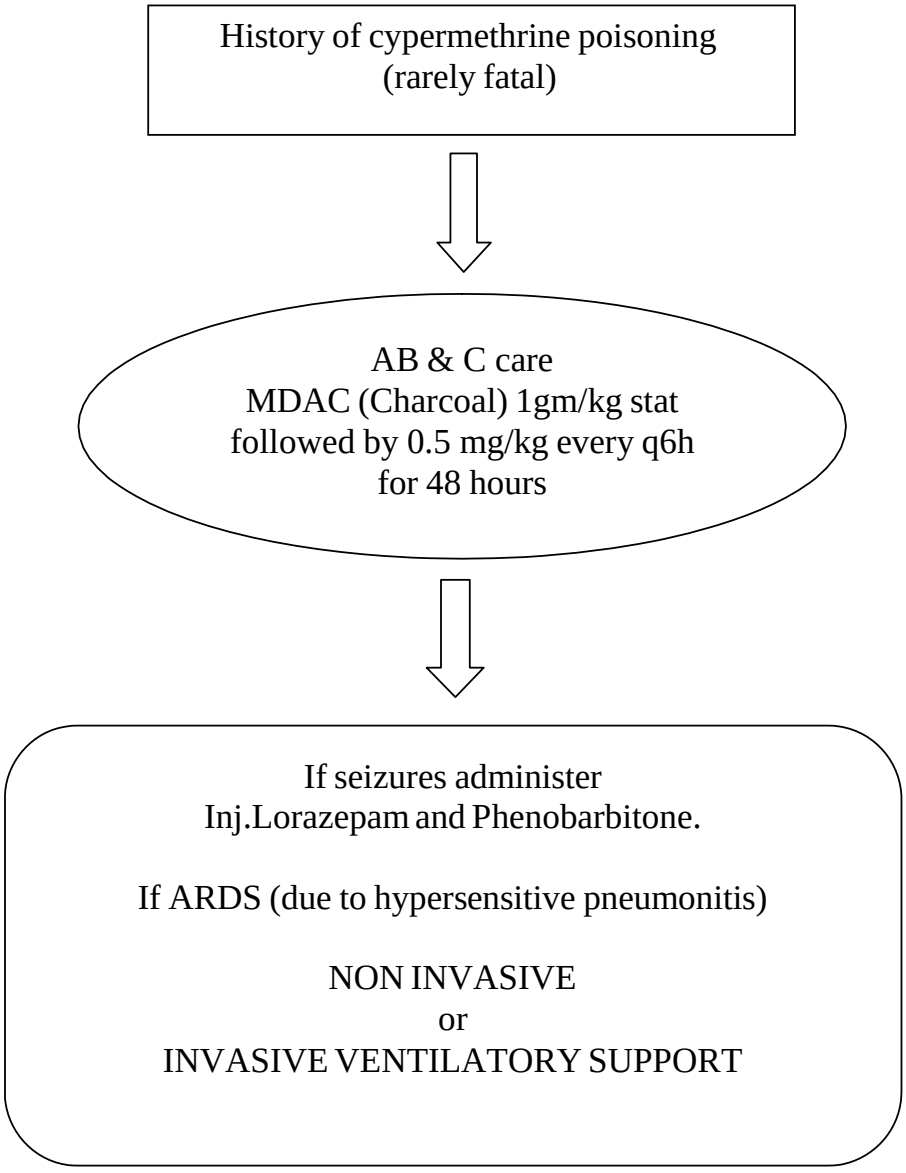
CLINICAL MANIFESTATIONS

- Angio-neurotic edema-cervico facial edema with stridor.
- Rhabdomyolysis
- Acute renal failure

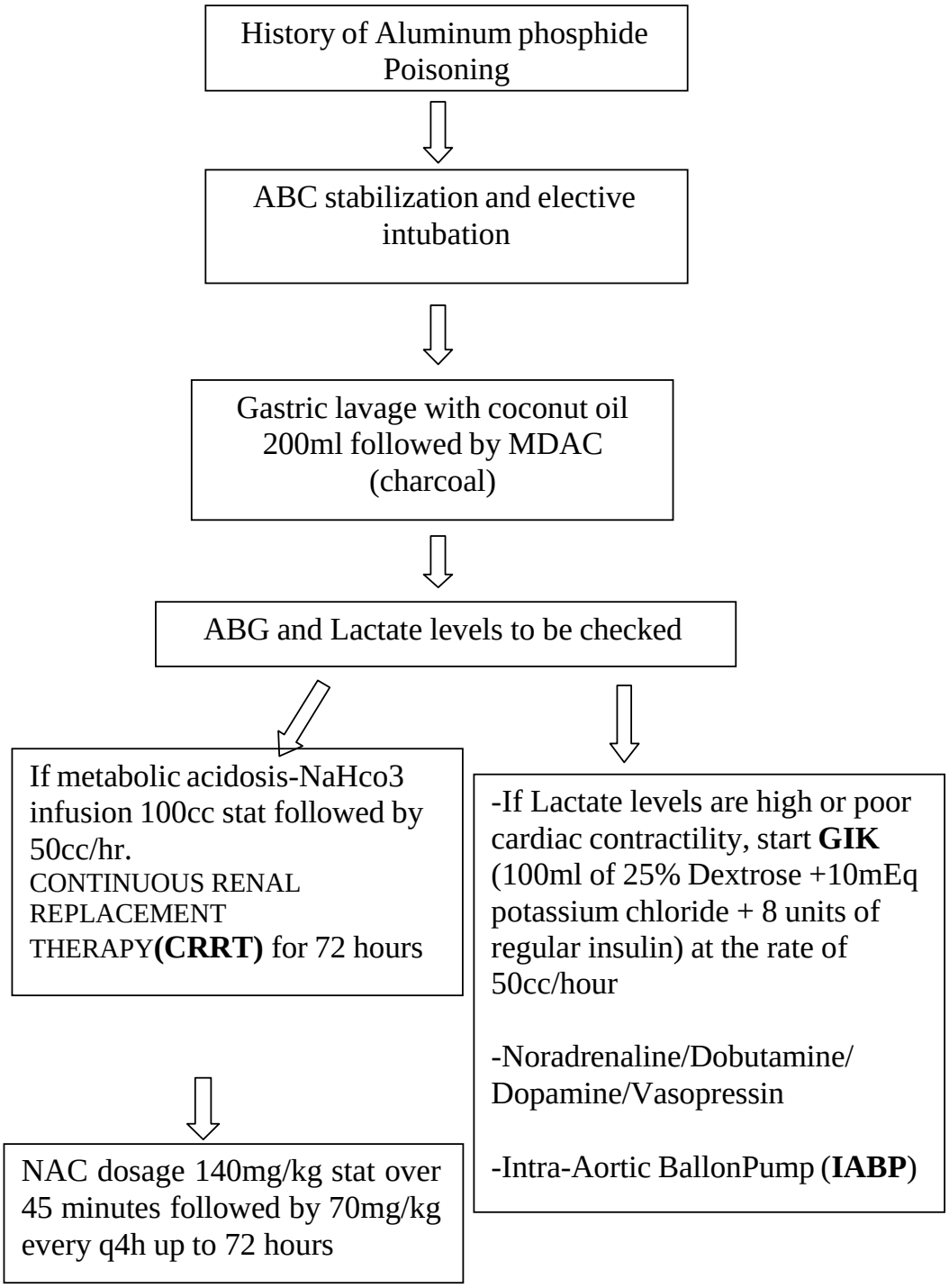
TREATMENT

1) Elective intubation
2) For angio-neurotic edema-cervico facial edema with stridor - Emergency tracheostomy
3) For Anaphylaxis- Refer page no: 56
4) **Forced Alkaline Diuresis**- Refer page no: 19

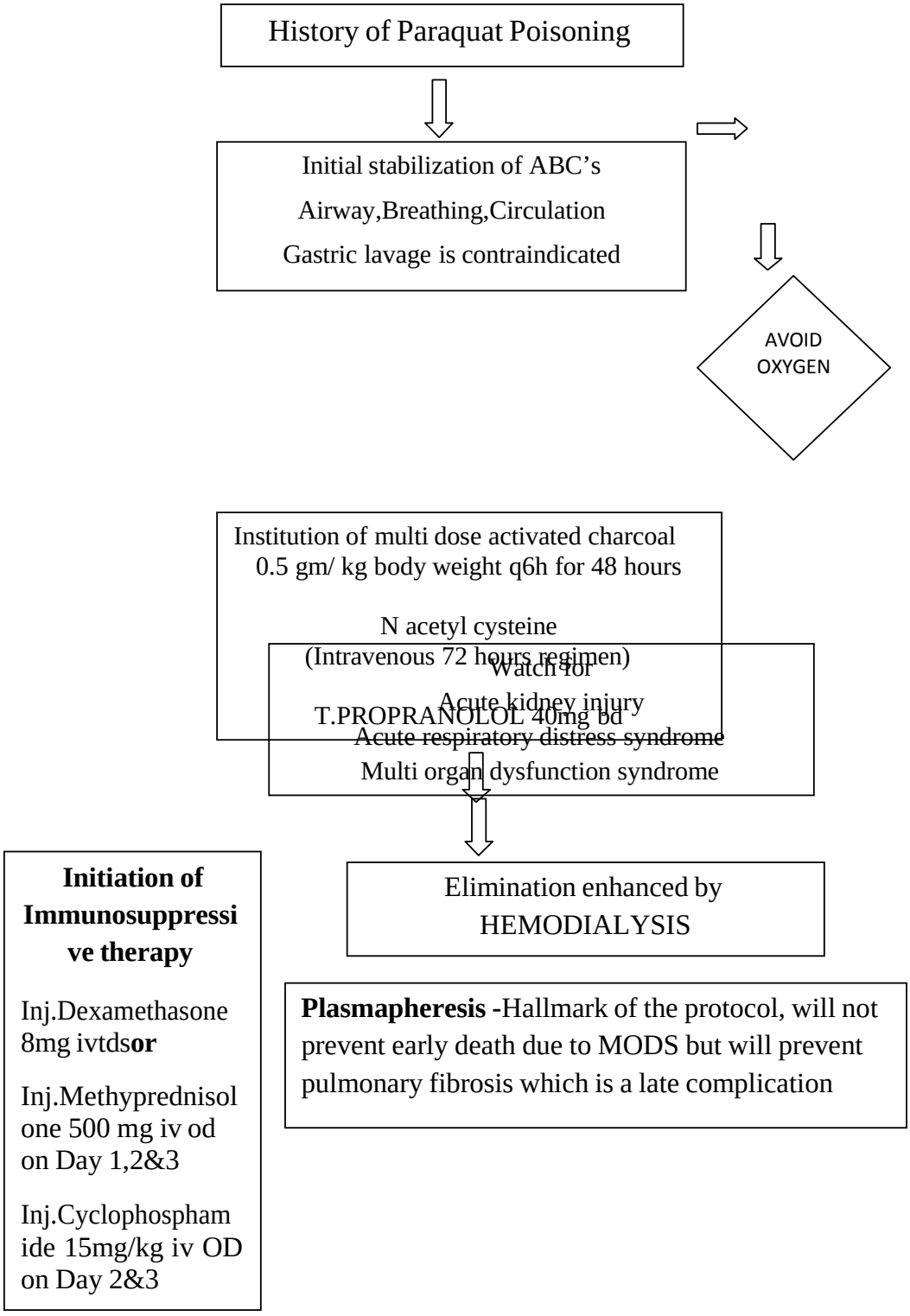
MANAGEMENT OF CYPERMETHRINE POISONING



MANAGEMENT OF ALUMINUM PHOSPHIDE (CELPHOS) POISONING

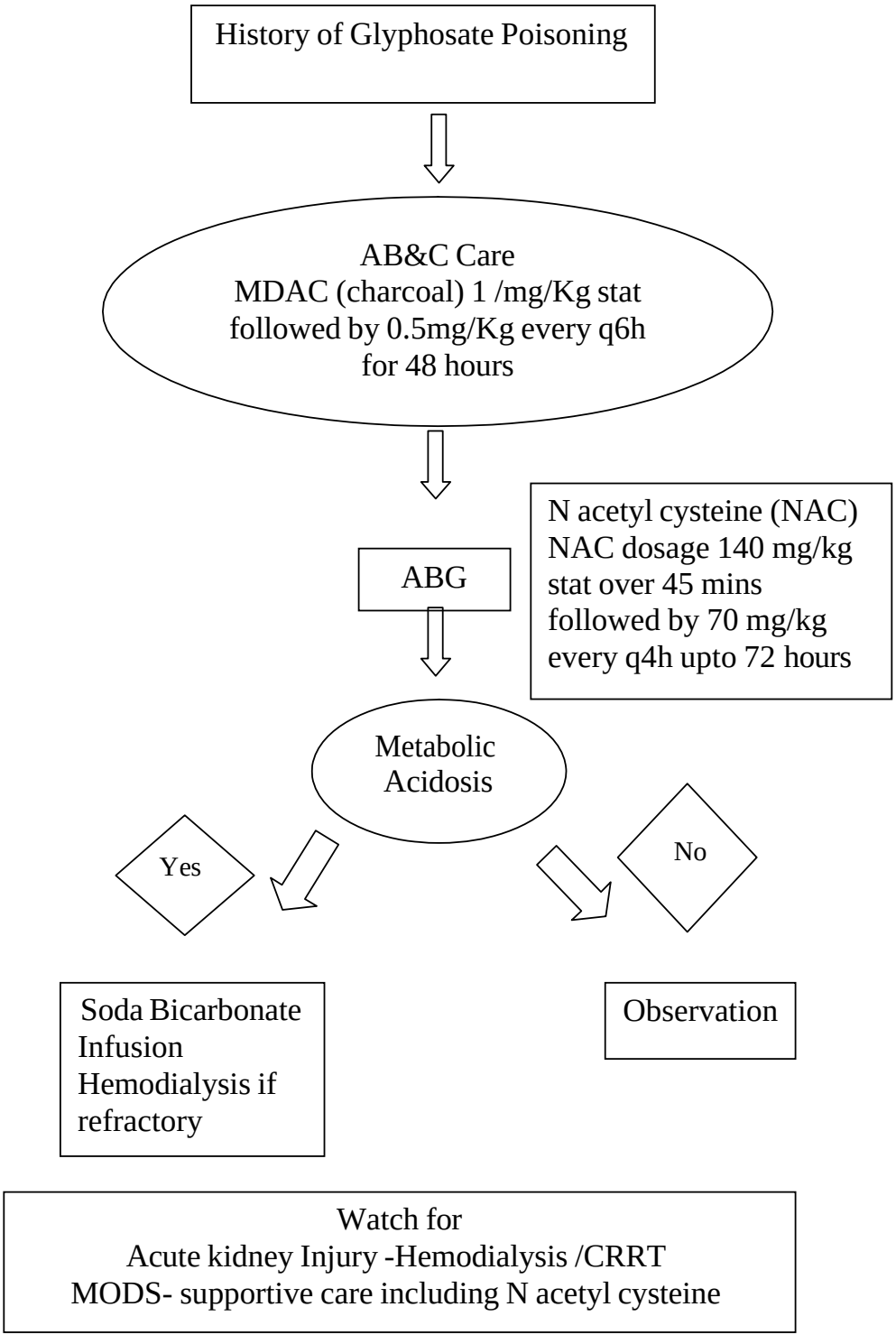


MANAGEMENT OF PARAQUAT POISONING

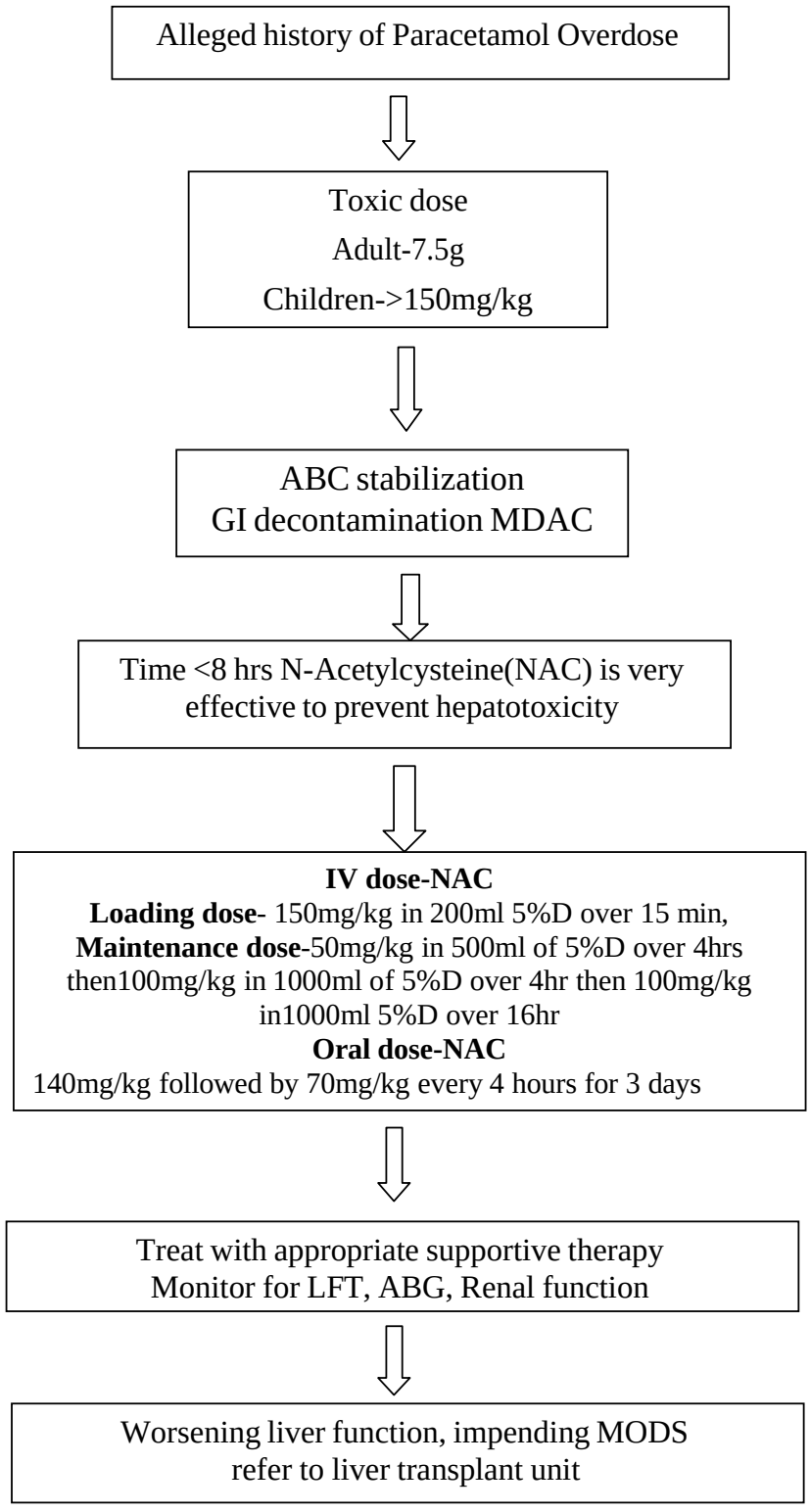


OUTCOME:70-80% MORTALITY	Maintain Immunosuppressive therapy: Inj.Hydrocortisone/Tab.Prednisolone for at least one month or until symptom free

MANAGEMENT OF GLYPHOSATE POISONING



MANAGEMENT OF PARACETAMOL OVERDOSE



BETA BLOCKER OVERDOSE

Alleged history of Beta blocker overdose

Cardiovascular symptoms	CNS symptoms
Hypotension Bradycardia Conduction delays &blocks Ventricular dysrhythmia's	Depressed mental status Coma Psychosis Seizures

Treatment

- ABC's & Decontamination with MDAC
- Hypotension

Intravenous fluids

Adrenergic receptor agonists -

Noradrenaline , Dopamine , Epinephrine & Isoproterenol

- Glucagon

1.5 to 0.15 mg/kg stat

If beneficial , infusion (1 to 10 mg/h) to be initiated

- HyperinsulinemiaEuglycemia therapy (HIET)

1 U/kg IV stat followed by 0.5 U/kg/h infusion

Glucose 0.5 gm/kg bolus , if Blood glucose < 400 mg/dl

Potassium supplementation if needed

Calcium – Recommended (not routinely) in refractory shock

- Calcium gluconate (10%) 0.6 ml / kg IV stat followed by 1.6 to 1.5 ml / kg / hr
- Calcium chloride (10%) 0.2 ml / kg IV stat followed by 0.2 to 0.5 ml / kg / hr Calcium chloride (10%) 0.2 ml / kg IV stat followed by 0.2 to 0.5 ml / kg / hr

- Bradycardia

Atropine (0.5 to 1 mg Q 3 – 5 mins)

Dopamine and epinephrine infusion

Pacing (Transcutaneous / Transvenous)

Sodium Bicarbonate - Recommended in wide QRS interval dysrhythmia's and severe acidosis

- Hypoglycemia

Intravenous Dextrose

- Seizures

Benzodiazepines - lorazepam stat or midazolam infusion

CALCIUM CHANNEL BLOCKER (CCB) OVERDOSE

Alleged history of calcium channel blocker overdose

Symptoms

Hypotension

Bradyarrhythmia's

Conduction blocks

Cardiogenic pulmonary edema

Seizures, Delirium, Coma secondary to cerebral hypoperfusion

Treatment

\+ ABC'S

Early airway management recommended

\+ Decontamination

MDAC (Multiple dose activated charcoal)

Whole bowel irrigation (PEGLEC) in overdose of sustained release CCB overdose

\+ Hypotension

IVC diameter guided fluids (Avoid overaggressive fluids)

Adrenergic receptor agoinst (guided by bedside Echo) –

Noradrenaline, Dopamine,Epinephrine & Isoproterenol

\+ Glucagon - 0.05 to 0.15 mg/kg stat and if beneficial, infusion (1 to 10 mg/h) to be initiated

+ Hyperinsulinemia Euglycemia therapy (HIET)

1 U/kg IV stat followed by 0.5 U/kg/h infusion

Glucose 0.5 gm/kg bolus, if Blood glucose < 400 mg/dl

Potassium supplementation as needed

+ Bradycardia-Atropine (0.5 to 1mg Q 3-5 mins), ineffective if given alone

Intravenous Calcium salts

Calcium gluconate (10%) 0.6ml/kg stat followed by 0.6 to 1.5 ml/kg/hr

or

Calcium chloride (10%) 0.2ml/kg stat followed by 0.2 to 0.5 ml/kg/hr

Dopamine and epinephrine infusion

Pacing (Transcutaneous / Transvenous)

+ Seizures-Benzodiazepines

+ Hypoglycemia – IV Dextrose

+ Extra corporeal life support

ARRHYTHMIA'S IN POISONING

ABC's stabilization
Rule out common causes (6Hs & 5 Ts) "first"
Treat the etiology and not only the rhythm
Management differ from routine

6 H's
Hypoxia
Hypovolemia
Hydrogen lon (Acidosis)
Hypokalemia
Hyperkalemia
Hypothermia

5T's :
Toxins
Tamponade (cardiac)
Tension Pneumothorax
Thrombosis (coronary and pulmonary)
Trauma

TACHYARRHYTHMIA'S

TCA Overdose induced VT

- NaHco3 infusion & MgSo4 infusion very useful
- Lignocaine infusion may be useful
- Amiodarone may HARM

Anti psychotic induced Torsades de pointes

- Defibrillation
- MgSo4
- NaHCo3
- Overdrive pacing

OPC induced Tachycardia

- Presynaptic excitation may respond to Labetolol
- Do not forget to rule out the common causes of Hypoxia, Hypercarbia, Hypovolemia, Agitation, Pain, Sepsis and Toxic myocarditis
- Delayed onset of tachycardia – suspect Intermediate Syndrome CO_2 Narcosis Rx the Cause.

Aluminium Phosphide (Celphos) or Oduvanthalai induced Tachycardia

- Toxic Myocarditis results in various Tachyarrhthymia's or Bradyarrhythmia
- Rx the cause with GIK, NaHco3, IABP & CRRT

BRADYARRHYTHMIA'S

OPC induced Bradycardia

- Atropine (ACLS dose of 3 mg is not enough)

Beta Blocker & CCB overdose induced Brady arrhythmia

- ACLS Algorithm
- Glucagon
- Beta Agonists
- Insulin - HyperinsulinemiaEuglycemia Therapy (HIET)
- Calcium Chloride
- PDE Inhibitors- Milrinoine, Inamrinone

Oleander seed induced Bradyarrhythmia

- Algorithm
- Antidote - Digibind / Digifab
- Hyperkalemia Beta Agonists, NaHco3, Insulin

If Refractory, CRRT to be initiated

No Calcium gluconate in oleander seed poisoning & digoxin over dose

MANAGEMENT OF ACID OR ALKALI POISONING

The following measures are contraindicated;

Induction of vomiting

Stomach wash

Activated charcoal

Ryles tube insertion

Oral feeds

Antacids

Endotracheal intubation

- Eye injury -irrigate for atleast 15 to 30 minutes with normal saline
- Give IV fluids
- High dose Inj. Pantoprazole 80mg ivstat followed by 160mg of pantoprazole in 100ml NS, infusion rate- 20ml/hourupto 48-72hours
- Inj. Metoclopramide 1ampoule iv bd
- Inj. Hydrocortisone 100mg iv bd (to prevent stricture,laryngeal edema) (controversial)
- If respiratory distress due to laryngeal edema give 100 % oxygen and plan for cricothyroidotomy
- Antibiotic coverage/ for pain opiod analgesics
- Systemic acidosis-NaHco3 as a bridging---CRRT
- Do OGD SCOPY with in 24hrs to assess the degree of necrosis

GRADE I- start oral feeds in day1

GRADE II- start oral feeds after 2-3 days

GRADE III –feeding jejunostomy

- If perforation or peritonitis-Do chest x ray PA view (check air under diaphragm)and USG Abdomen-plan emergency laparotomy

GLUCOSE 25% D + INSULIN R + POTASSIUM CHLORIDE (GIK REGIMEN)

Indications:

- Cardiac toxicity-drugs(Calcium Channel Blockers/Beta Blockers)with hypotension, LV dysfunction
- Cardiac toxicity poisoning (zinc/aluminiumphosphide) with hypotension, LVdysfunction
- Hyperglycemia

Contra-indications:

- Non-cardiac drug toxicity
- Normal LV function

Adverse effects:

- Hypoglycemia
- Hypokalemia
- Hypomagnesemia

Dosage/administrations:

- 100 ml of 25% Dextrose + 10 mEq potassium chloride + 8 units of regular insulin at the rate of 50 cc/hr.

Special precaution:

- Glucose & insulin administration through center line
- Check-Blood glucose every 1hr
- Maintain blood glucose- 100-250 mg/dl
- Check- potassium,magnesium every 4hr
- ECHO for every 2-4 hrs

N ACETYL CYSTEINE DOSAGE

INDICATIONS

- Yellow phosphorus (rat killer - rattol) poisoning
- Aluminium phosphide poisoning
- Yellow /green colouring agent poisoning
- Paracetamol poisoning
- Toxin induced liver and kidney injury
- Contrast induced nephropathy

INTRAVENOUS DOSAGE

- Loading Dose- 140 mg / kg in 200 ml of 5% Dextrose over 1 hour IV.
- Followed by Infusion at 70 mg / kg in 500 ml of 5% Dextrose over 45 minutes,

Every 4 hours upto 48- 72 hours.

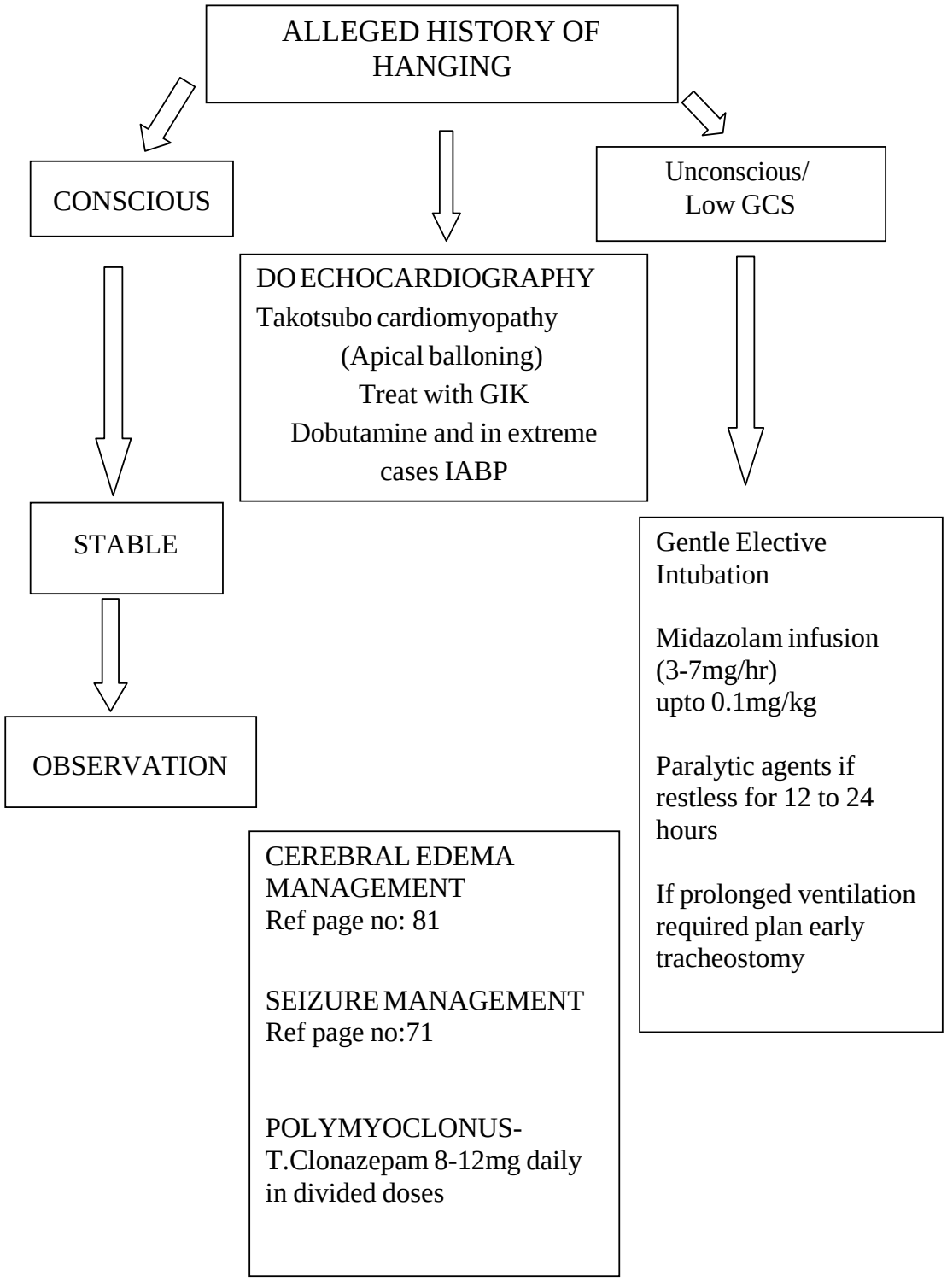
ORAL DOSE

- Loading dose 140 mg / kg, followed after 4 hours by 70 mg/ kg every 4 hours diluted with juice or soda.
- (Water must not be used as it releases phosphine gas)

CONTRAST INDUCED NEPHROPATHY

- IV / PO 600 to 1200 mg twice daily before and on the day of administration of contrast, totally 4 doses.

HANGING


ALLEGED HISTORY OF HANGING
CONSCIOUS
Unconscious/ Low GCS
DO ECHOCARDIOGRAPHY
Takotsubo cardiomyopathy
(Apical balloning)
Treat with GIK
Dobutamine and in extreme cases IABP
STABLE
OBSERVATION
Gentle Elective Intubation
Midazolam infusion (3-7mg/hr) upto 0.1mg/kg
Paralytic agents if restless for 12 to 24 hours
If prolonged ventilation required plan early tracheostomy
CEREBRAL EDEMA MANAGEMENT
Ref page no: 81
SEIZURE MANAGEMENT
Ref page no:71
POLYMYOCLONUS-
T.Clonazepam 8-12mg daily in divided doses

ENDOTRACHEAL INTUBATION

INDICATIONS FOR ENDOTRACHEAL INTUBATION

1. Airway obstruction
2. Cardiopulmonary resuscitation
3. Apnoea,haemodynamic instability
4. Unconscious patient with SpO_2<90%
5. Type 2 respiratory failure with failure of NIV
6. Impending respiratory arrest as shown by:
    - Raising $PaCO_2$
    - Inadequate $PaCO_2$ compensation for metabolic acidosis.
7. Shock (to reduce respiratory muscle work)
8. Status epilepticus: in order to increase antiseizure medication / start paralyzing agents.
9. Cerebral injury (trauma / CVA) with GCS<8.
10. Elective intubation for surgical or other procedures (such as tetanus patient with spasms needing neuromuscular paralyzing agent).
11. Flail chest / pulmonary contusion

Do not use a neuromuscular paralyzing agent while attempting to intubate a patient with upper airway obstruction.

MALLAMPATI AIRWAY CLASSIFICATION

A clinical sign to predict difficult tracheal intubation

Class	Visible structures with mouth maximally open and tongue protruded
I	Hard palate, soft palate, uvula, tonsillar pillars
II	Hard palate, soft palate, uvula
III	Hard palate, soft palate, base of uvula
IV	Hard palate

Seven P's of Rapid Sequence Intubation (RSI)

- **Preparation:** Preparing equipments and IV access.
- **Preoxygenation:**For 3-5 minutes.
- **Pretreatment:** To prevent the sympathetic over activity, intra cranial tension and patient distress give Inj.Atropine 20 mcg/kg or Inj.Glycopyrolate 10 mcg/kg, Inj.Lidocaine 1.5mg/kg,Inj.Fentanyl2 mcg/kgand Inj. Midazolam 0.2 to 0.3 mg/kg.
- **Paralysis with induction:**Inj.Propofol 1-2 mg/kg or Inj.Succinylcholine 2mg/kg and Inj.Vecuroium 0.08-0.1 mg/kg.
- **Protection and positioning:** Apply cricoid pressure to prevent regurgitation of stomach contents or to assist with vizualisation of the glottis (SELLICK MANOEUVRE)

- **Placement with proof:** End-tidal CO2 (EtCO2) determination is the most accurate method of confirming the position of ET tube.
- **Post intubation management:** A post procedural chest x-ray is obtained to confirm depth of tube placement and to evaluate for evidence of barotrauma.

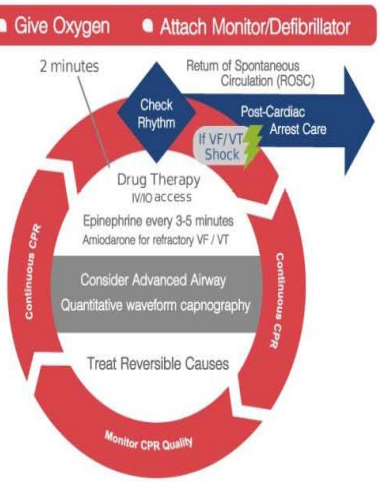
GUIDELINES FOR ASSESSING WITHDRAWAL OF MECHANICAL VENTILATION

- Patient's mental status: awake, alert, cooperative
- PaO_2> 60 mm Hg with an FIO_2< 50%
- PEEP :: 5 cm H_2O
- $PaCO_2$ and pH acceptable
- Spontaneous tidal volume > 5 ml / kg
- Vital capacity > 10 ml / kg
- Minute ventilation(MV)< 10 litres/min
- Maximum voluntary ventilation doubles of MV
- Maximum negative inspiratory pressure > 25 cm H_2O
- Respiratory rate < 30 breaths / min
- Static compliance > 30 ml / cm H_2O
- Rapid shallow breathing index (ratio of respiratory rate to tidal volume) < 100 breaths / min / L
- Stable vital signs after a 1 to 2 hour spontaneous breathing trial

Cardiac Arrest Circular Algorithm

Shout for Help/Activate Emergency Response

START CPR



Doses/Details for the Cardiac Arrest Algorithms

CPR Quality

- Push hard (≥ 2 inches [5cm]) and fast (≥ 100/min) and allow complete chest recoil.
- Minimize interruptions in compressions.*
- Avoid excessive ventilation
- Rotate compressor every 2 minutes
- If no advanced airway, 30:2 compression-ventilation ratio
- Quantitative waveform capnography
- If P_{ETCO_2} <10mm Hg, attempt to improve CPR quality
- Intra-arterial pressure
- If relaxation phase (diastolic) pressure < 20 mm Hg, attempt to improve CPR quality.

Drug Therapy

- Epinephrine IV/IO Dose: 1 mg every 3-5 minutes
- Vasopressin IV/IO Dose: 40 units can replace first or second dose of epinephrine
- Amiodarone IV/IO Dose**: First dose: 300 mg bolus. second dose: 150 mg

Advanced Airway***

- Supraglottic advanced airway or endotracheal intubation
- Waveform capnography to confirm and monitor ET tube placement
- 8-10 breaths per minute with continuous chest compressions

Return of Spontaneous Circulation (ROSC)

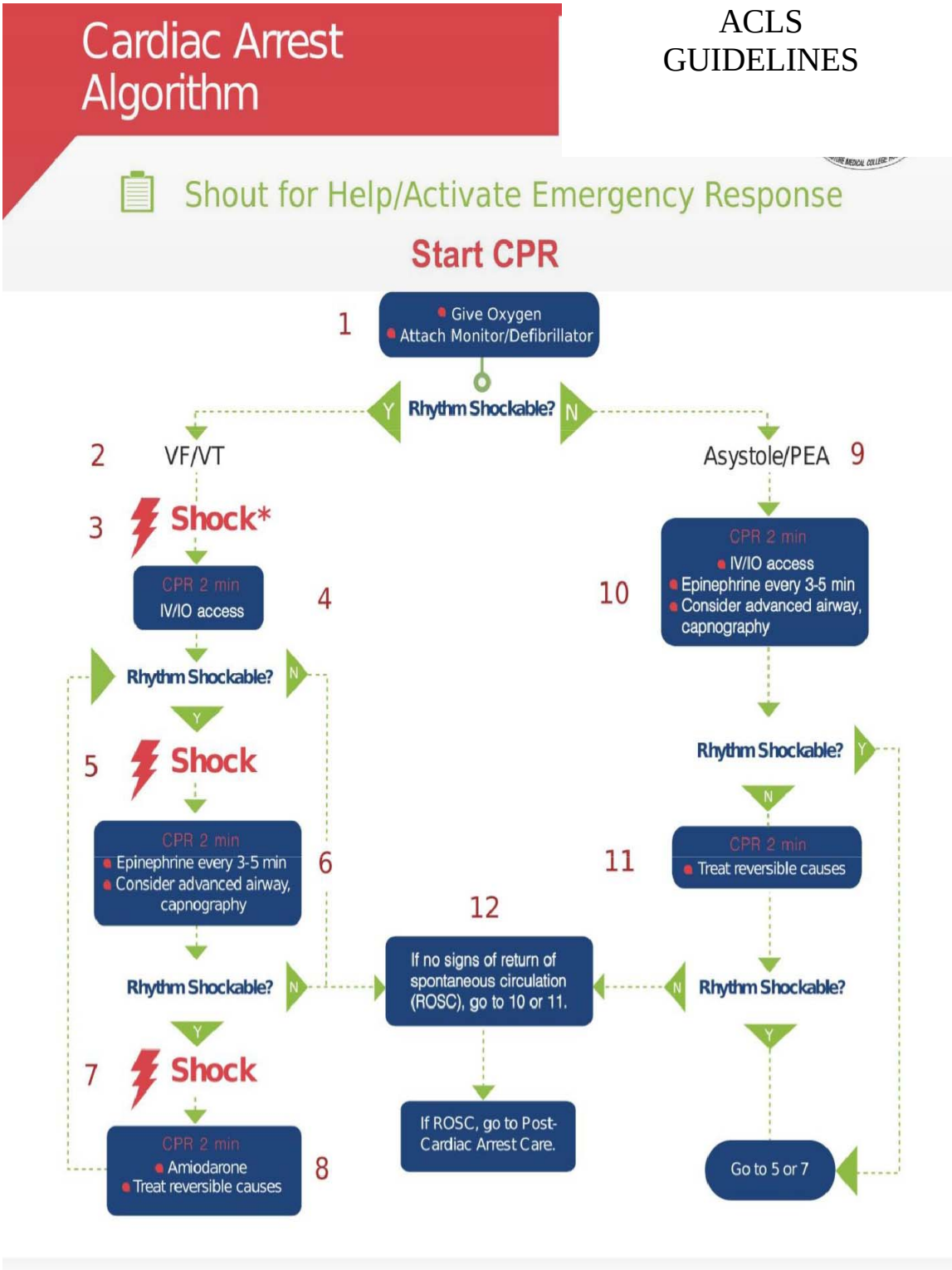
- Pulse and blood pressure
- Abrupt sustained increase in P_{ETCO_2} (typically ≥ 40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

Shock Energy

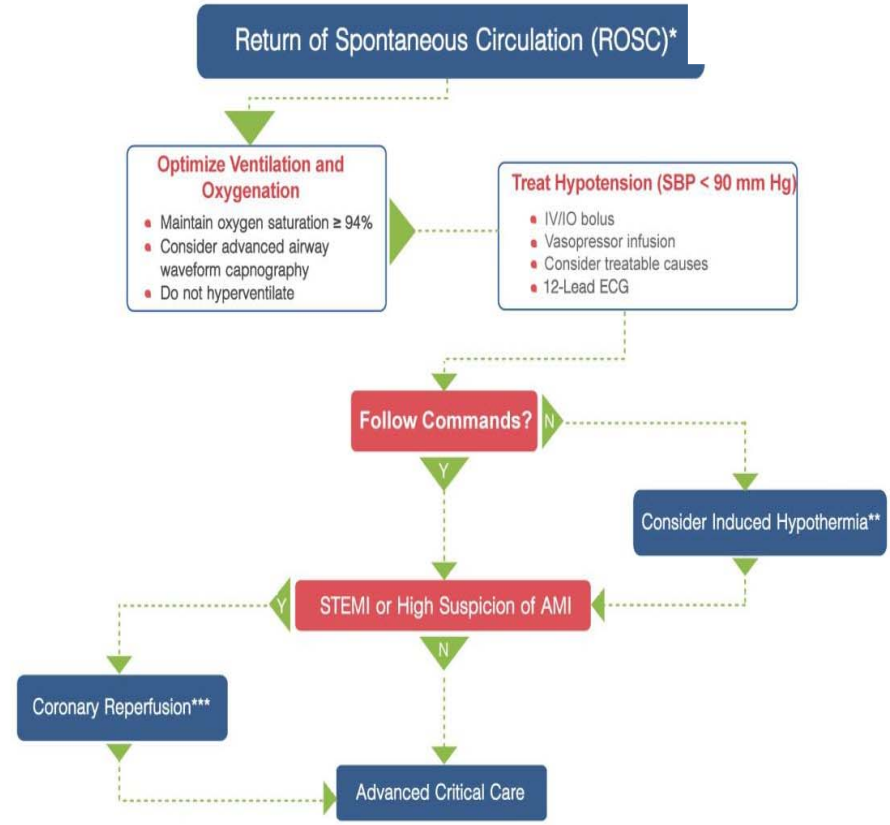
- Biphasic: Manufacturer recommendation (eg, initial dose of 120-200 J): if unknown, use maximum available.
- Second and subsequent doses should be equivalent, and higher doses may be considered
- Monophasic: 360 J

Reversible Causes

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-/Hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary


Cardiac Arrest Algorithm
Shout for Help/Activate Emergency Response
Start CPR
1
Give Oxygen
Attach Monitor/Defibrillator
Rhythm Shockable?
Y
N
2
VF/VT
3
Shock*
CPR 2 min
IV/IO access
4
Rhythm Shockable?
N
Y
5
Shock
CPR 2 min
Epinephrine every 3-5 min
Consider advanced airway, capnography
6
Rhythm Shockable?
N
Y
7
Shock
CPR 2 min
Amiodarone
Treat reversible causes
8
9
Asystole/PEA
10
CPR 2 min
IV/IO access
Epinephrine every 3-5 min
Consider advanced airway, capnography
Rhythm Shockable?
Y
N
11
CPR 2 min
Treat reversible causes
Rhythm Shockable?
N
Y
Go to 5 or 7
12
If no signs of return of spontaneous circulation (ROSC), go to 10 or 11.
If ROSC, go to Post-Cardiac Arrest Care.

Immediate Post-Cardiac Arrest Care Algorithm



Doses/Details

Ventilation/Oxygenation

- Avoid excessive ventilation.
- Start at 10-12 ≥ 94% breaths/min and titrate to target P_{ETCO_2} of 35-40 mm Hg.
- When feasible, titrate FIO_2 to minimum necessary to achieve $SpO_2 \geq 94\%$.

IV Bolus

- 1-2 L normal saline or lactated Ringer's.
- If inducing hypothermia, may use 4°C fluid.

Epinephrine IV Infusion

0.1-0.5 mcg/kg per minute (in 70-kg adult: 7-35 mcg per minute)

Reversible Causes

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-/Hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary

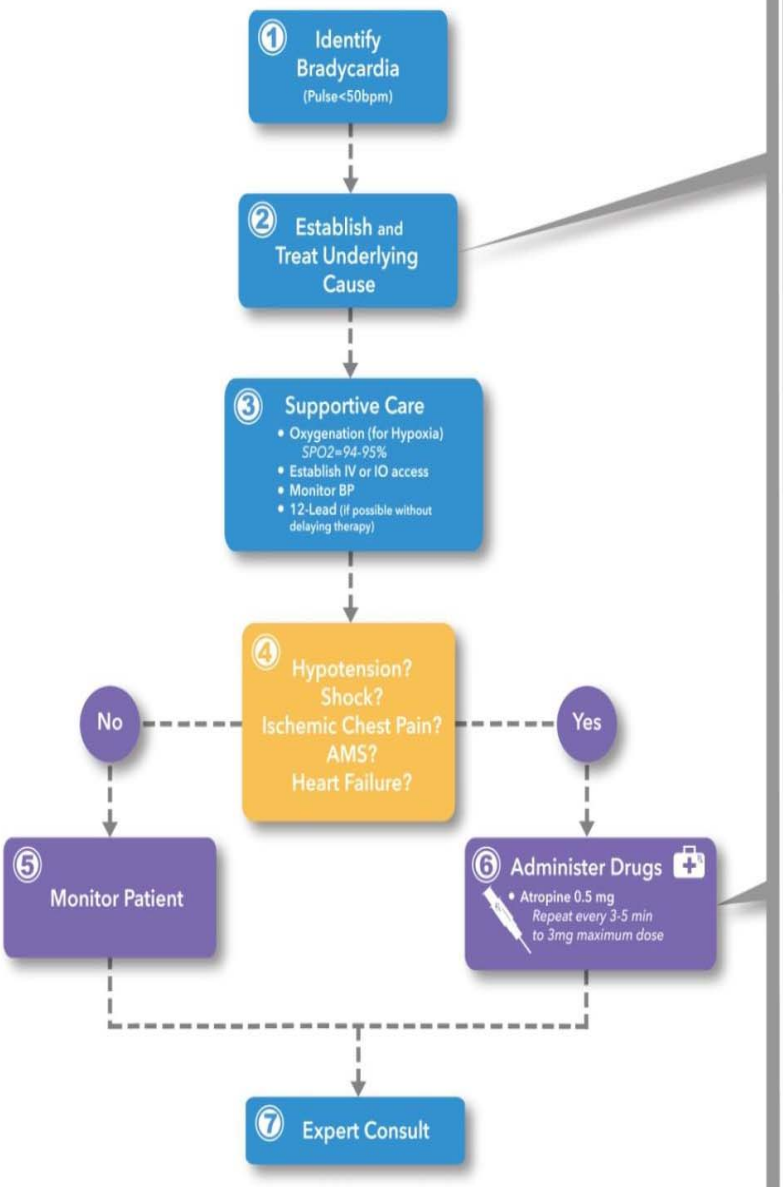
Dopamine IV Infusion

5-10 mcg/kg per minute

Norepinephrine IV Infusion

0.1-0.5 mcg/kg per minute (in 70-kg adult: 7-35 mcg per minute)

Adult Bradycardia



H's and T's:

- Hypoxia
- Hypovolemia
- Hydrogen Ion (Acidosis)
- Hypo/Hyperkalemia
- Hypothermia
- Toxins
- Tamponade (cardiac)
- Tension Pneumothorax
- Thrombosis (coronary and pulmonary)
- Trauma

If ineffective, consider

- Transcutaneous Pacing

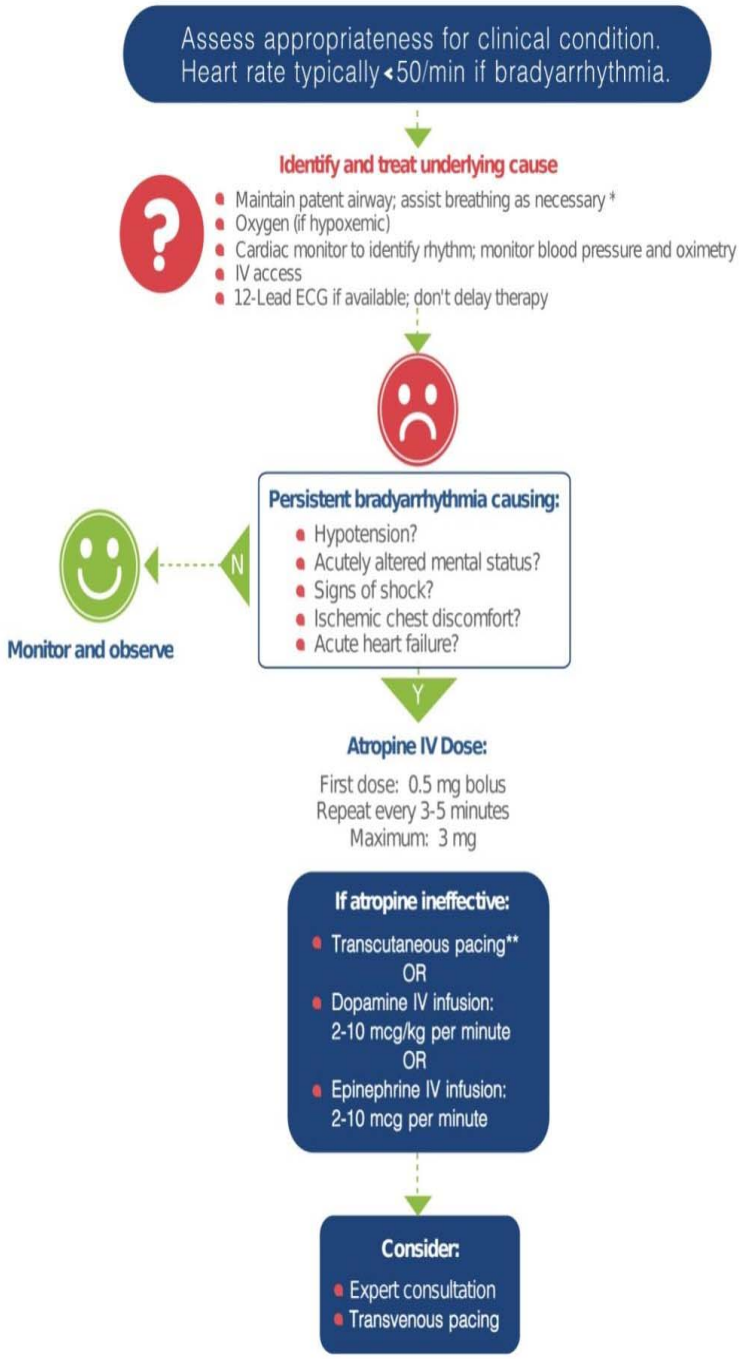
OR

- Dopamine Infusion 2-10 mcg/kg/min

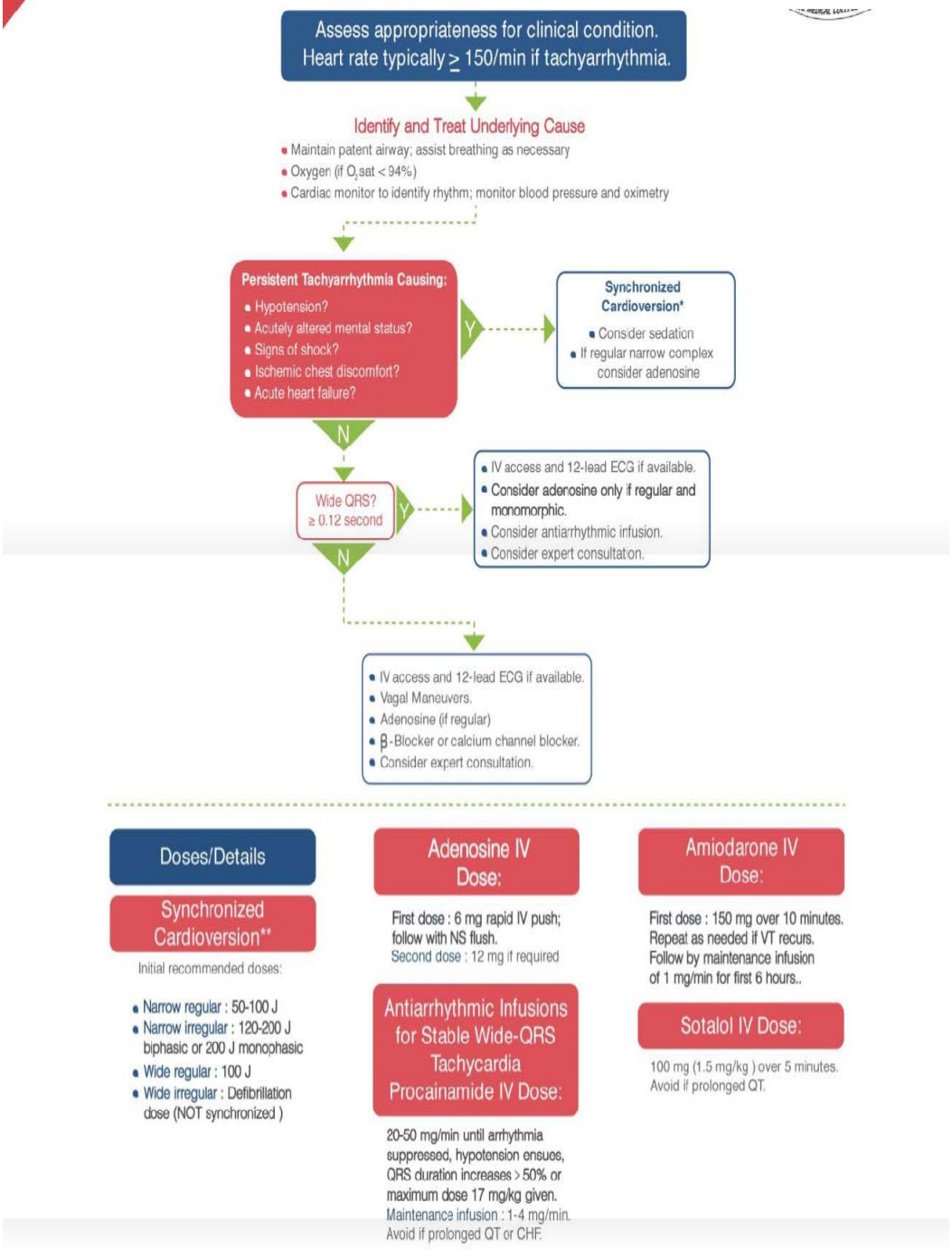
OR

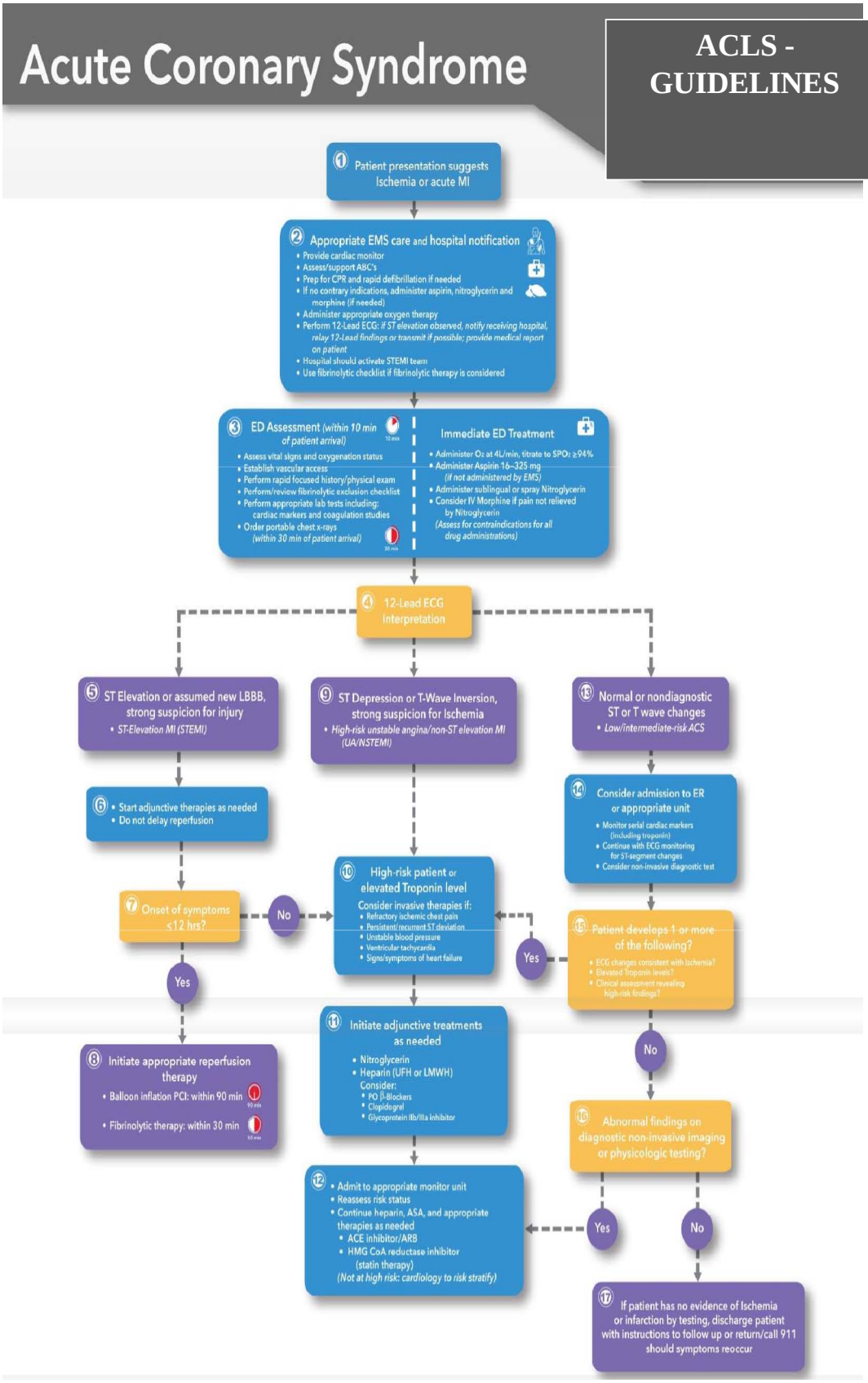
- Epinephrine Infusion 2-10 mcg/min

Bradycardia With a Pulse Algorithm



Tachycardia With a Pulse Algorithm




Acute Coronary Syndrome
1 Patient presentation suggests Ischemia or acute MI
2 Appropriate EMS care and hospital notification
• Provide cardiac monitor
• Assess/support ABC's
• Prep for CPR and rapid defibrillation if needed
• If no contrary indications, administer aspirin, nitroglycerin and morphine (if needed)
• Administer appropriate oxygen therapy
• Perform 12-Lead ECG: if ST elevation observed, notify receiving hospital, relay 12-Lead findings or transmit if possible; provide medical report on patient
• Hospital should activate STEMI team
• Use fibrinolytic checklist if fibrinolytic therapy is considered
3 ED Assessment (within 10 min of patient arrival)
10 min
• Assess vital signs and oxygenation status
• Establish vascular access
• Perform rapid focused history/physical exam
• Perform/review fibrinolytic exclusion checklist
• Perform appropriate lab tests including: cardiac markers and coagulation studies
• Order portable chest x-rays (within 30 min of patient arrival)
30 min
Immediate ED Treatment
• Administer O2 at 4L/min, titrate to SPO2 ≥94%
• Administer Aspirin 16–325 mg (if not administered by EMS)
• Administer sublingual or spray Nitroglycerin
• Consider IV Morphine if pain not relieved by Nitroglycerin
(Assess for contraindications for all drug administrations)
4 12-Lead ECG Interpretation
5 ST Elevation or assumed new LBBB, strong suspicion for injury
• ST-Elevation MI (STEMI)
9 ST Depression or T-Wave Inversion, strong suspicion for Ischemia
• High-risk unstable angina/non-ST elevation MI (UA/NSTEMI)
13 Normal or nondiagnostic ST or T wave changes
• Low/intermediate-risk ACS
6 • Start adjunctive therapies as needed
• Do not delay reperfusion
14 Consider admission to ER or appropriate unit
• Monitor serial cardiac markers (including troponin)
• Continue with ECG monitoring for ST-segment changes
• Consider non-invasive diagnostic test
7 Onset of symptoms ≤12 hrs?
No
10 High-risk patient or elevated Troponin level
Consider invasive therapies if:
• Refractory ischemic chest pain
• Persistent/recurrent ST deviation
• Unstable blood pressure
• Ventricular tachycardia
• Signs/symptoms of heart failure
Yes
15 Patient develops 1 or more of the following?
• ECG changes consistent with ischemia?
• Elevated Troponin levels?
• Clinical assessment revealing high-risk findings?
Yes
8 Initiate appropriate reperfusion therapy
• Balloon inflation PCI: within 90 min
90 min
• Fibrinolytic therapy: within 30 min
30 min
11 Initiate adjunctive treatments as needed
• Nitroglycerin
• Heparin (UFH or LMWH)
Consider:
• PO β-Blockers
• Clopidogrel
• Glycoprotein IIb/IIIa inhibitor
No
16 Abnormal findings on diagnostic non-invasive imaging or physicologic testing?
12 • Admit to appropriate monitor unit
• Reassess risk status
• Continue heparin, ASA, and appropriate therapies as needed
• ACE inhibitor/ARB
• HMG CoA reductase inhibitor (statin therapy)
(Not at high risk: cardiology to risk stratify)
Yes
No
17 If patient has no evidence of Ischemia or infarction by testing, discharge patient with instructions to follow up or return/call 911 should symptoms reoccur

SNAKE BITE MANAGEMENT

WHOLE BLOOD (VENOUS BLOOD) CLOTTING TIME

- Check whole blood clotting time at the time of admission using clean test tube, 2 ml of blood sample taken and kept without disturbing for 20 minutes.
- If initial clotting time is normal- test the clotting time every 30 minutes for 3 hours, then hourly.
- In envenomation is present, clotting time will be prolonged for more than 20 minutes.
- Clotting time should be tested every 6 hours after administration of ASV.
- The time taken for the liver to synthesize clotting factors in 6 hours.

HEMOSTATIC ENVENOMATION

- Starting dose -10 vials of ASV as IV infusion with normal saline over 1 hour duration.
- Repeat WBCT every 6 hours after administering ASV.
- Second dose -5 to 10 vials.
- Maximum 30 vials.
- Still persists -replace coagulation factors –with FFP

NEUROTOXIC ENVENOMATION

- Initial dose -10 vials of ASV.

- Atropine followed by Neostigmine (Has a role in postponing ventilator requirement in cobra envenomation)/ No role in krait bite.
- Inj. Neostigmine -0.5 mg IV every 15 minutes and

  Inj. Atropine- 0.6 mg IV every 4 dose of neostigmine to be given.
- Dose of neostigmine and atropine is to be adjusted according to the reversal of neurotoxicity.
- Stop Atropine and Neostigmine if intubation
- If initial dose of ASV is unsuccessful of 1-2 hours, repeat 10 vials of ASV.
- Maximum dose -20 vials.

COMPLICATIONS

- Respiratory failure: Give ventilatory support
- Bleeding diathesis: Give FFP & packed cell transfusion
- Renal failure: Haemodialysis
- If in shock- suspect Adrenal haemorrhage and pituitary suppression-initiate Steroids
- ASV induced anaphylaxis

TREATMENT FOR ASV REACTIONS

- Discontinue ASV
- Maintain IV line
- Maintain airway ; give 100% oxygen

- Endotracheal intubation and mechanical ventilation is needed if there is respiratory distress
- Administer Injection adrenaline 1:1000 (1mg/ml ie 1 ampoule):

  Injectintramuscularly 0.5mg in inferiolateral aspect of thigh.

  No subcutaneous route.
- If after 5 to 10 minutes the patient's condition has not improved or is worsening,a second dose of 0.5ml of adrenaline IM is given.This can be repeated for a third and final occasion but in the vast majority of reactions 2 doses of adrenaline will be sufficient.
- In severe life threatening situations, 0.5mg of 1:10,000 adrenaline can be given IV slowly -**carries a risk of cardiac arrhythmias**

CONSIDER ADDITIONAL MEASURES

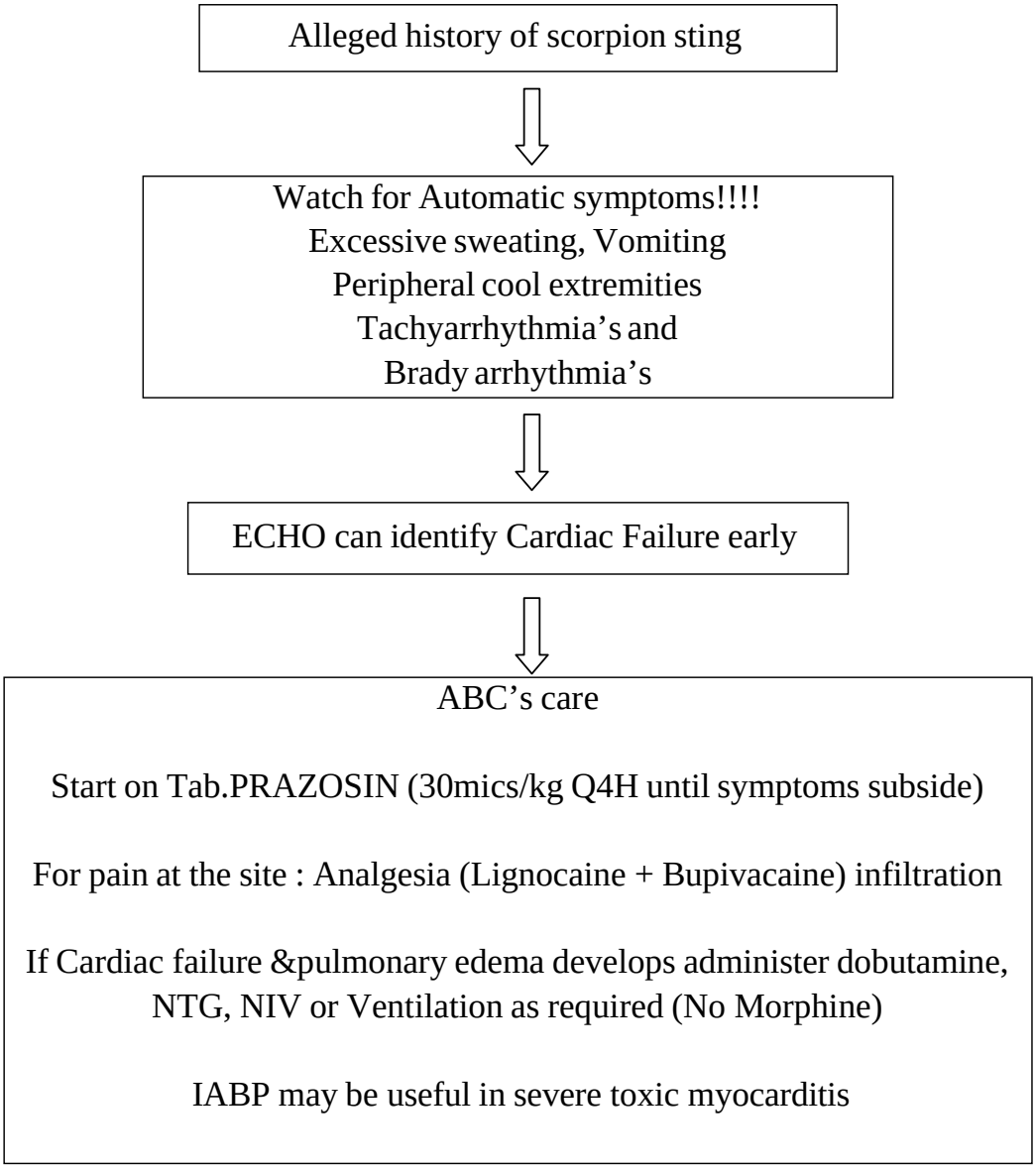
- Administer Beta 2 agonists -Salbutamol or Terbutaline by nebulizer for bronchospasm
- Try nebulised Adrenaline (2.5mg adrenaline in 2ml isotonic saline) in case of laryngeal edema which often will ease upper airways obstruction.
- Antihistamines: Administer

  H1 receptor blockers Inj. Chlorpheniramine maleate 10- 20mg as iv/imor Promethazine 0.5 -1mg/kg

  H2 receptor blockers Inj.Ranitidine 1mg/kg slowly intravenously
- Administer Corticosteroids intravenously:Hydrocortisone 2-6mg/kg or Dexamethasone 0.1 – 0.4mg/kg

- ASV can be restarted slowly for 10-15 minutes, keeping the patient under close observation. Then the normal drip rate should be resumed.
- Monitor vitals and provide supportive measures.

MANAGEMENT OF SCORPION STING



MANAGEMENT OF BEE AND WASP STING

- ABC's stabilization
- Watch for utricaria
  Parenteral antihistamines &steroids
- Watch for anaphylaxis
  Inj. Adrenaline 0.5 ml IM on inferolateral aspect of thigh of 1:1000 dilutions
  If Severe intravenous Adrenaline 2-5 ml of a 1:10,000 dilution or to initiate infusion and titrate to clinical response
  Parenteral Antihistamines , H1 & H2 Blockers
  Steroids
  Refer page no:56

STING REMOVAL

Scrap using scale and do not squeeze and take it out

PAIN

Only one sting - Local anaesthetic

Multiple stings - Systemic opioid analgesics

CALMING THE PATIENT IN ICU

AGENTS FOR ANALGESIA

Approximate Equivalent Single IV Dose		Infusion Rate	Onset to Peak Effect	Duration	Comments
Opioids					
Fentanyl	100-200 mcg	50-200 mg/hr	2-5min	0.5-2 hours	Fastest onset and shortest duration
Morphine	10mg	2-10 mg/hr	20-30 min	3-4 hours	Avoid in hypotension. Active metabolite accumulates in renal dysfunction. May cause itching due to histamine release (not a true allergy) Decreases preload, which may be beneficial in pulmonary edema.
NSAIDs (Parenteral)					
Ibuprofen	400-800 mg	IV over 30 minutes	Not reported	6 hours	Infuse over 30minutes. Not to exceed 3200 mg/day.
Ketorolac	15-60 mg	IV push	1-2 hours	4-6 hours	Max adult dose 120 mg/day (60 mg/d in elderly or weight <50 kg). Do not use for >5 days. Avoid use in renal dysfunction. Monitor for gastrointestinal adverse effects.

AGENTS FOR SEDATION

Drug	IV Bolus Dose	Infusion Rate	Onset to Peak	Duration	Comments
Propofol	0.03-0.15 mg/kg	5-80 mcg/kg/min	1-2 min	<20 min	Fastest onset and shortest duration. Avoid in hypotension. Dose/rate related hypotension/ bradycardia. Avoid IV push bolus due to increased risk of hypotension (limit dose to 10-20 mg).
Midazolam	1-6 mg	1-10 mg/hr	5-10 min	1.5-2 hours	Fast onset – good for acute agitation/anxiety. Active metabolite accumulates in renal dysfunction. Midazolam 2-3 mg is approximately equivalent to 1mg Lorazepam. **Midazolam is associated with increased incidence of delirium.**

Lorazepam	1-3 mg	1-5 mg/hr	15-20 min	2-4 hours	Slower onset but longer duration. Risk of propylene glycol toxicity with high doses (anion-gap acidosis. jSerum Creatinine. j Lactate).
Dexmedetomidine	1 mcg/kg over 20 min (not recommended)	0.2-1.5 mcg/kg/hr	30 min	2-4 hours	Limited data for use as a first line agent. FDA approved for use <24 hrs (Studied up to 7 days in literature). FDA approved max dose =0.7 mcg/kg/hr (studied up to 1.5 mcg/kg/hr). No respiratory depression-consider for patient failing spontaneous breathing trial due to agitation/anxiety. May cause hyper/hypotension. Consider higher starting dose if used as monotherapy. Expensive.

The Ramsay sedation scale

Clinical Score	Patient characteristics
1	Anxious, agitated or restless
2	Cooperative, oriented and tranquil
3	Sedated but responds to commands
4	Asleep; brisk response to light glabellar tap or loud auditory stimulus
5	Asleep; sluggish response to light glabellar tap or loud auditory stimulus
6	Asleep; no response to painful stimuli

AGENTS FOR DELIRIUM

Adverse Effects									
Antipsychotic Agent	**Dosage Form**	**Metabolism**	**Dosages (approx) (mg)**	**Max Doses (mg/day)**	**QTc Prolongation Potential Dose Related Effect**	**Sedation**	**Dopaminergic Receptor Affinity/Extra pyramidal Symptoms**	**Anticholinergic Effects**	**Orthostatic Hypotension**
Haloperidol	Tab, IV injection	T ½ : 21 hrs Hepatic	5	35	Low	Low	High	Low	Low
Quetiapine	Tab	T ½ : 6 hrs Hepatic	25	400	Moderate	Moderate	Low	Moderate	Low
Aripiprazole	Tab, solution (5mg/ml), IM	T ½ :75 hrs Hepatic	5	30	Low	Low	Low	Low	Low

DRUG TREATMENT FOR HYPERTENSIVE EMERGENCIES

Diagnosis		**Suggested Agents**		**Therapeutic Goal**		**Risk of Therapy**		**Pearls**
Acute aortic dissection	-	Labetalo1 IV continuous drip	-	SBP 100-120 mm Hg	-	Hypotension	-	Avoid volume depletion
	-	Esmolol IV bolus, then continuous drip	-	Prospective study used goal of SBP <140 mm Hg	-	Nitroprusside requires continuous BP monitoring	-	Always measure BP in both arms
	-	Sodium nitroprusside IV infusion		Reduction of shear forces by reduction of BP and HR<60		Respiratory distress in COPD/asthma patients;		Always use B-blocker prior to vasodilators;
		Nicardipine IV continuous drip (after B blocker)				Test dose of esmolol recommended; switch to diltiazem if esmolol intolerant		nitroprusside alone increases wall stress due to reflex tachycardia.
Acute pulmonary edema	-	Nitroglycerin sublingual, topical, or IV continuous drip	-	Reduction of BP by 20-30%	-	Diuretics and ACE inhibitors can exacerbate renal	-	IV nitrates dilate capacitance vessels at low doses,
	-	Furosemide IV	-	Vasodilatation	-			
	-	(nitrates should	-	Promote				

		be added to diuretics) Nitroprusside IV continuous drip		diuresis after vasodilatation Symptomatic relief		dysfunction Lower survival rates with diuretics alone		higher doses dilate arterioles and lower BP
Acute coronary syndrome	- -	Nitroglycerin sublingual, topical or IV continuous drip B blocker,such as metoprolol or labetalol bolus therapy	- -	No more than 20-30% reduction for SBP> 160 mm Hg Reduction of Ischemia	- -	B blockade can exacerbate left ventricular failure Blood pressures> 185/100 mm Hg contraindicates thrombolytic use	-	B blockade reduces mortality Beware of hypotension with therapy, consider RV infarct and volume depletion
Acute sympathetic crisis (cocaine, amphetamines)	- - -	Benzodiazepine IV bolus Nitroglycerin SL, topical, or IV continuous drip Phentolamine Verapamil IV bolus	- -	Reduction of excessive sympathetic drive Symptom relief	- -	Unopposed B blockade can cause alpha storm and increase cocaine toxicity Labetalol has been used in this setting but	- -	Most hypertension will resolve with time and benzodiazepines Watch respiratory rate

						is not recommended		
Acute renal failure	- - -	Labetalol bolus NicardipineIV continuous drip Dialysis	-	Reduction of BP by not more than 20% acutely	-	Hypotension	- -	Avoid nitroprusside Avoid ACE inhibitor acutely

Severe Pre-eclampsia, HELLP syndrome, eclampsia	- - -	Labetalol bolus Nifedipineorally (nicardipine may be better tolerated) Hydralazine IV	- -	<160/110 mm Hg 150/100 mm Hg if decreased platelets (<100000 mm3)	-	Hypotension	- -	Avoid nifedipine in patients over, or in those with CAD Use $MgSO_4$ to prevent seizures
Hypertensive encephalopathy	- -	Labetalol IV continuous drip Nicardipine IV continuous drip	-	Decrease MAP 15-20%	-	More aggressive lowering may lead to ischemic	-	Autoregulation of cerebral perfusion may be significantly impaired,

						infarction		therefore, avoid rapid BP manipulation
Subarachnoid hemorrhage	- - -	Labetalol IV continuous drip Nicardipine IV continuous drip Esmolol IV, bolus, then continuous drip	- -	SBP<160 mm Hg or MAP <130 mm Hg to prevent rebleeding Some neurosurgeons may prefer therapeutic hypertension to treat vasospasm	-	Avoid hypotension and monitor carefully to maintain SBP2: 120 to maintain cerebral perfusion	- -	Nimodipine is often used in SAH. This use is primarily not for BP reduction, but some decrease in BP may be seen Control pain and provide sedation

Intracranial hemorrhage	- Labetalol IV bolus, or continuous drip - Esmolol IV, bolus then continuous drip - Nicardipine IV continuous drip		- For patients with any evidence of potential elevation of ICP, treat elevated BP to a target MAP of 130 mm Hg - If there is no clinical suspicion of elevated ICP, treat to a MAP of 110, or SBP of 160 mm Hg		- Clinical and CT scan predictors of elevated ICP include: decreased LOC, evidence of midline shift, hematoma volume >30 ml - Avoid precipitous drops in BP	-	Early ICH growth often occurs in the first six hours. During this time BP control may diminish growth.

Acute ischemic stroke	- - -	Labetalol, IV bolus (start with 10 mg,or continuous drip Nicardipine IV continuous drip Hydralazine	- -	If fibrinolytic therapy planned, treat if>185/110 mm Hg Treat If>220/120 mm Hg on third measurement, spaced 15 minutes apart	- -	Lowering of blood pressure may significantly worsen ischemia and deficit Avoid lowering blood pressure more than 10-15% in first 24 hours	-	Elevated blood pressure commonly decreases over the first few hours after acute stroke without therapy
Acute-postoperative	- - -	Labetalol IV bolus, or continuous drip Esmolol IV, bolus, then continous	- -	Consider pre-operative BP for threshold to treat, but mild		Hypotension		Insure that pain,

		drip NicardipineIV continuous drip		elevation is acceptable Consider immediate surgical site complications such as bleeding <180/110 mmHg is a general guideline				anxiety, and temperature are controlled first

Abbreviations: ACE= angiotensin converting enzyme, BP = blood pressure, CAD = Coronary artery disease,

CT = computed tomography, HR=heart rate, IV = intravenous, MAP = mean arterial pressure, SAH = subarachnoid hemorrhage, SBP =systolic blood pressure.

USUAL INTRAVENOUS DOSES OF ANTIHYPERTENSIVE AGENTS USED IN HYPERTENSIVE EMERGENCIES

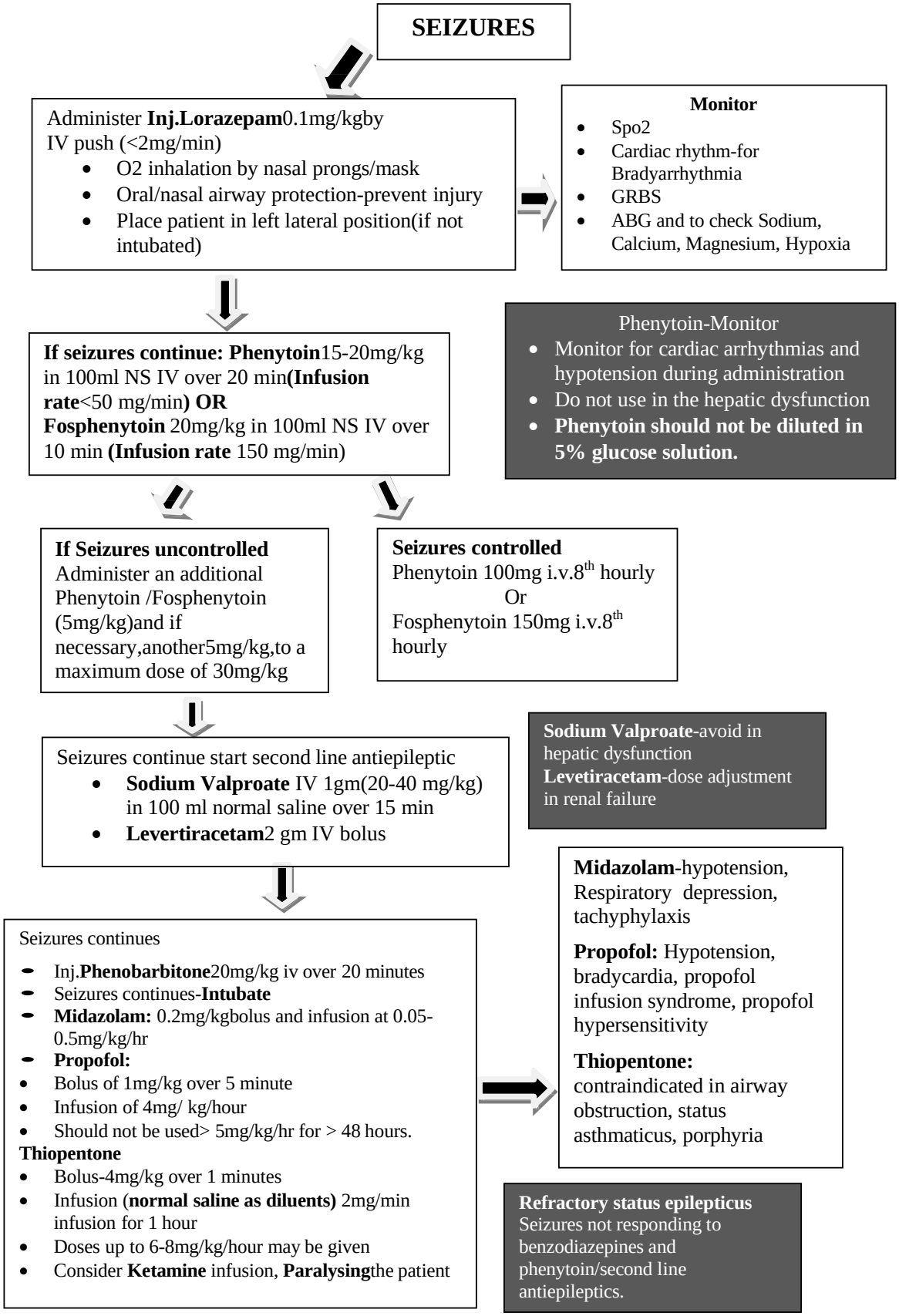
Antihypertensive Agents	Intravenous Doses
Nitroprusside	Initial 0.3µg/ kg / min; usual 2-4 µg/ kg/ min; maximum 10 µg/ kg / min for 10 min
Nicardipine	Initial 5 mg/h; titrate by 2.5 mg/h at 5-15 min intervals; max 15 mg/h
Labetalol	2 mg/min up to 300 mg or 20 mg over 2 min, then 40-80 mg at 10-min intervals up to 300 mg total
Enalaprilat	Usual 0.625 – 1.25 mg over 5 min every 6-8 h; maximum 5 mg/dose
Esmolol	Initial 80-500 µg/ kg over 1 min; then 50-300 µg/ kg/min
Phentolamine	5-15 mg bolus
Nitroglycerin	Initial 5 µg/min, then titrate by 5 µg/min at 3-5 min intervals; if no response is seen at 20 µg/min, incremental increases of 10-20 µg/min may be used
Hydralazine	10-50 mg at 30-min intervals

MANAGEMENT OF STATUS EPILEPTICUS

GOAL-To stop seizures as early as possible to prevent neuronal damage

GENERAL MEASURES

- Airway maintenance and adequate oxygen is essential
- Aspiration pneumonia is very common and higher antibiotics should always be used at the earliest prophylaxis
- The lines should be large vein as many AED causes phlebitis/thrombosis
- Two separate lines to be used for two different AEDs and drug should not be mixed
- Never use arterial lines for drug administration: it causes arterial necrosis and spasm
- Identify correctable metabolic causes like hypoglycemia- if hypoglycemia administer 50-100ml of 50% Dextrose
- Thiamine 100mg iv has to be given before dextrose if there is H/O alcoholism
- Pressor therapy-hypotension is very common during status epilepticus due to various causes.Because of failure of cerebral auto regulation,cerebral perfusion will depend on systemic blood pressure.Hence maintenance of BP is of paramount importance. Dopamine is most commonly used.
- Cardiac arrhythmias –continuous ECG monitoring and appropriate anti-arrhythmic drug is mandatory
- If there is evidence of raised ICT-Mannitol infusion or high dose steroids to be given


SEIZURES
Administer Inj.Lorazepam0.1mg/kgby IV push (<2mg/min)
O2 inhalation by nasal prongs/mask
Oral/nasal airway protection-prevent injury
Place patient in left lateral position(if not intubated)
Monitor
Spo2
Cardiac rhythm-for Bradyarrhythmia
GRBS
ABG and to check Sodium, Calcium, Magnesium, Hypoxia
If seizures continue: Phenytoin15-20mg/kg in 100ml NS IV over 20 min(Infusion rate<50 mg/min) OR Fosphenytoin 20mg/kg in 100ml NS IV over 10 min (Infusion rate 150 mg/min)
Phenytoin-Monitor
Monitor for cardiac arrhythmias and hypotension during administration
Do not use in the hepatic dysfunction
Phenytoin should not be diluted in 5% glucose solution.
If Seizures uncontrolled
Administer an additional Phenytoin /Fosphenytoin (5mg/kg)and if necessary,another5mg/kg,to a maximum dose of 30mg/kg
Seizures controlled
Phenytoin 100mg i.v.8th hourly
Or
Fosphenytoin 150mg i.v.8th hourly
Seizures continue start second line antiepileptic
Sodium Valproate IV 1gm(20-40 mg/kg) in 100 ml normal saline over 15 min
Levertiracetam2 gm IV bolus
Sodium Valproate-avoid in hepatic dysfunction
Levetiracetam-dose adjustment in renal failure
Seizures continues
Inj.Phenobarbitone20mg/kg iv over 20 minutes
Seizures continues-Intubate
Midazolam: 0.2mg/kgbolus and infusion at 0.05-0.5mg/kg/hr
Propofol:
Bolus of 1mg/kg over 5 minute
Infusion of 4mg/ kg/hour
Should not be used> 5mg/kg/hr for > 48 hours.
Thiopentone
Bolus-4mg/kg over 1 minutes
Infusion (normal saline as diluents) 2mg/min infusion for 1 hour
Doses up to 6-8mg/kg/hour may be given
Consider Ketamine infusion, Paralysingthe patient
Midazolam-hypotension, Respiratory depression, tachyphylaxis
Propofol: Hypotension, bradycardia, propofol infusion syndrome, propofol hypersensitivity
Thiopentone: contraindicated in airway obstruction, status asthmaticus, porphyria
Refractory status epilepticus
Seizures not responding to benzodiazepines and phenytoin/second line antiepileptics.

MANAGEMENT OF ACUTE PULMONARY OEDEMA

When to suspect

H/O: Orthopnea, Paroxysmal nocturnal dyspnea

Pink frothy sputum/ET aspirate

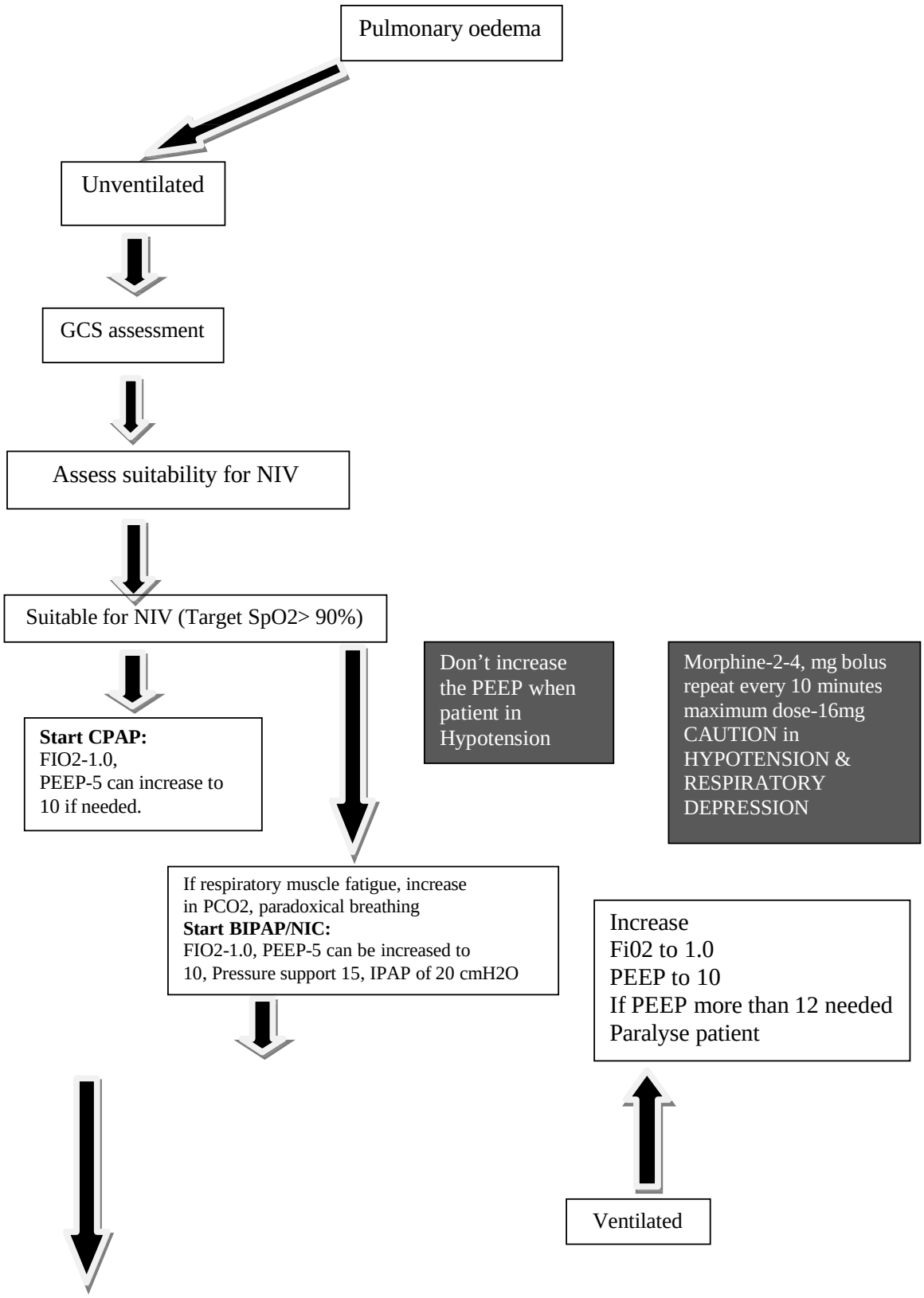
Look for JVP

Known case of heart disease

Lung:Bi basal crackles,SPO2, RR,

Cardiovascular: tachycardia,S3, arrhythmia (can precipitate pulmonary edema or be due to hypoxia)

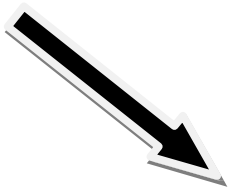
USG lung: extensive anterior bilateral B-lines


Pulmonary oedema
Unventilated
GCS assessment
Assess suitability for NIV
Suitable for NIV (Target SpO2> 90%)
Start CPAP:
FIO2-1.0,
PEEP-5 can increase to 10 if needed.
Don't increase the PEEP when patient in Hypotension
Morphine-2-4, mg bolus repeat every 10 minutes maximum dose-16mg CAUTION in HYPOTENSION & RESPIRATORY DEPRESSION
If respiratory muscle fatigue, increase in PCO2, paradoxical breathing
Start BIPAP/NIC:
FIO2-1.0, PEEP-5 can be increased to 10, Pressure support 15, IPAP of 20 cmH2O
Increase
Fi02 to 1.0
PEEP to 10
If PEEP more than 12 needed
Paralyse patient
Ventilated

If at any time

- Haemodynamically unstable
- Drop in GCS,
- SpO2< 85% after 1 hour
- Increase in CO2

Initiate Invasive Ventilation



REFER THE FOLLOWING POINTS 1-6 IN MANAGEMENT AS PER REQUIREMENT

1. In case of **fluid overload-Diuretic responsive/cardiac failure** start **frusemide**

    - **Bolus** 20 mg (IV 0.5 mg/kg in case of normal renal function, 1mg/kg in patients with AKI/CKD or history of chronic diuretic use)

    - **Infusion** 5 mg/hour, IV if no response in 30 minutes, increase to 10 mg/ hour (not useful in fluid overload with oliguric renal failure)

2. In case of **elevated BP** initiate **GTN** infusion 5-40 ug/ min (to keep systolic BP >100)

3. In case of **Decreased EF (ECHO) or proven cardiac failure** start **Dobutamine** at 1-2 mcg/kg/min and can increase to 10mcg/kg/min. After>72 hrstachyphylaxis occurs and the patient may require higher dose

4. In case of **hypotension** start inotropes

    - **Dopamine** 5ug/kg/min to be gradually increased to 20ug/ kg/ min. If the blood pressure is low-if no central line is in place.

    - **Adrenaline** to be started as a infusion at 5ug/min and tapered according to the BP (only through a central line)

5. In case of **arrhythmia / ACS:**

    - **Anticoagulation:** Heparin/UFH/LMWH

    - Antiplatelet agents: Aspirin/Clopidogrel

- **Amiodarone:** should be used in case of arrhythmia causing heart failure
- **Cardio version:** In acute arrhythmia precipitating pulmonary oedema

6. **Consider hemofiltration/ dialysis:** Known oliguric renal failure or if no response to frusemide in 4 hours with rising creatinine

Precipitating factors:

Common	**Uncommon**
• Myocardial infarction/ischemia • Valvular heart disease • Arrhythmia • Fluid overload especially renal failure • Acute hypertension • Myocarditis	• Cardiac Tamponade • Infective endocarditis / sepsis • Thyrotoxicosis (rare) • Acute MR due to papillary muscle rupture

Investigations:

1. ECG-arrhythmia, features of MI
2. Arterial blood gas analysis: Hypoxia, decreased PF ratio
3. Cardiac enzymes-will be elevated in Myocardial infarction/ ischemia
4. Chest X ray
5. ECHO- ejection estimation, R/o valvular abnormalities. Systolic/ diastolic dysfunction.

6. Serial NT-pro BNP-to be sent only if the diagnosis of pulmonary edema is in doubt.

MANAGEMENT OF ACUTE SEVERE ASTHMA

DIAGNOSIS

1.History of bronchial asthma.

2.Severe wheeze/expiratory rhonchi.

3.Respiratory rate >30/min.

4.Cyanosis/agitated/drowsy.

5.Silent chest.

6.Tachycardia/Pulsusparadoxus.

7.PEFR<50%, SaO_2<90%.

8.PaO_2< 60mmHg.

MONITORING

CXR PEFR ABG ECG CBC

MANAGEMENT

1. Reassure the patient as anxiety worsens respiratory distress.
2. Secure IV line
3. Supplemental oxygen to maintain SpO_2 of >95%
4. **NEBULIZE WITH BETA 2 AGONIST**

Salbutamol 5mgrepeated every 20 minutes for 1 hourly, as patient improves, reduce frequency gradually over next few hours .Tachycardia

is not an absolute contraindication,as it may be due to stress response due to airway constriction.

Nebuliser is best for unintubateddyspnoeic patients.

In uncooperative patients or if nebulizer not available use

Inj.TERBUTALINE 0.5mg sc Q6h.

5.Nebulise with **IPRATROPIUM BROMIDE** 0.5mg 4th hourly

6.**GLUCOCORTICOIDS**

Inj.Hydrocortisone 100mg iv Q6h

Inj.Methyl prednisolone 40-60mg iv Q6h

7. **Intravenous Aminophylline**

   a.)5mg/kg IV stat (250mg in 20ml 5%dextrose over 20 mins)

   b.)Maintenance dose 0.5mg/kg/hour (500mg in 500ml 5%dextrose @ 30ml/hr

8. **IV MAGNESIUM** 2 gram iv over 30 minutesin refractory asthma.(C/I in renal failure).

9. **ADRENALINE** 0.5mg subcutaneous in resistant cases.

10. **ANTIBIOTICS** if there is evidence of infection.

11. **ADEQUATE HYDRATION.**

12. **MECHANICAL VENTILATION** as per indications.

APPROACH TOUPPER GASTRO INTESTINAL BLEED

- Establish two wide bore Intravenous cannula
- Send for blood grouping & typing

Complete blood count

PT /INR

apTT

- Stop Aspirin, Clopidogrel, Heparin
- Monitor heart rate and systolic Blood Pressure every 10 minutes till stable-if haemodynamically unstable give fluid as required for resuscitation
- If GCS < 8 or haemodynamically unstable intubate
- Insert nasogastric tube to decompress the stomach – Give ice cold saline lavage using 500ml-1000ml of normal saline. Adrenaline 1-2 mg may be added to 1000ml of the ice cold lavage solution.
- Give Inj. Pantoprazole 80mg IV stat

  Followed by

  8mg/hour over 72 hours

- In variceal Bleed
  - Inj.Octreotide 100µgm IV stat

    Followed by 50 µgm/hour over 3 days
  - Inj.Somatostatin 250 µgm IV stat

    Followed by 3000 µgm in 250ml NS over 12 hours
  - Inj.Terlipressin 2mg iv stat followed by 1mg iv 6^{th} hourly for a further 24 hours
  - Inj Vitamin K 10mg iv × 3 days

- InfuseFresh frozen plasma 10ml/ kg

MANAGEMENT OF HEPATIC ENCEPHALOPATHY

- Secure airway, IV line
- Ryles tube aspiration
- Administer L Ornithine L Aspartate (LOLA)

  Each vial (10ml) of LOLA contains 5g

  4 vials (20 g) in 500 ml of NS over 12 hours × 3 days
- Always prefer IV Antibiotics
- Gut Antibiotics are

  T.Rifaximin 550 mg tds

  Or

  T.Metronidazole 200mg QID ×2 weeks

  Or

  C.Amoxycillin or Ampicillin 2-4 gm/ day

  Or

  T.Norflox 400 mg OD if bleeding then BD dose

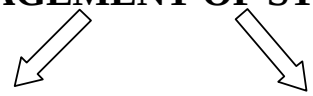
- Syrup Lactulose 30ml every 2nd hourly till passage of 2-3 soft formed stools
- Lactulose Enema

  Foleys catheter is inserted per rectally and 300 ml of lactulose mixed with 700 ml of normal saline is instilled through foleys

catheter and the balloon is inflated and retained for 2 hours, after 2 hours deflate the foleys balloon and evacuate the bowel contents

- If patient is violent- use Haloperidol / Lorazepam
- If fever present- Tepid sponging and use paracetamolupto 2gms/day
- Monitor blood sugar 4th hourly as these patients are prone to hypoglycemia
- Look for electrolyte imbalance

MANAGEMENT OF STROKE



Ischemic stroke Haemorrhagic stroke

Ischemic stroke

Based on onset of stroke

- Within 0-4.5 hours
- 4.5-24 hours
- >24 hours

WITHIN 0-4.5 hours- GOLDEN HOURS OF STROKE

- r-tPA(tissue Plasminogen activator) DOSAGE:0.9 mg/kg(maximum 90mg) ,10% iv bolus over 1 minute& 90% infusion over 60min
- Anti platelets:Aspirin 81-325mg/day within 48 hours, or 24-48 hours after thrombolytic therapy
- Avoid urinary catheterization for >2 hours

- Frequent BP monitoring
- For decline in neurological status or uncontrolled BP, stop infusion, give cryoprecipitate and reimage brain emergently

INDICATIONS OF THROMBOLYSIS IN ISCHEMIC STROKE

- Clinical diagnosis of stroke
- CT Brain-no haemorrhage,>1/3 oedema of MCA territory
- Age>18
- Onset of symptoms< 4.5 hours

CONTRAINDICATIONS OF THROMBOLYSIS

- Sustained BP>185/110 mm Hg despite treatment
- Platelets<100,000mm^3, Hct< 25%, glucose <50 or > 400 mg/dl
- Heparin use<48hrs
- Taking anticoagulant and INR ≥1.7
- H/O stroke,head trauma in 3 months,priorintracerebralhaemorrhage
- GI bleeding in preceding 21 days
- Recent myocardial infarction
- Major surgery within 14 days
- Rapidly improving symptoms
- Coma/stupor

If patient comes within 4.5-24 hours

- Cerebral edema management
- Asprin / Clopidogrel / Statins

INDICATIONS FOR HEPARIN:

- Transient ischemic attack
- Cardioembolic stroke- Atrial fibrillation, Dilated cardiomyopathy
- Cortical vein thrombosis
- Stroke in Evolution

If patient comes after 24 hours

- Supportive treatment
- Nutrition
- Antiplatelets
- Physiotherapy

Maintain euglycemia

BP Management

For Haemorrhagic Stroke and SAH maintain MAP around 130 mmHg

Treat with Labetalol, nicardipine*(refer Pg.no.69)*

For SAH, Tab. Nimodipine 16mg every 4^{th} hourly to prevent cerebral vasospasm.

Physiotherapy to prevent contractures.

MANAGEMENT OF MALIGNANT CEREBRAL EDEMA SECONDARY TO STROKE

Stage I

Initial Intensive care monitoring

-7 Monitor vitals & mental status every 2 hrs.

-7 Head end elevation at 20-30°

-7 Head in neutral position to avoid jugular vein compression

-7 Avoid hypotonic solution like half normal saline or 5% dextrose

-7 GCS <8 /Bulbar weakness- intubate and protect the airway

Stage II -Osmotic therapy

-7 Avoid hypercarbia

-7 Give iv infusion 20% mannitol (20%=20gm in 100ml)-0.25-2gm/kg over 30 minutes; repeat every 6-8 hours as needed

-7 If mannitol is contraindicated-consider hypertonic saline 3% Nacl,if needed up to 3 days

Infusion Rate:100ml @ 25 ml/hr. Check s.sodium daily -target level is 150-160mEq/L.

Stage III

-7 Surgery for cerebral edema – consult Neurosurgeon for possible Decompressivehemicraniectomy

Stage IV

-7 Experimental techniques like induced hypothermia(32-34°C) is effective in reducing ICT by suppressing all cerebral metabolic

activities by applying icepacks or endovascular coolingmethod for 24-72 hours followed by passive rewarming over 12-24 hours.

ROLE OF ULTRASOUNDIN THE HYPOTENSIVE PATIENT

Intravascular Volume Assessment / Hypotension of unclear etiology Inferior vena cava (IVC) visualization in subcostal view can give non-invasive central venous pressure (CVP) assessment

IVC normally fluctuates with respiration

Scanning Sequence

Place probe in subxiphoid/midclavicular line at costal margin - longitudinal view identify IVC through the liver, visualize hepatic veins and right atrium

Measure IVC at level of hepatic veins, approximately 2 cm from right atrium

Can measure in both B (2D) mode and M mode

Assess for respiratory variation

No change in IVC diameter with inspiration and expiration

Estimated CVP correlation:

CVP < 5- IVC < 1.5 cm with > 50% respiratory variation

CVP = 5-10 -	IVC = 1.5-2.5 cm with > 50% respiratory variation
CVP = 10-15-	IVC = 1.5-2.5 cm with < 50% respiratory variation
CVP >15-	IVC > 2.5 cm with < 50% respiratory variation

Pitfalls

Measuring IVC at incorrect location -over/underestimating width and variation

ULTRASOUND GUIDED PROCEDURES

Central line placement: Internal jugular vein, subclavian vein, femoral vein

Technique: Use linear high frequency probe

Place probe with indicator toward patient's right over the vessel

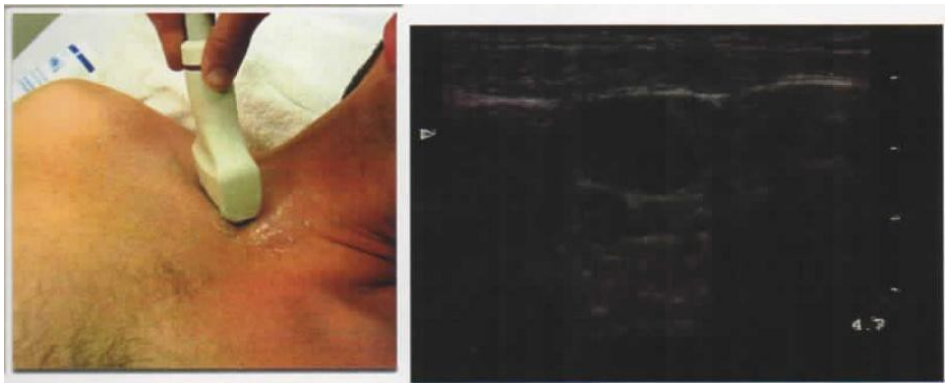
Identify vein by compressibility

Adjust probe so that vein is in the center of the screen

Insert needle 1 cm proximal to the probe at 45 deg angle at the center of the probe

Visualize needle head entering fascia and ultimately the vein, you may need to adjustthe angle of the probe in order to continue to visualize the needle head entering the vein.

Once in the vein and confirmed flashback in syringe, set down the probe and performcentral line placement using seldinger technique over guide wire.



Deep brachial vein line placement:

Technique: Use linear high frequency probe

Place probe with indicator toward patient's right over the vessel

Identify vein by compressibility

Adjust probe so that vein is in the center of the screen

Insert needle 1 cm proximal to the probe at 45 degree angle at the center of the probe. Visualize needle head entering fascia and ultimately the vein, you may need to adjust the angle of the probe in order to continue to visualize the needle head entering the vein.

Once in the vein and confirmed flashback in syringe, set down the probe and place and secure line

Pericardiocentesis:

Technique: Use curvilinear low frequency transducer

Place probe in the subxiphoid area with the indicator toward the patent's right

Insert needle 1 cm proximal to the probe at 60 degree angle at the center of the probe. Visualize needle head entering fascia and ultimately the pericardial sac

Once confirmed, place the probe down and continue drainage of pericardial fluid.

Paracentesis:

Technique: Use the curvilinear low frequency transducer.

Examine the abdomen with the transducer to identify area of maximal fluid.

Insert needle 1 cm proximal to the probe at 45 degree angle at the center of the probe.

Visualize needle head entering fascia and ultimately the abdominal cavity.

Once confirmed with flashback of fluid in syringe, set down the probe and continue drainage.

Thoracentesis:

Technique: Use curvilinear low frequency transducer

Place probe in midscapular line, mid-back an identify area of most fluid

Insert needle perpendicular to the back and at the same angle as the probe at that area

Once confirmed by flashback into syringe, put down the probe and continue drainage

HYPERNATREMIA

DIAGNOSIS

Serum Sodium > 145 mEq/L

Serum Sodium > 160 mEq/L carries bad prognosis

HYPERNATREMIA IS USUALLY DUE TO WATER DEFICIT AND NOT SODIUM OVERLOAD

MANAGEMENT

Calculate the water deficit.

DEFICIT = Desired total body water – Current total body water.

CURRENT TBW = 0.6 x Body weight in Kg.

$$\text{DESIRED TOTAL BODY WATER} = \frac{\text{Serum Na x CURRENT TBW}}{\text{Desired Na}(140)}$$

CORRECTION

- Corrected with either 5% Dextrose or 0.45% NS.
- Safest route of administrationof free water is by mouth or nasogastric tube

RATE OF CORRECTION

- In acute hypernatremia targeted rate of correction by1 mEq / L/hr.
- In chronic hypernatremia rapid rate of correction leads to cerebral edema. Saferate of correction isreduction of serum sodium by 1mEq / every 2 hours **or** 10 mEq/ L over first 24 hours.

HYPONATREMIA

Normal serum sodium = 135-145 mEq/L.

Hyponatremia means

- In euvolemic patients -Water retention
- In hypovolemic patients –Loss of sodium is greater than loss of water
- In hypervolemic (edematous) patients- Retention of water is greater than retention of sodium
- **Acute Hyponatremia** needs rapid correction with hypertonic saline
- **Chronic Hyponatremia** rapid correction is dangerous. Water restriction is the most effective therapy.

As per causes of Hyponatremia preference of therapy are

WATER RESTRICTION IN : SIADH, edema, renal failure, primary polydipsia

SALT SUPPLEMENT IN **:** True volume depletion, diuretics, adrenal insufficiency

Causes of SIADH

- Pneumonia, tuberculosis and empyema.
- Solid tumors like bronchogenic carcinoma.
- CVA, SAH, SDH and meningitis.
- Drugs- phenothiazines, carbamazepine, tricyclic antidepressant.

Diagnosis of SIADH

- Decreased serum Na level.
- Decreased serum urea,creatinine and uric acid and serum osmolality.
- Increased urine Na >20mEq/L.
- Urine osmolality >100mosm/L.
- No edema or dehydration clinically.
- Normal thyroid and adrenal function.

Management of SIADH

1. Water restriction to 500-800 ml/day- MAIN STAY OF TREATMENT
2. Treatment of underlying causes

STOP THE OFFENDING DRUGS

Oral hypoglycemic (Tolbutamide, Chlorpropamide)

Anticancer drugs (Vincristine, Cyclophosphamide)

CNS drugs (Haloperidol, Carbamazepine, TCA)

3. Increased dietary salt intake
4. Inj. Frusemide increases free water clearance
5. V1 receptor antagonist tablet Tolvaptan/ Conivaptan are available as 15mg -30 mg

CALCULATION OF DEFICIT = Serum Sodium x 0.6 x body weight

SALINE STRENGTH

1 Litre Normal Saline = 155 mEq/L

1 Litre of 3% Saline = 517 mEq/L

HYPONATERMIA WITH DEHYDRATION

Hydrate with Normal saline.

DILUTIONAL HYPONATREMIA

- Patient is usually edematous.
- Serum is hypoosmolar.
- Restrict water and salt
- Loop diuretics.
- Correct hypokalemia.
- Correction of the underlying cause.

TREATMENT OF HYPERKALEMIA

Serum potassium > 5.5mEq/L is considered as hyperkalemia

UNDER ECG MONITORING

Antagonism of membrane effect of Hyperkalemia	**K^+ Movement into Cells** ↓	**Removal of K^+ from Body** ↓
↓	**1).**Insulin & Glucose:	**1).**If renal function normal give Inj.Frusemide 40mg iv
10 ml of 10% Calcium gluconate given over 10 minutes. -Can be repeated after 10 minutes -This transiently protects the myocardium (Does not decrease K^+)	100ml of 25% Dextrose with 8-10 units of regular insulin infused over 30 minutes **2).**B2–adrenergic agonists Salbutamol / Terbutaline nebulization 15mg over 15minutes.Repeat every 15 minutes **3).**$NaHCO_3$ infusion (if associated with acidosis) 7.5% $NaHCO_3$ 50mlover 10 minutes followed by an infusion at the rate of 5ml/hr	**2).**Give 30gm of Potassium binding resins 8-12 hourly irrespective of renal function **3).**Hemodialysis Most rapid and effective method Peritoneal dialysis only 15% 20% as effective as hemodialysis

TREATMENT OF HYPOKALEMIA

THERAPEUTIC GOAL:

- To correct potassium deficit
- Minimize ongoing loss.
- To prevent life threatening complication.

UNDER ECG MONITORING

ORAL ROUTE (Safer)	INTRAVENOUS CORRECTION
• KCL ideal Choice. • K2CO2 and Potassium citrate ideal for Renal tubular acidosis or Chronic diarrhea	• For Severe Hypokalemia and in those unable to take anything orally. • Avoid I.V.K^+ till Urine Output established.
Average Dose 60 -80 meq/day	↓
Available: 20meq/15ml solution or 8meq/tablet	To give 10meq/hr mix 25ml of 15% KCL (10ml each) in 500ml of isotonic saline & deliver 25 drops/min (100ml/hr)
Adverse effects: G.I. irritation so advice to take diluted or along with food.	↓ Continue I.V.KCL as long as rhythm returns to normal then gradually taper and startoral Kcl.

DON'Ts to follow:

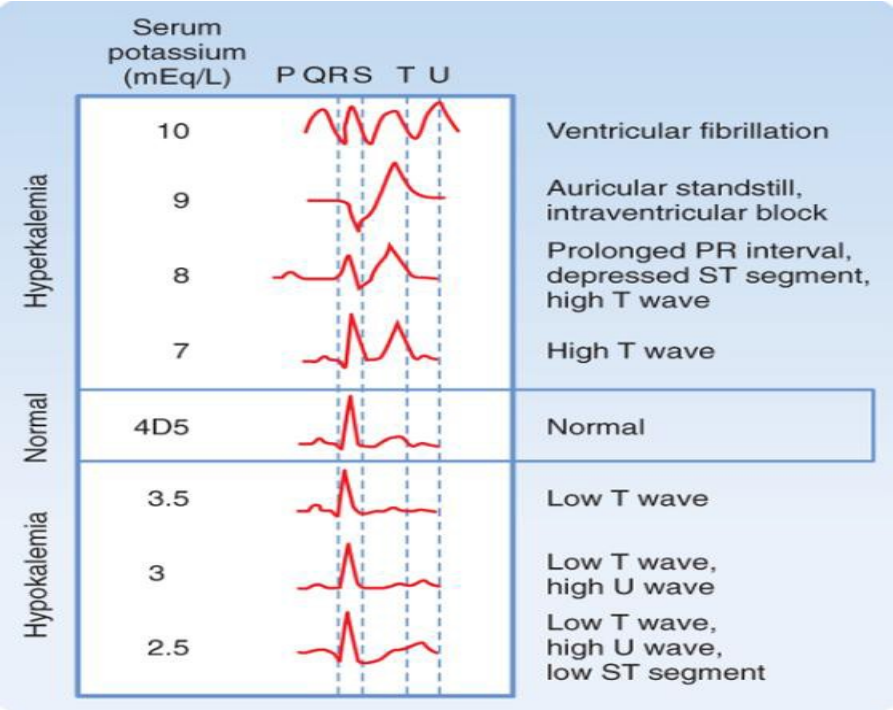
>10- 20mEq/hr.

>40mEq/litre

>240mEq/day

- Don’t add KCL in IsolyteM, or Dextrose fluid
- Never give direct iv KCL ,it cause sudden death due to cardiac arrest
- DKA and Hyperosmolar hyperglycemic state are the commonest indication of iv potassium therapy.

ECG CHANGES IN HYPER & HYPOKALEMIA



MAGNESIUM- REPLACEMENT AND THERAPEUTIC USES

- Normal serum magnesiumis 1.8-2.4 mg%.
- $MgSo_4$is available as 10% or 50% solution.
- 1 gram of $MgSo_4$ = 4 mmol = 8 mEq(mEq = 2×mmol) = 10ml of 10% $MgSO_4$ = 2ml of 50 % MgSO4.
- Severe deficiency (<1.2mg%) should be replaced parenterally.

PARENTERAL REPLACEMENT:

1. All critically ill patients are given a daily replacement of 1- 2g = 4-8 mmol (2-4ml of 50% $MgSO_4$). **No daily dose is to be given those with renal failure.**
2. **Mg and K^+:** Mg deficiency enhances renal potassium loss. Hypokalemia and hypomagnesemia often coexist. So hypokalemia resistant to standard replacement doses of potassium should evoke a suspicion of Mg deficiency.
3. **Mg and Ca^+:** Manifestations of deficiency are similar consisting of neuromuscular irritability. Mg deficiency can also cause hypocalcemia through its action on parathyroids.

THERAPEUTIC USES:

Arrhythmias:

1. Magnesium is given not only to correct a deficiency but also as a therapeutic agent for treating cardiac arrhythmias (where a mild state of hypermagnesemia suppresses the arrhythmia).
2. In Torsades de pointes, the dose is 4-8mmol (1-2 gram) over 3-5 minutes.

The following tachyarrhythmias respond favorably to magnesium:

(1) Intractable ventricular tachycardia and fibrillation whether hypo-or normomagnesemia

(2) Torsades de pointes,

(3) Digitalis-toxicventriculartachyarrhythmia,

(4) Multifocal atrial tachycardia and

(5) Hypomagnesemic atrial tachyarrhythmia.

Ecclampsia: Pritchard's Regimen

4g $MgSO_4$ (20% solution = 20 ml) slow IV over 20 minutes followed by

4g $MgSO_4$ (50% solution = 8 ml) IM into each gluteal region (total =8g)

4g $MgSO_4$ (50% solution) every 4 hours for 24 hours after delivery / last seizure (alternate gluteal site).

If IM not possible use IV infusion (same dose).

Monitor

- Maintain urine output (>30ml/hr)
- Check deep tendon reflexes every 15 minutes. Disappearance of knee reflex is a sign to detect onset of Mg toxicity
- Respiratory rate <12 –Stop the regimen

Bronchial Asthma

$MgSO_4$ is suggested for patients who have life-threatening exacerbations or whose exacerbation remains severe (peak expiratory flow <40 % of baseline) after one hour of intensive conventional therapy.

MECHANISM: Inhibition of calcium influx into airway smooth muscle cells

- IV $MgSO_4$ (approximately 2 gm diluted with normal Saline and infused over 20- 30 minutes) has bronchodilator activity in acute asthma
- Nebulized: As a 7.5% (isotonic solution) in bronchospasm.It can be used as a vehicle for beta 2 agonists.

TREATMENT OF $MgSO_4$ OVERDOSE:

- IV Calcium 10-20ml of 5% solution with NS is used to counteract affect of hypermagnesemia
- Intubate/ ventilator support

MANAGEMENT OF DIABETIC KETOACIDOSIS

DIAGNOSIS

- Hyperglycaemia> 250 mg%
- Ketonaemia
- Ketonuria
- Increased anion gap (more than 20)

  Anion gap = Na^+ – (Cl + HCO3)

  = 140 – (100+25)

  Normal anion gap is 8-16

- pH less than 7.3 or HCO3 less than 15

INVESTIGATIONS

* Completehemogram, Urine includingketones, chest X Ray, ECG
* RBS, RFT, Na^+, K^+, Cl , ABG
* Hourly or two hourly RBS, K^+

PRINCIPLES OF MANAGEMENT IS TO CORRECT THE FOLLOWING

- Fluid deficit
- Hyperglycaemia
- Electrolyte imbalance
- Acidosis
- Management of infection if present

a) CORRECTION OF FLUID DEFICIT

- In DKA the fluid deficit is 6-8 litres in the extracellular compartment and this needs to be corrected with saline.
- 3 litres of intracellular compartment deficit to be corrected with dextrose.
- Strict input and output chart is a must

1. Establish the intravenous line preferably a cannula
2. 0.9% normal saline is to be given as follows:
    a) 1 litre in the first half an hour
    b) 1 litre in the next one hour
    c) 1 litre in the next two hours
    d) 250 to 500 ml next two hours

Note :

- The rate may vary according to the patients clinical state of dehydration.

- In old patients and in those with cardiac illness, rate of infusion is to be slowed down and monitor closely for circulatory overload.
- If initial serum Na^+ is more than 155 mEq/L, use half normal (0.45%) saline at a rate of 250 ml per hour.
- If the patient is conscious, start giving plenty of fluids orally if tolerated.

B. INSULIN THERAPY

1. Use plain insulin only

   a) Loading dose of 10 units IV

   b) Maintenance dose of 0.1 unit/kg/hour as an IV infusion.

   (50 units of plain insulin in 50 ml of normal saline, 5 ml per hour = 5 units per hour)

$$\text{Rate of infusion} = \frac{\text{Desired dose x Quantity}}{\text{50 Units}}$$

$$= \frac{\text{5 units x 50 ml}}{\text{50 Units}} = 5\text{ml/hr}$$

2. Monitor the blood glucose every hour

- Blood sugar should fall by 50-100 mg/hour with the onset of insulin therapy.
- If not, think of infection, endocrine diseases like thyrotoxicosis or cushing's disease or insulin resistance states.
- The insulin dose can be increased upto 16 units/hour.
- Monitor the ketone bodies in the blood and urine.

- If the blood sugar is less than 250 mg% and ketone bodies are positive in the urine, continue insulin drip IV until ketone bodies become negative. Start 5% Dextrose drip 0.5 litre/2hrs to avoid hypoglycaemia.
- If the blood sugar is less than 250 mg% and ketone bodies are absent, start split dose of insulin
- Insulin spacing can also be done when the anion gap normalizes and HCO3 is > 15 mEq/L

C. CORRECTION OF ELECTROLYTE IMBALANCE

Serum potassium usually falls with the onset of insulin therapy.

- Monitor serum potassium level every second hour
- KCl is to be added into the normal saline drip

40mEq/hr if K^+ is < 3mEq/L

30mEq/hr if K^+ is < 3-4mEq/L

20mEq/hr if K^+ is < 4-5mEq/L

Patients with oliguria and renal impairment require close monitoring of potassium levels and careful correction.

D. CORRECTION OF ACIDOSIS

Acidosis is to be corrected only if the HCO3 is less than 10mmol/L and/or pH is less than 7.

Bicarbonate should not be given as bolus dose.

It should be given along with another infusion.

100 ml 8.4% HCO3 is given with another infusion like normal saline or dextrose saline over 1 to 2 hours.

E. TREATMENT OF UNDERLYING INFECTIONS

The infection is usually occult.

a) Examine the skin and feet.

b) Ask for chest x-ray.

c) Send for urine and blood cultures.

Meanwhile start broad-spectrum antibiotics.

COMPLICATIONS

1. Lactic acidosis may result from prolonged dehydration, shock, infection, andtissue hypoxia in DKA patients.
2. Arterial thrombosis manifesting as stroke, MI, or an ischemic limb.
3. Cerebral edema.
4. Symptoms of increased intracranial pressure (e.g., headache, altered mental status, papilledema)

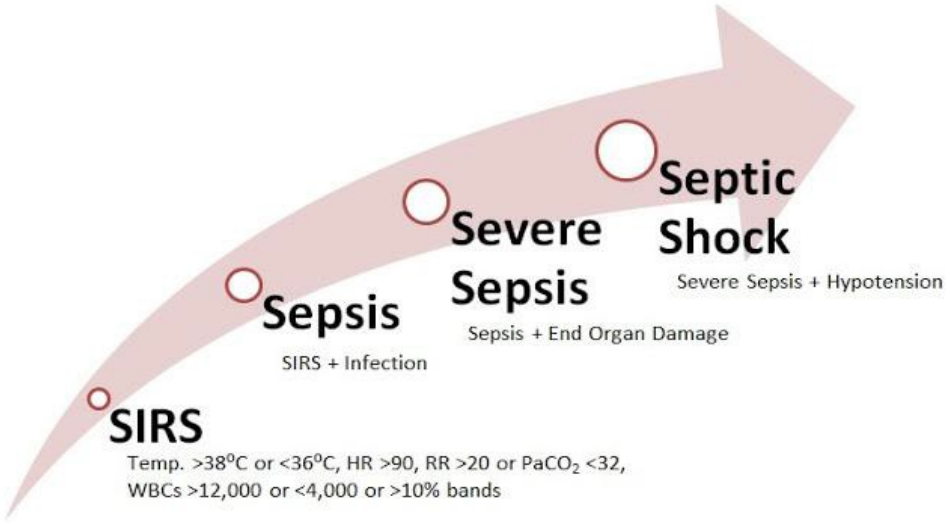
REBOUND KETOACIDOSIS

Rebound ketoacidosis can occur due to premature cessation of IV insulin infusion or inadequate doses of SC insulin after the insulin infusion has been discontinued. All patients T1DM and patients with T2DM who develop DKA (indicating severe insulin deficiency) require both basal and premeal insulin in adequate doses to avoid recurrence of metabolic decompensation.

SEPSIS

INTRODUCTION:

Sepsis can be due to bacterial, viral or fungal infection. This is one of the most significant challenges in critical care.



- **Systemic Inflammatory Response Syndrome (SIRS):**

  Two or more of the following conditions.

  1.Tachycardia (HR >90/min)

  2.Tachypnoea (>24 breaths /min)

  3.Fever**(**oral temperature > 38°C) or hypothermia (<36°C)

  4.Leukocyte count >12,000/cu mm or <4000/cu mm or >10% bands

- **Sepsis:** SIRS that has a proven or suspected microbial etiology
- **Severe sepsis:** Sepsis with one or more signs of organ dysfunction or evidence of tissue hypoperfusion like elevated lactate

CVS	**:**	Systolic BP< 90mmHg or
CNS	**:**	Sudden altered sensorium
Renal	**:**	Urine output of <0.5 ml/kg/hrfor 1 hour despite adequate fluid resuscitation
Hematological	**:**	Platelet count of <80,000 or 50% reduction in platelet count from the highest value recorded over previous 3 days
Respiratory	**:**	ARDS pH < 7.30 or base deficit > 5 mEq/L and Serum Lactate >2mmol/L
Unexplained metabolic acidosis		MAP< 70 mmHg that responds to fluid therapy

- **Septic shock:**

  Sepsis with hypotension (Systolic BP < 90)for at least 1 hr despite adequate fluid resuscitation

  or

  Need of vasopressors to maintain systolic BP> 90 or MAP>70 (with inotropic support -Dopamine 5 mcg/kg/min or norepinephrine orepinephrine 0.25 mcg/kg/min)

- **Refractory septic shock:**

  Septic shock lasts for > 1 hr, and does not respond to fluid or vasopressor administration (Dopamine >15 mcg/kg/min or norepinephrine or epinephrine of >0.25 mcg/kg/min)

- **Multi-organ dysfunction syndrome (**MODS): Dysfunction of more than one organ

- **Critical illness-related corticosteroid insufficiency (CIRCI):** Inadequate corticosteroid activity for the patient's severity of illness; should be suspected whenhypotension is not relieved by fluid administration

MANAGEMENT

- Resuscitation goals are :

  Central venous pressure- 8-12mm Hg

  Mean arterial pressure - >70mm Hg

  Urine output- > 0.5ml/kg/hr

- Before starting antibiotics, obtain two or more blood culture, atleast one blood drawn percutaneously and one blood from venous catheter.

- Identify the focus of infection and consider abscess drainage or tissue debridement

- Begin intravenous antibiotics within first hour of identification of sepsis. **HIT HARD,HIT HEAVY,HIT EARLY**

- Use crystalloids or colloids. Give bolus fluid challenge 1000 ml or crystalloid or 500ml of colloids over 10 minutes and repeat if blood pressure or urine output doesn't improve

- Start vasopressor therapy if needed
- If patient is in shock give Inj.Hydrocortisone 200mg followed by 50mg iv Q6H
- Following resolution of tissue perfusion, transfuse packed cells if Hb< 7g/dl
- Transfusion of platelets if <5000/mm3
- Maintain blood glucose < 150mg/dl
- Use LMWH for DVT prophylaxis.

ICU ACTRAPID INSULIN INFUSION PROTOCOL

Insulin infusion is Actrapid 50 units in 50ml normal saline (1 unit/ml)

	Test blood glucose level
Not requiring insulin infusion	6-12 hourly
Stable insulin infusion rate	4 hourly
Change in insulin infusion rate	1 hour after change in infusion rate

BLOOD GLUCOSE LEVEL	**ACTION**
20-60mg	10ml of 50% glucose IV stat
60-160mg	1unit/hr
161-200mg	2 units bolus and 2 units /hr
201-240mg	3 units bolus and 3 units /hr
240-300mg	4 units bolus and 4 units /hr
301mg-360mg	5 units bolus and 5 units /hr
360-400mg	6units bolus and 6 units /hr
>400mg	10 units bolus Consider reducing feeds

EMERGENCY DRUGS – INFUSION RATE IN PUMPS

LABETALOL

- 1 ampule(20 ml) = 100 mg
- Preparation : 20 ml Labetalol + 30 ml NSS
- Drug Concentration : 1 ml = 2 mg
- Rate of Infusion : $\frac{\text{Desired Dose x Quantity}}{\text{Drug concentration}}$
- Example : $\frac{5\text{ mg x }50}{100\text{ mg}}$ = 2.5 ml / hr

NITROGLYCERINE

- 1 ampule= 50 mg (10 ml)
- PREPARATION: 40 ml NSS + 10 ml NTG
- DRUG CONCENTRATION : 50 mg/ 50 ml = 1mg/1ml
- 1mg x 1000 = 1,000mcg /1ml
- Rate of Infusion : $\frac{\text{Desired Dose x 60}}{\text{Drug Concentration}}$
- Example : $\frac{5\text{ mcg x 60 min}}{1000\text{ mcg}}$ = 0.3 ml/hr

DOPAMINE

- 1 ampoule= 200mg/5ml
- AMOUNT OF DRUG NEEDED per 50 ml infusion solution :
- Amount of drug to dilute = Body weight x 3
- Ex. 70 kg x 3= 210 mg
  Amount of drug = $\frac{210\text{mg x5ml}}{2\text{oomg}}$ = 5.25ml
- PREPARATION : 44.75 ml NSS +5.25ml drug = 50ml
- 1ml = $\frac{210\text{mg x 1000}}{50\text{ml}}$ = 4200mcg
- RATE OF INFUSION : $\frac{\text{mcg x body weight x 60 min}}{\text{drug concentration}}$
- Example : $\frac{5\text{ mcg x 70 x 60}}{4{,}200\text{ mcg}}$ = 5 ml/hr

DOBUTAMINE

- 1 ampule= 250mg/5mL
- AMOUNT OF DRUG NEEDED in 50 ml solution
- Amount of drug = body weightx 3
- Ex. 70 kg x 3= 210 mg
- Amount of drug in ml = $\frac{210mg \times 5ml}{250MG}$ = 4.2ml
- PREPARATION : 45.8 ml NSS + 4.2ml drug = 50 ml
- Rate of Infusion : $\frac{mcg \times body\ weight \times 60\ min}{Drug\ concentration}$
- Example: $\frac{4\ mcg \times 70\ kg \times 60}{4200\ mcg/ml}$ = 4ml/hr

DOSE	INOTROPIC AGENTS MECHANISM	EFFECTS / SIDE EFFECTS
1-3 mcg / kg / min	Dopaminergic receptors	Splanchnic vasodilation
2 – 8 mcg / kg / min	β_1 – Receptor agonist	+ Inotropic
7 – 10 mcg / kg / min	α - Receptor agonist	↑ Systemic vascular resistance(SVR)
2.5 – 15 mcg / kg / min	β_1 – Receptor agonist > β_2 – Receptor agonist > α - Receptor agonist	+ Inotropic, ↑ SVR, tachycardia
50 mcg / kg bolus IV over 10 min, 0.375-0.75mcg / kg / min	↑ cAMP	Decreases SVR, + Inotropic, atrial and ventricular tachyarrhythmias

LASIX

- 1 ampule = 20mg (2 ml)
- Drug Concentration : 10 ampule = 200mg (20ml)
- PREPARATION: 20 ml Lasix + 20 ml NSS
- 40 ml = 200 mg
- 1 ml = 5mg
- Rate of Infusion : $\frac{Desire\ dose \times quantity}{Drug\ concentration}$ = ml/hr
- Example : $\frac{10\ mg/hr \times 40\ ml}{200\ mg}$ = 2 ml /hr

HEPARIN

- 1 ampule : 25,000 IU / 5ml

- PREPARATION : 45 ml NSS + 25,000 (5 ml) Heparin
- Rate of Infusion : $\frac{\text{Desired dose x Quantity}}{\text{Drug Concentration}}$
- Example : $\frac{100 \text{ units} \times 50}{25,000 \text{ units}} = 0.2$ ml/hr

AMIODARONE

- 1 ampoule = 150 mg (3ml)
- LOADING DOSE : 1 ampule (150 mg /3 ml) + 12 ml D5W
- A .MAINTANENCE DOSE : 360 mg in 6 hours
- $\frac{360 \text{ mg} \times 3 \text{ ml}}{150 \text{ mg}} = 7.2$ ml
- 7.2 ml (amiodarone) + 42.8 ml D5%W = 50 ml = 8.3 ml/hr

B. 540 mg in 18 hours

- $\frac{540 \text{ mg} \times 3 \text{ ml}}{150 \text{ mg}} = 10.8$ ml
- 10.8 ml (amiodarone) + 39.2 ml D5%W= 2.7ML /hr

ADRENALINE

- 1 ampoule = 1ml/1mg
- PREPARATION: 12 ml of Adrenaline + 38 ml D5W = 50 ml
- DRUG CONCENTRATION = 12 mg/ 50 ml=0.24mg
- 0.24mg x1000= 240mcg /ml
- Rate of Infusion: $\frac{\text{Desired dose} \times 60}{240\text{mcg}} = \text{ml/hr}$
- Example : $\frac{2\text{mcg} \times 60 \text{ min}}{240\text{mcg}} = 0.5$ ml/hr

VASOPRESSIN

- 1 ampoule = 20 units / 1 ml
- USUAL DOSE: 0.01 to 0.03 units/ minute
- PREPARATION : 20 units in 50 ml NSS
- DRUG CONCENTRATION: 20units / 50ml = 0.4units / ml
- Rate of Infusion: $\frac{\text{Desired Dose x 60}}{\text{Drug Concentration}}$
- Example : $\frac{\text{0.01 units/min x 60}}{\text{0.4 units / ml}}$ = 1.5 ml/hr

SANDOSTATIN (OCTREOTIDE)

- 1 ampoule : 100 mcg/ml
- 3 ampules (300 mcg /3 ml) + 27 ml NSS = 30 ml
- Drug Concentration: 30 ml = 300 mcg
- 1 ml = 10 mcg
- NOTE : 25 MCG BOLUS FOLLOWED BY 25 – 50 MCG / HR

INSULIN

- PREPARATION: 49.5 ml NSS + 50 units (0.5 ml R.I)
- Rate of Infusion : $\frac{\text{Desired Dose}}{\text{50 units}}$ x Quantity
- Example : $\frac{\text{3 units x 50 ml}}{\text{50 units}}$ = 3 ml / hr

DORMICUM(MIDAZOLAM)

- 1 ampoule = 15 mg (3ml)
- PREPARATION: 45 mg ampule (9 ml) + 36 ml NSS
- Drug Concentration : 45mg /45ml =1mg/1ml
- Rate of Infusion : $\frac{\text{Desired Dose x Quantity}}{\text{Drug Concentration}}$
- Example : $\frac{\text{2mg x 45 ml}}{\text{45mg}}$ = 2ml / hr

PROPOFOL

- INFUSION: 1 ampoule: 200 mg = 20 ml
- PREPARATION : 500 mg = 50 ml without dilution
- DRUG CONCENTRATION: 1 ml = 10 mg

- Rate of Infusion : $\frac{\text{Desired Dose x quantity}}{\text{Drug Concentration}}$
- Example : $\frac{10\text{ mg x }50\text{ml}}{500\text{mg}}$ = 1ml/hr

FENTANYL

- INFUSION:1 ampoule = 500 mcg (10 ml)
- PREPRATION : 10 ml Fentanyl + 40 ml NSS
- Drug Concentration : 50 ml = 500 mcg
- 1 ml = 10 mcg
- Rate of Infusion : $\frac{\text{Desired Dose x Quantity}}{\text{Drug Concentration}}$
- Example : $\frac{25\text{ mcg x }50\text{ ml}}{500\text{mcg}}$ = 2.5 ml

PHENYTOIN

- 1 ampoule : 250 mg / 5 ml
- LOADING DOSE: 15 mg/kg at a rate not greater than 50 mg/min for 20 – 30 mins.
- MAINTENENCE DOSE: followed by 100 mg every 6-8 hours

PROPHYLAXIS: 200-600 mg/day PO/IV

- ANTIARRYTHMIC : 10 mg IV every 15 minutes until arrhythmia stops

FOSPHENYTOIN

1 Ampoule =150mg/2ml

Loading dose=20mg/kg at a rate not greater than 150mg/min for 10 minutes

Maintanence dose: followed by 150mg every 8 hourly

EMERGENCY DRUGS – VEHICLE FOR DRUG INFUSION

AMIODARONE:

Diluent: D5W Only

Loading dose : 150mg over 10mins then 1mg/min for 6 hours

Maintenance : 450mg/250ml = 1.8mg/ml

Infusion rate : 0.5mg/min = 17ml/hr

DILTIAZEM

Diluent : NS, D5W

Concn : 125mg/125ml = 1mg/ml

Initial dose : 0.25mg/kg (20mg) bolus followed by 0.35mg/kg (25mg) bolus if necessary

Infusion rate : 5-15mg/hr, titrate to effect

DOBUTAMIE

Diluent : NS,D5W

Concn : 250mg/250ml = 1000mcg/ml

Infusion rate : 3mcg/kg/min; upto 20mcg/kg/min

(ex: for a 70kg patient to receive 3mcg/kg/min, the drip rate should be 13ml/hr)

DOPAMINE

Diluent : NS,D5W

Concn : 800mg/500ml = 1600mcg/ml

Infusion rate : start at 3 mcg/kg/min titrate to effect

(for 70kg patient to receive 3 mcg/kg/min, the drip rate should be 8 ml/hr)

EPINEPHRINE

Diluent : NS,D5W

Concn : 5mg/500ml = 10mcg/ml

Infusion rate : 1-4 mcg/min initially, titrate to effect (1mcg/min = 6ml/hr)

ESMOLOL

Diluent : NS, D5W

Concn : 2.5g/250ml = 10mg/ml

Initial dose : LD 500mcg/kg over 1 min

Infusion rate : Start at 50mcg/kg/min (21ml/hr for a 70kg patient)

HEPARIN

Concn : 25000units/250ml = 100units/ml

Initial dose : 60-80units/kg

IBUTILIDE

Diluent : NS, D5W or undiluted

Dosage : 1mg (if wt<60kg:0.01mg/kg) over 10mins; can repeat 10mins after initial infusion

Concn : Undiluted, 1mg,10ml; diluted, 1mg/50ml(0.02mg)

INAMRINONE

Diluent : NS only (protect from light)

Concn : 200mg/100ml = 2mg/ml

Initial dose : LD 0.75mg/kg over 2 mins

Infusion rate : Start at 5 mcg/kg/min, titrate upto 15mcg/kg/min

ISOPROTERENOL

Diluent : NS,D5W

Concn : 2mg/500ml = 4 mcg/ml

Infusion rate : 2 mcg/min, titrate upto 10mcg/min

LEPIRUDIN

Diluent : NS, D5W

Concn : 100mg/250ml

Loading dose(LD) : 0.4mg/kg (0.2mg/kg if clcr<60ml/min)

Maintenance(MD) : 0.15mg/kg/hr (titrate to prothrombin time 2-2.5X normal)

LIDOCAINE

Diluent : NS,D5W

Concn : 2g/500ml = 4 mg/ml

Infusion rate : 1-4 mg/min (1 mg/min = 15ml/hr)

MILRINONE

Diluent : NS,D5W

Concn : 40mg/200ml = 0.2 mg/ml

Loading dose : 50 mcg/kg diluted over 10 mins

NICARDIPINE

Diluent : NS,D5W

Concn : 40mg/200ml = 0.2 mg/ml

Loading dose : 50 mcg/kg diluted over 10 mins

NITROGLYCERIN

Diluent : NS,D5W (glass or polyolefin containers only)

Concn : 50mg/250ml = 200 mcg/ml

Infusion rate : 10 mcg/min titrate to effect (10mcg/min = 3ml/hr)

NITROPRUSSIDE

Diluent : D5W only (Protect from light)

Concn : 50mg/250ml = 200 mcg/ml

Infusion rate : 0.25 mcg/kg/min titrate to effect (10mcg/min = 3ml/hr)

NOREPINEPHRINE

Diluent : D5W only

Concn : 8mg/500ml = 16 mcg/ml

Infusion rate : 2 mcg/min titrate to effect (2mcg/min = 8ml/hr)

PHENYLEPHRINE

Diluent : D5W only

Concn : 8mg/500ml = 16 mcg/ml

Infusion rate : 2 mcg/min titrate to effect (2mcg/min = 8ml/hr)

PROCAINAMIDE

Diluent : NS, D5W

Concn : 2g/500ml = 4mg/ml

Loading dose : 17mg/kg

Infusion rate : 1- 4 mg/min = 15ml/hr

THEOPHYLLINE

Diluent : NS, D5W

Concn : 800mg/500ml = 1.6mg/ml

Initial dose : LD 5mg/kg over 20 mins

Infusion rate : 0.2-0.6 mg/kg/hr

NS – NORMAL SALINED5W – DEXTROSE 5% WATER
DOPAMINE INFUSION

400 mg in 500 ml **NS/5%D –** values in ml/hour or microdrops / min (1ml = 60 micro drops / 15 macro drops)									
Patient'sWeight ⟶ / µg/kg/ min ↓	**35 kg**	**40 Kg**	**45 Kg**	**50 Kg**	**55 kg**	**60 Kg**	**65 Kg**	**70 Kg**	**75 kg**
2 µg	5	6	7	8	9	9	10	11	12
3 µg	8	9	10	11	12	14	15	16	17
4 µg	11	12	14	15	17	18	20	21	23
5 µg	13	15	17	19	21	23	24	26	28
6 µg	16	18	20	23	25	27	29	32	34
7 µg	18	21	24	26	29	32	34	37	39
8 µg	21	24	27	30	33	36	39	42	45
9 µg	24	27	30	34	37	41	44	47	51
10 µg	26	30	34	38	41	45	49	53	56
11 µg	29	33	37	41	45	50	54	58	62
12 µg	32	36	41	45	50	54	59	63	68
13 µg	34	39	44	49	54	59	63	68	73
14 µg	37	42	47	53	58	63	68	74	79
15 µg	39	45	51	56	62	68	73	79	84
16 µg	42	48	54	60	66	72	78	84	90
17 µg	45	51	57	64	70	77	83	89	96
18 µg	47	54	61	68	74	81	88	96	101
19 µg	50	57	64	71	78	86	93	100	107
20 µg	53	60	68	75	83	90	98	105	113

DOBUTAMINE INFUSION

500 mg in 500 ml **NS/5%D –** values in ml/hour or microdrops / minmin (1ml = 60 micro drops / 15 macro drops)									
Patient's Weight → / µg/kg/ min ↓	**35 kg**	**40 Kg**	**45 Kg**	**50 Kg**	**55 kg**	**60 Kg**	**65 Kg**	**70 Kg**	**75 kg**
2 µg	4	5	5	6	7	7	8	8	9
3 µg	6	7	8	9	10	11	12	13	14
4 µg	8	10	11	12	13	14	16	17	18
5 µg	11	12	14	15	17	18	20	21	23
6 µg	13	14	16	18	20	22	23	25	27
7 µg	15	17	19	21	23	25	27	29	32
8 µg	17	19	22	24	26	29	31	34	36
9 µg	19	21	24	27	30	32	35	38	41
10 µg	21	24	27	30	33	36	39	42	45
11 µg	23	26	30	33	36	40	43	46	50
12 µg	25	29	32	36	40	43	47	50	54
13 µg	27	31	35	39	43	47	51	55	59
14 µg	29	34	38	42	46	50	55	59	63
15 µg	32	36	41	45	50	54	59	63	68
16 µg	34	38	43	48	53	58	62	67	72
17 µg	36	41	46	51	56	61	66	71	77
18 µg	39	43	49	54	59	65	70	76	81
19 µg	40	46	51	57	63	68	74	80	86
20 µg	42	48	54	60	66	72	78	84	90

SODIUM NITROPRUSSIDE INFUSION

50 mg in 100 ml 5%D + 500 mg thiosulfate, Cover with black paper – values in ml/hour or microdrops / minmin (1ml = 60 micro drops / 15 macro drops)									
Patient's Weight → / µg/kg/ min ↓	**35 kg**	**40 Kg**	**45 Kg**	**50 Kg**	**55 kg**	**60 Kg**	**65 Kg**	**70 Kg**	**75 kg**
0.2	1	1	1	1	1	1	2	2	2
0.5	2	2	3	3	3	4	4	4	5
1.0	4	5	5	6	7	7	8	8	9
1.5	6	7	8	6	10	11	12	13	14
2.0	8	10	11	12	13	14	16	17	18
2.5	11	12	14	15	17	18	20	21	23
3.0	13	14	16	18	20	22	23	25	27
3.5	15	17	19	21	23	25	27	29	32
4.0	17	19	22	24	26	29	31	34	36
4.5	19	22	24	27	30	32	35	38	41
5.0	21	24	27	30	33	36	39	42	45

NORADRENALINE INFUSION

4 mg in 500ml 5% Dextrose values in ml / hour or micro drops / minmin (1ml = 60 micro drops / 15 macro drops)	
µg / min	Micro drops / min
1	8
2	15
3	23
4	30
5	38
6	45
7	53
8	60
9	68
10	75
11	83
12	90
13	98
14	105
15	113

NITROGLYCERIN INFUSION

200 mg in 500ml Normal saline in glass bottle via rigid polyethylene tube values in ml / hour or micro drops / minmin (1ml = 60 micro drops / 15 macro drops)	
µg / min	Micro drops / min or ml per hour
5	1
10	2
20	3
30	5
40	6
50	8
75	11
100	15
150	23
200	30
250	38
300	45
350	53
400	60

DRUG INTERACTION CHART

	Dobutamine	Dopamine	Adrenaline	Noradrenalline	Vasopressin	Frusemide	Insulin	Morphine	Midazolam	Lorazepam	Sodabicarb
Dobutamine	…	C	C	C	C		C	C	__	C	
Dopamine	C	…	C	C	C			C	C	C	
Adrenaline	C	C	…	C	C	V	C	C	C	C	
Noradrenaline	C	C	C	…	C	__		C	C	C	
Vasopressin	C	C	C	C	…	x	C	x	x	x	C
Frusemide			V	__	x	…	x	__		C	C
Insulin	x		C			x	…	C	C	x	x
Morphine	x	C	C	C	C	__	C	…	C	C	__
Midazolam	__	C	C	C	x		C	C	…	x	
Lorazepam	C	C	x	C	x	C		C	x	…	x
Sodabicarb					C	C		__		x	…

C Compatible

Incompatbile

… patible for short duration

x No data

_ Conflicting data

V Variable

RISK / OUTCOME ASSESSMENT

CARDIOVASCULAR SYSTEM

The **Killip classification** is devised before reperfusion therapy in an individuals with an acute myocardial infarction , in order to risk stratify them.

KILLIP CLASS	DEFINITION	MORTALITY (%)
I	No clinical signs of heart failure	6
II	With rales or crackles in the lungs, S_3 gallop	17
III	Frank acute pulmonary edema	30-40
IV	Cardiogenic shock	60-80

The **TIMI Score** in STEMI is a combination of history and physical to predict 30 day mortality in patients who receive thrombolytic therapy

TIMI Risk Score	POINTS
HISTORY	
Age >75	3
Age 65- 74	2
Angina or Diabetes, HTN	1
EXAMINATION	
Systolic BP <100	3
Heart rate >100	2
KILLIP Class II-IV	2
Weight <67 kg	1
PRESENTATION	
Anterior STEMI or LBBB	1
Time to reperfusion> 4 hours	1
	TOTAL 0-14

RISK SCORE	30 DAY MORTALITY %
0	**0.8**
1	**1.6**
2	**2.2**
3	**4.4**
4	**7.3**
5	**12**
6	**16**
7	**23**
8	**27**
>8	**36**

CHA_2DS_2-VASc score for stroke risk in Atrial fibrillation

	CONDITION	POINTS
C	Congestive heart failure (or Left ventricular systolic dysfunction)	1
H	Hypertension: blood pressure consistently above 140/90 mmHg (or treated hypertension on medication)	1
A_2	Age 2:75 years	2
D	Diabetes Mellitus	1
S_2	Prior Stroke or TIA or thromboembolism	2
V	Vascular disease (e.g. peripheral artery disease, myocardial infarction, aortic plaque)	1
A	Age 65–74 years	1
Sc	Sex category (i.e.female sex)	1

Annual Stroke Risk	
CHA_2DS_2-VASc Score	**Stroke Risk %**
0	0
1	1.3
2	2.2
3	3.2
4	4.0
5	6.7
6	9.8
7	9.6
8	12.5
9	15.2

Treatment recommendations based on the CHA2DS2-VASc score

Score	Risk	Anticoagulation Therapy	Considerations
0 (Male) or 1 (Female)	Low	No anticoagulant therapy	No anticoagulant therapy
Male)	Moderate	Oral anticoagulant should be considered	Oral anticoagulant, with well controlled Vitamin K Antagonist (VKA, e.g. warfarin with time in therapeutic range >70%) or Non-VKA Oral Anticoagulant (NOAC, e.g. dabigatran, rivaroxaban, edoxaban or apixaban)
2 or greater	High	Oral anticoagulant is recommended	Oral anticoagulant, with well controlled Vitamin K Antagonist (VKA, e.g. warfarin with time in therapeutic range >70%) or Non-VKA Oral Anticoagulant (NOAC, e.g. dabigatran, rivaroxaban, edoxaban or apixaban)

American college of cardiology/American heart association-Guidelines of evaluation and management of chronic heart failure

STAGE	DESCRIPTION	TREATMENT
A	No structural heart disease and no symptoms but risk factors : CAD,HTN ,DM, cardio toxins, familial cardiomyopathy	Lifestyle modification-diet, exercise, smoking cessation; treat hyperlipidemia and use ACEI for HTN
B	Abnormal LV systolic function ,MI, valvular heart disease but no HF symptoms	Lifestyle modifications, ACEI, nadrenergic blockers
C	Structural heart disease and HF symptoms	Lifestyle modifications, ACEI , nadrenergic blockers, diuretics, digoxin
D	Refractory HF symptoms to maximal medical management	Therapy listed under A,B,C and mechanical assist device, heart transplantation, continuous IV inotropic infusion, hospice care in selected patients

GASTROINTESTINAL SYSTEM

ROCKALL RISK SCORING SYSTEM - To identify adverse outcome following acute upper gastrointestinal bleeding.

Mnemonic is ABCDE - Age, Blood pressure fall (shock), Co-morbidity, Diagnosis & Evidence of bleeding

Variable	Score 0	Score 1	Score 2	Score 3
Age	<60	60- 79	>80	
Shock	No shock	Pulse >100 BP >100 Systolic	SBP<100	
Co-morbidity	Nil major		CHF, IHD, major morbidity	Renal failure, liver failure, metastatic cancer

Diagnosis	Mallory-Weiss	All other diagnoses	GI malignancy	
Evidence of bleeding	None		Blood, adherent clot, spurting vessel	

Score:

< 3 - good prognosis

> 8- high risk of mortality

CHILD PUGH SCORE-To assess the prognosis of chronic liver disease

Measure	**1 point**	**2 points**	**3 points**
Total bilirubin (mg/dl)	< 2	2-3	>3
Serum albumin (g/dl)	>3.5	2.8-3.5	< 2.8
Prothrombin time prolongation (values >14 in secs)	< 4.0	4.0-6.0	> 6.0
Ascites	None	Mild	Moderate to Severe
Hepatic encephalopathy	None	Grade I-II (or suppressed with medication)	Grade III-IV (or refractory)

Chronic liver disease is classified into Child-Pugh class A to C

Points	Class	One year survival	Two year survival
5-6	**A**	100%	85%
7-9	**B**	81%	57%
10-15	**C**	45%	35%

MELD (Model For End-stage Liver Disease)- To assess the severity of chronic liver disease. It is useful in persons waiting for Liver Transplantation.

MELD = 3.78×ln [serum bilirubin (mg/dL)] +11.2×ln [INR] + 9.57×ln[serum creatinine (mg/dl)] + 6.43×aetiology(0: cholestatic or alcoholic, 1:otherwise)

The following modifications to the score

- If the patient has been dialyzed twice within the last 7 days, then the value for serum creatinine used should be 4.0
- Any value less than one is given a value of 1 (i.e. if bilirubin is 0.8, a value of 1.0 is used) to prevent the occurrence of scores below 0 (the natural logarithm of 1 is 0, and any positive value below 1 would yield a negative result)

MELD Score	Mortality (%)
40 or >	71.3
30–39	52.6
20–29	19.6
10–19	6.0
< 9	1.9

MADDREY DISCRIMINANT FUNCTION- Scoring system in alcoholic hepatitis

= (4.6× [Prothrombin time- control PT]+serum bilirubin)

MDF > 32 -one month mortality-32%

50% with presence of hepatic encephalopathy

75% with presence of hepatorenal syndrome

WEST HAVEN CRITERIA for grading mental status in patient with hepatic encephalopathy

GRADE	FEATURES
0	No abnormality detected
I	Trivial lack of awareness Euphoria or anxiety Shortened attention span Impairment of addition or subtraction
II	Lethargy or apathy Disorientation for time Obvious personality change Inappropriate behaviour
III	Somnolence to semi-stupor Responsive to stimuli Confused Gross disorientation Bizarre behaviour
IV	Coma,unable to test mental state

RANSONS CRITERIA in non-gallstone acute pancreatitis, the parameters are

At admission:

1. Age in years >55 years
2. WBC count >16000 cells/mm^3
3. Blood glucose >200 mg/dl
4. Serum AST >250 IU/L
5. Serum LDH >350 IU/L

Within 48 hours:

1. Serum calcium < 8.0 mg/dl
2. Hematocrit fall > 10%
3. Hypoxemia PaO_2 < 60 mmHg
4. Base deficit > 4 mEq/L
5. Sequestration of fluids > 6 Litres
6. BUN increased by 5 or more mg/dl after IV fluid hydration

The criterion for point assignment is that a certain breakpoint be met at anytime during that 48 hour period, so that in some situations it can be calculated shortly after admission.

For **gallstone pancreatitis**, the parameters are:

At admission:

1. Age in years > 70 years
2. WBC count > 18000 cells/mm^3

3. Blood glucose > 220 mg/dl
4. Serum AST > 250 IU/L
5. Serum LDH > 400 IU/L

Within 48 hours:

1. Serum calcium < 8.0 mg/dl
2. Hematocrit fall > 10%
3. Hypoxemia PaO_2 < 60 mmHg
4. Base deficit > 5 mEq/L
5. Sequestration of fluids > 4 Litres
6. BUN increased by 2 or more mg/dl after IV fluid hydration

Interpretation

- Score 2: 3, severe pancreatitis likely.
- Score < 3, severe pancreatitis is unlikely

or

- Score 0 to 2 : 2% mortality
- Score 3 to 4 : 15% mortality
- Score 5 to 6 : 40% mortality
- Score 7 to 8 : 100% mortality

RENAL SYSTEM

Kidney Disease Improving Global Outcome (KDIGO)

STAGES OF ACUTE KIDNEY INJURY (AKI)

STAGE	SERUM CREATININE	URINE OUTPUT
1	Increase in 1.5-1.9 times baseline or 2:0.3 mg/dl increase	< 0.5 ml/kg/h for 6 h
2	2-2.9 times baseline	< 0.5 ml/kg/h for 12 h
3	3 times baseline or Increase in serum creatinine to 2:4 mg/dl or Initiation of renal replacement therapy	< 0.3 ml/kg/h for 24 h or Anuria for 2:12 h

For CKD patients do COCKCROFT-GAULT FORMULA:

$$\text{Estimated GFR } \left(\frac{\text{ml}}{\text{min}}\right) = \frac{(140 - \text{Age}) \times \text{Body weight (kg)}}{72 \times \text{S. creatinine (mg/dl)}} \times 0.85 \text{ (in females)}$$

Kidney Disease Outcomes Quality Initiative (KDOQI)

STAGES OF CHRONIC KIDNEY DISEASE

CKD STAGE	GLOMERULAR FILTRATION RATE	DESCRIPTION
1	> 90 ml/min	Kidney damage with normalor increased GFR
2	60-89 ml/min	Kidney damage with mildly decreased GFR
3	30-59 ml/min	Moderate decreased GFR
4	15-29 ml/min	Severely decreased GFR
5	<15 ml/min or on dialysis	End stage renal disease(ESRD)

CENTRAL NERVOUS SYSTEM

GRADING SCALES FOR SUBARACHNOID HEMORRHAGE

Grade	Hunt – Hess Scale	World Federation of Neurosurgical Societies (WFNS) Scale
1	Mild headache, normal mental status, no cranial nerve or motor findings	GCS score 15, no motor deficits
2	Severe headache, normal mental status, may have cranial nerve deficit	GCS score 13 -14, no motor deficits
3	Somnolent, confused, may have cranial nerve or mild motor deficit	GCS score 13 – 14, with motor deficits
4	Stupor, moderate to severe motor deficit, may have intermittent reflex posturing	GCS score 7-12, with or without motor deficits
5	Coma, reflex posturing or flaccid	GCS score 3-6,with or without motor deficits

For ruptured aneurysms, prognosis for good outcome falls as the grade increases. For example it is unusual for grade 1 patient to die if the aneurysm is treated, but the mortality rate for grade 4 and 5 patients may be as high as 80%.

GLASGOW COMA SCALE

Glasgow coma scale		Score
EYE OPENING	Spontaneously	4
	To speech	3
	To pain	2
	None	1
VERBAL RESPONSE (Non intubated)	Orientated	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	None	1
VERBAL RESPONSE (Intubated)	Seems able to talk	5
	Questionable ability to talk	3
	Generally unresponsive	1
MOTOR RESPONSE	Obeys commands	6
	Localizes to pain	5
	Withdraws from pain	4
	Flexion to pain (Decorticate posture)	3
	Extension to pain (Decerebrate posture)	2
	None	1
MAXIMUM SCORE		**15**

Score 3 or 4- 85% chance of dying or remaining vegetative

Score > 11 - 5 to10% chance of dying or remaining vegetative

- 85% chance of moderate disability or good recovery

Intermediate scores correlate with proportional chances of recovery

BRITISH MEDICAL RESEARCH COUNCIL CLASSIFICATION

for assessing severity in TB Meningitis

STAGE	CLINICAL FEATURES
I **EARLY DISEASE**	Meningeal signs only Conciousness intact No focal neurological signs
II **MEDIUM SEVERITY**	Conciousness is disturbed but the patient is not comatose or delirious Focal neurological signs or cranial nerve palsies present Raised intracranial pressure present secondary to hydrocephalus
III **ADVANCED DISEASE**	Deeply comatose with evidence of brainstem dysfunction Decerebrate or decorticate posturing, fixed dilated pupils

RESPIRATORY SYSTEM

Acute Respiratory Distress Syndrome (ARDS)

- Acute onset (within 1 week of known clinical disease)
- Bilateral opacities on chest x ray
- Respiratory failure not fully explained by heart failure
- PaO2/FiO2 <300 mmHg with a minimum of 5cm H_2O PEEP

Severity of ARDS

ARDS SEVERITY	PaO2/FiO2	MORTALITY%
Mild	200-300	27
Moderate	100-200	32
Severe	<100	45

CURB-65: To assess the severity of Pneumonia

Confusion

Urea-> 20mg/dl

Respiratory rate >30/min

Blood pressure :Systolic<90 mm Hg

Diastolic< 60 mm Hg

Age > 65 years

Give score of 1 for each feature present

CURB-65 SCORE	SEVERITY	WHERE TO TREAT
0	LOW	HOME
1	LOW	HOME
2	MODERATE	HOSPITAL
3-5	HIGH	HOSPITAL:ASSESS FOR ICU ADMISSION

Wells Clinical Score for DVT

Clinical Parameter Score	Score
Active cancer	+1
Paralysis or recent plaster immobilization of the lower extremities	+1
Recently bedridden for >3 days or major surgery within 4 weeks	+1
Localized tenderness along the distribution of the deep venous system	+1
Entire leg swelling	+1
Calf swelling >3 cm compared with the asymptomatic leg	+1
Pitting edema (greater in the symptomatic leg)	+1
Previous DVT documented	+1
Collateralsuperficialveins (non varicose)	+1
Alternative diagnosis (as likely or greater than that of DVT)	-2
Total of Above Score	
High probability	**3**
Moderate probability	**1 or 2**
Low probability	**:: 0**

DEPARTMENT OF MEDICINE

INVESTIGATION CHART

CBC DATE					
HB%					
TC					
DC					
ESR					
RBC					
PLT					
PCV					
RDW					
MCV					
MCH					
MCHC					

RFT DATE	**UREA**	**CREATININE**

ELECTROLYTES	**DATE**				
Na+					
K+					
Cl					
HCO3					

DATE				
RBS				
FBS				
PPBS				

DATE	**CLOTTING PROFILE**				
	BT	**CT**	**PT**	**aPTT**	**INR**

LFT	**Sr.BILIRUBIN**			**SGOT**	**SGPT**	**ALP**	**Sr.PROTEIN**	**ALBUMIN**
DATE		**D**	**ID**					

----------MEDICAL COLLEGE, DEPARTMENT OF

MEDICINE DRUG CHART

NAME: **AGE:** **IP NO:** **DRUG ALLERGY:**

DRUGS	STRENGTH	ROUTE OF ADMIN	DOSAGE	DATE										SIGN OF M.O.

DEPARMENT OF GENERAL MEDICINE,----------
MEDICAL COLLEGE

DISCHARGE SUMMARY

NAME: **AGE:** **SEX:**
IP.NO:

CMHIS: **PHONE:**

DATE OF ADMISSION: **DATE OF DISCHARGE:**

DIAGNOSIS:

CHIEF COMPLAINTS:

PRESENTING ILLNESS:

PAST HISTORY:
SHT/DM/CAD/TB/BA/COPD/CVD/RHD/DYSLIPIDEMIA/SEIZURE/JAUNDICE

SURGERY/BLOOD TRANSFUSION

PERSONAL HISTORY: ALCOHOLISM **TOBACCO**

MENSTRUAL HISTORY:

FAMILY HISTORY:

DRUG HISTORY:

EXAMINATION:
PALLOR/ICTERUS/CYANOSIS/CLUBBING/LYMPHADENOPATHY/PEDAL EDEMA

GENERAL EXAMINATION: GCS **BUILT**
CONSCIOUS **ORIENTED**

CVS-

RS-

P/A-

CNS-

DIAGNOSIS:

TREATMENT GIVEN:

COURSE AT HOSPITAL:

CONDITION ON DISCHARGE:

ADVICE GIVEN:

PROCEDURES

NASOGASTRIC TUBE INSERTION

INDICATIONS

To drain gastric contents

To decompress the stomach

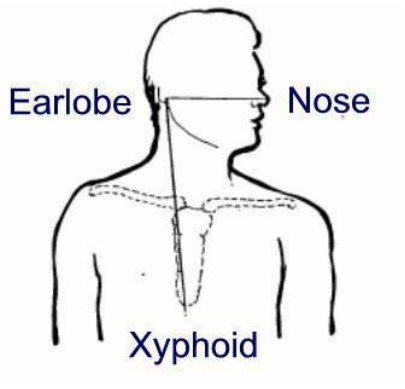
To obtain a specimen of the gastric contents,

To treat gastric immobility, and bowel obstruction.

For drainage and/or lavage in drug overdosage or poisoning

Procedures:

1. Examine nostrils for deformity/obstructions to determine best side for insertion
2. Measure tubing from bridge of nose to earlobe, then to the point halfway between the end of the sternum and the navel
3. Mark measured length with a marker or note the distance
4. Lubricate 2-4 inches of tube with lubricant (preferably 2% Xylocaine
5. Pass tube via either nare posteriorly, past the pharynx into the esophagus and then the stomach.
6. Instruct the patient to swallow (you may offer ice chips/water) and advance the tube as the patient swallows.
7. Advance tube until mark is reached Check for placement by attaching syringe to free end of the tube, aspirate sample of gastric contents.



BLADDER CATHETERISATION

Indications

To the bladder and its contents.

To drain bladder contents

To decompress the bladder

To obtain a specimen of urine

To treat urinary retention, and bladder outlet obstruction.

To aid in the diagnosis of GU bleeding.

PROCEDURE

Steps in Catheterization:

Female

- Place the patient in supine position with the knees flexed and separated and feet flat on the bed, about 60 cm apart. If this position is uncomfortable, instruct the patient either to flex only one knee and keep the other leg flat on the bed, or to spread her legs as far apart as possible. A lateral position may also be used for elderly or disabled patients.

- With the thumb, middle and index fingers of the non-dominant hand, separate the labia majora and labia minora. Pull slightly upward to locate the urinary meatus. Maintain this position to avoid contamination during the procedure.

- With your dominant hand, cleanse the urinary meatus, using forceps and chlorhexidine soaked cotton balls. Use each cotton ball for a single downward stroke only.

- Place the drainage basin containing the catheter between the patient's thighs.

- Pick up the catheter with your dominant hand.

- Insert the lubricated tip of the catheter into the urinary meatus.

- Advance the catheter about 5-5.75 cm, until urine begins to flow then advance the catheter a further 1-2 cm.

Note: If the catheter slips into the vagina, leave it there to assist as a landmark. With another lubricated sterile catheter, insert into the urinary meatus until you get urine back. Remove the catheter left in the vagina at this time.

- Attach the syringe with the sterile water and inflate the balloon. It is recommended to inflate the 5cc balloon with 7-10cc of sterile water, and to inflate the 30cc balloon with 30-35cc of sterile water.
- Improperly inflated balloons can cause drainage and leakage difficulties.
- Gently pull back on the catheter until the balloon engages the bladder neck.

Male

- Place the patient in supine position with legs extended and flat on the bed.
- Prepare the catheterization tray and catheter and drape the patient appropriately using the sterile drapes provided. Place a sterile drape under the patient's buttocks and the fenestrated (drape with hole) drape over the penis.
- Apply water-soluble lubricant to the catheter tip.
- With your non-dominant hand, grasp the penis just below the glans and hold upright.
- If the patient is uncircumcised, retract the foreskin. Replace the foreskin at the end of the procedure.
- With your dominant hand, cleanse the glans using chlorhexidine soaked cotton balls. Use each cotton ball for a single circular motion.
- Place the drainage basin containing the catheter on or next to the thighs.

- With you non-dominant hand, gently straighten and stretch the penis. Lift it to an angle of 60-90 degrees. At this time you may use the urojet to anesthetize the urinary canal, which will minimize the discomfort.

- With your dominant hand, insert the lubricated tip of the catheter into the urinary meatus.

- Continue to advance the catheter completely to the bifurcation i.e. until only the inflation and drainage ports are exposed and urine flows (this is to ensure proper placement of the catheter in the bladder and prevent urethral injuries and hematuria that result when the foley catheter balloon is inflated in the urethra).

Note: If resistance is met during advancement of the catheter: Pause for 10-20 seconds. Instruct the patient to breathe deeply and evenly. Apply

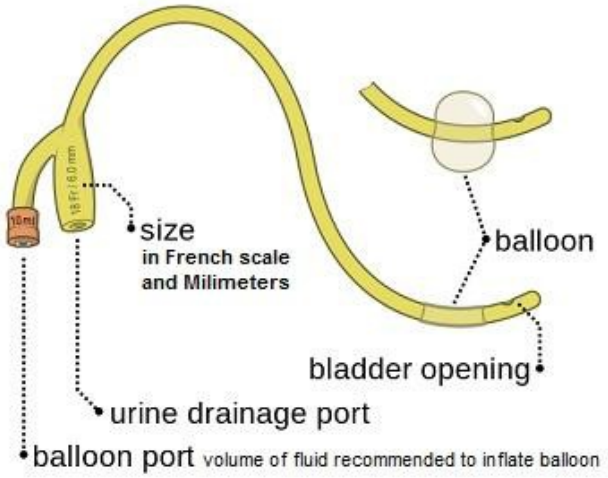
gentle pressure as the patient exhales

If you still meet resistance, stop the procedure and repeat above steps.

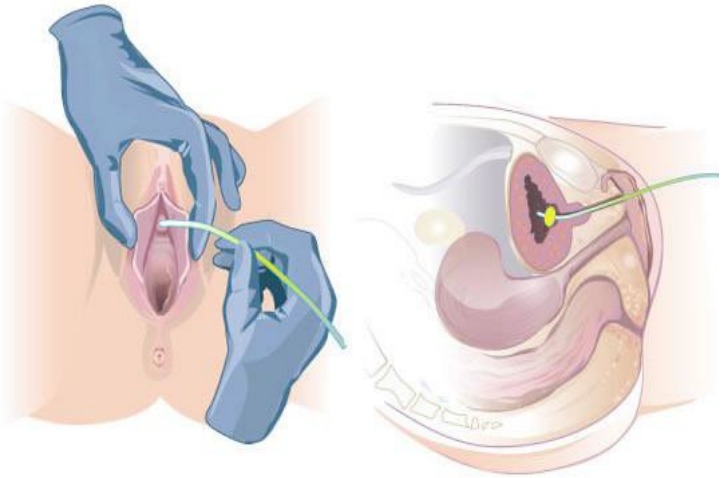
- Attach the syringe with the sterile water and inflate the balloon. It is recommended to inflate the 5cc balloon with 7-10cc of sterile water, and to inflate the 30cc balloon with 35cc of sterile water. Improperly inflated balloons can cause drainage and leakage difficulties.

- Gently pull back on the catheter until the balloon engages the bladder neck.

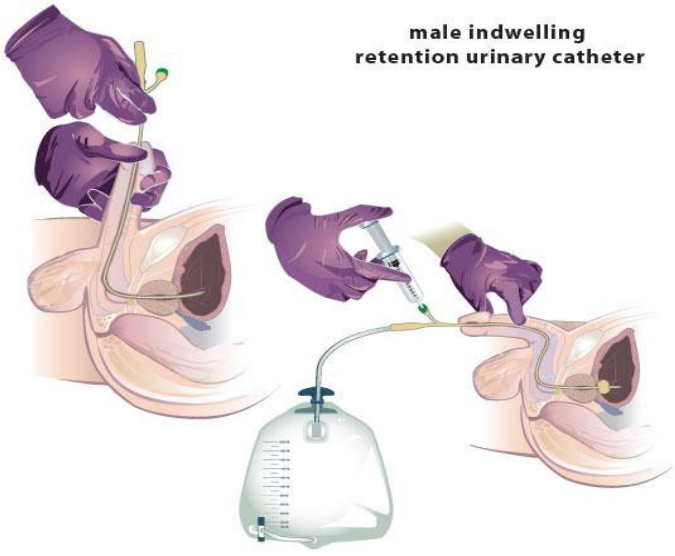
- Attach the urinary drainage bag and position it below the bladder level. Secure the catheter to the thigh. Avoid applying tension to the catheter. Remove the drapes.



female catheter insertion



male indwelling retention urinary catheter



ENDOTRACHEAL INTUBATION

INDICATIONS

Endotracheal intubation is used for the following conditions:

- respiratory arrest
- respiratory failure
- airway obstruction
- need for prolonged ventilatory support
- multiple trauma, head injury and abnormal mental status
- inhalation injury with erythema/edema of the vocal cords
- protection from aspiration

PROCEDURE

1 Open the patient's mouth by separating the lips and pulling on the upper jaw with the index finger.

2 Holding a laryngoscope in the left hand, insert it into the mouth of the patient with the blade directed to the right tonsil.

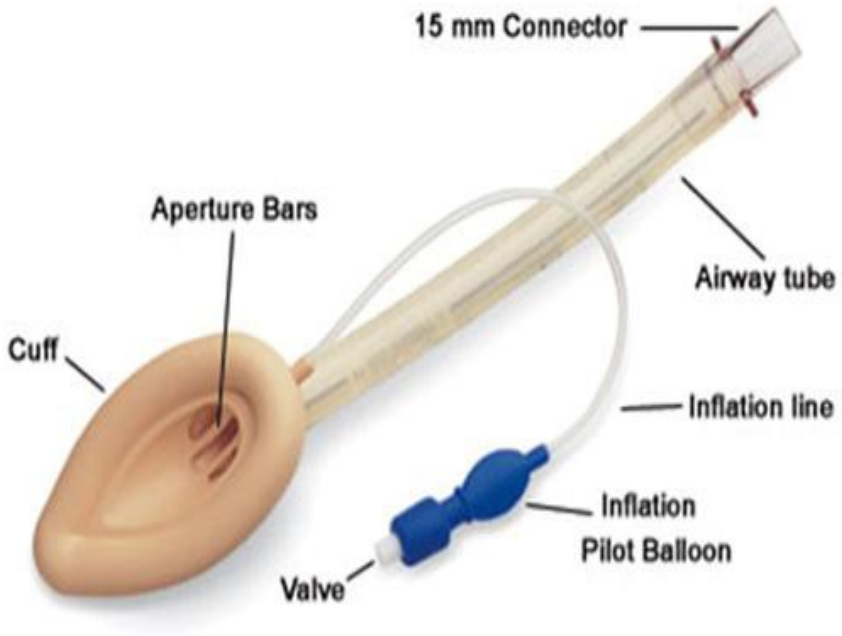
3. Once the right tonsil is reached, the laryngoscope is swept to the midline, keeping the tongue on the left to bring the epiglottis into view.

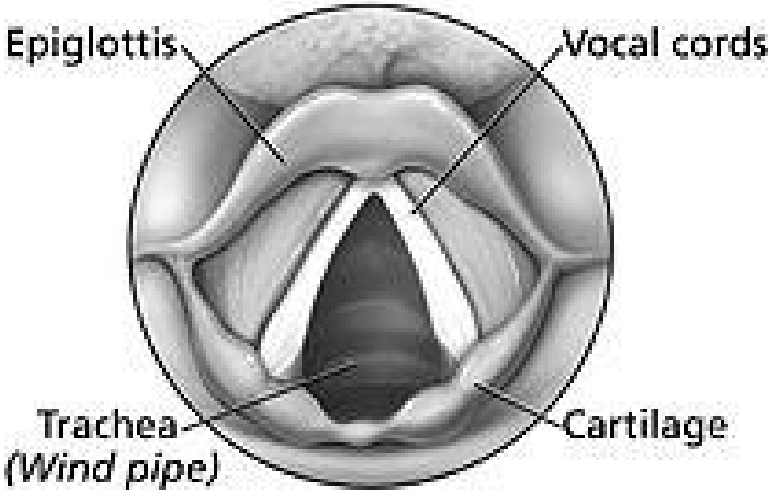
4 The laryngoscope blade is then advanced until it reaches the angle between the base of the tongue and the epiglottis.

5 The laryngoscope is lifted upwards towards the chest and away from the nose to bring the vocal cords into view.

6 The tube is inserted through the cords to the point that the cuff rests just below the cords. Finally, the cuff is inflated

7 Using a stethoscope listen for breathing sounds to ensure correct placement of the tube.





National Cancer Institute

DEFIBRILLATION

INDICATIONS

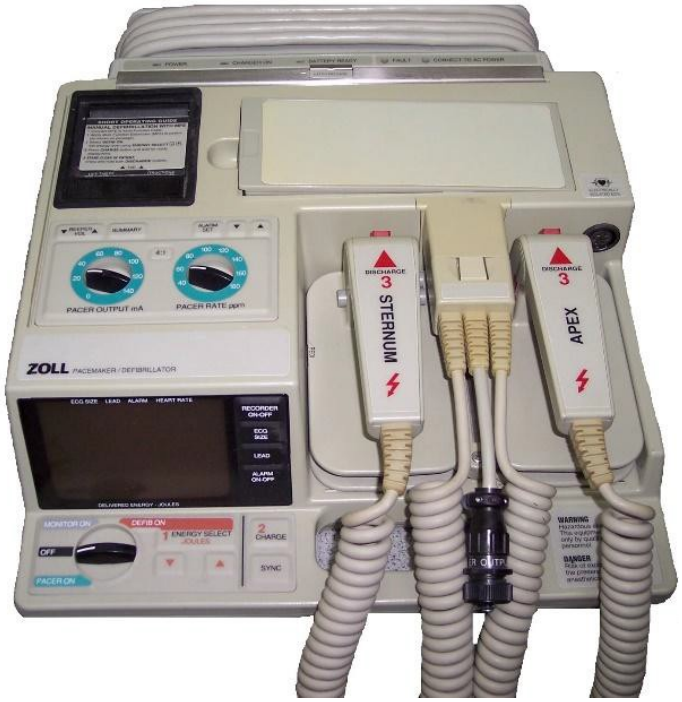
Defibrillation is performed to correct life-threatening arrhythmias of the heart including ventricular fibrillation and cardiac arrest.

PROCEDURE

Electrocardiogram leads are attached to the patient chest. Gel or paste is applied to the defibrillator paddles, or two gel pads are placed on the patient's chest.

The paddles are placed on the patients chest with conducting gel to ensure good contact between the paddles and skin.

The defibrillator is programmed to recognize distinct components of the electrocardiogram and will only fire the electrical shock at the correct time. Again, all direct contact with the patient is discontinued prior to defibrillation.



ARTERIAL BLOOD GAS

Arterial blood samples should be obtained in strict anaerobic conditions and should be placed on ice and held at 0° C until analysis. Any air bubbles introduced during the sampling procedure will lead to overestimation of PaO_2 and $PaCO_2$

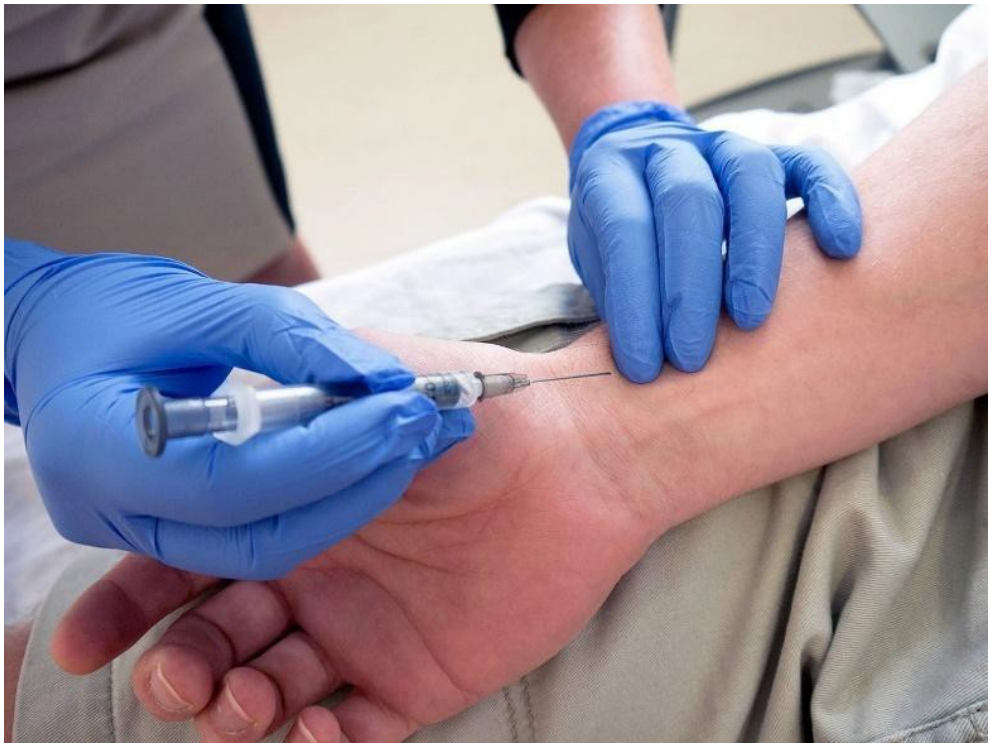
Radial Artery Blood Sampling

The radial artery is most easily accessible medial to the radial styloid process and lateral to the flexor carpi radialis tendon, 2-3 cm proximal to the ventral surface of the wrist crease (see the image below).

Palpate the patient's radial pulse with the index and middle finger pads of the nondominanthand Visualize the direction of the artery, and clean the desired puncture site in an outward circular motion with an antiseptic solution

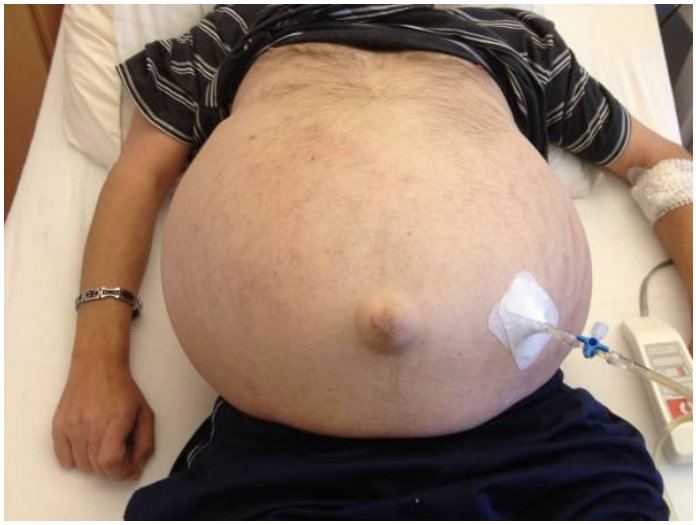
Uncap the ABG syringe, and hold it with 2 fingers of the dominant hand. The needle bevel should be facing upward. Insert the needle just under the skin at a 45º angle, aiming in the direction of the artery, while palpating the radial pulse proximal to the puncture site with the nondominanth and . Angling the needle minimizes trauma to the vessel and allows smooth muscle fibers to occlude the puncture site after the procedure.

Advance the needle slowly. Once the needle enters the lumen of the radial artery, the arterial blood flow starts to fill the syringe .At this point, remove the nondominant hand from the field. It is not necessary to pull back the plunger, unless an unvented plunger with a small (25-gauge) needle is being used or the patient has a weak pulse. After 2-3 mL of arterial blood has been obtained, remove the needle. At the same time, use a small piece of gauze, held in the nondominant hand, to apply firm occlusive local pressure at the puncture site for 5 minutes



PARACENTESIS

Paracentesis is a procedure in which a needle or catheter is inserted into the peritoneal cavity to obtain ascitic fluid for diagnostic or therapeutic purposes



INDICATIONS

- New-onset ascites
- Suspected spontaneous or secondary bacterial peritonitis
- Respiratory compromise secondary to ascites
- Abdominal pain or pressure secondary to ascites

PROCEDURE

- After proper antiseptic preparation and local anesthesia, a diagnostic tap can be performed with a 10- to 20-mL syringe and an 18-gauge needle.

- After proper antiseptic preparation and local anesthesia, a therapeutic tap can be performed with an intravenous catheter over the needle connected to drainage tubing.
- To minimize the risk of persistent leak from the puncture site, use a small-gauge needle or take a "Z" track during insertion of the needle. (During removal of the needle, the subcutaneous tissue seals on itself.)in the right lower quadrant.

BONE MARROW BIOPSY

INDICATIONS:

1 Evaluation of unexplained anemia, leukopenia, thrombocytopenia, or pancytopenia

2. Evaluation of elevated peripheral counts (eg, polycythemia, thrombocytosis, leukocytosis).

3. Diagnosis and evaluation of plasma cell disorders and leukemias, ITP, aplasticanaemia, Unexplainedsplenomegaly, infections (KALA AZAR),storage disorders(GAUCHERS DISEASE)

PROCEDURE

1. Obtain informed consent for bonemarrow aspiration/biopsy.

2. Assist the patient to assume a prone position. If unable to maintain prone position, try a lateral decubitus position, with knees bent toward chest.

3. Palpate the iliac crest and follow along to posterior superior spine. Mark site with pen.

4. Using sterile technique, prepare the surrounding skin with povidone-iodine solution. Apply sterile drape to area.

5. With 25-gauge needle, draw up 9 cc of 1% lidocaine solution. Inject 0.5 cc under the skin, raising a wheal. Change needle to 22-gauge. Inject more lidocaine deeper into surrounding tissue in a circular formation, locating and tapping the iliac crest to anesthetize the periosteum. Occasionally, a spinal needle is needed to reach the periosteumin a larger patient. Wait about two minutes for the anesthetic to take effect.

6. With the surgical blade, make a small incision.

7. Loosen and then relock the obturator of the Jamshidi needle with the cap secured. Introduce the needle into the incision, holding the capped end firmly in the palm of the hand. Anchor the shaft between the middle and index fingers of the other hand. With a rotating motion, carefullypenetrate the soft tissue of the periosteum. Continue tomaneuver the needle through the cortex of the iliac crest about 1 mm to the marrow. Release the manual pressure and slowly insert the needle about 1–2 mm further.

8. Unlock the cap, and remove the obturator. Quickly attachan empty 10 cc syringe to the end of the biopsy needle. Askthe patient to take a deep breath to minimize a momentary painful pulling sensation as a small amount, about 1 cc, isaspirated. If no aspirate is obtained, advance the needle another 1–2 mm. A good specimen contains visible bonespicules when spread on the slide. Sometimes, it is necessary to change sites and repeat the aspiration procedure.

9. If additional tests have been ordered, more aspirate maybe withdrawn into heparinized syringes.

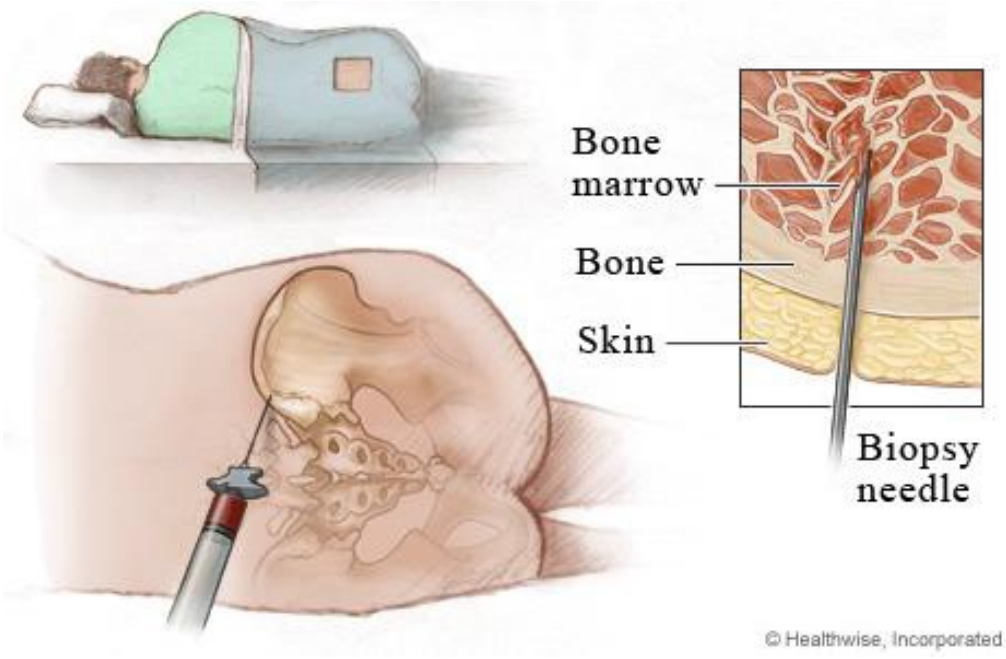
10. If a core biopsy also is required, replace the needle cap and pull back the needle about 2–3 mm to the level of the cortex. Then, advance the needle at a different angle toward the anterior iliac spine into the marrow. Remove the obturator.

11. Turn the needle clockwise and counterclockwise about three times. Then, withdraw the needle about 2 –3 mm. While rocking and rotating the needle, advance it again about 5 mm.

12. Withdraw the needle. Fit the obturator into the distal end of the needle and push the specimen through the hubonto gauze or directly into specimen cup.

13. Verify labeling of all specimens and dispatch them to lab.

14. Instruct patient to lie supine for about 15–30 minutes. The site should be kept dry with the pressure dressing in place for about 24 hours. Instructions also should be given to apply additional pressure to site if bleeding occurs through.



LUMBAR PUNCTURE

Three essential features must be observed:

- The patient must be precisely horizontal.
- The back of the patient must be exactly perpendicular to the bed or table.
- The needle must be inserted in the exact midline parallel to the horizontal plane preferably L2 – L3 or L3 – L4 space

Procedure:

The patient is positioned on a hard surface (bed or table) on his or her side, with the craniospinal axis parallel to the floor.

After the area has been prepared, local anesthesia should be used.

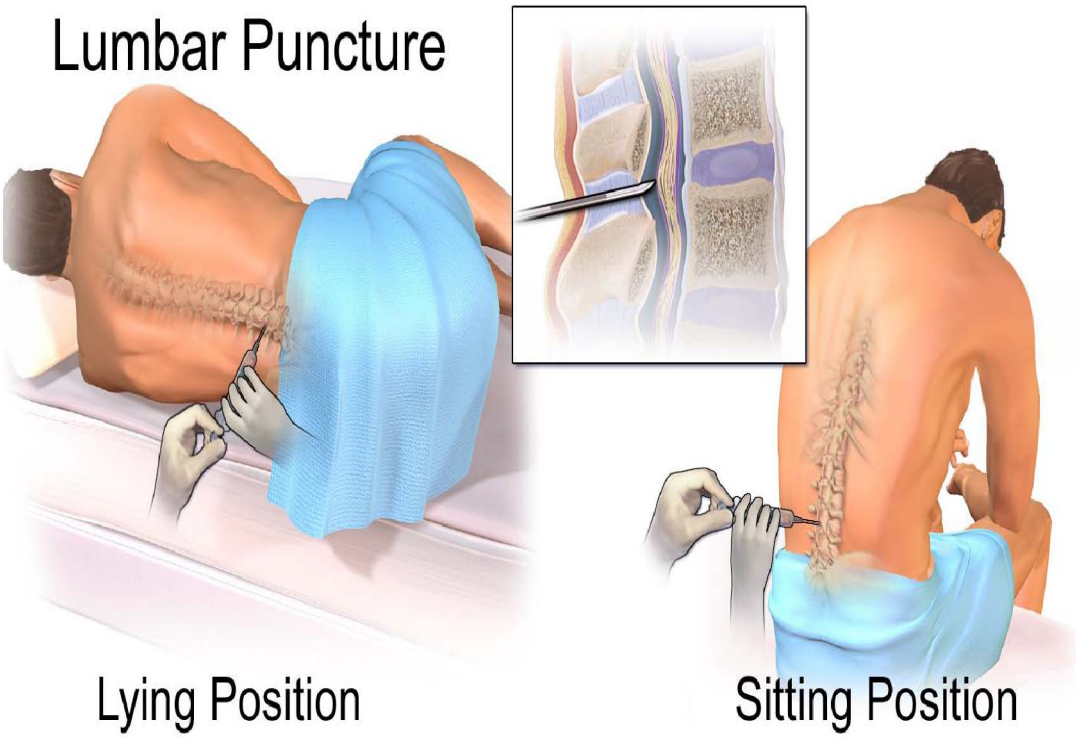
A 20 or 22 gauge needle is recommended.

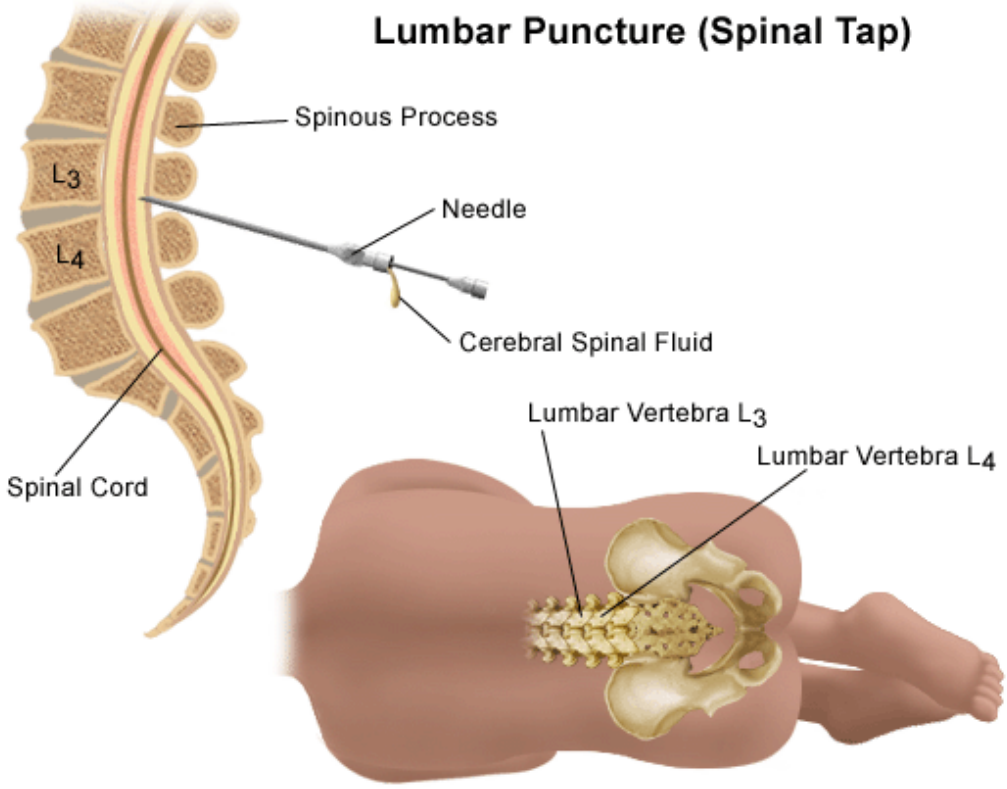
The bevel of the needle is pointed upward (toward the ceiling in the horizontal patient) so that the point slips in between the fibers of the dura, leaving the smallest possible hole. The midline is the necessary entry site.

As soon as the needle penetrates the skin, the hub is aimed at the umbilicus.

Approximately 3 to 5 cm depth, a sensation is created by penetration of the ligamentumflavum. The stylus is withdrawn.

As soon as CSF appears in the hub, the three-way stopcock is inserted and the CSF collected.


Lumbar Puncture
Lying Position
Sitting Position


Lumbar Puncture (Spinal Tap)
Spinous Process
L3
L4
Needle
Cerebral Spinal Fluid
Spinal Cord
Lumbar Vertebra L3
Lumbar Vertebra L4

FUNDAMENTALS IN DIABETES MANAGEMENT - FOR CRRIS

CLASSIFICATION OF DIABETES MELLITUS

WHO CLASSIFICATION

Diabetes can be classified into four clinical categories:

- Type 1 diabetes (due to b-cell destruction, usually leading to absolute insulin

  deficiency)

- Type 2 diabetes (due to a progressive insulin secretary defect on the background of insulin resistance)

- Other specific types of diabetes due to other causes

  e.g., genetic defects in beta-cell function (eg: MODY), genetic defects in insulin action, diseases of the exocrine pancreas (such as chronic pancreatitis, pancreatectomy, cystic fibrosis), and drug- or chemical-induced (such as in the treatment of HIV/ AIDS or after organ transplantation)

- Gestational diabetes mellitus (GDM) (diabetes diagnosed during pregnancy that is not clearly overt diabetes)

Diagnostic criteria for Diabetes Mellitus - American Diabetes Association (ADA) criteria -2016 (Non Pregnant adult)

	NORMAL	PREDIABETES	DIABETES
FASTING	70-99	100-125	>126
2hrs GTT (75gms)	<139	140-199	>200
HbA1c	<5.6	5.7-6.4	>6.5
Random Blood sugar	-	-	>200 + Symptoms

DIAGNOSTIC CRITERIA FOR GDM (GTT with 75gms of Glucose)

FASTING	ONE HOUR	TWO HOUR
92	180	153

The diagnosis of GDM is made when any of the plasma glucose values are met or exceeded

How to treat a newly detected patient with type 2 diabetes mellitus?

- Metformin, if not contraindicated and if tolerated, is the preferred initial pharmacological agent for type 2 diabetes. (contraindicated if Serum creatinine≥ 1.5 mg/dl in men and ≥ 1.4 mg/dl in women)

- Based on the response to treatment, a second or third oral antidiabetic drug (OAD) such as a sulphonylurea or a DPP-4 inhibitor can be added in addition to metformin, in the course of therapy.

- In newly diagnosed type 2 diabetic patients with marked hyperglycemic symptoms like polyuria, polydipsia and weight loss, and /or in those with markedly elevated blood glucose levels or A1C, consider insulin therapy, with or without additional agents, from the outset. (whenever the fasting more than 250mgs and postprandial more than 350mgs)

- Insulin is the preferred agent for patients admitted in hospital. Scheduled subcutaneous basal-bolus insulin therapy is effective and safe for treatment of hyperglycemia in noncritically ill patients

- A type 2 diabetic patient should be assessed for complications of diabetes like retinopathy, nephropathy, neuropathy, cardiovascular disease, peripheral vascular disease, infections and ulcers, at the time

of detection of diabetes. This is because type 2 diabetes can be asymptomatic for quite a long time.

Goals of therapy: For Out patients

- A1C < or around 7.0%
- Pre-prandial capillary plasma glucose 90–130 mg/dL
- Peak post-prandial capillary plasma glucose <180 mg/dL
- Blood pressure < 140/80 mm Hg (ADA recommendation)
- LDL cholesterol < 100 mg/dL

Treatment targets should be individualized for each patient.

Goals of therapy: For GDM

- Insulin is the preferred agent
- Pre-prandial capillary plasma glucose less than 90mg/dL
- 2 hrs Post-prandial capillary plasma glucose less than 120 mg/dL
- In known pcos patients, metformin can be continued along with insulin

Treatment targets should be individualized for each patient.

Goals of therapy: For Inpatients

- Insulin is the preferred agent
- Target BG : 140-180 mg/dl is reasonable
- Stringent (80-110mg/dl) glucose control associated with risk of hypoglycemia
- Sliding scale insulin therapy is inappropriate for glycemic control

Treatment targets should be individualized for each patient.

<u>Various insulin preparations used in therapy and their properties</u>

Type of Insulin	Onset	Peak	Duration	Injection Time	BS test time to assess the response	Colour code
Regular	30mts	2-3 hrs	4-6 hrs	30 mts before food	4-6 hrs after	Yellow
NPH	1-2 hrs	4-6 hrs	10-12 hrs	Before food or bedtime	10-12 hrs	Green
Combo 30/70 or 50/50	30 mts	Variable	10-12 hrs	30 mts before food	10-12 hrs	30/70 – Brown 50/50 - Grey
Short acting analogues	< 15 mts	1-2 hrs	3-4 hrs	Just before or after food	4 hours	variable
Long acting analogues	2-4 hrs	Peak less	24-36 hrs	Anytime	24 hours	variable

Indications for Insulin:

- Type 1 diabetes
- Diabetes patients admitted in the hospital

- Women with diabetes who become pregnant
- Transiently in type 2 diabetes in special situations

  Glucotoxicity

  Peri-operatively

  Hyperglycaemia in intercurrent illness
- T2DM patients – poorly controlled on oral agents

Indications for Insulin infusion:

- DKA / NKHHS
- Patients with inotropics support
- Critically ill patients with TPN
- Post cardiac surgery and cardiogenic shock patients
- Perioperative period

Methodology for blood sugar venous sampling

- Fasting Blood sugar : Overnight fasting for 8-12 hrs (even without IVF)
- Post Prandial BS : Two hour after food along with routine medications (insulin)
- Random blood sugar : taken any time of the day.
- Preferred to take blood sample Na Fluride tube (Grey Colour Top) for BS test.
- Make sure that the blood sample should reach the Lab within half an hour.

HYPOGLYCEMIA

Hypoglycemia is common in insulin treated diabetic patients and may occur in patients taking an insulin secretagogue. It may range from a very mild lowering of glucose (60–70 mg/dl), with minimal or no symptoms, to severe hypoglycemia, with very low levels of glucose (< 40 mg/dl) and neurological impairment.

Signs and Symptoms of Hypoglycemia

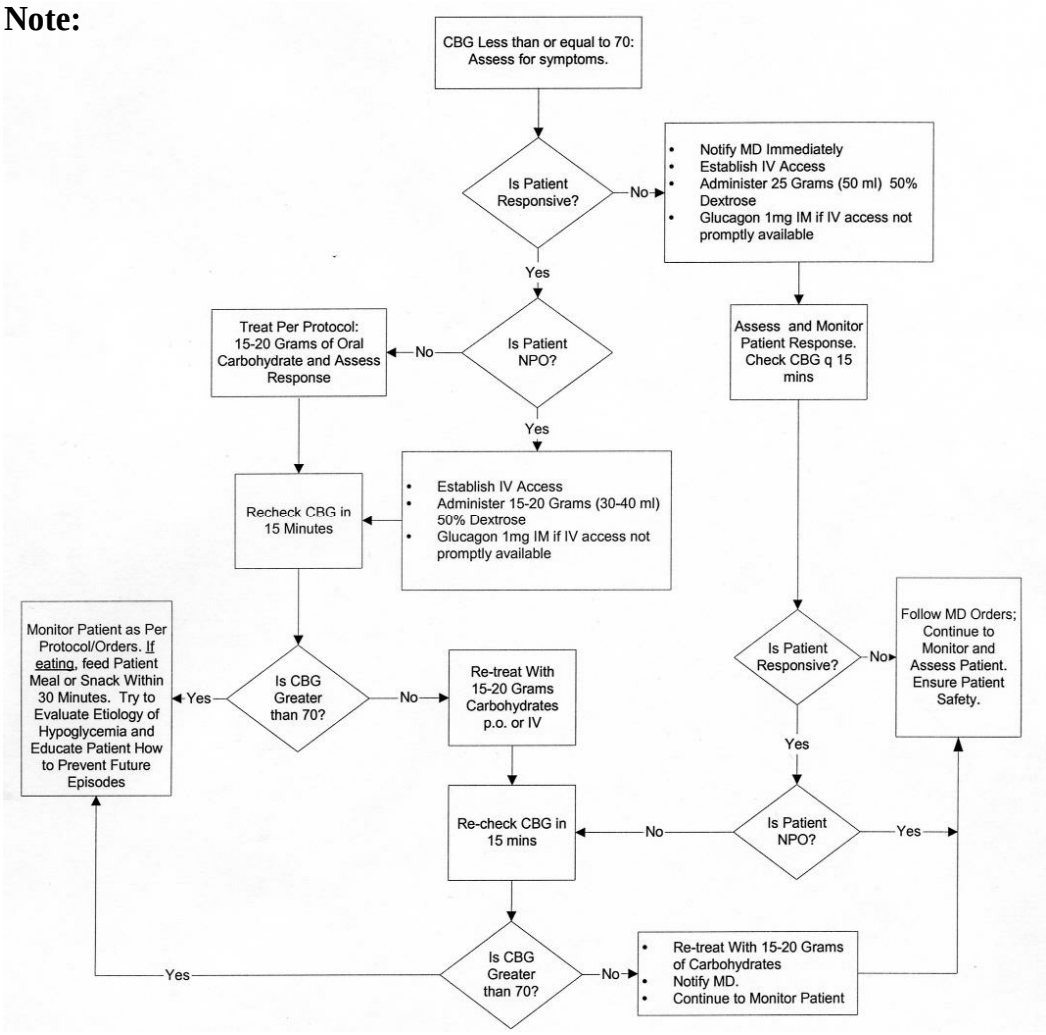
Early Adrenergic Symptoms	Neuroglycopenic Signs
• Pallor	• Confusion
• Diaphoresis	• Slurred speech
• Tachycardia	• Irrational or uncontrolled behavior
• Shakiness	• Extreme fatigue
• Hunger	• Disorientation
• Anxiety	• Loss of consciousness
• Irritability	• Seizures
• Headache	• Pupillary sluggishness
• Dizziness	• Decreased response to stimuli

Risk factors for hypoglycemia :

- Insulin / drug and food mismatch
- Critically ill patients – renal & hepatic failure and sepsis
- Endocrine deficincies
- Chronic alcoholism
- Drug dispensing error

ADULT HYPOGLYCEMIA TREATMENT PROTOCOL

Note:



- After treating an anti-hyperglycemic agents induced hypoglycemia, patient needs monitoring till the duration of the induced agent.
- After treating hypoglycemia induced by sulphonylureas, chances of rebound hypoglycemia is very high.

GUIDELINES FOR THE CRRI IN PULMONOLOGY

AEROSOL DRUG THERAPY

AEROSOL IS A SUSPENSION OF SOLID (OR) LIQUID IN GAS

INDICATION:

OBSTRUCTIVE AIRWAY DISEASES LIKE COPD AND BRONCHIAL ASTHMA.

ADVANTAGE:

DELIVERY OF DRUG TO THE TARGETED SITE THERE BY MINIMISING THE SYSTEMIC SIDE EFFECT.

DEVICES:

I. PMDI (PRESSURISED METERED DOSE INHALER)
II. DPI (DRY POWDER INHALER)
III. NEBULIZERS

I. PMDI:

- EACH ACTUATION DELIVERS A SPECIFIED AMOUNT OF DRUG.
- PORTABLE, COMPACT, AND EASY TO USE.

DISADVANTAGE:

- HAND MOUTH COORDINATION
- OROPHARYNGEAL DEPOSITION OF DRUG

} REDUCED BY SPACER

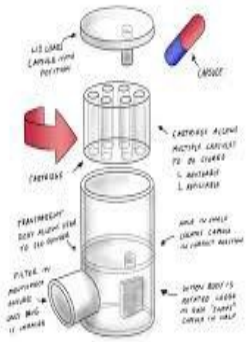
HOW TO USE:

- SHAKE WELL BEFORE USE
- REMOVE THE MOUTH CAP
- BREATH OUT

COMPLETELY

- PLACE THE INHALER TIGHTLY IN BETWEEN THE LIPS
- AS YOU BREATH IN SLOWLY, ACTUATE THE MDI
- CONTINUE INSPIRATION TO THE TOTAL LUNG CAPACITY
- REMOVE THE MDI FROM MOUTH
- HOLD YOUR BREATH FOR 10 SECONDS
- WAIT FOR 1 MINUTE BETWEEN PUFFS

I. DPI:



ADVANTAGE:

- NO HAND MOUTH COORDINATION NEEDED.

DISADVANTAGE :

- HIGH INSPIRATORY FLOW RATE IS REQUIRED TO GENERATE THE AEROSOL. SO NOT USEFUL IF THE PATIENT IS VERY DYSNOEIC

HOW TO USE:

- ASSESSABLE THE APPARATUS
- LOAD THE DOSE
- EXHALE SLOWLY TO FRC
- SEAL LIPS AROUND THE MOUTH PIECE
- INHALE DEEPLY AND FORCEFULLY (>60L /MIN)
- REMOVE THE DEVICE FROM MOUTH
- HOLD BREATH FOR 10 SECS

II. NEBULIZERS:

ADVANTAGE :

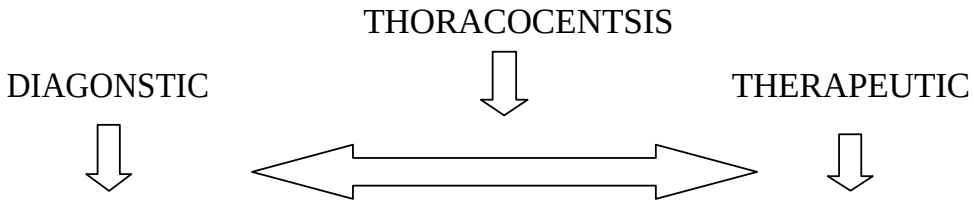
- VERY USEFUL IN SICK PATIENTS
- LESS PATIENT COORDINATION REQUIRED

DRUGS USED:

B- Agonists	Anti-Cholinergics	Steriods
Salbutamol	Ipratropium	Budesonide
Terbutaline	Tiotropium	Fluticasonepropionate
Formoterol		Beclamethasone
Salmeterol		Mometasone
		Cyclisonide

OTHERS:

TOBRAMYCIN, COLISTIN, N-ACETYLCYSTEINE, NORMAL SALINE, SODIUM CROMOGLYCATE.



PLEURAL EFFUSSION OF UNKNOWN ORIGIN

INDICATION

1. EMPYEMA
2. TO RELIEVE DYSPNEA DUE TO EFFUSION
3. TO EVALUATE THE STATUS OF UNDERLYING LUNGS

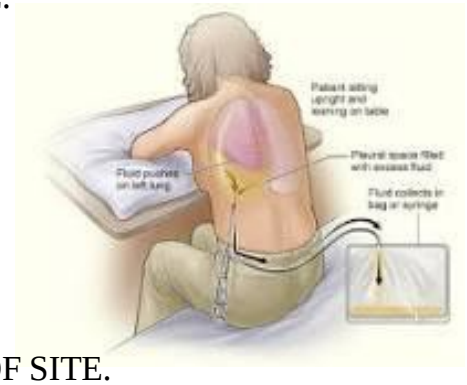
CONTRA INDICATION:

BLEEDING DIATHESIS

HOW TO PERFORM:

- POSITIONING OF THE PATIENT:

  PATIENT SIT ON THE EDGE OF THE TABLE WITH ARMS AND SHOULDERS RESTING ON PILLOWS ON BEDSIDE TABLE.JUST SUPERIOR TO RIB, TO AVOID INTERCOASTAL BUNDLES. POSTERIOR LINE PENETRABLE.



- SELECTION OF SITE.

  -IDEAL USG GUIDED

  -ONE INTERSPACE BELOW THE SPOT WHERE THE TACTILE FREMITUS IS LOST AND PERCUSSION NOTE BECOMES DULL

TECHNIQUE:

- EXPLAIN THE PROCEDURE TO THE PATIENT
- GET SIGNED CONSENT
- CLEAN THE SELECTED SITE
- ANESTHESTISE THE SKIN PERIOSTEUM OF THE RIB AND PARIETAL PLEURA WITH INJ.LIGNOCAINE

- NEEDLE SIZE : 25G FOR SKIN, 22 G (1.5 INCH LONG) FOR PERIOSTEUM AND PARIETAL PLEURAL
- OBESE PATIENT : LUMBAR PUNCTURE NEEDLE OR VENFLON NEEDLE
- AFTER PROPER ANAESTHESIA NEEDLE IS ADVANCED TO THE PLEURAL SPACE AND ASPIRATED

WHEN TO STOP THE PROCEDURE :

- VASOVAGAL ATTACK
- IF THE PATIENT DEVELOPS COUGH, CHEST PAIN, CHEST TIGHTNESS, BREATHLESSNESS.

COMPLICATION:

- VASOVAGAL REACTION
- PNEUMOTHORAX
- PLEURAL INFECTION AND HAEMOTHORAX
- RE-EXPANSION PULMONARY EDEMA.

FUNDAMENTALS OF PSYCHIATRY FOR THE CRRI

MODULE-I

1) CLASSIFICATION OF LEVEL OF CARE

- Maximum therapeutic effort
- Maximum effort with daily re-evaluation
- Selective limitation of certain therapeutic measures
- Comfort care only

2) DEATH TRAJECTORIES

- Timely death
- Untimely death

3) HUMAN DEATH AWARENESS/ PSYCHOLOGICAL REACTION OF PHYSICIANS

Physician

- Identifies with the patient, age , character and look
- Identifies the patient as somebody in his own life
- Dealing with sick family member
- Is fearful of death and disability
- Unconsciously reflects the feelings felt or expressed by the patient or family

- Cannot tolerate high and protracted level of ambiguity or uncertainty
- Feels professionally insecure

4) PSYCHOLOGICAL ASSESSMENT /TREATMENT OF TERMINALLY ILL/HOPELESSLY ILL PATIENT

SYMPTOM ASSESSMENT

- Memorial symptom assessment scale (MSAS)
- Memorial pain assessment scale(MPAS)
- Anxiety and depression

assessment TREATMENT

- Non narcotic analgesics
- Narcotic analgesics
- Adjuvant drugs - Psychotropics

5) PSYCHOLOGICAL ASSESSMENT OF DYING PATIENT

- Sharing the patient's subjective experience
- Group therapy- group interventions for patients for advanced disease, talk about dying without fearing that they are upsetting loved ones can practice getting acquainted with dying
- other modalities-

- hypnosis
- deep relaxation technique
- yoga
- meditation
- music

therapy MODULE

–II

6) SPIRITUAL CONCERN

- Therapist must explore the religious concern
- Reunion with God in the after-life

Psychiatric in[put is necessary to untangle multiple religious agendas and to help with conflict resolution

7) Decision points, advanced directories, proxies, and surroundings

a) Where to die?

- Unattended deaths- traumatic or unexpected death(funeral rites is crucial to the normal resolution of mourning process)
- Attended deaths- dying in hospitals, nursing homes, hospices, home

b) Living will

- Patient leaves instructions on what care they do or do not wish

to receive after they become incapacitated

c) Health Proxy

📣 Patient may formally designate any individual to function as a health proxy and make all health decisions on their behalf

d) Surrogate decision maker

📣 Patient has left no formal instruction, nearest relatives become decision maker by custom and by default

e) Brain death determination, autopsy and organ donation

📣 The growing use of organ transplantation has been a factor in the legal acceptance of brain death because it gives better results with transplanted organ.

📣 Family demands of organ donation or respected

📣 Patient's choice may be overridden by the family, absent formal directives

8) FAMILY COPING DURING THE END OF LIFE

a) Family involvement in decision making

- Health professionals should be sensitive to end of life distortions and should educate and support the surrogated well before the actual moment of end of life.
- Physiological and psychological distress of the primary caregiver should be addressed

b) Cultural, spiritual and religious issues

- ABCDE model for evaluation of cultural issues

A- Attitudes

B- Beliefs

C- Context

D- Decisions

E- Environment

9) SELECTED ETHICAL ISSUES/ PSYCHIATRIC CONSULTATION

1. Informed consent for experimental treatment – has 3 problems

- Disclosure
- Understanding
- Voluntariness.

2. Stopping – curative treatment and invasive procedures

Withholding- diagnostic procedures, parenteral nutrition, antibiotics and CPR

Withdrawing – life supports, tube feeds, oral feeds, I.V. fluids

3. Physician aided dying- Transient passive thoughts of death by improving QOL. Suicidal ideation in the context of major depression.

Request for physician aided dying; assisted suicide and euthanasia

4. Voluntary refusal of food and water- less likely to have cancer, acute pain, decade older, more ready to die

5. Care giver response- caregivers wanting aid in dying and made references to palliative care services or emotional support

10) MORAL BURDEN OF PHYSICIANS/PSYCHIATRISTS

- The decision about withdrawing the treatments and nutrition were shared by family members giving social morality, an opportunity to mold physician behaviour

- Given the complex and changeable motives of terminally ill patients, given that good palliative care is still not the rule, it seems dangerous to risk desensitizing the medical caregivers and society.

  Educate the medical profession and the public about the provision of state-of-the-art care before legalization of aid in dying provides excuses for continued avoidance of faithful attention to the needs of dying patients.

CLINICAL SKILLS IN DERMATOLOGY FOR A CRRI

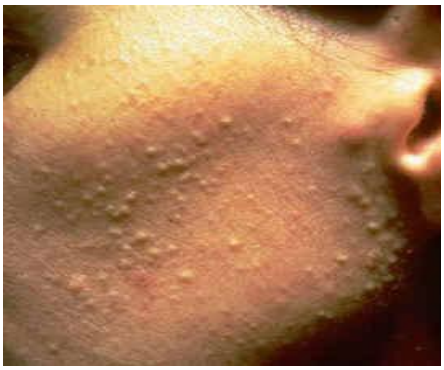
- To develop practical and diagnostic skills, knowledge and experience in clinical dermatology.

-Primary lesions:

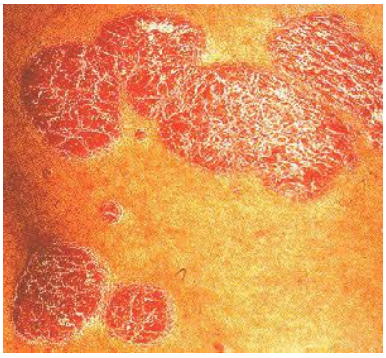
Macule: a circumscribed, flatdiscolouration<0.5 cm present at the same level of skin.

Patch: >0.5 cm, flat discolouration, at the same level of skin.

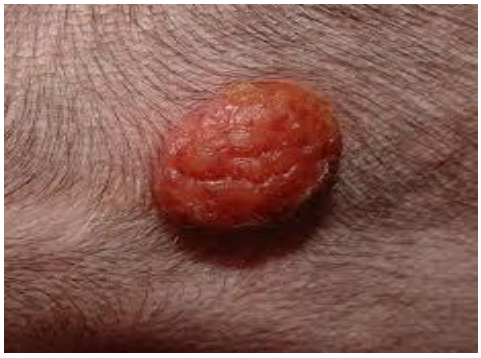
Papules: elevated solid lesion <0.5 cm in diameter, with variable colour.



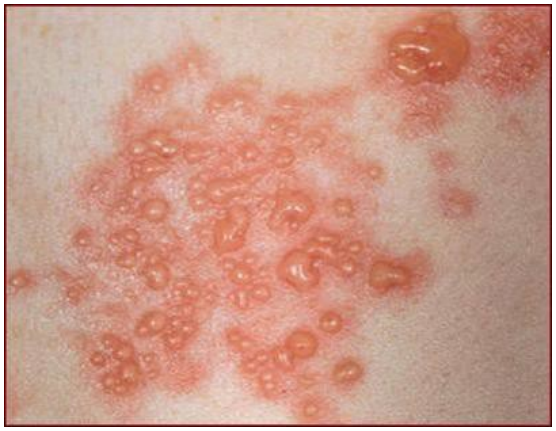
Plaque: Elevated solid lesion >0.5 cm in diameter, may be formed by colescence of papules.



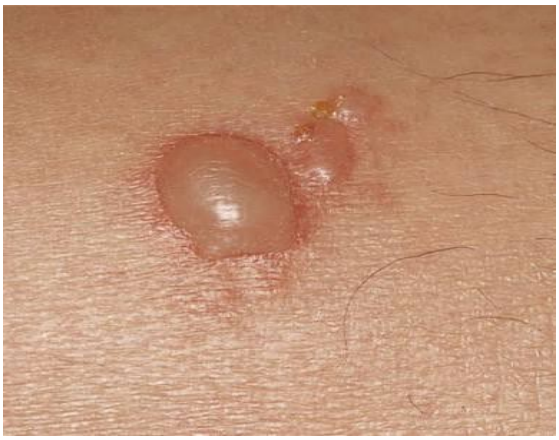
Nodule: a circumscribed, elevated, solid lesion >0.5 cm



Vesicle: Free fluid filled lesion < 0.5cm

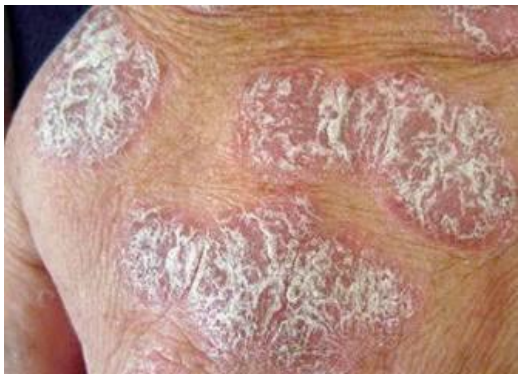


Bullae : Fluid filled lesion > 0.5cm

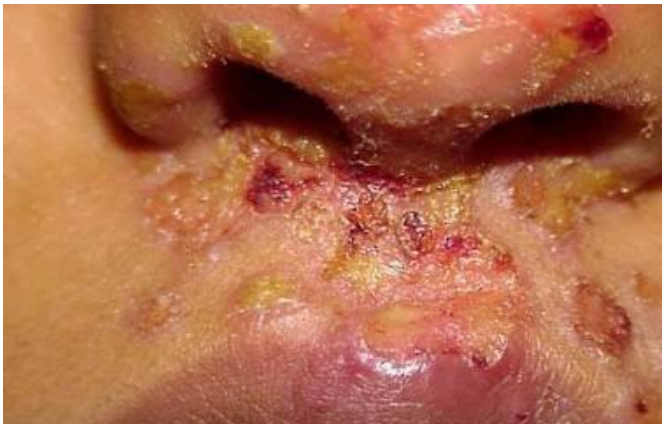


SECONDARY SKIN LESIONS LIKE :

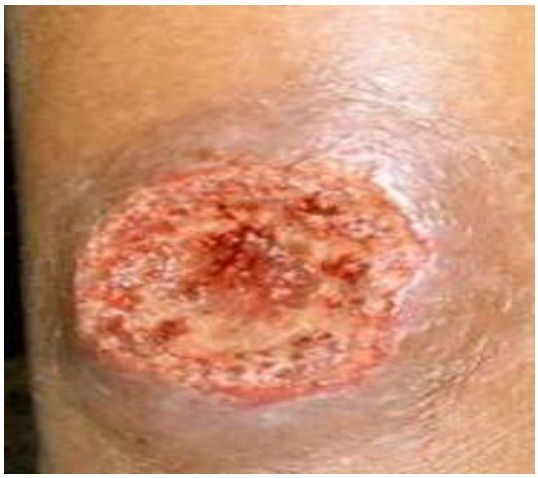
Scales : Excessive formation of dead epidermal cells.



Crust : Collection of dried serum and cellular debris

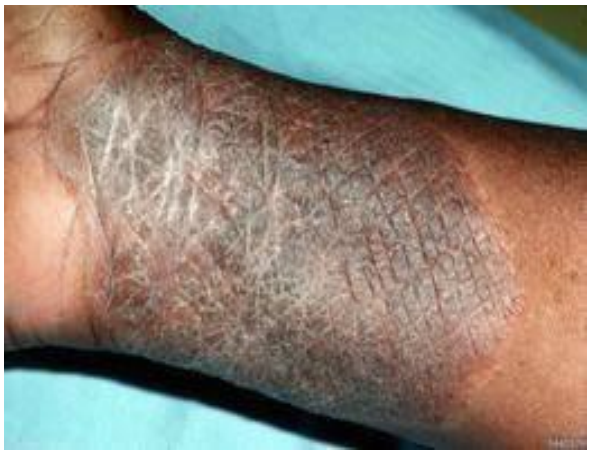


Ulcer : Loss in the continuity of skin.



Lichenification : Thickening, hyperpigmentation, rough area

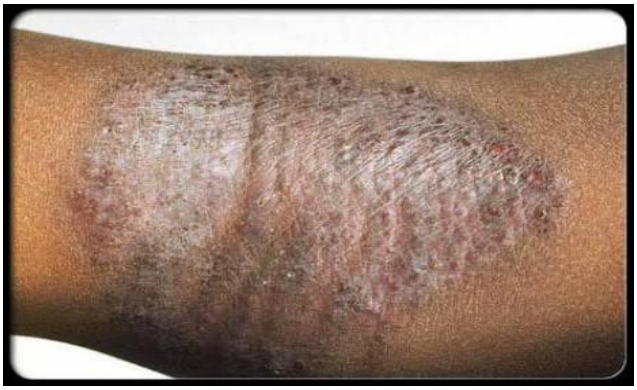
Mainly due to chronic scratching.



- To develop appropriate and timely management of common skin disorders like:

  -pruritis, urticaria, scabies, pyoderma lichen planus, dermatophytosis, herpes simplex virus and herpes zoster, psoriasis, eczema, connective disorders like SLE, scleroderma & DLE, hansens disease
- To develop skills of history taking for differentiation and treatment of various skin disorders:

-Psoriasis☒chronicity, duration, aggravating factors, waxing and waning of the disease, complications like arthritis, erythroderma

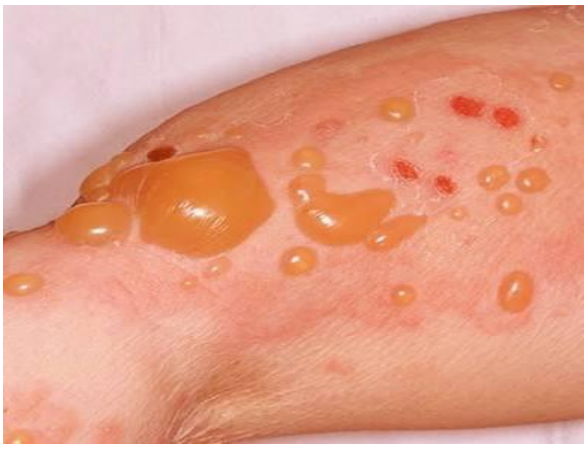


-Eczema☒acute /subacute /chronic

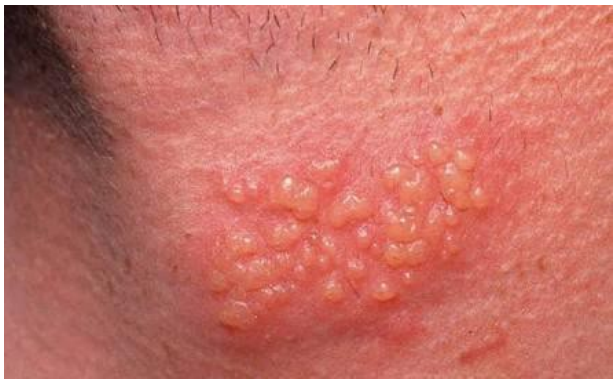
-Connective tissue disorders☒joint pain, photosensitivity, systemic involvement

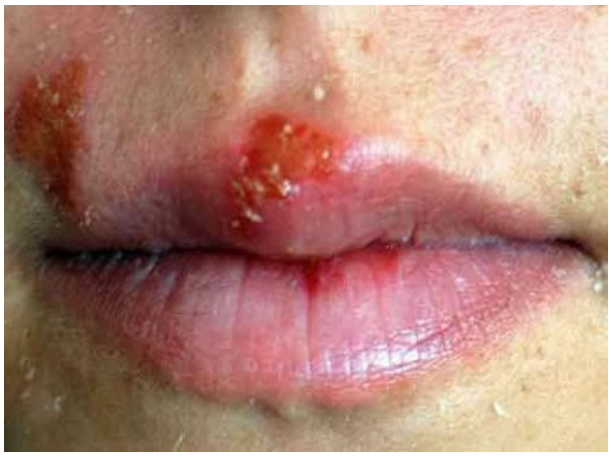
-Dermatophytosis☒annular plaque with central clearing and active erythematous border

-bullous disorders☒ tense or flaccid bullae with or without pruritis with mucosal involvement



-Herpes simplex and zoster☒grouped vesicles over erythematous plaque involving specific dermatome





- To develop skills of eliciting dermatological signs:

-Psoriasis☒auspit'z sign, worn off's sign, candle wax sign, pavithrans nose sign

-Bullous disorders: nikolskys sign, asboe Hansen sign, sheklek off's sign

- To develop skills in ethical usage of topical and systemic therapy for particular disease:

-Topical steroid☒where, when, how long, strength along with its contraindications & indications.

-Emollients☒liquid paraffin

-Keratolytics Antifungals, immunomodulators

-Immunosuppressants☒steroids, methotrexate, azathioprine cyclophosphamide, cyclosporine, MMF,

-Upcoming biologicals☒eterncept, rituximab, infliximab, omalizumab

- To develop skills in dermato -pathology like biopsy, excision , cosmetically suturing, dermabrasion, subcision
- To develop skills in bedside procedure:☒tzanksmear, scrapping, split skin smear, needling

To develop skills in various procedure like cryotherapy, chemical peeling, RF done for wart, molluscumcontagiosum, melanosis, acne, pyogenic granuloma,

- To develop skills about phototherapy(NBUVB,PUVA) for skin disorder-psoriasis, vitiligo, parapsoriasis, alopecia areata, morphae

- To build solid foundation in essential terminology and recognition skills.
- To develop the management of inpatients in appropriate way :care and treatment of skin disorders:

-psoriasis, lichenplanus, eczema, connective tissue disorders, bullous disorders,

- To develop skills to communicate and satisfy patient with chronic skin disease.

FUNDAMENTALS FOR A CRRI IN STD POSTING

1. To develop practical skills, knowledge and experience in sexually transmitted infections including HIV.

2. To develop skills regarding counselling of a person attending STD clinic which plays a major role in STD clinic.

    - counselling is a confidential dialogue between a client and a counselor.

    - It aims at providing information on HIV/AIDS and bringing about behaviour change in the client.

- **FIVE C'S: CONSENT, CONFIDENTIALITY, COUNSELLING, CORRECT TEST RESULTS AND CONNECTIONS TO CARE.**

  The steps in STI counselling are:

    - pre-test counselling: provides basic information

    - post-test counseling: to understand and cope with results

    - Follow-up counseling: emphasis on safe behavior and support.

3. To develop skills in development of patient – doctor relationship, the very essential in STD clinic so as to develop confidence in the medical officers.

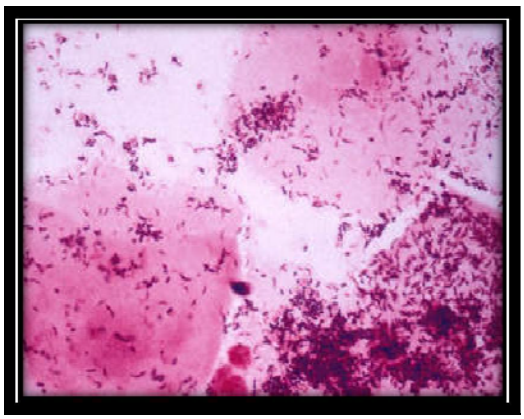
4. To develop skills in history taking and clinical examination related to sexually transmitted infections.

5. To develop skills in bed – side investigations like wet mount, KOH mount, pH test, whiff test, Gram stain, Leishman stain and specimen collection for culture of organisms causing STD.

Wet mount	discharge mixed with a drop of saline in a slide demonstrates trichomonas, clue cells
KOH mount	discharge mixed with a drop of 10% KOH in a slide demonstrates spores, pseudo hyphae in candidiasis
Gram's stain	Intracellular gram negative diplococcic : Gonorrhea Nugent's scoring : Bacterial vaginosis School of fish appearance : Chancroid
Leishman's stain	Multinucleated gaint cells : Herpes genitalis Greenbalt – pund cells : donovanosis
Whiff test	Fishy odour on adding KOH : Bacterial vaginosis

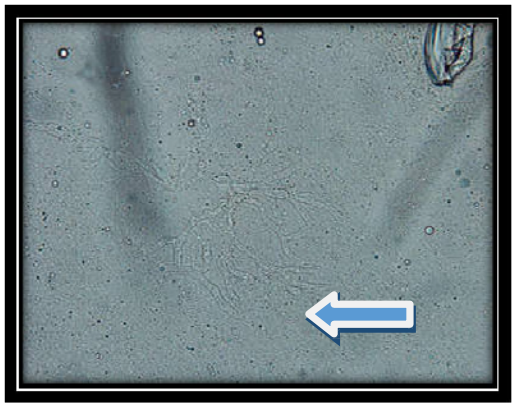
6. To develop skills in laboratory diagnosis like RAPID PLASMA REAGIN (RPR) & HIV and their interpretations.
7. To develop skills in treatment of various sexually transmitted diseases.
8. To develop skills for podophyllin application, Inj Benzathine penicillin, radiofrequency and cryotherapy and proper usage of topical therapy.
9. To develop skills in universal precautions, proper disposal of hospital waste.
10. To develop skills in partner management like epidemiological treatment (epidose), condom promotion and partner screening.

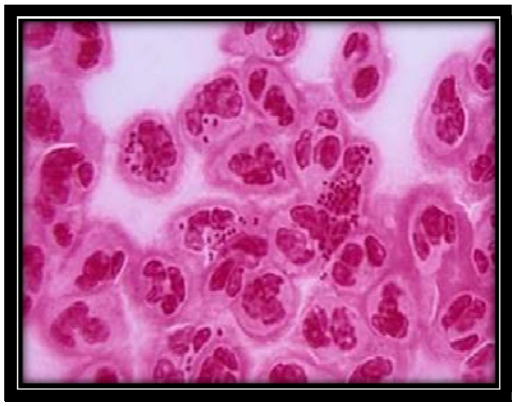
BACTERIAL VAGINOSIS CLUE CELLS



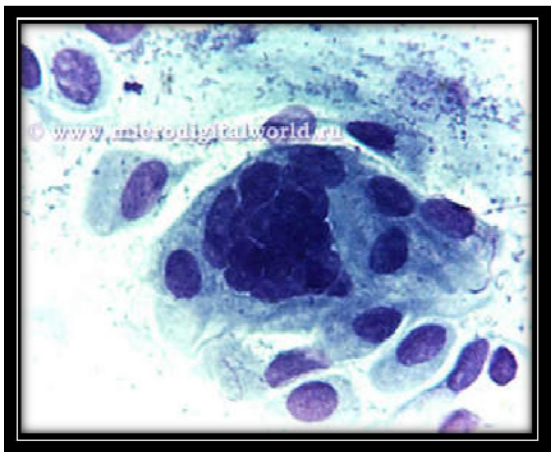
TRICHOMONAS VAGINALIS

CANDIDIASIS : figure of 8NEISSERIA GONORRHOEAE





MULTINUCLEATED GAINT CELLS : HERPES GENITALIS



11. To develop skills in syndromic management of sexually transmitted infections as

1. It Effectively treats cases in settings with limited or no laboratory facilities, rendering the patient non-infectious.
2. Emphasis on single dose regimens and directly observed therapy for better treatment adherence and outcomes.
3. It ensures non-judgmental STI control and prevention service provision for high risk groups.

LIMITATIONS:

1. Not useful in asymptomatic patients.
2. Over – treatment in patients with one STI.
3. Potential for antibiotic resistance

IMPORTANT CONSIDERATIONS IN MANAGEMENT OF STI:

- Educate and counsel client and sexual partners regarding STI , safe sex practices
- Educate and counsel about importance of history taking
- Treat partners
- Advise sexual abstinence or condom use during the course of treatment.
- Provide condoms, educate about correct and consistent use.
- Refer all patients to ICTC
- Follow up after 7 days for all STI, 7^{th}& 14^{th} day for Lower abdominal pain and 7^{th} , 14^{th} & 21^{st} day for induinal bubo.

- If symptoms persist ,asses whether it is due to re-infection and advise prompt referral.
- Consider immunization against Hepatitis B and HPV.

COLOUR CODED KIT FOR SYNDROMIC MANAGEMENT

KIT NO.	SYNDROME	COLOUR	CONTENTS	STDS TREATED
Kit 1	Urethral discharge (UD), Cervical discharge (CD), Ano-rectal discharge (ARD) painful scrotal swelling (PSS) Presumptive treatment (PT)	Grey	Tab.Azithromycin 1 g(1) and Tab. Cefixime 400 mg (1)	Gonorrhea Chlamydia
Kit 2	Vaginal discharge (VD)	Green	Tab. Secnidazole 2 g (1) and Tab. Fluconazole 150 mg (1)	Trichomoniasis Candidiasis Bacterial vaginosis
Kit 3	Genital Ulcer Disease – Non herpetic	White	inj. Benzathine penicillin 2.4 MU (1) and Tab.Azithromycin 1 g(1) and Disposable syringe 10ml with 21 gauge needle	Early syphilis Chancroid

			(1)and Sterile water 10ml (1)	
Kit 4	Genital Ulcer Disease – Non – Herpetic: for patients allergic to penicillin.	Blue	Tab. Doxycycline 100 mg (30) Tab. Azithromycin 1 g (1)	
Kit 5	Genital Ulcer Disease – Herpetic	Red	Tab. Acyclovir 400 mg (21)	Herpes genitalis
Kit 6	Lower abdominal pain (LAP/PID)	Yellow	Tab. Cefixime 400 mg (1) Tab. Metronidazole 400 mg (28) Cap. Doxycycline 100 mg (28)	Gonorrhoea Chlamydia Trichomoniasis
Kit 7	Inguinal bubo (IB)	Black	Tab. Doxcycline 100 mg (42) Tab. Azithromycin 1 g (1)	chancroid, lgv

12. To develop skills in POST EXPOSURE PROPHYLAXIS for HIV.

Post exposure prophylaxis (PEP) refers to the comprehensive management given to minimize the risk of infection following potential exposure to blood-borne pathogens.

The regimen is to be started within 72 hours, preferably within 2 hours.

In case of exposure the drugs can be obtained from casualty/ IMCU where it is available 24*7 and thereafter the course can be completed after consultations from the medical officers in the STD department.

FIRST AID MANAGEMENT IN CASE OF OCCUPATIONAL EXPOSURE

FOR SKIN-

If the skin is broken after a needle-stick or sharp instrument:

Immediately wash the wound and surrounding skin with water and soap, and rinse. Do not scrub or use antiseptics or skin washes (bleach, chlorine, alcohol, betadine).

AFTER A SPLASH OF BLOOD OR BODY FLUIDS:

TO UNBROKEN SKIN:	• Wash the area immediately • Do not use antiseptics
FOR THE EYE:	Irrigate exposed eye immediately with water or normal saline. Sit in a chair, tilt head back and ask a colleague to gently pour water or normal saline over the eye. If wearing contact lens, leave them in place while irrigating, as they form a barrier over the eye and will help protect it. Once the eye is cleaned, remove the contact lens and clean them in the normal manner. This will make them safe to wear again. Do not use soap or disinfectant on the eye.
MOUTH:	Spit fluid out immediately. Rinse the mouth thoroughly, using water or saline and spit again. Repeat this process several times. Do not use soap or disinfectant in the mouth. Consult the designated physician of the institution for management of the exposure

DO'S AND DON'T'S IN PEP

Do	Do Not
Remove gloves, if appropriate	Do not panic
Wash the exposed site thoroughly with running water	Do not put the pricked finger in mouth
Irrigate with water or saline if eyes or mouth have been exposed	Do not squeeze the wound to bleed it
Wash the skin with soap and water	Do not use bleach, chlorine, alcohol, betadine, iodine or other antiseptics/ detergents on the wound

- Do – Consult the designated physician immediately.
- Eligibility for PEP is decided on the exposure code of the hospital worker and the HIV status of the source.

EXPOSURE STATUS

SKIN INTEGRITY PRESERVED : NO PEP	
EC 1 (Exposure code)	Small volume of exposure in mucous membrane/ integrity compromised skin
EC 2	several drops, major blood splash, duration of several minutes or more, solid needle, superficial scratch
EC 3	large bore hollow needle, deep puncture, visible blood on device, needle used in patient's artery or vein

SOURCE HIV STATUS

HIV NEGATIVE	NO PEP
SC 1 (Source Code)	Low titre exposure e.g. asymptomatic, high CD4 count
SC 2	High titre exposure e.g. advanced AIDS, primary HIV infection, high or increasing viral load, low CD4 count
SC UNKNOWN	

PEP is recommended for Exposure code 2& 3 with HIV Status Code either 1 & 2. For HIV status unknown the PEP recommendation is based on prevalance of HIV in the area.

At present TEL regimen for 28 days is given for PEP. (TENOFOVIR 300MG OD, EFAVIRENZ 600 MG OD, LAMIVUDINE 300 MG OD).

Before starting PEP, baseline HIV status of the exposed individual is to be seen. Thereafter HIV testing is to be repeated after 3 months.

TRANSFUSION MEDICINE

INSTRUCTIONS TO BE GIVEN TO THE CRRI

1. To encourage voluntary, relative and replacement donors to all elective surgery cases since the Government have ordered that there should be NO PAID DONAR SYSTEM.

2. Requisition form for blood grouping and cross matching and issue of all should be signed by the Assistant Surgeons only.

3. All unit Chiefs are request to ensure therapeutic transfusions before 2P.M when the Medical Officers are available in the ward.

4. All unit chiefs are requested to instruct their Assistants to reserve the blood before 2P.M. on THE PREVIOUS DAY OF REQUIREMENT.

5. Even though requests for blood are placed in advance the concerned unit chiefs are requested to ascertain the availability of blood before taking the case to the theatre.

6. Every day the blood availability list will be sent to each operation theatre and the department of Anaesthesia at 9.00A.M. except theatre holidays.

7. The assistant in-charge are requested to verify the cross matching form before starting the transfusion and the cross matching form should be attached to the case sheet.

8. Kindly do the blood grouping and RH typing on the admission day itself along with other investigations. To avoid unnecessary delay and complication like rare blood groups when the patient is on the table fort the surgery.

9. Kindly send the sample (Plain blood 5ML) In a Test Tube properly labelled with the patients name age, sex, I.P.No., Unit, Date of collection, etc.

10. When they come to blood bank to collect the blood they should bring the towel to cover the blood bag.

11. Blood grouping, Rh Typing forms will be supplied from the Blood Bank which should be attached to the case sheet of the patient.

12. Whenever any transfusion reaction observed it should be informed to the Medical Officer of blood bank immediately.

13. It is requested that the blood sample should be sent to the blood bank though the hospital servant only and not through the patients and their relatives and donors.

14. The blood sample for patient must send to the blood bank on the reservation day itself (one day before surgery) for patients who has provided donors already. This is to minimize the work load on the day of surgery.

15. Please collect your patient's blood grouping result in the blood bank, before 9.00 A.M and after 2.00 P.M every day.

PHYSICAL MEDICINE & REHABILITATION

BASICS FOR THE CRRI

Physical Medicine and Rehabilitation (PM&R), also known as **Physiatry** or **Rehabilitation Medicine,** is a branch of Medicine that aims to enhance and restore functional ability and quality of life to those with physical impairments or disabilities. A Physician having completed training in this field is referred to as a **Physiatrist.** Physiatrists specialize in restoring optimal function to people with injuries to the muscles, bones, and nervous system.

Sub-specializations recognized in this field include

- Pain medicine
- Pediatric rehabilitation
- Spinal cord injury Rehabilitation
- Sports Medicine
- Brain Injury Rehabilitation
- Cardio- pulmonary Rehabilitation

Musculoskeletal pain management forms an important aspect of Physiatry. Its management comprises of diagnosis and judicial use of Physical modalities along with medication.

Interventional Physiatry includes Intra- articular injections, Nerve blocks, Botox injection etc.

Surgical aspects of PMR is focused on Tendon transfers, Tendon lengthening, deformity correction etc.

Amputee Rehabilitation includes stump care, adjacent joint moblisation and prosthetic fitting & training. The field of Prosthesis is much advanced with the latest robotic technology being used. An amputated athlete now has access to special prosthesis called Sprint Foot which enables him to participate in competitive sports. The Physiatrist has to choose the right prosthesis & also chart out a training programme which will be carried out by his team of therapists.

A CRRI posted in PMR is taught basic assessment of the neuromuscular system. He is introduced to the various Physical Modalities used for pain relief. He also learns the importance of exercise which prevents reccurrence of muscular pain. He is exposed to the field of Orthosis & Prosthesis and how & when to use them.

DEPARTMENT OF GENERAL SURGERY

GUIDELINES FOR THE CRRI

ABSCESS INCISION AND DRAINAGE

Abscesses are localized infections of tissue marked by a collection of pus surrounded by inflamed tissue. Abscesses may be found in any area of the body, but most abscesses presenting for urgent attention are found on the extremities, buttocks, breast, perianal area, or from a hair follicle. Abscesses begin when the normal skin barrier is breached, and microorganisms invade the underlying tissues. Causative organisms commonly include *Streptococcus, Staphylococcus,* enteric bacteria (perianal abscesses), or a combination of anaerobic and gram-negative organisms.

Abscess resolve by drainage. Smaller (<5mm in diameter) abscesses may resolve to conservative measures (warm soaks) to promote drainage. Larger abscesses will require incision to drain them, as the increased inflammation, pus collection, and walling off of the abscess cavity diminish the effectiveness of conservative measures.

Indications

1. Abscess on the skin which is palpable

Contraindications

1. Extremely large abscesses which require extensive incision, debridement, or irrigation (best done in OR)
2. Deep abscesses in very sensitive areas (supralevator, ischiorectal, perirectal) which require a general anesthetic to obtain proper exposure

3. Palmar space abscesses, or abscesses in the deep plantar spaces

4. Abscesses in the nasolabial folds (may drain to sphenoid sinus, causing a septic phlebitis)

Materials

1. Universal precautions materials

2. 1% or 2% lidocaine WITH epinephrine for local anesthesia, 10 cc syringe and 25 gauge needle for infiltration

3. Skin prep solution

4. #11 scalpel blade with handle

5. Draping

6. Gauze

7. Hemostat, scissors, packing (plain or iodoform, 1/2")

8. Tape

9. Culture swab

Pre procedure education

1. Obtain informed consent

2. Inform the patient of potential severe complications and their treatment

3. Explain the steps of the procedure, including the not insignificant pain associated with anesthetic infiltration

4. Explain necessity for follow-up, including packing change or removal

Procedure

1. Use universal precautions
2. Cleanse site over abscess with skin prep
3. Drape to create a sterile field
4. Infiltrate local anesthetic, allow 2-3 minutes for anesthetic to take effect
5. Incise widely over abscess with the #11 blade, cutting through the skin (Figure 1) into the abscess cavity. Follow skin fold lines whenever able while making the incision

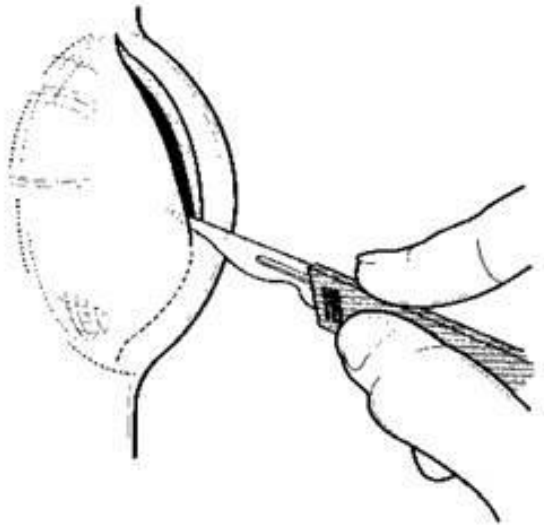


Figure 1: Making the incision

6. Allow the pus to drain, using the gauzes to soak up drainage and blood. Use culture swab to take culture of abscess contents, swabbing *inside* the abscess cavity
7. Use the hemostat to gently explore the abscess cavity to break up any loculations within the abscess
8. Using the packing strip, pack the abscess cavity (Figure 2)

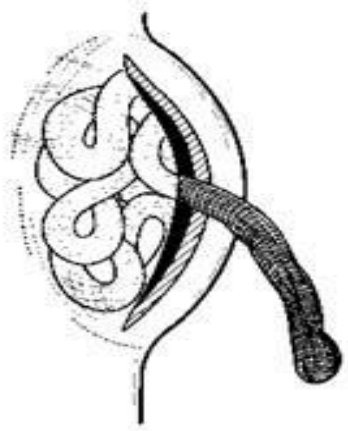
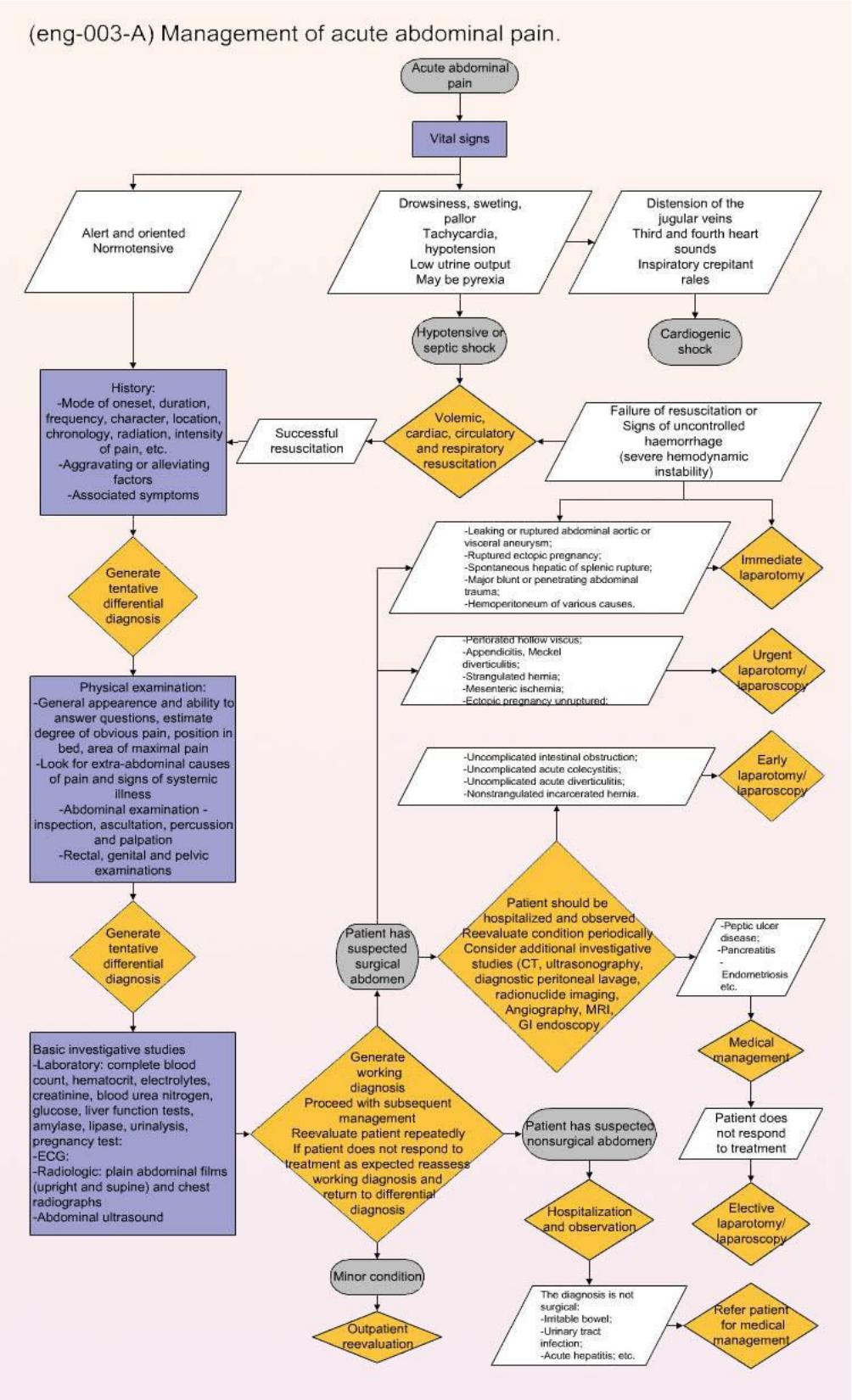


Figure 2: Packing the abscess

9. Place gauze dressing over wound, and tape in place

Complication	Prevention	Management
Insufficient anesthesia	Remember that the tissue around an abscess is acidotic, and local anesthetic loses effectiveness in acidotic tissues	Do a field block; use sufficient quantity of anesthetic; allow time for anesthetic effect
No drainage	Localize site of incision by palpation	Extend incision deeper or wider as needed
Drainage is sebaceous material	Abscess was an inflamed sebaceous cyst	Express all material, break up sac with hemostat, pack open as with an abscess

MANAGEMENT OF ACUTE ABDOMEN



SUTURE REMOVAL:

Choose a tool to cut your stitches. Use a sharp pair of surgical scissors if possible. Sharp nail scissors or nail clippers also work fine. Avoid using any type of blunt edge, and don't use a knife - it's too easy for knives to slip.

Sterilize your cutting tool and a pair of tweezers. Drop them in a pot of boiling water for a few minutes, let them thoroughly dry on a clean paper towel, then swab them thoroughly with a cotton ball soaked in rubbing alcohol. This will ensure the cutting tool and tweezers don't transfer bacteria to your body.

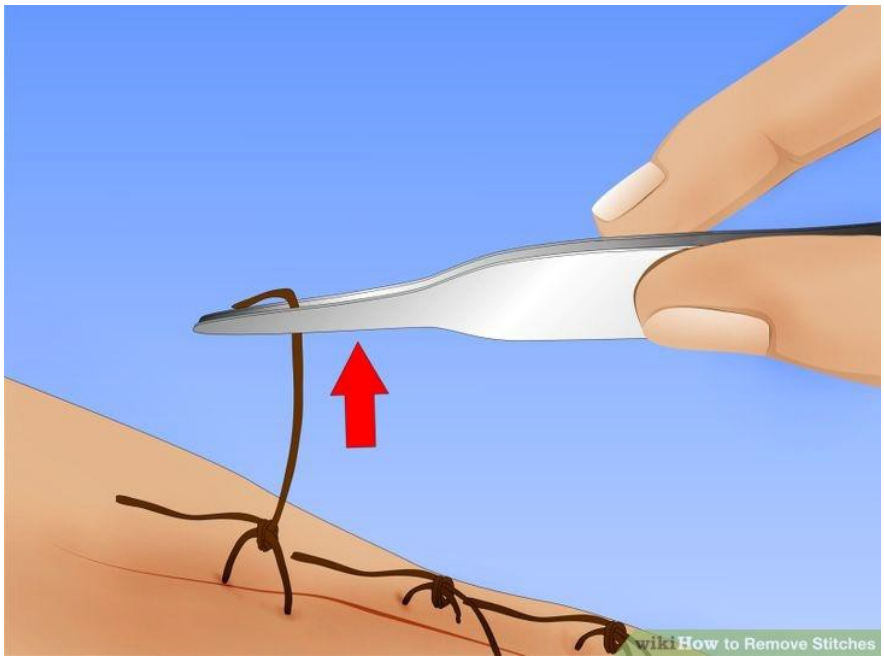
Gather your other supplies. There are a few other things you should have on hand. Gather sterile bandages and antibiotic ointment in case you need to treat an area that starts to bleed. You shouldn't need to use these supplies, since if your skin has properly healed, no bandage is necessary, but it's important to have them on hand just in case.

Wash and sterilize the stitch site. Use soapy water, and dry yourself thoroughly with a clean towel. Use a rubbing alcohol-soaked cotton ball to further clean the area around the stitches. Be sure the area is completely clean before proceeding.

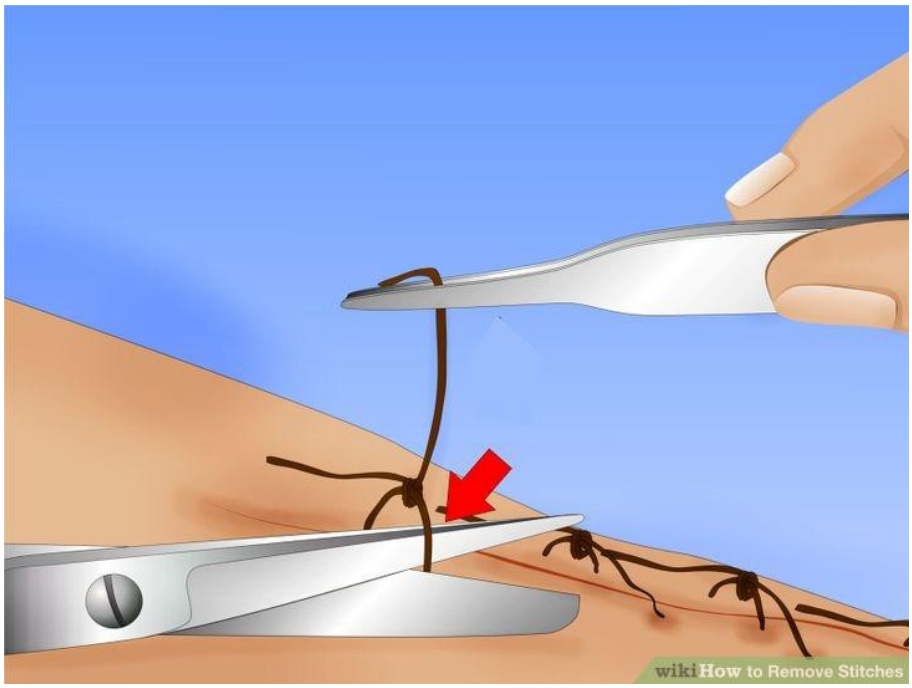
Removing the Stitches

Part 2

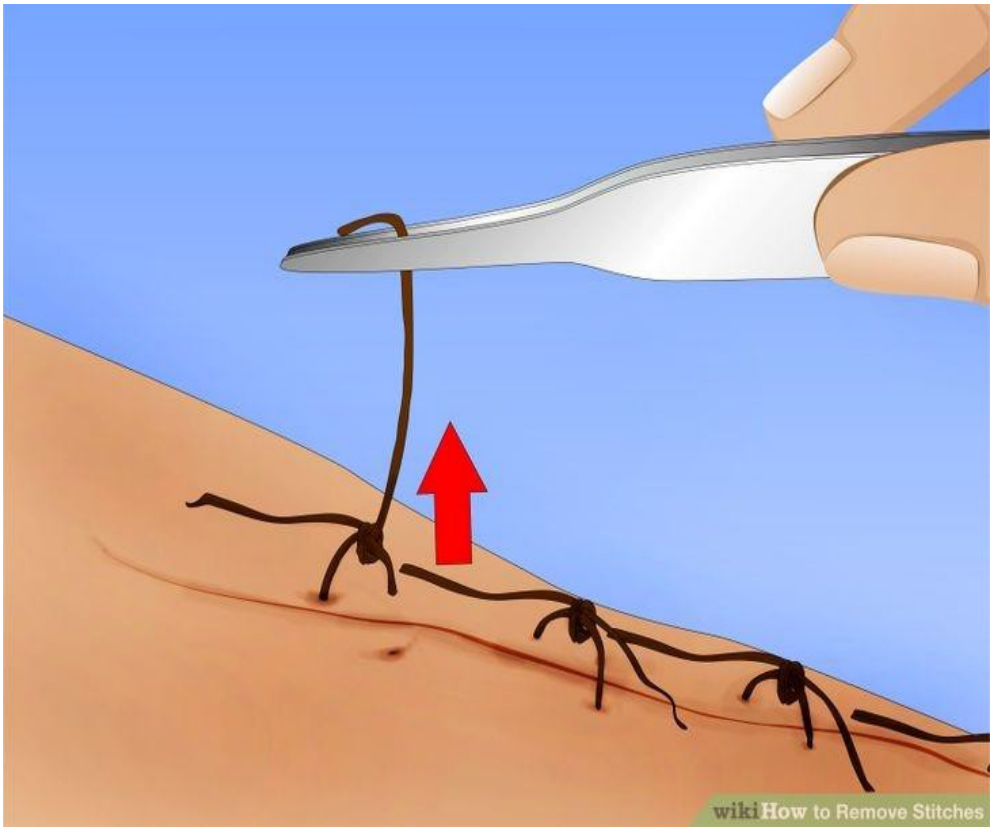
Sit in a well-lighted spot. You'll need to be able to see every stitch clearly to do the job properly. Don't attempt to remove your stitches in a place that's too dark, or you could hurt yourself.



Lift the first knot. Use the pair of tweezers to gently lift the knot of the first stitch slightly above the skin.

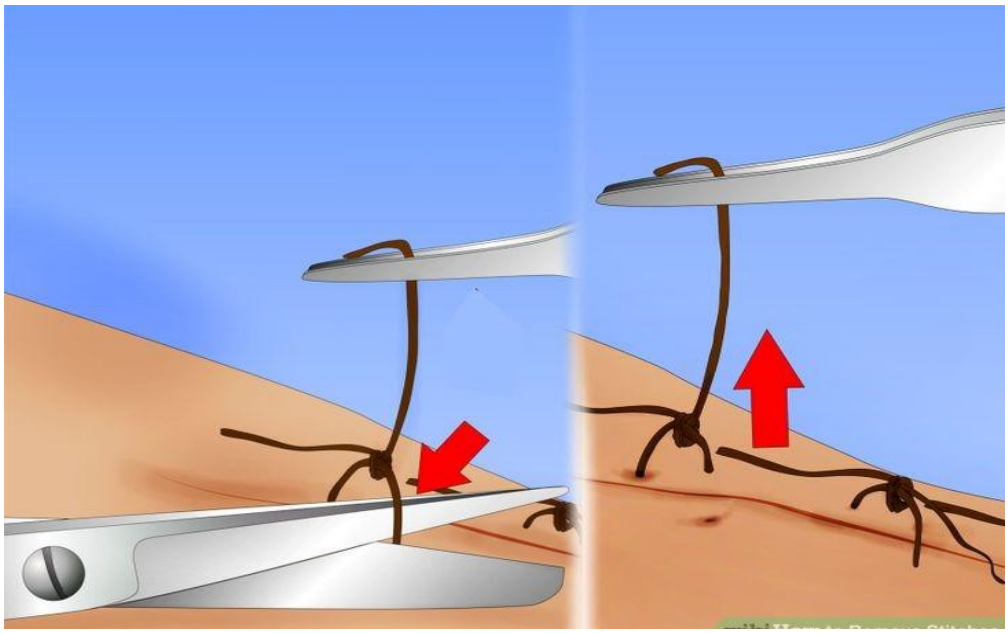


Cut the suture. Holding the knot above your skin, use your other hand to wield your scissors and snip the suture next to the knot.[2]

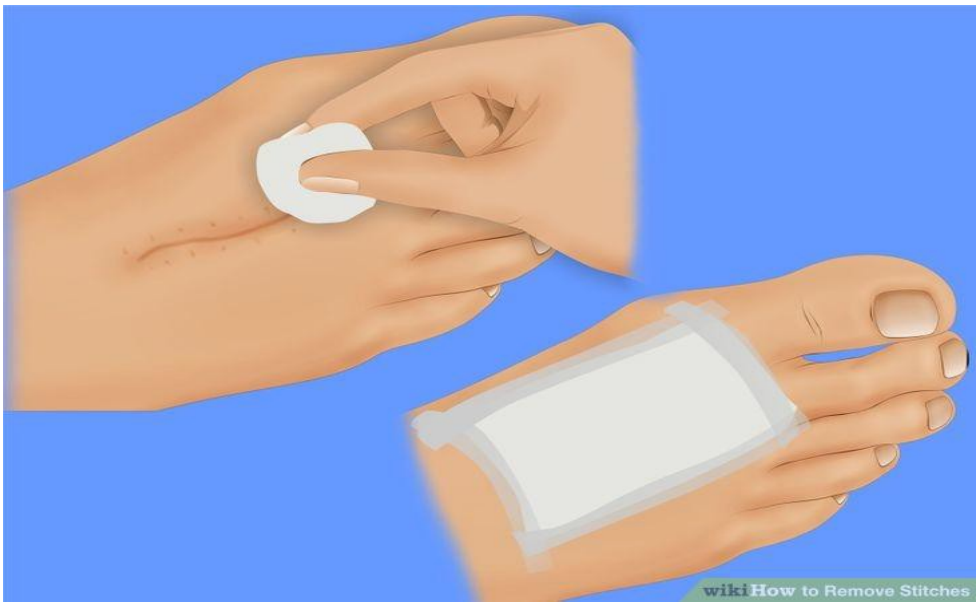


Pull the thread through. Use the tweezers to continue grasping the knot and gently pull the stitch through your skin and out. You might feel a bit of pressure, but it should not be painful.

- If the skin starts to bleed when you remove the stitch, your stitches are not ready to come out. **Stop what you're doing and see a doctor to remove the remaining stitches.**
- Take care not to pull the knot through your skin. It will catch on your skin and cause bleeding to occur.



Continue removing the stitches. Use the tweezers to lift the knots, then snip with the scissors. Pull the thread through and discard. Continue until all the stitches have been removed.



Cleanse the wound. Make sure there's no residue left around the area of the wound. If you'd like, you can place a sterile bandage to cover the area and allow it to continue to heal.

DRESSINGS

- **Background**
- There are a number of different dressings and techniques available for managing wounds. The majority of wounds in children are acute trauma or surgical wounds.
- **Objectives of wound dressing**
    - to reduce pain,
    - to apply compression for haemorrhage or venous stasis,
    - to immobilise an injured body part,
    - to protect the wound and surrounding tissue
    - to promote moist wound healing.

Assessment

Elicit a careful history of injury i.e.:

- mechanism of injury; associated blood loss; risk of contamination; deeper structure damage;
- tetanus status;
- consider Non accidental Iinjury;
- underlying chronic illness or disability.

Fully examine the injured part in particular checking for

- underlying nerve, vessel and tendon damage. This requires assessment of movement while exploring the wound (especially in palmar or hand wounds).
- Assess tissue damage or loss

Investigation

Request special investigations where appropriate

- xray for radiopaque foreign body or underlying fracture
- ultrasound is useful for puncture wounds with a radiolucent foreign body such as thorn or splinter.

Consider referral for plastic or general surgical opinion either in ED or as outpatient

Management

- Anaesthesia - see Analgesia and sedation guideline
- Cleansing - see Laceration guideline
- Wound closure - see Laceration guideline
- Dressing: in general keep dressings as simple as possible

Dressing Choices

Dressing types	Examples	Advantages	Disadvantages	Indications	Contraindications
Semi-permeable - thin, adhesive, transparent polyurethrane film	OpSite, Tegaderm	Some moisture evaporation, Reduces pain. Barrier to external contamination. Allows inspection.	Exudate may pool, may be traumatic to remove.	Superficial wounds.As a secondary dressing.	Highly exudative wounds.
Non adherent Moist (Tulle Gras Dressing) - Gauze	Jelonet, UnitulleBactigras,	Reduces adhesion to wound.Moist	Does not absorb exudate.Requi	Burns.Wounds healing by secondary	Allergy

impregnated with paraffin or similar. May be impregnated with antiseptics or antibiotics	Sofra-Tulle	environment aids healing.	res secondary dressing May induce allergy or delay healing when impregnated	intention	
Non adherent Dry Thin perforated plastic film coating attached to absorbent pad	Melolin, Melolite, Tricose	Low wound adherence.May absorb light exudate.	Not suitable in high exudate Can dry out and stick to wound. May require secondary dressing	Wounds with moderate exudate	Dry wounds (may cause tissue dehydration)
Fixation SheetPorous polyester fabric with adhesive backing	Fixomull, Hypafix, Mefix	Can be used directly on wound site. Conforms to body contours, good pain relief and controls oedema, Remains permeable allowing exudate to escape and be washed and dried off wound.Dressing changes can be left for 5-7 days.	Dressing needs washing with soap and water pat-dried twice daily.Requires application of oil prior to removal - ideally soaked in oil and wrapped in cling film overnight.	Wounds with mild exudate, not needing frequent review	Infected wounds,allergy to adhesives
Calcium AlginateNatural polysaccharide from seaweed	Kaltostat	Forms gel on wound and hence moist environment. Reduces pain. Can pack	May require secondary dressing.Not recommended in anaerobic infections.Gel can be	Moderately or highly exudative wounds.Need for haemostasis	Dry wounds or hard eschar

		cavities.Absorbent in exudative wounds.Promoteshaemostasis. Low allergenic.	confused with slough or pus in wound.		
Foam Dressings Polyurethane foam dressing with adhesive layer incorporated	PolyMem	Moist, highly absorbent and protective	Set size of foam may be limited by wound size	Wounds with mild to moderate exudate.	Dry wounds. Wounds that need frequent review.
Hydrocolloid Dressings Polyurethane film coated with adhesive mass	Duoderm	Retains moisture, painless removal.	Avoid on high exudate wounds	Burns (small)Abrasions	Dry wounds Infection
Paper adhesive tapesAdhesive tape may be applied directly to healing laceration	Micropore	Non allergenic. Provides wound support	Non absorbent	Small wounds	Exudative or large wounds.

Decision Tree Types of wounds and dressing options

Wound Type	Dressing options	Review times
Dry necrotic wound	Moisture retention eg hydrocolloid, semi permeable	3-4 days
Slough - covered wounds	Moisture retention and fluid absorption eg hydrocolloid, alginate	3-4 days
Infected wound	Avoid semi occlusive dressings. Consider alginate or hydrocolloid if high exudate	1-2 days

Wound Type	Dressing options	Review times
Graze, abrasions - clean	Film, tulle, fixation sheet or dry	2 days
Graze, abrasions - soiled	Dry or tulle	2 days
Puncture wounds or bites	Open or dry	2 days
Laceration - suturedLacerations	Open or dry, consider paper tape support after suture removal	3-7days see
Burn-minor Burns	Film, medicated tulle, fixation sheet	4-5 days visual review leave dressing on if healing see
Burn-major or requiring admission eg special areasBurns	Plastic wrap prior to surgical review, medicated tulle	Inpatient review
Chronic wounds eg ulcers, PEG sites etc	Hydrocolloid, alginate, foam	5 days

INTERCOSTAL DRAINAGE INSERTION:

Fluid or air that accumulates in the pleural space will reduce lung expansion and lead to respiratory compromise and hypoxia.

Insertion of an intercostal catheter (ICC) enables drainage of air or fluid from the pleural space, allowing negative intra-thoracic pressures to be re-established leading to lung re-expansion.

Indications:

- Pneumothorax
- Haemothorax
- Pleural effusion

Contraindications:

- Need for immediate thoracotomy

Complications:

- Pain
- Thoracic or abdominal visceral trauma
- Tension pneumothorax

Equipment

- Special procedures tray
- Under water sealed drain system (UWSD)
    - use cell saver UWSD for massive haemothorax
- Intercostal Catheter (guide sizes only)
    - use smaller size for draining air
    - larger size for draining blood/fluid
        - Newborn 8-12 FG

- Infant 12-16 FG
- Child 16-24 FG
- Adolescent 20-32 FG

- Spigot connector / tube adaptor - 2 sizes
- Suction must be available and working
- Sterile gloves & gown
- Mask
- Sterile towels x 2
- 500ml bottle of sterile water
- Antiseptic solution
- 1% lignocaine + 1:100,000 adrenaline 5mL ampoule
- 5ml/10ml syringe and needle
- Scalpel blade
- Suture material - black silk or nylon with needle size 3.0 x 2
- Sleek and Tegaderm x 2

Analgesia, Anaesthesia, Sedation

Local anaesthetic and intravenous analgesia are mandatory, as ICC placement is a painful procedure. The use of sedation should always be discussed with a senior emergency doctor, as it can potentially worsen the patient's clinical condition.

Procedure

Establish patient on continuous cardiac monitoring and pulse oximetry

- Place conscious patient in a sitting position at 45 degrees with arm of same side placed above head
- Palpate the fourth or fifth intercostal space just anterior to the mid-axillary line
- Surgically prepare the area
- Ensure local anaesthetic is infiltrated from subcutaneous tissue down to pleura.
- Select the appropriate size I.C.C. and **remove stylet**.
- Incise the skin parallel to the upper border of the rib below the chosen intercostal space. Incise down to the fascia.
- "Blunt dissect" (using an artery forcep) down to the pleura, enter the pleural space, and then widen the hole by opening the forceps.
- Sweep the pleural space with a gloved finger to widen the hole and push the lung away from the hole (only possible in older children, beware of rib fractures in injured child).
- Hold the tip of the catheter with a curved artery clamp and advance it into the pleural space, directing the catheter posteriorly and superiorly.
- Advance so that all apertures of the tube are in the chest and not visible
- Attach the tube to UWSD below the patient's chest level
- Anchor the drain and suture the wound. Tape in place with tegaderm sandwich and anchor the tube to the patient's side.
- Connect to the UWSD.

- Watch for "swinging" of water in tube connection.

Post-Procedure Care

Reassess ABCs and ensure ICC is functioning

- Reassess need for analgesia.
- In children following the removal of the tube coverage with a large tegaderm is sufficient for closure rather than a formal purse string suture.

LIPOMA EXCISION:

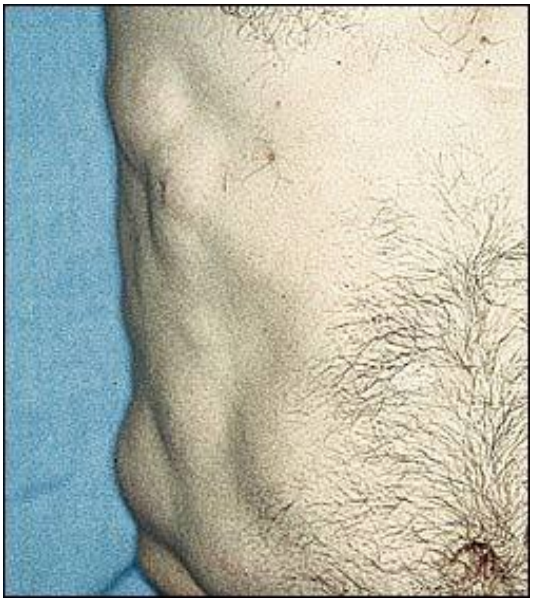
Lipomas are slow-growing, nearly always benign, adipose tumors that are most often found in the subcutaneous tissues. Most lipomas are asymptomatic, can be diagnosed with clinical examination *(Table 1)* and do not require treatment. These tumors may also be found in deeper tissues such as the intermuscular septa, the abdominal organs, the oral cavity, the internal auditory canal, the cerebellopontine angle and the thorax. Lipomas have been identified in all age groups but usually first appear between 40 and 60 years of age. Congenital lipomas have been observed in children. Some lipomas are believed to have developed following blunt trauma.

TABLE 1

Differential Diagnosis of Lipoma

1	Epidermoid cyst	8	Weber-Christian panniculitis
2	Subcutaneous tumors	9	Vasculitic nodules
3	Nodular fasciitis	10	Rheumatic nodules
4	Liposarcoma	11	Sarcoidosis
5	Metastatic disease	12	Infections (e.g., onchocerciasis, loiasis)
6	Erythema nodosum	13	Nodular subcutaneous fat necrosis
7	Hematoma		

While solitary lipomas are more common in women, multiple tumors (referred to as lipomatosis) are more common in men. Hereditary multiple lipomatosis, an autosomal dominant condition also found most frequently in men, is characterized by widespread symmetric lipomas appearing most often over the extremities and trunk. Lipomatosis may also be associated with Gardner's syndrome, an autosomal dominant condition involving intestinal polyposis, cysts, and osteomas. The term Madelung's disease, or benign symmetric lipomatosis, refers to lipomatosis of the head, neck, shoulders, and proximal upper extremities. Persons with Madelung's disease, often men who consume alcohol, may present with the characteristic “horse collar” cervical appearance. Rarely, these patients experience swallowing difficulties, respiratory obstruction, and even sudden death.



Multiple lipomatosis of the trunk (hereditary multiple lipomatosis).

Evaluation

Lipomas usually present as nonpainful, round, mobile masses, with a characteristic soft, doughy feel. The overlying skin appears normal. Lipomas can usually be correctly diagnosed by their clinical appearance alone.

Microscopically, lipomas are composed of mature adipocytes arranged in lobules, many of which are surrounded by a fibrous capsule. Occasionally, a nonencapsulatedlipoma infiltrates into muscle, in which case it is referred to as an infiltrating lipoma.

Four other types of lipomas may be noted on a biopsy specimen. Angiolipomas are a variant form with co-existing vascular proliferation. Angiolipomas may be painful and usually arise shortly after puberty. Pleomorphic lipomas are another variant in which bizarre, multinucleated giant cells are admixed with normal adipocytes. Pleomorphic lipomas' presentation is similar to that of other lipomas, but they occur predominantly in men 50 to 70 years of age. A third variant, spindle cell lipomas, has slender spindle cells admixed in a localized portion of regular-appearing adipocytes. A newly described variant of superficial lipoma, adenolipoma, is characterized by the presence of eccrine sweat glands in the fatty tumor; this type is often located on the proximal parts of the limbs.

A rare clinical consideration is Dercum's disease, or adiposis dolorosa, which is characterized by the presence of irregular painful lipomas most often found on the trunk, shoulders, arms, forearms, and legs. Dercum's disease is five times more common in women, is often found in middle age, and has asthenia and psychic disturbances as other prominent features.

Malignancy is rare but can be found in a lesion with the clinical appearance of a lipoma. Liposarcoma presents in a fashion similar to that of a lipoma and appears to be more common in the retroperitoneum, and on the shoulders and lower extremities. Some surgeons recommend complete excision of all clinical evidence of a lipoma to exclude a possible liposarcoma, especially in fast-growing lesions. Recently, magnetic resonance imaging has been used with some success to differentiate lipomas and liposarcomas.

Treatment

NONEXCISIONAL TECHNIQUES

Nonexcisional treatment of lipomas, which is now common, includes steroid injections and liposuction.

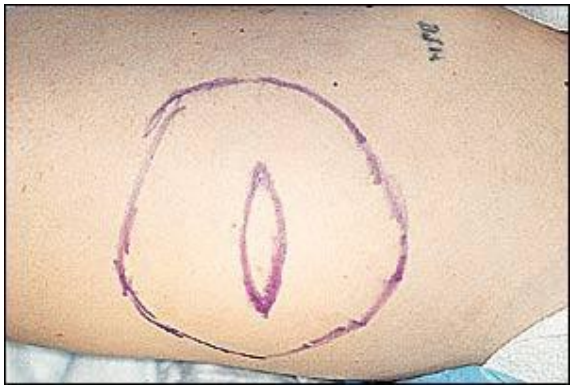
Steroid injections result in local fat atrophy, thus shrinking (or, rarely, eliminating) the lipoma. Injections are best performed on lipomas less than 1 inch in diameter. A one-to-one mixture of 1 percent lidocaine (Xylocaine) and triamcinolone acetonide (Kenalog), in a dosage of 10 mg per mL, is injected into the center of the lesion; this procedure may be repeated several times at monthly intervals.[8] The volume of steroid depends on the size of the lipoma, with an average of 1 to 3 mL of total volume administered. The number of injections depends on the response, which is expected to occur within three to four weeks. Complications, which are rare, are the result of the medication or the procedure, and can be prevented by injecting the smallest total amount possible and by positioning the needle so that it is in the center of the lipoma.

Liposuction can be used to remove small or large lipomatous growths, particularly those in locations where large scars should be avoided. Complete elimination of the growth is difficult to achieve with liposuction. Office procedures using a 16-gauge needle and a large

syringe may be safer than large-cannula liposuction. Diluted lidocaine usually provides adequate anesthesia for office liposuction.

PREPARATION FOR EXCISION

Surgical excision of lipomas often results in a cure. Before the surgery, it is often helpful to draw an outline of the lipoma and a planned skin excision with a marker on the skin surface. The outline of the tumor often helps to delineate margins, which can be obscured after administration of the anesthetic. Excision of some skin helps to eliminate redundancy at closure.



Proposed incision removing skin over the lipoma. The palpable borders of the lipoma are marked to aid the surgeon in complete removal.

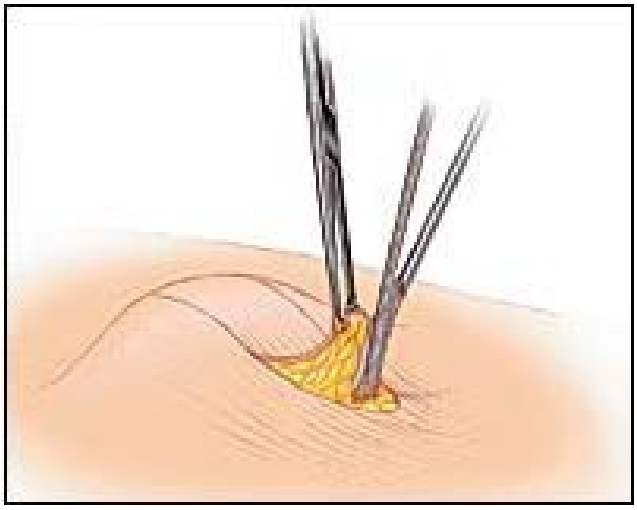
The skin is then cleansed with povidone iodine (Betadine) or chlorhexidine (Betasept) solution, making sure to avoid wiping away the skin markings. The area is draped with sterile towels. Local anesthesia is administered with 1 or 2 percent lidocaine with epinephrine, usually as a field block. Infiltrating the anesthetic in the subcutaneous area surrounding the operative field creates a field block.

ENUCLEATION

Small lipomas can be removed by enucleation. A 3-mm to 4-mm incision is made over the lipoma. A curette is placed inside the wound and used to free the lipoma from the surrounding tissue. Once freed, the tumor is enucleated through the incision using the curette. Sutures generally are not needed, and a pressure dressing is applied to prevent hematoma formation.

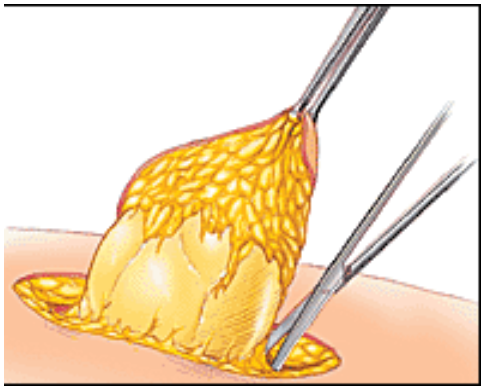
EXCISION

Larger lipomas are best removed through incisions made in the skin overlying the lipoma. The incisions are configured like a fusiform excision following the skin tension lines and are smaller than the underlying tumor. The central island of skin to be excised is grasped with a hemostat, or Allis clamp, which is used to provide traction for the removal of the tumor Dissection is then performed beneath the subcutaneous fat to the tumor. Any tissue cutting is performed under direct visualization using a no. 15 scalpel or scissors around the lipoma. Care must be taken to avoid nerves or blood vessels that may lie just beneath the tumor.



The skin inside the incision grasped with a hemostat to provide traction. The lipoma is dissected from the surrounding tissue using scissors or a scalpel.

Once a portion of lipoma has been dissected from the surrounding tissue, hemostats or clamps can be attached to the tumor to provide traction for removal of the remainder of the growth. Once it is freed, the lipoma is delivered as a whole. The surrounding tissue in the hole can be palpated to ensure complete removal of the tumor.



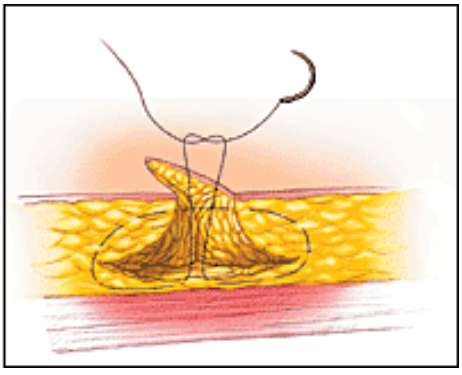
Once freed, the lipoma is delivered as a whole, and hemostasis is achieved.

Complications of Lipoma Excision

Surgical infection/cellulitis/fasciitis
Ecchymosis
Hematoma formation
Injury to nearby nerves with permanent paresthesia/anesthesia
Injury to nearby vessels/vascular compromise
Permanent deformity secondary to removal of a large lesion

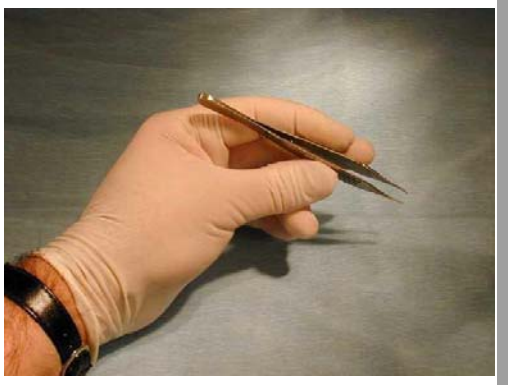
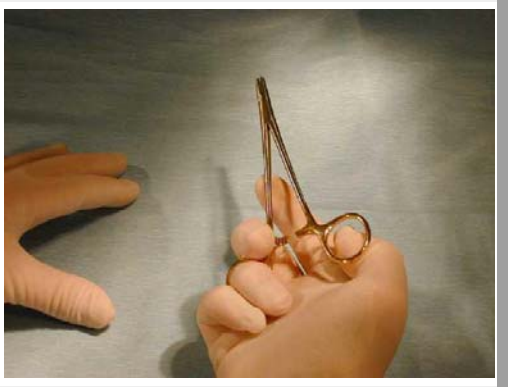
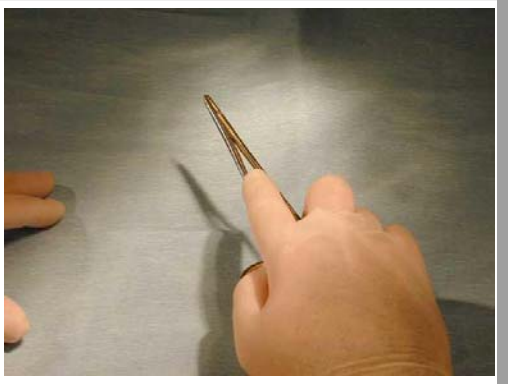
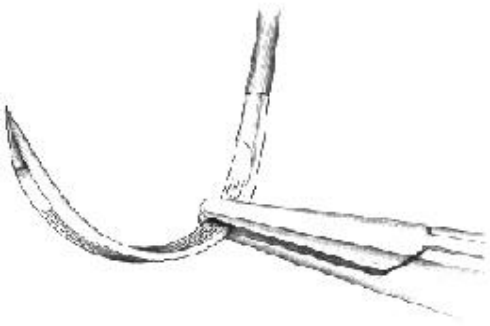
Excessive scarring with cosmetic deformity or contracture
Muscle injury/irritation
Fat embolus
Periostitis/osteomyelitis
Seroma

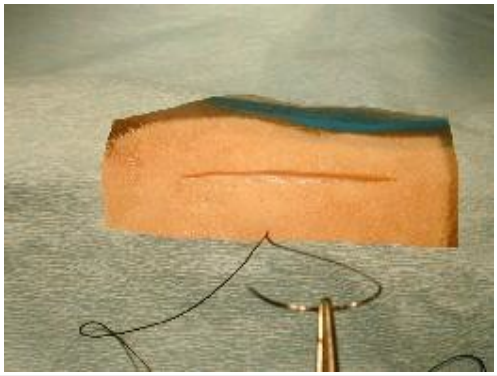
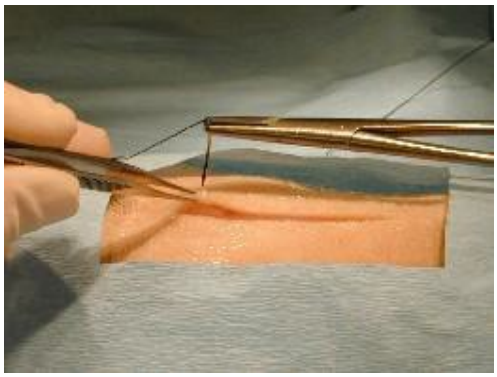
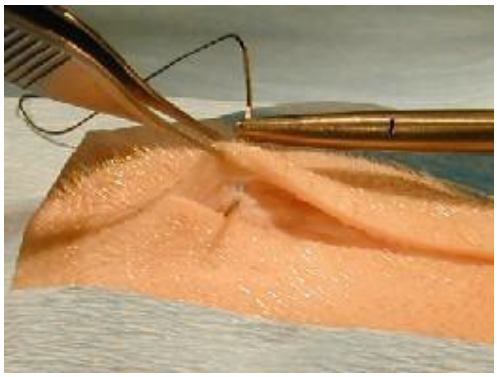
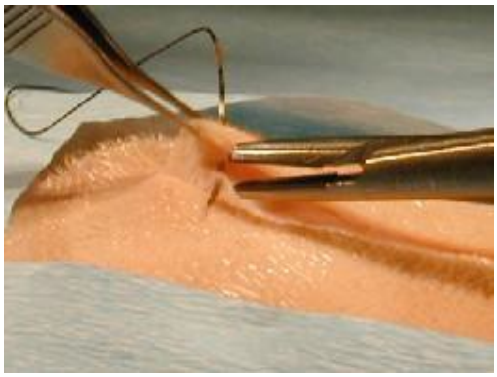
Adequate hemostasis is achieved following the removal of the lipoma using hemostats or suture ligation. The dead space is closed beneath the skin using buried, interrupted 3-0 or 4-0 Vicryl sutures. Occasionally drains may have to be placed to prevent fluid accumulation, but this should be avoided if possible. The skin is then closed with interrupted 4-0 or 5-0 nylon sutures. A pressure dressing is placed to reduce the incidence of hematoma formation. The patient is given routine wound care instructions, and the wound is checked in two to seven days. The sutures are removed after seven to 21 days, depending on the body location. Specimens should be submitted for histologic analysis.

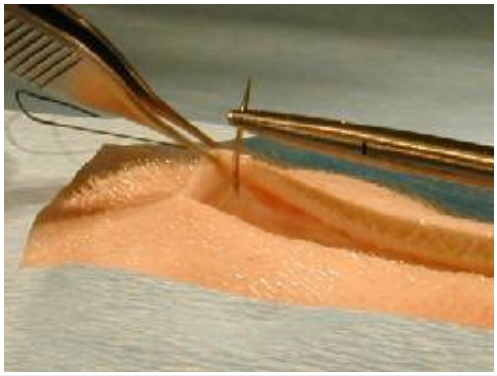
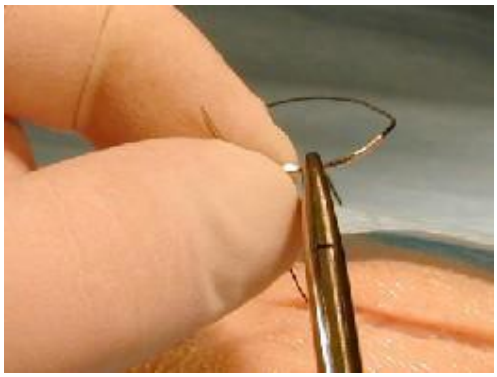
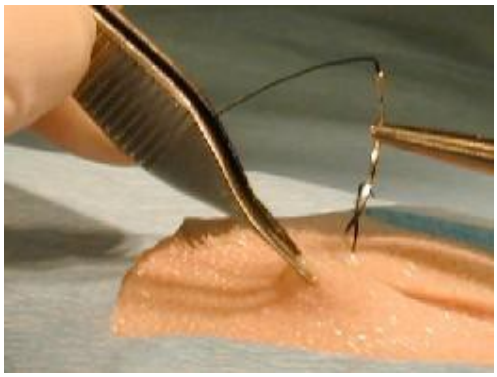
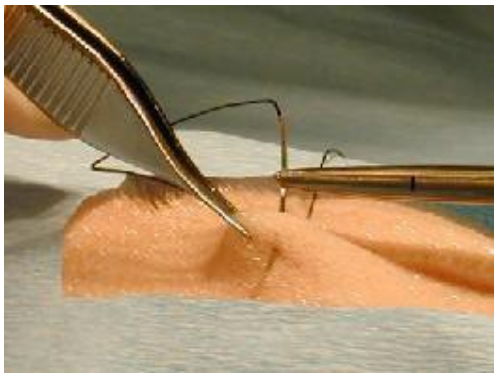


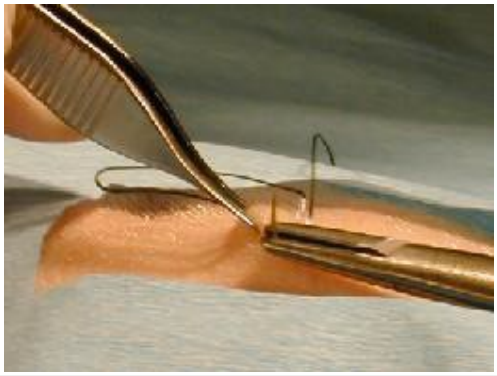
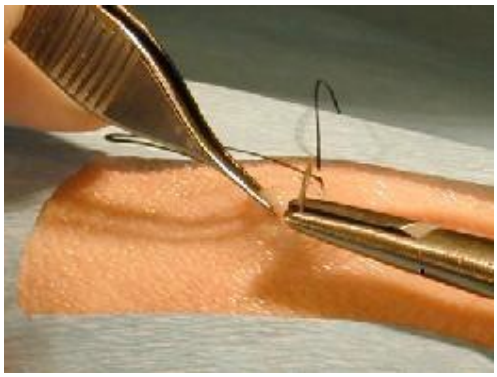
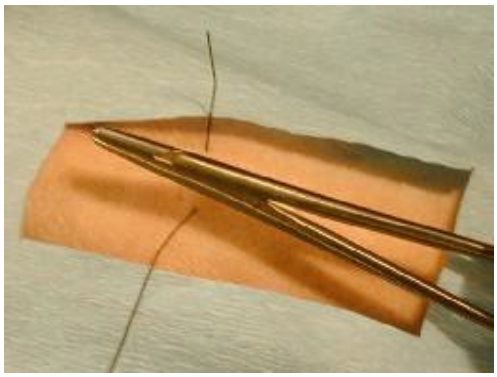
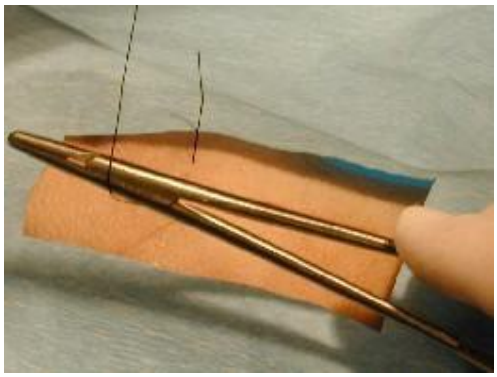
Interrupted 3-0 or 4-0 Vicryl sutures are used to partially close the dead space.

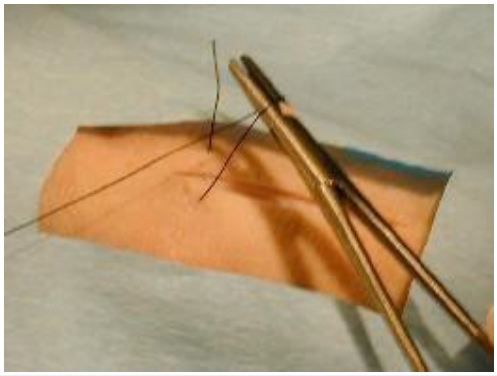
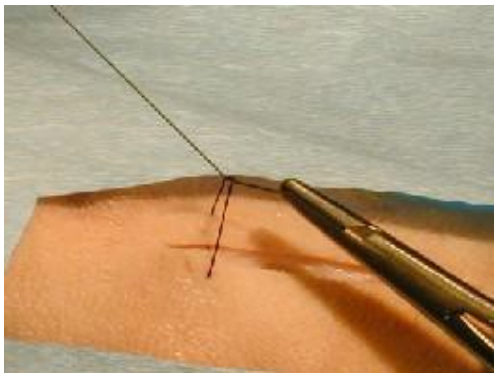
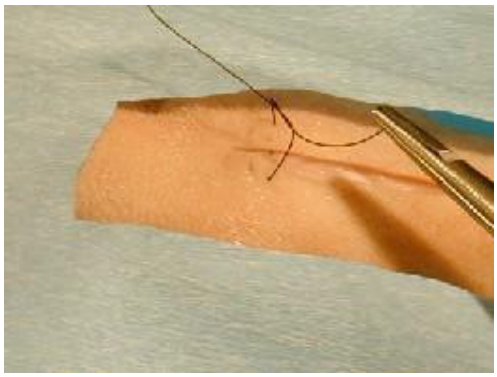
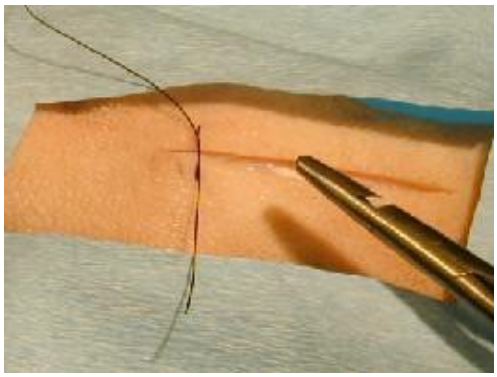
SIMPLE INTERRUPTED SUTURE

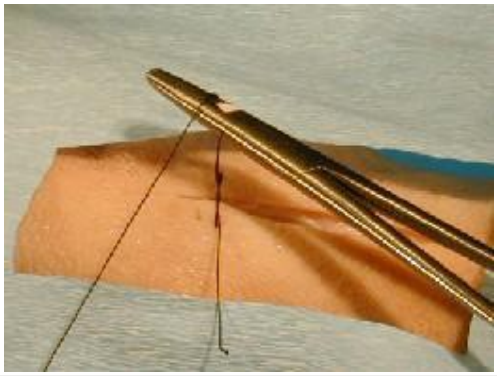
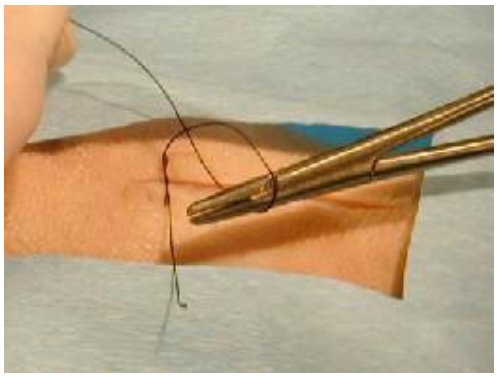
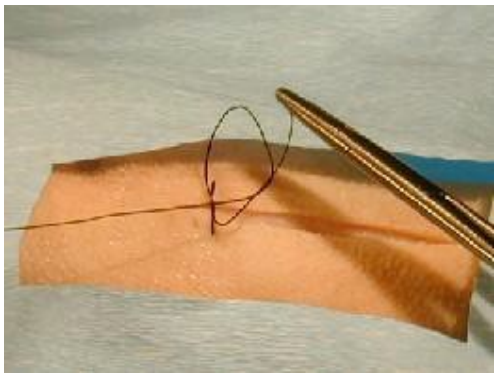
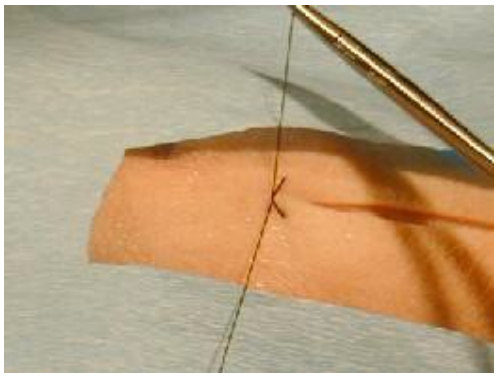
Small toothed forceps, such as the Addison forceps shown here, should be used to grasp the skin edges during suturing. Forceps with teeth provide a secure grasp with minimal pressure, thereby avoiding crushing of the skin edge. The forceps should be held in the first three fingers as one would hold a pen, using the first three fingers.	
The needle holder should be held in a way that is comfortable and affords maximum control. Most surgeons grasp the needle holder by partially inserting the thumb and ring finger into the loops of the handle. Note that the index finger provides additional control and stability.	
This illustrates the same grasp, but with the hand pronated. Supination and pronation are required to manipulate the curved needles used in surgery.	
As a rule, the needle should be grasped at its center or perhaps 50-60% back from the pointed end. The needle should be grasped 1-2 mm from the tip of the needle holder.	

One should avoid grasping the suture material or the distal end of the needle with the needle holder, since this will damage the suture.	
Placement of the 1st suture is begun by grasping and slightly everting the skin edge. The right hand is rotated into pronation so that the needle will pierce the skin at a 90^{o} angle. Note that the trailing suture is placed away from the surgeon to avoid tangling.	
The needle is driven through the full thickness of the skin by rotating the needle holder (supinating). By keeping the shaft of the needle perpendicular to the skin surface at all times, one takes advantage of the needle's curvature in traversing the skin as atraumatically as possible.	
The needle has been released and is about to be regrasped. Note that the forceps maintain their grasp, thereby preventing the needle from retracting. The right hand has been fully pronated in preparation for regrasping the needle.	

Pronation in the previous step makes it possible to complete passage of the needle with a smooth, natural supination which rotates the needle upwards and away from the surgeon. Again, this minimizes trauma to the tissues.	
Here the needle is being regrasped in preparation for passage through the opposite skin edge. This was traditionally done by grasping the needle with the non-dominant hand. However, given the risks of HIV and hepatitis, it is probably advisable to train yourself to use the forceps for this instead of fingers.	
The skin edge closest to the surgeon has been grasped and everted slightly, while the right hand is pronated to "cock" the needle and position it for passage through the skin.	
Again, the right hand is supinated in order to rotate the needle through the full thickness of the skin, keeping the shaft at a right angle to the skin surface.	

After releasing the needle, the right hand is pronated before the needle is regrasped...	
... and the right hand is then supinated in order to rotate the needle through the skin atraumatically.	
The suture material is drawn through the skin, leaving 2-3 cm. protruding from the far skin surface. The forceps are then dropped or "palmed" so the left hand can grasp the long end in preparation for an instrument tie. Note that the needle holder is positioned between the strands over the wound.	
The long strand is being wrapped around the needle holder to form the loop for the first throw of a square knot.	

The needle holder is then rotated away from the surgeon to grasp the short end of the suture.	
The short end is grasped and drawn back through the loop toward the surgeon.	
The throw is tightened...	
... creating a flat throw which will be tightened just enough to approximate the skin edges. Remember: approximate; do not strangulate.	

The second throw of the square knot is initiated with the needle holder pointed to the left as the long strand is wrapped around it by bringing the long strand toward the surgeon.	
The needle holder is then rotated toward the surgeon to retrieve the short end, ...	
... and the short end is drawn through the loop that has been created, pulling it away from the surgeon.	
The second throw is then brought down and tightened securely against the first throw.	

With a braided material, such as silk, a third throw (replicating the first) would be placed to secure the knot. If a slippery monofilament material, such as nylon, were being used, one would place 5 or 6 throws of alternating construction in order to minimize the likelihood of knot slippage.

The suture will then be cut leaving 3-4 mm tails. The next suture will then be placed about 4 mm away from the first one. The distance between stitches will depend on how easily the wound edges can be approximated and how much tension or motion is likely to be exerted across the wound during healing. For example, a wound on a flexion surface, such as a knuckle, might require closer sutures than a wound in the scalp.

BASIC SKILLS TO BE ACQUIRED BY CRRI DURING ANAESTHESIA POSTINGS

I) Theatre discipline
II) IV access
III) Airway
IV) Pre operative evaluation
V) Basic knowledge of Anaesthesia Machine
VI) Intensive care
VII) Basic Life Support
VIII) Monitoring
IX) Lumbar puncture
X) Post operative care
XI) Basic setting of ventilator

I) THEATRE DISCIPLINE

Students to maintain punctuality and be present in the theatre half an hour before the theatre starts.

Wear surgical attire like:

a. scrub suits ,
b. cap-hood,
c. shoe covers
d. mask
e. gloves
f. gown

Regulate the operating room environment, by minimising personnel traffic during operations.

Maintain log book regularly.

CRRI ORIENTATION

SKILLS	PERFORM INDEPENDENTLY	**PERFORM WITH SUPERVISION**	**ASSIST THE EXPERT**	**OBSERVE**
Obtain a proper relevant history and perform a humane and thorough clinical examination, internal examination(per rectal and pervaginal) and examinations of all organs / Systems in adults and children				
Arrive at a logical working diagnosis after clinical examination				
Order appropriate tests keeping in mind their relevants and cost effectiveness				
Write the complete case record with all necessary details				
Write a proper discharge summary with all relevant information				
Obtain an informed consent for any examination / procedure				
At the end of the session , the learners should be able to perform the following				
Start an IV line and monitor infusion				
Start and monitor blood transfusion				
Venous cut down				
Manage a CVP line				
Conduct CPR(Cardio pulmonary resuscitation)				
Basic life support / ITLS				
Endotracheal intubation				
Pass nasogastric tube				
Perform digital rectal				

examination and proctoscopy				
Urithral catheterisation				
Dressing of the wounds/ ulcers				
Suturing of simple wounds				
Remove small subcutaneos swellings				
Various types of biopsies				
Relieve pneumothorax				
Infiltration , surface and digital nerve blocks				
Incise and drain superficial abscesses				
Manage lacerated wounds				
Control external haemorrage				
Vasectomy				
Circumcision				

Surgery for hydrocele

Surgery for hernia

Injection / banding of piles

Mangement of shock

Assessment and management of burns

The candidate shall observe all the operations performed by the surgeons by assisting and observing surgeons during general surgical posting

II) IV ACCESS

Preferred sites for intravenous cannulation

1. Dorsal venous arch
2. Wrist volar aspect
3. Cubital fossa: cephalic and basilic vein
4. Foot dorsal arch
5. Leg saphenous vein
6. Skull should be used when other sites are not available

Cannulation guidelines

Cannulation is a process wherein cannula is inserted into and kept inside a vein.Various sizes of intravenous cannula are available. Different cannula sizes are indicated by different colours making them easier to differentiate specially in emergency situations.

SIZE	COLOUR	AMOUNT OF INFUSED ML/MINUTE	
24 g	Yellow		Neonates
22 g	Blue	36 ml/ min	Paediatrics
20 g	Pink	61 ml/min	Adults (blood sampling)
18 g	Green	90 ml/min	Large volume of fluid and blood, feeding of patients, harvesting of stemcells
17 g	White	140 ml/min	Large volume of iv fluids and blood
16 g	Gray	200 ml/min	Emergency situations
14 g	Brown	300 ml/min	Rapid iv transfusion and blood and medications

III) AIRWAY MANAGEMENT

Airway management is a primary consideration in cardiopulmonary resuscitation, anaesthesia, emergency medicine, intensive care medicine and first aid.

Endotracheal intubation

It is the placement of flexible plastic tube in the trachea to maintain an open airway or to serve as a conduit.

Most widely used route is the orotracheal, where the Endotracheal tube is passed through the mouth into the vocal cord.

Laryngeal mask airway

LMA is a supraglottic airway where a tube connects to an elliptical mask with a cuff.

Inserted into the oral cavity and the cuff inflated, forms a periglottic seal, allowing ventilation.

Bag mask ventilation

Bag mask ventilation is an essential emergency medical skill.

It allows for oxygenation and ventilation of patients until a more definitive airway management can be established.

Adjuncts such as oral and nasal airways can aid ventilation by relieving airway obstruction.

IV) PRE OPERATIVE EVALUATION

Assessment of a patient about to undergo an operation is the foundation of an anaesthetist's good clinical practice.

Why is it necessary?

The increasing burden of medical co morbidities entails sufficient time between pre anaesthetic evaluation and planned surgical procedure to facilitate testing, interventions and optimization and also establishes doctor patient relationship

What is done?

- Assessment of patient's history,
- Physical examination
- Airway examination,
- Differential diagnosis,
- The planning of intra and peri-operative management.

This is done within 30 days before the planned surgical procedure and reassessment with in 48hr period preceding surgical procedure. This is a medico legal document which contains a concise legible statement of date and time of examination, relevant positive and negative findings.

Goals:

To ensure that patient can safely tolerate anaesthesia.

Mitigate issues associated with overall peri-operative period.

Consent

Consent is process with early provision of written information including risks to patient before admission for an elective procedure.

All CRRIs should necessarily know about different types of consent and methodology to write a proper informed consent.

Anaesthetic Risk

At the preoperative visit, discussion of risk associated with the anaesthesia should be explained to the patient in a way that is easy for the patient to understand. These risks can range from common but minor side effects to rare but serious complications. Communication of risk is very important .

Anaesthetic risk is assessed by ASA guidelines which puts forth the classification of physical status for all surgical patients irrespective of the anestheic procedure. This stratification has great value in assessing the perioperative outcome. The ASA classification ranges form Class I – Class V. Class VI for brain dead patients .Letter E is added after the ASA physical status in emergency surgery.

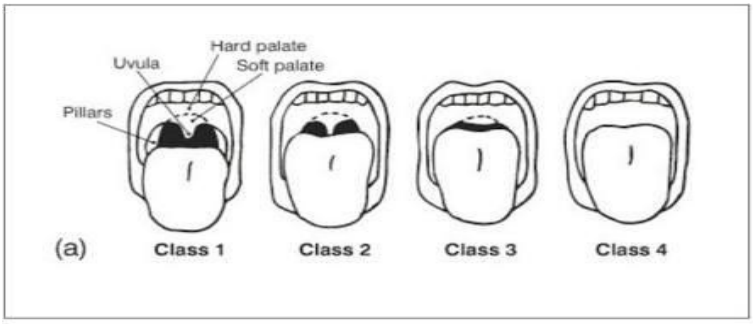
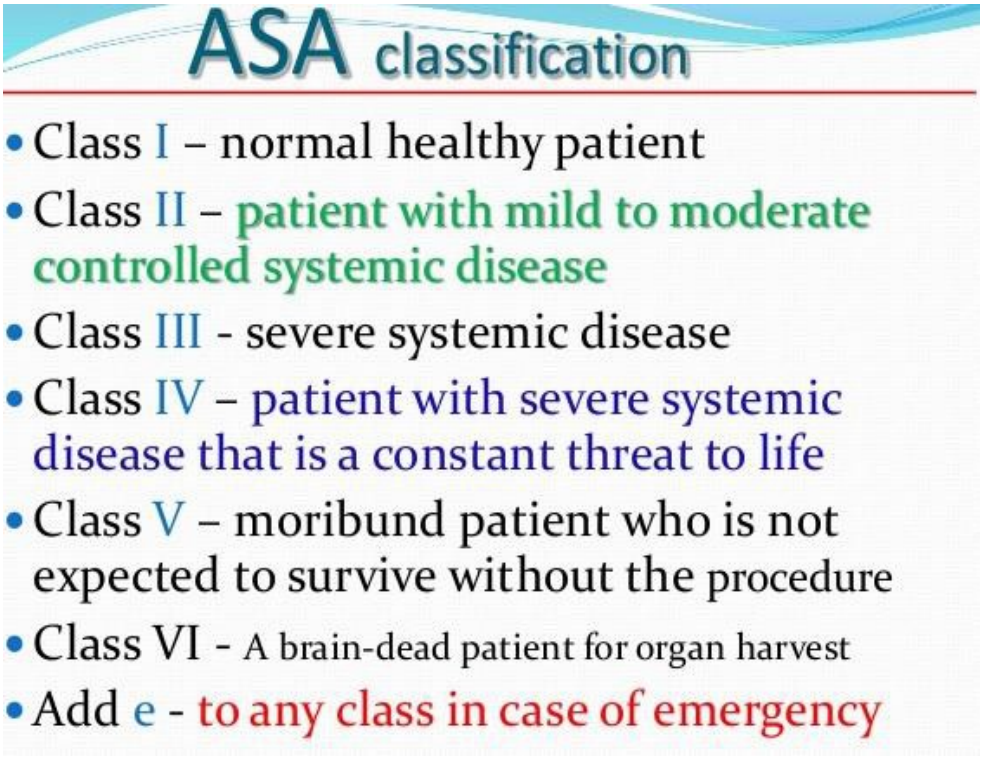


Figure 1. The Mallampati score:
Class 1. Complete visualization of the soft palate
Class 2. Complete visualization of the uvula
Class 3. Visualization of only the base of the uvula
Class 4. Soft palate is not visible at all



V) BASIC KNOWLEDGE OF ANAESTHESIA MACHINE

The anaesthesia machine is used to support the administration of anaesthesia. It is commonly referred to as the Boyle's machine.

It is a continuous flow anaesthetic machine designed to provide an accurate and continuous supply of medical gases (O2 and N2O) mixed with accurate concentrations of anaesthetic vapour. This was invented by Henry Edmund Gaskin Boyle in 1917.

Anaesthetic machine is divided into:

High pressure, intermediate pressure and low pressure systems. The gas source is from a central manifold through pipelines or cylinders which are colour coded for particular gases.

Cylinders made of molybdenum steel are attached to the Boyle's machine, serve as a back up and are also colour coded.

The vaporizer is mounted on the back bar of the anaesthetic machine where the liquid volatile is converted into vapour.

Pressure gauges, regulators and pop off valves protect the machine components and patient from high pressure gases.

Integrated ventilator to ventilate the patient during administration of anaesthesia.

Systems for monitoring the gases and the patients parameters are also incorporated into modern anaesthesia machines.

VI) INTENSIVE CARE UNIT

The ICU is a unit in the hospital were the seriously ill patients are cared for by specially trained staff.

Common equipments in ICU

Mechanical ventilator to assist breathing, cardiac monitors, external pacemakers, defibrillators, dialysis machine and a variety of monitors.

Mechanical ventilators

Mechanical ventilation is indicated when the patient's spontaneous ventilation is inadequate to maintain life.

Common indications for mechanical ventilation.

- Acute lung injury
- Apnea with respiratory arrest
- Acute severe asthma
- COPD
- Acute respiratory acidosis

Modes of ventilation

- Assist/ Control mode
- SIMV mode
- CPAP mode

Complicatons of mechanical ventilation

1) Ventilator associated pneumonia
2) Barotrauma
3) Hypotension
4) Ventilator dependence.

Thus within the context of preoperative evaluation anaesthesiologists must be knowledgeable and skilled at assessing patients with varying medical complexity.

VII) BASIC LIFE SUPPORT

- **2010 American Heart Association Guidelines**

Adult Basic Life Support

Basic life support (BLS) is the foundation for saving lives following cardiac arrest. Fundamental aspects of BLS include immediate **recognition** of sudden cardiac arrest (SCA) and **activation** of the emergency response system, early **cardiopulmonary resuscitation** (*CPR*), and rapid **defibrillation** with an automated external defibrillator (*AED)*. Initial recognition and response to heart attack and stroke are also considered part of BLS.

Immediate Recognition and Activation of the Emergency Response System

If a lone rescuer finds an unresponsive adult (ie, no movement or response to stimulation) or witnesses an adult who suddenly collapses, after ensuring that the scene is safe, the rescuer should check for a response by tapping the victim on the shoulder and shouting at the victim. The trained or untrained bystander should at a minimum activate the community emergency response system .If the victim also has absent or abnormal breathing (ie, only gasping), the rescuer should assume the victim is in cardiac arrest . The lay rescuer should phone the emergency response system once the rescuer finds that the victim is unresponsive the dispatcher should be able to guide the lay rescuer through the check for breathing and the steps of CPR, if needed. The healthcare provider can check for response and look for no breathing or no normal breathing (ie, only gasping) almost simultaneously before activating the emergency response system. After activation of the emergency response system, all rescuers should immediately begin CPR for adult victims who are unresponsive with no breathing or no normal breathing (only gasping).

Pulse Check

Studies have shown that both lay rescuers and healthcare providers have difficulty detecting a pulse. Healthcare providers also may take too long to check for a pulse.

- The lay rescuer should not check for a pulse and should assume that cardiac arrest is present if an adult suddenly collapses or an unresponsive victim is not breathing normally.

- The healthcare provider should take no more than 10 seconds to check for a pulse and, if the rescuer does not definitely feel a pulse within that time period, the rescuer should start chest compressions

Early CPR

Chest Compressions

Chest compressions consist of forceful rhythmic applications of pressure over the lower half of the sternum. These compressions create blood flow by increasing intrathoracic pressure and directly compressing the heart. This generates blood flow and oxygen delivery to the myocardium and brain.

- Effective chest compressions are essential for providing blood flow during CPR. For this reason all patients in cardiac arrest should receive chest compressions .

- To provide effective chest compressions, push hard and push fast. It is reasonable for laypersons and healthcare providers to compress the adult chest at a rate of at least 100 compressions per minute with a

compression depth of at least 2 inches/5 cm. Rescuers should allow complete recoil of the chest after each compression, to allow the heart to fill completely before the next compression .Rescuers should attempt to minimize the frequency and duration of interruptions in compressions to maximize the number of compressions delivered per minute. A compression-ventilation ratio of 30:2 is recommended.

Rescue Breaths

A change in the *2010 AHA Guidelines for CPR and ECC* is to recommend the initiation of compressions before ventilations. While no published human or animal evidence demonstrates that starting CPR with 30 compressions rather than 2 ventilations leads to improved outcomes, it is clear that blood flow depends on chest compressions. Therefore, delays in, and interruptions of, chest compressions should be minimized throughout the entire resuscitation. Moreover, chest compressions can be started almost immediately, while positioning the head, achieving a seal for mouth-to-mouth rescue breathing, and getting a bag-mask apparatus for rescue breathing all take time. Beginning CPR with 30 compressions rather than 2 ventilations leads to a shorter delay to first compression.

Once chest compressions have been started, a trained rescuer should deliver rescue breaths by mouth-to-mouth or bag-mask to provide oxygenation and ventilation, as follows:

- Deliver each rescue breath over 1 second.
- Give a sufficient tidal volume to produce *visible chest rise* .
- Use a compression to ventilation ratio of 30 chest compressions to 2 ventilations.

Adult BLS Skills

The sequence of BLS skills for the healthcare provider is depicted in the BLS Healthcare Provider Algorithm (see Figure 2).

Figure 2.

BLS healthcare provider algorithm.

Managing the Airway

As previously stated, a significant change in these Guidelines is to recommend the initiation of chest compressions before ventilations (CAB rather than ABC). This change reflects the growing evidence of the importance of chest compressions and the reality that setting up airway equipment takes time. The ABC mindset may reinforce the idea that compressions should wait until ventilations have begun. This mindset can occur even when more than 1 rescuer is present because "airway and breathing before ventilations" is so ingrained in many rescuers. This new emphasis on CAB helps clarify that airway maneuvers should be performed quickly and efficiently so that interruptions in chest compressions are minimized and chest compressions should take priority in the resuscitation of an adult.

Open the Airway: Healthcare Provider

A healthcare provider should use the head tilt–chin lift maneuver to open the airway of a victim with no evidence of head or neck trauma. Although the head tilt–chin lift technique was developed using unconscious, paralyzed adult volunteers and has not been studied in victims with cardiac arrest, clinical and radiographic evidence and a case series have shown it to be effective.

Between 0.12 and 3.7% of victims with blunt trauma have a spinal injury, and the risk of spinal injury is increased if the victim has a craniofacial injury, a Glasgow Coma Scale score of <8, or both. For

victims with suspected spinal injury, rescuers should initially use manual spinal motion restriction (eg, placing 1 hand on either side of the patient's head to hold it still) rather than immobilization devices. Spinal immobilization devices may interfere with maintaining a patent airway, but ultimately the use of such a device may be necessary to maintain spinal alignment during transport.

If healthcare providers suspect a cervical spine injury, they should open the airway using a jaw thrust without head extension (Class IIb, LOE C). Because maintaining a patent airway and providing adequate ventilation are priorities in CPR , use the head tilt–chin lift maneuver if the jaw thrust does not adequately open the airway.

Rescue Breathing (Box 3A, 4)

The *2010 AHA Guidelines for CPR and ECC* make many of the same recommendations regarding rescue breathing as in 2005:

- Deliver each rescue breath over 1 second .
- Give a sufficient tidal volume to produce *visible chest rise* .
- Use a compression to ventilation ratio of 30 chest compressions to 2 ventilations.
- When an advanced airway (ie, endotracheal tube, Combitube, or laryngeal mask airway [LMA]) is in place during 2-person CPR, give 1 breath every 6 to 8 seconds without attempting to synchronize breaths between compressions (this will result in delivery of 8 to 10 breaths/minute). There should be no pause in chest compressions for delivery of ventilations.

Studies in anesthetized adults (with normal perfusion) suggest that a tidal volume of 8 to 10 mL/kg maintains normal oxygenation and elimination of CO_2. During CPR, cardiac output is ::25% to 33% of normal, so oxygen uptake from the lungs and CO_2 delivery to the lungs are also reduced. As a result, a low minute ventilation (lower than normal tidal volume and respiratory rate) can maintain effective oxygenation and ventilation. For that reason during adult CPR tidal volumes of approximately 500 to 600 mL (6 to 7 mL/kg) should suffice. This is consistent with a tidal volume that produces visible chest rise.

Patients with airway obstruction or poor lung compliance may require high pressures to be properly ventilated (to make the chest visibly rise). A pressure-relief valve on a resuscitation bag-mask may prevent the delivery of a sufficient tidal volume in these patients. Ensure that the bag-mask device allows you to bypass the pressure-relief valve and use high pressures, if necessary, to achieve visible chest expansion.

Excessive ventilation is unnecessary and can cause gastric inflation and its resultant complications, such as regurgitation and aspiration . More important, excessive ventilation can be harmful because it increases intrathoracic pressure, decreases venous return to the heart, and diminishes cardiac output and survival. In summary, rescuers should avoid excessive ventilation (too many breaths or too large a volume) during CPR.

During CPR the primary purpose of assisted ventilation is to maintain adequate oxygenation; the secondary purpose is to eliminate CO_2. However, the optimal inspired oxygen concentration, tidal volume and respiratory rate to achieve those purposes are not known. As noted

above, during the first minutes of sudden VF cardiac arrest, rescue breaths are not as important as chest compressions because the oxygen content in the noncirculating arterial blood remains unchanged until CPR is started; the blood oxygen content then continues to be adequate during the first several minutes of CPR. In addition, attempts to open the airway and give rescue breaths (or to access and set up airway equipment) may delay the initiation of chest compressions. These issues support the CAB approach of the *2010 AHA Guidelines for CPR and ECC* (ie, starting with **C**hest Compressions prior to **A**irway and **B**reathing).

For victims of prolonged cardiac arrest both ventilations and compressions are important because over time oxygen in the blood is consumed and oxygen in the lungs is depleted (although the precise time course is unknown). Ventilations and compressions are also important for victims of asphyxial arrest, such as children and drowning victims, because they are hypoxemic at the time of cardiac arrest.

Mouth-to-Mouth Rescue Breathing

Mouth-to-mouth rescue breathing provides oxygen and ventilation to the victim. To provide mouth-to-mouth rescue breaths, open the victim's airway, pinch the victim's nose, and create an airtight mouth-to-mouth seal. Give 1 breath over 1 second, take a “regular” (not a deep) breath, and give a second rescue breath over 1 second. Taking a regular rather than a deep breath prevents the rescuer from getting dizzy or lightheaded and prevents overinflation of the victim's lungs. The most common cause of ventilation difficulty is an improperly opened airway, so if the victim's chest does not rise with the first rescue breath,

reposition the head by performing the head tilt–chin lift again and then give the second rescue breath.

If an adult victim with spontaneous circulation (ie, strong and easily palpable pulses) requires support of ventilation, the healthcare provider should give rescue breaths at a rate of about 1 breath every 5 to 6 seconds, or about 10 to 12 breaths per minute (Class IIb, LOE C). Each breath should be given over 1 second regardless of whether an advanced airway is in place. Each breath should cause visible chest rise.

Ventilation With Bag and Mask

Rescuers can provide bag-mask ventilation with room air or oxygen. A bag-mask device provides positive-pressure ventilation without an advanced airway; therefore a bag-mask device may produce gastric inflation and its complications.

The Bag-Mask Device

A bag-mask device should have the following: a nonjam inlet valve; either no pressure relief valve or a pressure relief valve that can be bypassed; standard 15-mm/22-mm fittings; an oxygen reservoir to allow delivery of high oxygen concentrations; a nonrebreathing outlet valve that cannot be obstructed by foreign material and will not jam with an oxygen flow of 30 L/min; and the capability to function satisfactorily under common environmental conditions and extremes of temperature.

Masks should be made of transparent material to allow detection of regurgitation. They should be capable of creating a tight seal on the face, covering both mouth and nose. Masks should be fitted with an oxygen

(insufflation) inlet and have a standard 15-mm/22-mm connector. They should be available in one adult and several pediatric sizes.

Bag-Mask Ventilation

Bag-mask ventilation is a challenging skill that requires considerable practice for competency. Bag-mask ventilation is not the recommended method of ventilation for a lone rescuer during CPR. It is most effective when provided by 2 trained and experienced rescuers. One rescuer opens the airway and seals the mask to the face while the other squeezes the bag. Both rescuers watch for visible chest rise.

The rescuer should use an adult (1 to 2 L) bag to deliver approximately 600 mL tidal volume for adult victims. This amount is usually sufficient to produce visible chest rise and maintain oxygenation and normocarbia in apneic patients . If the airway is open and a good, tight seal is established between face and mask, this volume can be delivered by squeezing a 1-L adult bag about two thirds of its volume or a 2-L adult bag about one third of its volume. As long as the patient does not have an advanced airway in place, the rescuers should deliver cycles of 30 compressions and 2 breaths during CPR. The rescuer delivers ventilations during pauses in compressions and delivers each breath over 1 second. The healthcare provider should use supplementary oxygen (O_2 concentration >40%, at a minimum flow rate of 10 to 12 L/min) when available.

Ventilation With a Supraglottic Airway

Supraglottic airway devices such as the LMA, the esophageal-tracheal combitube and the King airway device, are currently within the

scope of BLS practice in a number of regions (with specific authorization from medical control). Ventilation with a bag through these devices provides an acceptable alternative to bag-mask ventilation for well-trained healthcare providers who have sufficient experience to use the devices for airway management during cardiac arrest. It is not clear that these devices are any more or less complicated to use than a bag and mask; training is needed for safe and effective use of both the bag-mask device and each of the advanced airways.

Ventilation With an Advanced Airway

When the victim has an advanced airway in place during CPR, rescuers no longer deliver cycles of 30 compressions and 2 breaths (ie, they no longer interrupt compressions to deliver 2 breaths). Instead, continuous chest compressions are performed at a rate of at least 100 per minute without pauses for ventilation, and ventilations are delivered at the rate of 1 breath about every 6 to 8 seconds (which will deliver approximately 8 to 10 breaths per minute).

Cricoid Pressure

Cricoid pressure is a technique of applying pressure to the victim's cricoid cartilage to push the trachea posteriorly and compress the esophagus against the cervical vertebrae. Cricoid pressure can prevent gastric inflation and reduce the risk of regurgitation and aspiration during bag-mask ventilation, but it may also impede ventilation. Cricoid pressure might be used in a few special circumstances (eg, to aid in viewing the vocal cords during tracheal intubation). However, the routine use of cricoid pressure in adult cardiac arrest is not recommended.

AED Defibrillation

All BLS providers should be trained to provide defibrillation because VF is a common and treatable initial rhythm in adults with witnessed cardiac arrest. For victims with VF, survival rates are highest when immediate bystander CPR is provided and defibrillation occurs within 3 to 5 minutes of collapse. Rapid defibrillation is the treatment of choice for VF of short duration, such as for victims of witnessed out-of-hospital cardiac arrest or for hospitalized patients whose heart rhythm is monitored.

A lay rescuer connects the AED to the patient and follows voice commands. The energy level chosen for defibrillation is 200 Joules in adults. The rhythms that require defibrillation are VF and pulseless VT. In Asystole and PEA, the machine asks the rescuer to continue with CPR. It is important to remember not to touch the victim while the AED is analyzing the rhythm and while delivering the shock.

Recovery Position

The recovery position is used for unresponsive adult victims who clearly have normal breathing and effective circulation. This position is designed to maintain a patent airway and reduce the risk of airway obstruction and aspiration. The victim is placed on his or her side with the lower arm in front of the body.

There are several variations of the recovery position, each with its own advantages. No single position is perfect for all victims. The position should be stable, near a true lateral position, with the head dependent and with no pressure on the chest to impair breathing). Studies in normal

volunteers show that extending the lower arm above the head and rolling the head onto the arm, while bending both legs, may be feasible for victims with known or suspected spinal injury.

Changes Recommended in 2015

The following changes were recommended to the 2010 BLS guidelines:

The rate of chest compressions is 100 to 120/ min (not atleast 100/ min)

The depth of chest compression is 5 to 6 cm. (not atleast 5 cm)

REF: American Heart Association

VIII) Clinical Monitoring

The various senses of the attending doctor are the primary equipment for clinical measurement. The anaesthetist should develop a sixth sense, a subconscious mental computation of observations which warns of impending events and prompts action to meet the needs of the patient. Simple observations that are made and their relevance include the following:

- Colour of the skin and blood – oxygenation
- Temperature of skin- circulatory status, fluid balance , acid base status
- Pulse – cardiac activity and arterial pressure
- Urine output (> 0.5ml / Kg /Hr)- Circulatory status , fluid balance.
- Respiratory movement –adequacy of lung ventilation

- Movement of anaesthesia bag-adequacy of lung ventilation and depth of anaesthesia.
- Perspiration and lacrimation – depth of anestheic
- Muscle tone and movement- Relaxation, depth of anaesthesia
- Pupils – Depth of anaesthesia, State of cerebral circulation

Basic instrumental monitoring of patient:

For Circulation:

- Non invasive blood pressure (NIBP),
- Electrocardiogram (ECG)
- Pulse oxymetry (SpO2)

For Respiration:

- IPPV
- Airway pressures
- Ventilator volume Capnography
- Disconnection alarms
- Volatile agent monitoring
- Pulse oxymetry

Metabolic status

- Capnography
- Blood glucose
- Acid base balance

Neuromuscular transmission

- Nerve stimulator

Basics instrumental monitoring of anaesthesia machine

- Oxygen failure warning alarm
- Airway pressure monitoring
- Ventilator failure alarm

A high index of suspicion should be directed to accuracy of monitors.

It is important that a CRRI understands the limitations of electronic surveillance monitoring and hence a strict clinical monitoring is mandatory

IX) Lumbar Puncture

A lumbar puncture is a medical procedure in which a needle is inserted into the subarachnoid space. The use of a needle to introduce anaesthetic agent into subarachnoid space is called Sub arachnoid block or Spinal block.

All such blocks are performed under strict sterile techniques.

The students must confirm the presence of oxygen source in fully checked anaesthesia machine and facilities for intubation are available before starting the block. A good knowledge of the different types of spinal needles and the positioning of the patient for lumbar puncture. CRRI should have performed at least five Lumbar punctures during his posting in anaesthesia. He should know about the haemodynamic changes that occurs intra operatively and should also know to treat the same. CRRI should have a basic knowledge of various complications of spinal anaesthesia and ways of tackling each.

X) <u>Post operative care</u>

Patient should not leave the operating room unless:

- They have a stable and patent airway,
- Have adequate ventilation and oxygenation
- And are haemodynamically stable

Before the patient is fully responsive, pain is manifested as postoperative restlessness.

Hypoxemia, acidosis, hypotension, bladder distension should also be considered.

Shivering should be taken care of as it can increase oxygen demand Hypovolemia is the most common cause of hypotension in PACU.

Hypoventilation in PACU is most commonly due to the depressant effect of anaesthetic agents.

The possibility of a postoperative pneumothorax should always be considered following central line placement , intercostal blocks , rib fractures nephrectomise and neck dissections.

XI) Basic setting of ventilator

Mechanical Ventilation: Mechanical ventilation replaces or supplements normal ventilation by the pulmonary system.

In many instances the problem is primarily that of impaired CO2 elimination. The decision to initiate mechanical ventilation is a clinical one , but certain parameters have been suggested as guidelines.

Respiratory gas tension

- PaO2 <%0 mmHg in room air OR PaCO2 > 50 mm Hg in absence of metabolic alkalosis
- pAO2/Fio2 ratio <300 mm Hg
- PA-aO2 GRADIENT > 350mm Hg
- Vd/Vt > 0.6
- Clinical indices – RR> 35 Breaths per minute

Care of patients requiring mechanical ventilation

Tracheal intubation for mechanical ventilation mostly done in ICU patients to manage pulmonary failure.

Both nasal and oral routes appear to be relatively safe for 2-3 weeks.

If tracheal tube is anticipated for more than 2-3 weeks then tracheostomy is indicated.

Initial ventilator settings

Depending on the type of pulmonary failure mechanical ventilation can be used for either a partial or a full ventilator support.

Modes for full support

- Controlled mode of ventilation –CMV
- Assist controlled mode- ACMV
- Pressure controlled Ventilation –PCV

Partial ventillatory support

- Synchronised intermittent mandatory ventilation –SIMV

Weaning from Mecahnical ventilation

Weaning modes

- SIMV
- Pressure support

The ease of weaning a patient is inversely related to the duration of mechanical ventilation. Criteria for weaning:

- Inspiratory Pressure < 25 mm Hg
- Tidal volume > 5ml/Kg
- Vital capacity > 10 ml / Kg
- Minute ventilation < 10 L

ORTHOPAEDICS

FUNDAMENTALS FOR THE CRRI

TRAUMA: ATLS PROTOCOL

- Primary survey and resuscitation:

A- Airway and cervical spine control

B- Breathing & ventilation

C- Circulation and haemorrhage control

D- Disability: Central Nervous System dysfunction

E- Exposure / Environmental control

- Secondary survey: 'head to toe'
- Definitive treatment
- Tertiary survey: Next day to ensure nothing is missed.

Secondary survey

The secondary survey occurs after all life-threatening injuries from the primary survey have been identified and treated, and parallel initial investigations performed (see box). It aims to identify all the injuries sustained, involves a thorough head to toe examination including full neurological examination, examination of the spine, log rolling and performing a PR exam. As a result of the secondary survey further investigations may need to be taken

Definitive care

Definitive care starts once the patient has been resuscitated and any life threatening injury dealt with. It includes further surgical intervention, antibiotics, tetanus immunisation and may involve transfer to a tertiary centre. Transferring a trauma patient is very risky and should involve the most appropriate doctor, trained in transfer. Ideally a tertiary survey should be performed the next day to ensure nothing has been missed in the initial surveys.

FRACTURE MANAGEMENT:

OPEN FRACTURES:

- An open fracture refers to osseous disruption in which a break in the skin and underlying soft tissue communicates directly with the fracture and its hematoma
- One-third of patients with open fractures are multiply injured.
- Any wound occurring on the same limb segment as a fracture must be suspected to be a consequence of an open fracture until proven otherwise.
- Soft tissue injuries in an open fracture may have three important consequences:
- Contamination of the wound and fracture by exposure to the external environment.
- Crushing, stripping, and devascularisation that results in soft tissue compromise and increased susceptibility to infection.

- Destruction or loss of the soft tissue envelope may affect the method of fracture immobilization, compromise the contribution of the overlying soft tissues to fracture healing (e.g., contribution of osteoprogenitor cells), and result in loss of function from muscle, tendon, nerve, vascular, ligament, or skin damage.

RADIOGRAPHIC EVALUATION:

- Trauma survey includes a lateral cervical spine film and AP views of the chest, abdomen, and pelvis.
- Extremity radiographs are obtained as indicated by clinical setting, injury pattern, and patient complaints. It is important to include the joint above and below an apparent limb injury.
- Additional studies include CT with or without intravenous or oral contrast, cystograms, urethrograms, intravenous pyelograms, angiography, and others as indicated clinically.

GUSTILO & ANDERSON CLASSIFICATION OF OPEN FRACTURES:

Grade I: Clean skin opening of <1 cm, usually from inside to outside; minimal muscle contusion; simple transverse or short oblique fractures

Grade II: Laceration >1 cm long, with extensive soft tissue damage; minimal to moderate crushing component; simple transverse or short oblique fractures with minimal comminution.

Grade III: Extensive soft tissue damage, including muscles, skin, and neurovascular structures; often a high-energy injury with a severe crushing component

IIIA: Extensive soft tissue laceration, adequate bone coverage; segmental fractures, gunshot injuries, minimal periosteal stripping

IIIB: Extensive soft tissue injury with periosteal stripping and bone exposure requiring soft tissue flap closure; usually associated with massive contamination

IIIC: Vascular injury requiring repair

INITIAL MANAGEMENT OF OPEN FRACTURES:

- Thorough wound wash with 9 litres of normal saline.
- IV antibiotics
- Stabilisation of fracture with external fixator

CLOSED FRACTURES:

IMMOBILSATION:

- Prevents displacement, angulations, shortening.
- Prevents movement of bony fragments.
- Permits normal healing.
- Relieves pain.

CAST:

The term “cast” can refer to the rigid outer shell only or both the shell and one or more of the under cast layers placed on the skin. The shell may be made from Plaster of paris, synthetics and thermoplastic materials.

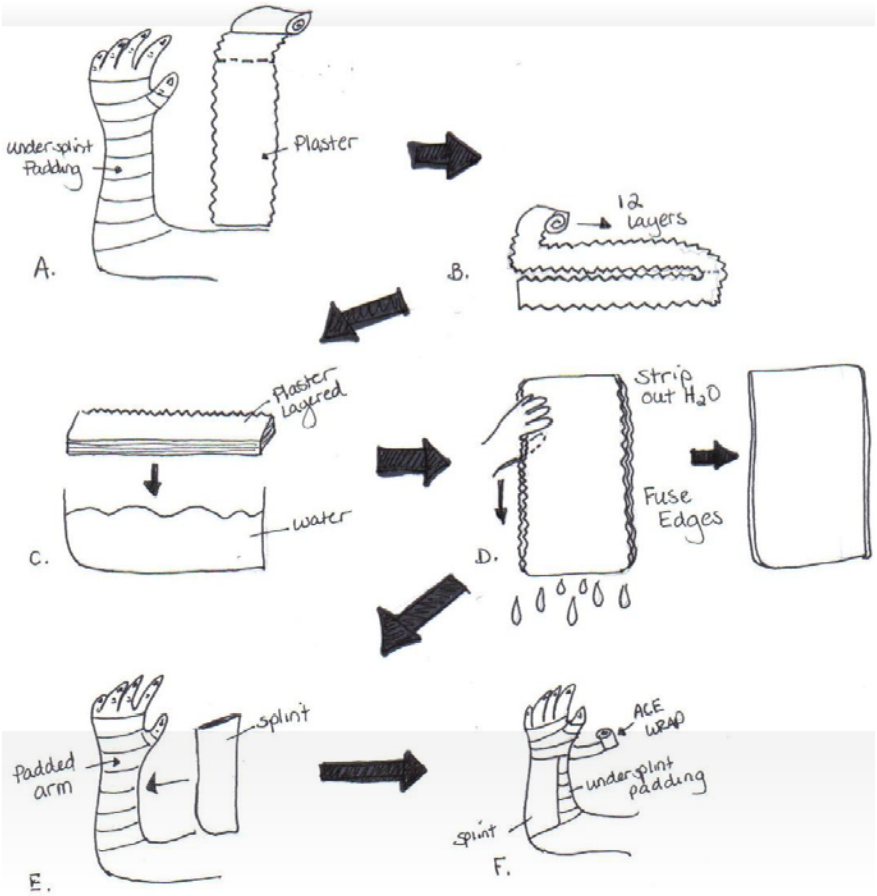
PLASTER OF PARIS:

- Derived from gypsum, or calcium sulfate dihydrate.
- When dehydrated, gypsum forms a white powder called plaster of Paris (anhydrous calcium sulfate).
- When this powder is soaked in water, it recrystallizes in an exothermic (heat releasing) reaction and gypsum is formed. As it sets, the plaster hardens into whatever form it was molded into before setting.
- Plaster casts are constructed from bandages impregnated with plaster of Paris.
- When dry, a plaster bandage resembles a roll of bandage with white powder adhering to it.
- When water is added, the plaster becomes highly moldable and paste-like.
- Consistency varies from creamy to coarse, depending on type and chemicals introduced. Creamy plaster tends to be less durable.
- The ultimate strength of a plaster cast can also be improved by addition of resins.

COMPLICATIONS OF PLASTER OF PARIS APPLICATION:

- Cast sores
- Tight pop application:
    - Blebs
    - Compartment syndrome
    - Gangrene
    - Nerve palsy
    - Joint stiffness

POP APPLICATION STEPS:



WOUND DRESSING:

Daily wound dressing

Should be done in a sterile environment

Appropriate antibiotics according to culture and sensitivity

TRACTION:

Traction is defined as the application of force to any body part for the purpose of restoring alignment following a fracture, overcoming deformity to relieve muscle spasms or pain, and/or maintaining alignment while a fractured bone heals.

- Skin traction – the pull is applied directly on the skin and subcutaneous tissues and indirectly to bones.
- Skeletal traction – applied directly to the bone by means of a pin or wire.
- Upper Tibial pin traction
- Lower Tibial pin traction
- Calcaneal pin traction

Upper tibial pin traction and lowertibial pin traction are applied using Steinman pin and Bohler Braun split. The calcaneal pin traction is applied using Denhams pin and Bohler Braun splint.

OTORHINOLARYNGOLOGY

GUIDELINES FOR CRRI

Op timings 8.00 am to 02.00 noon,

OT 9.00 am to 3.00 pm (till all procedures done)

When you are posted in a department first introduce yourself to all the persons working in the Department HOD, CHIEF, ASSISTANT, PG, CO CRRI, OP, WARD and OT STAFF

Be familiar with the department as which room is for what purpose eg. DNE Room.

You should learn how to examine the ear, nose throat, larynx using ENT instruments. Using head mirror or head light.

Learn how to take short brief history quick & thorough examination provisional diagnosis before treating the patient.

LEARN OP PROCEDURE

Ear syringing, wax removal, aural toileting, aural puc c/s, mastoid dressing, suture removal, foreign body removal in ear nose throat larynx, ant/ pos nasal packing, nasal drop application, tracheostomy tube care & changing, DNE, VLS.

Investigations

X- Ray PNS, Matoid, Nasal bone and Naso Pharaynx, CT PNA, Temporal Bone and Head & Neck, PTA, Impedance. OAE, BERA, Calloric test.

Emergency in ENT

Nasal Bleeding, Tracheostomy, Stridor, Anaphylactic Shock, Foreign Body in ENT.

Ward :

How to write daily progress notes, Pre OP/ Post Op Protocol & management see to that every patient gets the treatment eg. Due drugs, opinion, investigations. Update the investigation chart.

Pre OP Orders

Informed & Written consent for surgery Paediatric always – Blue Venflone (24 G)

Ear Case – Start Venflon on the opposite hand of the operating ear, fix the venflon properly given Heparanizhed NS 2CC in venflon test dose for antibiotic previous night & enter the case sheet what was the reaction to the test dose.

Hair preparation shave only 2 cm all around the operation area follow the pre OP instructions given by the anesth, eg. WITH HOLD DRUGS, investigation enter your logbook daily get signed from assistant.

Duty CRRI

Is in charge of the ward work, DNE Room, next day OT register, Night Duty Register, must accompany the duty PG on Rounds & emergency call (Ward & Casualty)

NASAL FOREIGN BODIES:

Nasal foreign bodies are most commonly seen in children between the ages of two to five. They may be organic or inorganic. Soft objects such as tissue paper, or sponge fragments rather than hard objects are the commonest to be found in the nose. Small button batteries can produce devastating tissue damage and necrosis including septal perforation in a short time.

Clinical features:

A nasal foreign body may remain in situ for weeks and only present with a unilateral nasal discharge, which may be foul smelling or occasionally blood stained. In other cases, patient may present immediately if the history of foreign body is known.

Management:

There are various ways of removing foreign body in the nose. It is crucial to make a correct decision as to what is going to be the best method for removal of a foreign body, bearing in mind that a child is unlikely to tolerate repeated manipulation. In babies and uncooperative children, general anaesthesia with cuffed endotracheal tube is used.

Methods of removal are:

1. Forceps removal: Pieces of paper or cotton swabs can easily be removed with a pair of forceps.

2. Hook: Nasal foreign body hook or Eustachian catheter are used to remove rounded objects by passing it beyond the foreign body and gently dragging it forward along the floor.

3. Endoscopic removal.

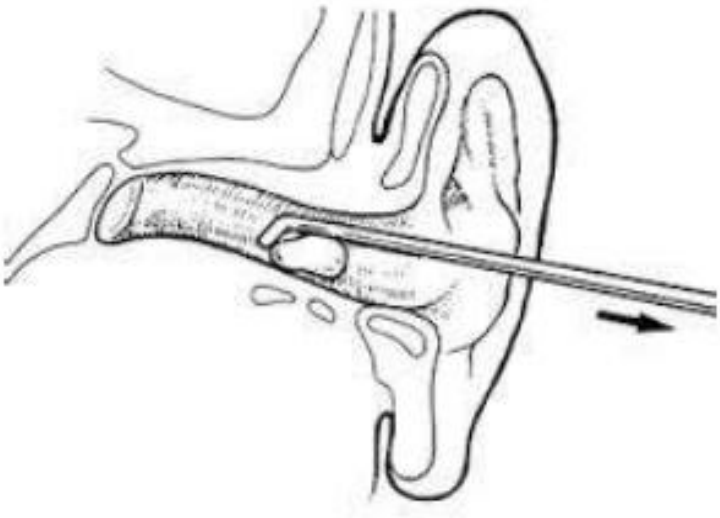
4. Oral positive pressure techniques (ambubag or 'parent's kiss' where the carer blows into the open mouth of the child whilst occluding the contralateral nostril) is an effective way of removing anterior nasal foreign bodies.

5. Other methods include magnets, nasal washing or superglue.

Complications:

A foreign body left in the nose may result in vestibulitis, sinusitis, rhinolith formation and inhalation into the tracheobronchial tree.

FOREIGN BODY EAR- REMOVAL



FOREIGN BODIES IN THE EAR:

Children are naturally curious about their surroundings and about their orifices. They are inclined to place toys, foodstuff and household articles in the ear which may lead to just a minor irritation or a life threatening problem. Foreign bodies within the external auditory canal can be classified as inanimate or animate (eg. live insects). Inaniamte objects can be inert or corrosive/irritant, organic or inorganic and hydrophobic or hydrophilic. Adults can also present with aural foreign bodies due to self-instrumentation of the ear canal.

The isthmus is the narrowest part of the external auditory canal and objects frequently impact at this point. Objects lateral to the isthmus are usually more readily removed.

Clinical features:

Inert foreign bodies may be completely asymptomatic an and go unnoticed for many weeks, months or even years. Many patients complain of irritation, deafness, otorrhea or tinnitus. Button batteries are arguably the most dangerous foreign body in the ear, producing tissue necrosis and later produces granuloma formation.

Insects in the ear can produce very distressing symptoms and the removal of live, moving insects can exacerbate oedema and trauma.

Management:

If the patient is cooperative, majority of the foreign bodies can be removed with ease. If an object is not removed easily on the first attempt, referral to an otolaryngologist is essential to minimize further trauma to the

child. General anaesthesia may be required for removal in some patients, especially children.

Methods for removal include irrigation, suction, instrumentation or surgical approach. The use of irrigation is naturally contraindicated for extracting hydrophilic items such as peas, beans , other vegetable matter or tissue paper. Soft or irregular foreign bodies like a piece of paper, swab or a piece of sponge can be removed with forceps. Smooth or hard objects can be removed by sliding a hook over the top of it and then rotate the hook to engage the object and pull it out of the canal. Do not grasp it with forceps as it may slip away further. Superglue impregnated into cotton buds can be used to aid aural foreign body removal.

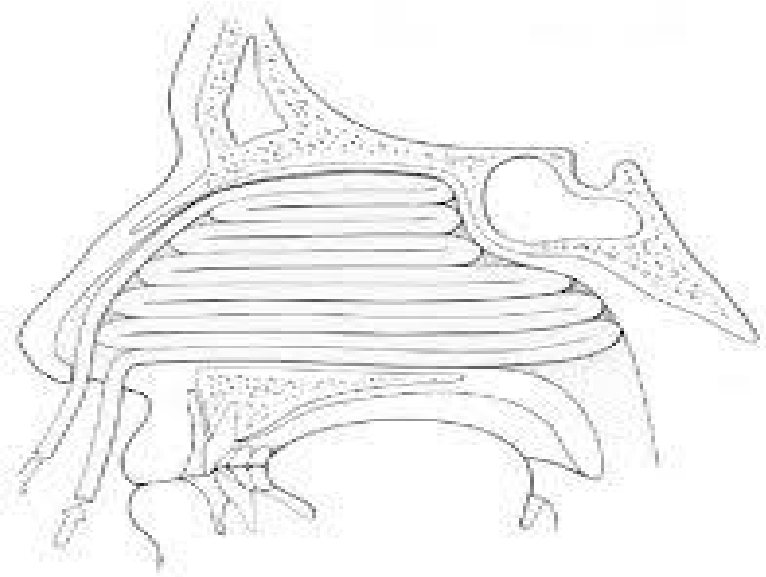
Urgent removal is justified for battery removal or where severe oedema and symptoms exist. Postaural approach is used to remove foreign bodies impacted in deep meatus, medial to the isthmus or those which have been pushed into the middle ear.

Animate , alive foreign bodies should be killed first by instilling oil, spirit or chloroform followed by removal by any of the above mentioned methods.

Complications:

If objects are not removed rapidly otitis externa can develop and if not treated complications can include mastoiditis and deep neck space infections.

ANTERIOR NASAL PACKING



Indication:

Active anterior epistaxis where the site of bleeding is difficult to localize.

Materials used:

It can be done using ribbon gauze impregnated with liquid paraffin about 1 meter gauze(2.5cm wide in adults and 12 mm in children)is required for each nasal cavity.

The packing is done using Tilley's forceps and Thudichum speculum under good illumination.

First few centimeters of gauze is folded upon itself and inserted along the floor and then while nasal cavity is packed tightly by layering the gauze from floor to the roof and from before backwards

Packing can also be done in vertical layers from back to then front.

One or both nasal cavities need to be packed.

Pack can be removed after 24 hours if the bleeding has stopped.

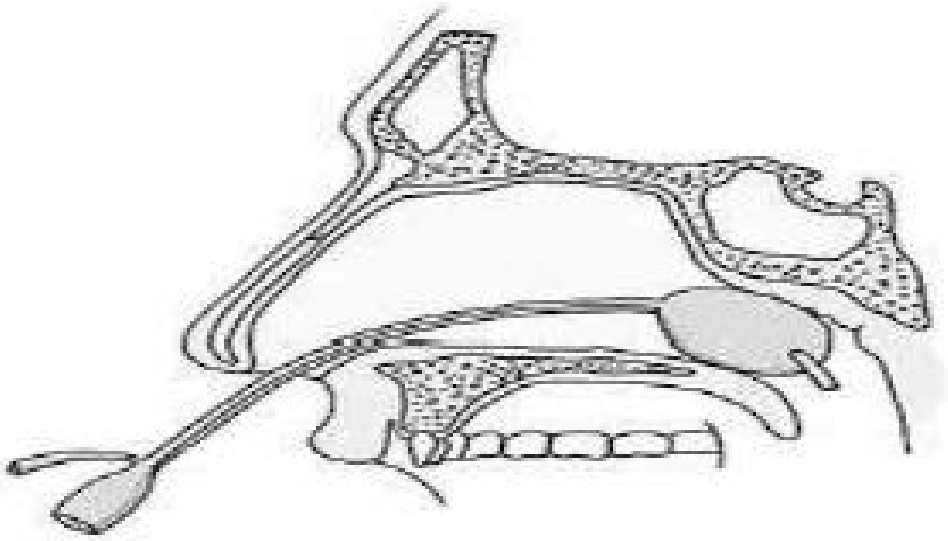
If the pack has to be retained for 2 to 3 days, systemic antibiotics has

to be given to prevent sinus infection and toxic shock syndrome

Complications of packing:

- Septic shock
- Sinusitis-
- Septal pressure necrosis

POSTERIOR NASAL PACKING



It is used to control posterior nasal bleeding.

Conventional method:

A gauze roll about the size of the patient's nasopharynx is used .

Three silk threads must be tied to the gauze roll. One at each end and the other one at the middle. The patient should be in a recumbent position. After anesthetising the nasal cavity with 4% xylocaine the mouth is held open.

Two nasal catheters are passed through the nasal cavities till they reach just below the soft palate. These lower ends of the catheters are grasped with forceps and pulled out through the mouth. The silk tied to the ends of the gauze is tied to the nasal catheters. The post nasal pack is introduced through the mouth and gradually pushed into the nasopharynx, at the same time the nasal catheters on both sides of the nose must be pulled out. When the pack snugly sits inside the nasopharynx, the two silk threads tied to its end would have reached the anterior nares along with the free end of the nasal suction catheter.

The two silk threads tied to the suction catheters are untied. The catheters are removed from the nose. The silk thread is used to secure the pack in place by tying both the ends to the columella of the nose. The silk tied to the middle portion of the gauze pack is delivered out through the oral cavity and taped to the angle of the cheek. This middle portion silk will help in removal of the nasal pack. In addition to the postnasal pack anterior nasal packing must also be done in these patients.

Postnasal pack using balloon catheters:

Specially designed balloon catheters are available. This can be used to perform the post nasal pack. Foleys catheter can be used to pack the post nasal space. Foley's catheter is introduced through the nose and slid up to the nasopharynx. The bulb of the catheter is inflated using air through the side portal of the catheter. Air is used to inflate the bulb because even if the bulb ruptures accidentally there is absolutely no danger of aspiration into the lungs. After the Foleys catheter is inflated the free end is knotted and anchored at the level of the anterior nares.

TOTAL LARYNGECTOMY COMPLICATIONS AND POST OP CARE:

Complications Early Complications

Drain Failure - Non-functional drains results in collection of secretion under the flap, compromising its viability. The loss of vacuum may be due to leak in the pharynx, skin or stomal closure. It must be identified early and rectified.

Hematoma - This is a relatively rare complication of total laryngectomy. If present the patient must be taken back to the OT and clots evacuated. New drains must be inserted at this point.

Infection - If erythema and edema of the skin develops then subcutaneous infection should be suspected. The pus must be promptly drained under sterile conditions and sent for culture and sensitivity. The dead space between the neopharynx and skin flap is reduced by compressive dressing or anti septic gauze packing. If the discharge persists then a pharyngo cutaneous fistula must be suspected or a chyle fistula should be ruled out if neck dissection is carried out.

Pharyngocutaneous Fistula - Poor pre op nutritional status, advanced tumour stage, diabetes, pre op RT or ChemoRT are all factors that significantly increase the chance of fistula. The fistula results from a closure defect through which saliva accumulates in the dead space between the neopharynx and skin flap. A turbid copious drain and erythema and oedema around the wound should arouse suspicion of fistula. It can be confirmed by methylene blue given to the patient orally or by Gastrigraffin swallow radiography. Fistula is managed by regular antiseptic gauze packing as well as compression dressing to reduce dead space. The patient is kept NPO and

not even allowed to swallow saliva. A salivary bypass procedure maybe helpful in these cases. The tract may be attempted to be sterilised from inside out by asking the patient to swallow antiseptic solution few times daily - 10 mL of 0.25% acetic acid by mouth or an antibiotic or other antiseptic preparation three to four times daily. If conservative methods fail then operative closure of the tract needs to be considered.

An excellent option for fistula closure before complete epithelialization is a pedicled muscle flap (pectoralis, trapezius, or latissimus dorsi) slipped between the pharyngeal and skin defects. Such flaps endow excellent blood flow and antibacterial benefits to an avascular, infected bed. Control of esophageal reflux is also an important aspect of preventing and managing pharyngocutaneous fistula.

Wound Dehiscence - Wound dehiscence may accompany a tensioned skin closure, postradiation state, wound infection, fistula, or poorly designed ischemic neck flaps. Local wound care should suffice for healing by secondary intention, but if the carotid becomes persistently exposed, vascularized muscle flap coverage is advisable.

Stomal Stenosis - If the stoma is created as described earlier, stomal stenosis is uncommon. This approach can be used in revision as well. In patients with small tracheas or a propensity for stenosis, women have a higher likelihood of fistula. Revision, when necessary, can be done with V-Y advancement flaps, Z-plasties, and a "fish-mouth" stomaplasty. Excision of cartilage remnants is preferable to radical excision and laryngectomy tube placement, but in some cases, prolonged use of a laryngectomy tube is required.

Pharyngoesophageal Stenosis and Stricture - When pharyngoesophageal stenosis or stricture is evident, tumor recurrence should be suspected; but once this has been ruled out by endoscopy and

biopsy, outpatient dilation is usually an effective treatment. An adequate lumen (36 Fr) is necessary not only for swallowing and nutrition but also for tracheoesophageal speech production. If dilation is unsuccessful, flap reconstruction is preferable.

Hypothyroidism - Preoperative or postoperative RT plus hemithyroidectomy is usually sufficient to induce a low-thyroid state. Thyroid function tests every 1 to 2 months after completion of all treatment indicate when supplemental thyroid medication is required

Post Op Care

Patient is shifted immediate post op to an ICU for observation. In our centre he/she is maintained on parenteral nutrition for the first 24 hrs. Wound dressing is changed once every 24 hrs. A cleaned and sterilised tube is changed each time. The drain is removed if the total collection in 24 hrs is less than 20 ml for 2 consecutive days. If patient is stable then the urine catheter is removed and the patient made ambulant the very next day of surgery. IV antibiotics are continued for about a week post op. If there are signs of wound infection then a culture sensitivity report is warranted and targeted antibiotics are changed. The frequency of dressing may also be increased as needed. The viability of the flap is assessed daily and early changes noted and addressed accordingly. The patient is advised to be NPO and not even allowed to swallow saliva till about a week. Ryle's tube feeding maybe started after 24-48 hrs. After 7 days the neck sutures are removed except for around the stoma. If the closure looks healthy then the patient is asked to take sips of liquid feeds like milk/water after 1 week. If there is no leak then patient is started on oral feeds and the Ryle's tube can be removed. If there was prior irradiation to the neck then oral feeds are delayed for about 2-3 weeks. 4 -6 weeks post op, once the wound is completely healed the

patient can be sent for post op radiotherapy if required. During the immediate post op period the acute loss of voice and getting used to stoma care may have a profound effect on the patient's psyche. The patient is counselled during this period. Attention should be paid to parameters like Haemoglobin count, RFT, urine output, nutritional status, stoma care, humidification of air and suction clearance of secretions, maintenance of saturation and corrective measures initiated at the earliest. If a TEP is placed primarily then phonation exercises must be started early in the post op period.

TOTAL MAXILLECTOMY COMPLICATIONS AND POST OP CARE

Complications

Although the spectrum of complications can range from mild to severe, and reversible to permanent, thinking of them as acute versus chronic in nature is easier. Acute complications include intraoperative or immediate postoperative hemorrhage. This is most likely from the internal maxillary artery and should be controlled with clips or suture ligation. Occasionally, angiography and embolization may be preferable because it does not disturb the surgical field.

Other intraoperative complications include corneal injury from improper placement of the corneal shield or tarsorrhaphy. In addition, visual acuity may be compromised, either from injury to the optic nerve during the procedure or from overpacking of the maxillary defect, causing vascular compromise to the nerve. If an acute decrease in visual acuity is detected, the packing should be removed and an ophthalmological consultation should be initiated.

Oral contents may reflux of into the nasal cavity, either from velopharyngeal incompetence or through a breakdown of the soft palate at the posterior aspect of the palatal prosthesis. This can be managed in the acute phase by naso-gastric tube feeds. Eustachian tube dysfunction can complicate 20-25% of patients following maxillectomy. This can be treated with placement of a ventilation tube, if it is persistent. Epiphora can be seen in the immediate postoperative period, usually from swelling surrounding the DCR; this resolves quickly and spontaneously**.**

Intermediate complications include infection, failure of prosthesis, and or flap failure (most commonly from necrosis).

Chronic complications include trismus from scarring around the muscles of mastication, decreased facial movement due to scar formation, chronic epiphora, unacceptable cosmesis, and velopharyngeal incompetence. All these surgical complications may be exacerbated by the use of postoperative radiotherapy.

Post Operative Care

Airway monitoring should be performed during the acute postoperative phase. Tracheostomy is rarely required and, furthermore, the authors prefer early extubation (in the operating room) to prevent ventilator-associated complications. If the orbital contents are preserved, frequent visual checks are indicated. This signals any signs of optic nerve compromise from over packing of the defect or retro-orbital hematoma. Nasal saline spray is initiated immediately to prevent crusting of the nasal cavity.

Early mobilization is critical to prevent thrombotic and pulmonary complications. While in bed, the head should be elevated 30 °. A diet may be progressed to soft-mechanical rapidly. Once the patient is tolerating an oral diet, ambulating, and showing signs of recovery they may be discharged, usually 2-5 days following the operation. Follow-up should be arranged in 1 week to remove any packing and

sutures. Usually after 3 weeks of appropriate recovery the patient may be referred to the maxillofacial prosthodontist for a more permanent prosthesis.

Long-term monitoring

Long-term follow-up is dictated by the disease process and patient risk factors. Ophthalmologic follow-up should also be performed if the orbit is preserved to monitor for ischemic complications, radiation-induced complications, or enophthalmos.

Using a prosthesis for reconstruction (preserving an open cavity) facilitates the surveillance of the cavity for recurrence; however, these prosthetic devices require frequent and meticulous care. Conversely, use of a soft tissue flap for the reconstruction compounds the surveillance. Sensitivity and specificity of the physical examination under these circumstances is poor; therefore, sequential MRI and PET or PET-CT are necessary to assess for recurrence.

Summary of Complications:

1. Intraoperative hemorrhage
2. Troublesome Epiphora

3. Damage to orbital structures
4. Damage to cornea
5. Visual disturbances
6. Loss of vision due to over packing the maxillectomy cavity compromising vascularity of optic nerve
7. Velopharyngeal incompetence (Nasal leak of ingested fluids)
8. Cosmetic defects / scars
9. Trismus due to scarring of muscles of mastication

TRACHEOSTOMY TUBE TYPES, POST TRACHEOSTOMY CARE AND DECANNULATION.

TYPES OF TRACHEOSTOMY TUBES: Tracheostomy tubes for adults:

- Uncuffed tube
- **Cuffed tube-** when cuff is inflated, it prevents aspiration of pharyngeal secretions into the trachea. It can also prevent air leak. It is used when there is danger of aspiration of pharyngeal secretions as in unconscious patient or when patient is put on a respirator. Cuff should be deflated every 2 hours for 5 minutes to prevent damage to trachea and cartilage necrosis.
- **Double cuff tube-** each cuff can be inflated alternately to prevent pressure necrosis at one site.
- **Fenestrated tube-** single or multiple holes situated at the upper curvature. The hole helps in speech production or in weaning from tracheostomy.

- **Adjustable flange long tube**-extra length tracheostomy tubes are used when pretarcheal tissues are thick or swollen or to bypass a growth or stenosis in trachea. Flange in these cases can be adjusted.
- **Single lumen tube**-there is no inner cannula.
- **Double lumen tube-** they have an inner cannula inside an outer cannula. It is easier to remove, clean and replace the inner cannula, keeping the outer cannula in place for breathing.
- **Suction aid tracheostomy tubes-**they have a small ending above the cuff to suck out pharyngeal secretion and prevent their aspiration.

Classification of tubes according to material:

PORTEX TRACHEOSTOMY TUBE

FULLER'S TRACHEOSTOMYTUBE

- **Silver-**an alloy of silver, copper and phosphorus, e.g. fuller, Negus, Jackson's tube.

> **Fuller's tracheostomy tube-**consists of an outer tube and an inner tube, the latter being slightly longer. Outer tube is made of two blades, which when pressed together, can be easily introduced into the tracheostomy opening. Inner tube has a hole in the center so that patient can still have a chance to breath from larynx even when tube is blocked at its outer end.

> **Jackson's tracheostomy tube-**it has three parts: outer tube, inner tube and an obturator. Outer tube is not split, inner tube can be fixed to the shield of the outer tube by a lock. The obturator helps in the introduction of the tube into the trachea.

- **PVC (polyvinyl chloride):** they are disposable, single use tubes and thermo labile and thus adjust to tracheal lumen.

- **Silicone:** bacteria and secretions do not adhere to the tube and there is minimum of crusting.

- **Siliconised PVC:** it has the properties of both PVC and silicone i.e., it is thermo labile and adjusts to tracheal wall while silicone prevents crusting.

- **Silastic**-it is soft and non-irritating and minimizes crusting.
- **Armoured tubes-**they are plastic tubes reinforced by a spiral or rings of stainless steel. They are not easily kinked.

POST TRACHEOSTOMY CARE:

- **Constant supervision-** after tracheostomy, constant supervision of patient for bleeding, displacement or blocking of tube and removal of secretions is essential.
- **Suction-**depending on the amount of secretion, suction may be required every half an hour or so. Use sterile catheters with y connector to break suction force. Suction injuries to tracheal mucosa should be avoided. This is done by applying suction to catheter only when withdrawing it.
- **Prevention of crusting and tracheitis:**
- Proper humidification by use of humidifier, steam tent or nebulizer. o If crusting occurs a few drops of normal or hypotonic saline or ringer lactate are instilled into trachea every 2 -3 hours to loosen crusts.
- **Care of tracheostomy tube-** inner cannula should be removed and cleaned as and when indicated for first 3 days. Outer tube ,unless blocked or displaced should not be removed for 3-4 days to allow a track to be formed when tube placement will become easy. After 3-4 days outer tube can be removed and cleaned every day. If cuffed tube

is placed it should be periodically deflated to prevent pressure necrosis or dilatation of trachea.

DECANNULATION:

- Tracheostomy tube should not be kept longer than necessary. Prolonged use of tube leads to tracheobronchial infections, tracheal ulceration, granulation, stenosis and unsightly scars.
- To decannulate a patient, tracheostomy tube is plugged and patient closely observed, this is called sphigotting.if the patient can tolerate it for 24 hours, tube can be safely removed
- Strapping of the wound done after the tube removal if patient tolerate sphigotting, wound is taped and patient is again closely observed.
- Healing of the wound takes place within few days or week. Rarely secondary closure of wound may be required.

TRACHEOSTOMY PROCEDURE

DEFINITION: tracheostomy is making an opening in the anterior wall of trachea and converting it into a stoma on the skin surface. Sometimes the term tracheotomy has been interchangeably used but he latter actually means opening the trachea.

INDICATION OF TRACHEOSTOMY:

- Respiratory obstruction
- Retained secretions

- Respiratory insufficiency

FUNCTIONS OF TRACHEOSTOMY:

- Alternate pathway for breathing
- Improves alveolar ventilation
- Protects the airway
- Permits removal of tracheobronchial secretions
- Intermittent positive pressure ventilation
- To administer anaesthesia

TYPES OF TRACHEOSTOMY: According to timing of the procedure:

- Emergency tracheostomy
- Elective tracheostomy can be either for therapeutic or prophylactic purpose. According to purpose:
- Permanent tracheostomy
- Temporary tracheostomy

According to site of stoma:

- High tracheostomy-done above the level of thyroid isthmus (isthmus lies against 2, 3, 4 tracheal rings.
- Mid tracheostomy-done through 2 or 3 rings and would entail division of thyroid isthmus or its retraction.
- Low tracheostomy-done below the level of isthmus.

PROCEDURE:

- **Position** - patient lies in supine position with a pillow under the shoulders so that neck is extended. This brings the forward.
- **Anesthesia-** no anaesthesia is required in unconscious patients or when it is an emergency procedure. In other patients, 2% lignocaine with 1:100000 adrenaline is infiltrated in the line of incision and the area of dissection.
- A vertical incision is made in the midline of the neck extending from the lower border of cricoid cartilage to just above the sternal notch. This is the most favoured incision and can be used in emergency and elective procedures. It give rapid access with minimum of bleeding and neck dissection. A transverse incision is, 5 cm long made 2 finger breadth above the sternal notch can be used in elective procedures. It has the advantage cosmetically better scar.
- After incision tissues are dissected in the midline. Dilated veins are either displaced or ligated.
- Strap muscles a separated in the midline and retracted laterally.
- Thyroid isthmus is displaced upwards or divided in the midline and retracted laterally.
- Pretracheal fascia identified and dissected. The first tracheal ring is identified and avoided as perichondritis of cricoid cartilage with stenosis can occur.
- A few drops of 4 % lignocaine is injected into the trachea to suppress cough when trachea is incised.
- Trachea is fixed with hook and a circular ring is cut from 3^{rd} and 4^{th} ring or 3^{rd} and 2^{nd} rings anteriorly occasionally inferiorly based flap of tracheal ring cartilage is made and sutured to the stromal skin called Bjork's flap.

- Tracheostomy tube of appropriate size is inserted and secured.
- Skin incision should not be sutured tightly as it may lead to development of subcutaneous emphysema.
- Gauze dressing is placed between the skin and flange of the tube around the stoma.

COMPLICATIONS:

Immediate (at the time of operation):

- Hemorrhage
- Apnea
- Pneumothorax
- Injury to recurrent laryngeal nerve
- Aspiration of blood
- Injury to esophagus

Intermediate (during first few hours or days):

- Bleeding reactionary or secondary.
- Displacement of tube, Blocking of tube
- Subcutaneous emphysema
- Tracheitis and tracheobronchitis with crusting in trachea.
- Atelectasis and lung abscess, Local wound infection and granulations.

Late (with prolonged use of tube for weeks and months:

- Hemorrhage

- Laryngeal stenosis, tracheal stenosis,Tracheoesophageal fistula
- Problems of decannulation
- Persistent tracheocutaneous fistula
- Problems of tracheostomy scar
- Corrosion of tube fragments and aspiration into tracheobronchial tree

OPHTHALMOLOGY

GUIDELINES FOR CRRI

OPD

History taking and disposing op cases like conjunctivitis, hordeolumexternum & internum, blepharitis and refractive error.

OCULAR EXAMINATION

1.TESTING OF VISUAL ACUITY

A) DISTANT VISUAL ACUITY is checked using Snellens chart. The patient is seated at 6 meters from chart & recorded.

B) NEAR VISUAL ACUITY is tested by using near vision chart.

2.EXTERNAL OCULAR EXAMINATION: Head posture,facial symmetry,eye brows, eye lids, lacrimal apparatus, conjunctiva, cornea, anterior chamber, pupils and lens are examined.

FUNDUS EXAMINATION using direct opthalmoscope to look for red reflex, media opacity, papilloedema, macular edema and background retina.

SIDE ROOM PROCEDURES:

SALINE IRRIGATION:for chemical injuries and foreign body removal

NLD PATENCY TEST: Under topical anaesthesia normal saline is pushed into the punctum and the duct patency checked.If there is no free passage regurgitation is noted.

SCHIOTZ TONOMETRY:To measure intraocular pressure.Under topical anaesthesia footplate of tonometer vertically placed on centre of cornea and reading on the scale is recorded using chart.

-Assisting in procedures like gonioscopy and applanation tonometry.

INVESTIGATIONS

PREOPERATIVE MANAGEMENT:

- Preoperative evaluation of patient for surgery will be done including CBC, RBS, RFT,URINE ROUTINE AND ECG.
- Physician opinion regarding ECG and any relevant systemic diseases and dental opinion to rule out septic foci is obtained.
- Taking the patient for Bscan

SURGERY

SURGICAL PROCEDURE:

- To do minor surgical procedures likeChalazion incision &curettage,lid repair and FB removal.
- Giving facial block
- Assist major surgeries
- To observe surgeries like cataract surgery, lacrimal apparatus surgeries and trabaculectomy,

POST-OP MANAGEMENT:

- Topical application of eyedrops
- Check vitals
- Management of systemic diseases like DM and SHT

OBSTETRICS AND GYNAECOLOGY

GUIDELINES FOR CRRI

OUTPATIENT DEPARTMENT :

ANTENATAL OP :

- History taking
- Recording vitals
- Per abdominal examination
- Per vaginal examination
- CTG

GYNAECOLOGICAL OP :

- History taking
- Recording vitals
- Per abdominal examination
- Per vaginal examination
- Taking PAP SMEAR
- VIA / VILI
- Cervical biopsy

LABOUR WARD :

- starting intravenous infusion
- using partograph
- conduct of normal labour and assist deliveries conducted by outlet forceps & vacuum
- active management of third stage of labour
- episiotomy wound suturing
- cardiotocographic monitoring
- bladder catheterisation
- blood transfusion
- diagnosis and assist in managing obstretics emergency

o APH

o PPH

o ECLAMPSIA

o SHOULDER DYSTOCIA

o CORD PROLAPSE

SEPTIC WARD :

- Observing and assisting procedures like dilatation and curettage , manual vacuum aspiration, suction evacuation with check curettage.

CRITICAL CARE UNIT :

- Management of high risk cases such as AP Eclampsia, Heart disease complicating pregnancy , severe anaemia complicating pregnancy, antepartum & postpartum haemorrhage and complications like DIC, shock, Thrombo-embolism , pulmonary oedema , Sepsis
- Vitals monitoring , ECG
- CPR
- Care of patient on ventilator

ANTENATAL WARD :

- Categorising antenatal mothers into normal mothers and high risk such as Gestational Diabetes Mellitus , Gestational hypertension , Twin pregnancy , previous caesarean section, abnormal presentations (such as breech ,transverse lie)medical disorder complicating pregnancy (such as heart disease, Anaemia , APLA)
- Management of high risk mothers under the guidance of the Professors and Assistant Professors
- CTG
- Examination
- USG Obstretics

POSTNATAL WARD :

- Receiving postnatal patients
- Monitoring vitals
- Per-vaginal and per-rectal examination

POST-LSCS WARD :

IMMEDIATE POST-OP CARE:

- Monitoring vitals like pukse rate , blood pressure, urine output
- Observing for any abdominal distension ,
- Fluid and electrolytes management
- Pain control

LATE POST-OP CARE :

- Breast care
- Surgical site care
- Diet
- Bowel care
- Advice regarding exclusive breast feeding and child immunisation

GYNAECOLOGY WARD :

- Evaluating pre-op patients posted for major gynaecological surgery and monitoring post-op patients

- PRE-OP EVALUATION : History taking, physical examination, investigations, antimicrobial prophylaxis
- Pre-op preparation (informed consent , Bowel preparation)
- Components of post-op management
  - Fluid and electrolytes management
  - Diet
  - Pain control
  - Ambulation
  - Care of surgical site
  - Management of complications

OPERATION THEATRE :

- Steps of hand washing
- Learning of sterile techniques and approach in theatre
- Assisting cases of caesarean section

GYNAECOLOGY THEATRE :

- Assisting major cases like vaginal/abdominal hysterectomy, staging laparotomy, myomectomy.
- minor procedures like fractional curettage with cervical biopsy, cryocauterisation/cervical polypectomy, pyometra drainage, bartholin's cyst excision, wound resuturing.

- Observe and assist laparoscopic assisted surgeries like laparoscopic cystectomy, diagnostic laparoscopy, diagnostic hysteroscopy, laparoscopic assisted vaginal hysterectomy

FAMILY PLANNING :

OUT-PATIENT DEPARTMENT:

- Evaluating the Patients coming for outpatient department by history taking , examination
- Counselling the patients regarding temporary and permanent methods of contraception
- Patients coming for temporary contraception are evaluated and temporary contraceptions are provided
- Method most commonly followed is Usage of IUCD.
- Patients are also motivated for use of other contraceptive methods like OCP
- Risks and benefits of al the methods are explained to the patients
- Follow up of postnatal patients
- Patients opting for permanent sterilisations are evaluated on op basis and are subjected for the procedure

WARD :

- Postnatal patients are received , vitals monitored and evaluated.
- Pre-op preparations are done like informed consent , anti-microbial prophylaxis

THEATRE :

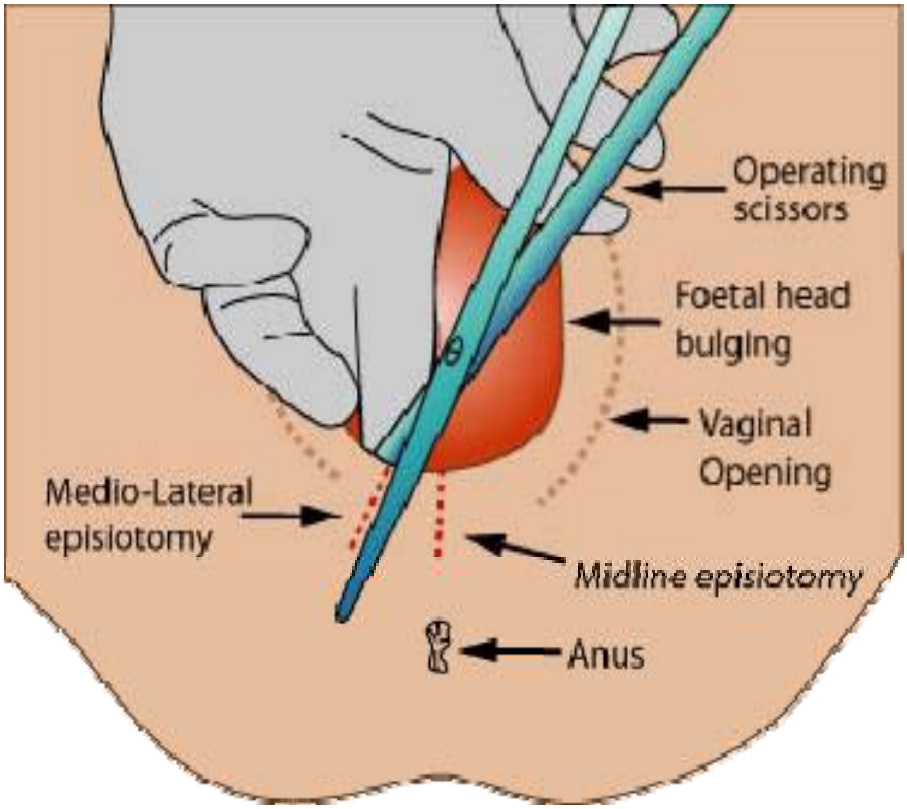
- Skills in assisting procedures like tubectomy , mini-laparotomy , puerperal sterilisation, interval sterilisation) are acquired by observing and assisting them.

- Procedures likemanual vacuum aspiration , medical termination of pregnancy, laparoscopic sterilisation are observed

COMMON PROCEDURES TO BE LEARNT DURING CRRI PERIOD

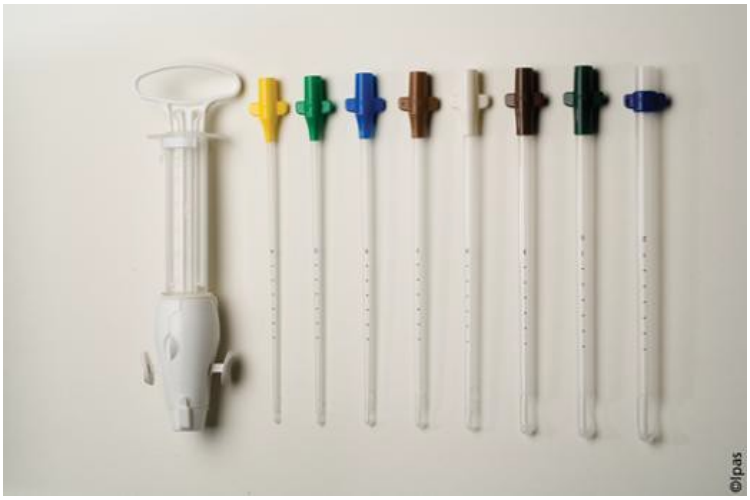
EPISIOTOMY

An **episiotomy** also known as **perineotomy**, is a surgical incision of the perineum and the posterior vaginal wall generally done during second stage of labor to quickly enlarge the opening for the baby to pass through. The incision, which can be done from the posterior end of the vulva at an angle of 45 degree(medio-lateral episiotomy), is performed under local anesthetia and suturedafter delivery.



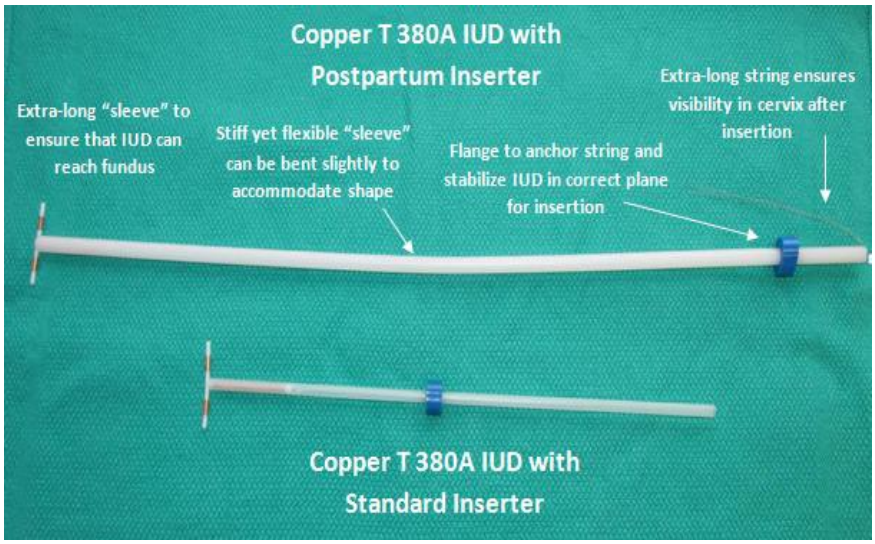
MANUAL VACUUM ASPIRATION:

Manual vacuum aspiration. This procedure can be used around 5 to 12 weeks after the last menstrual period (early first trimester). It involves the use of a specially designed syringe to apply suction.



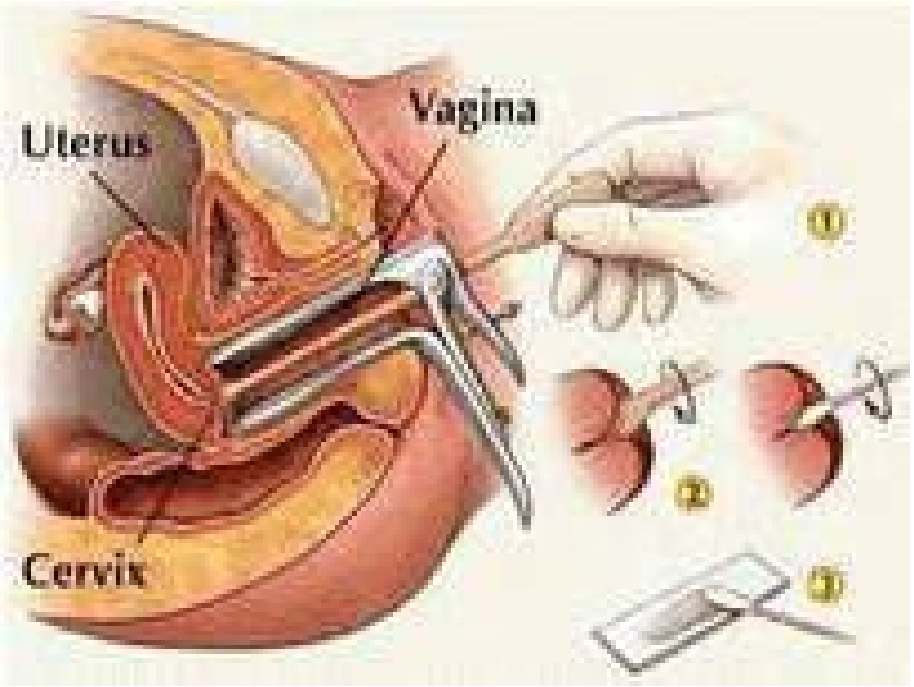
POSTPARTUM IUCD INSERTION

Postpartum IUCD insertion is the insertion of an IUCD within 48 hours following childbirth



PAP SMEAR

A Pap smear (also called a Pap test) is a screening procedure for cervical cancer. It tests for the presence of precancerous or cancerous cells on the cervix

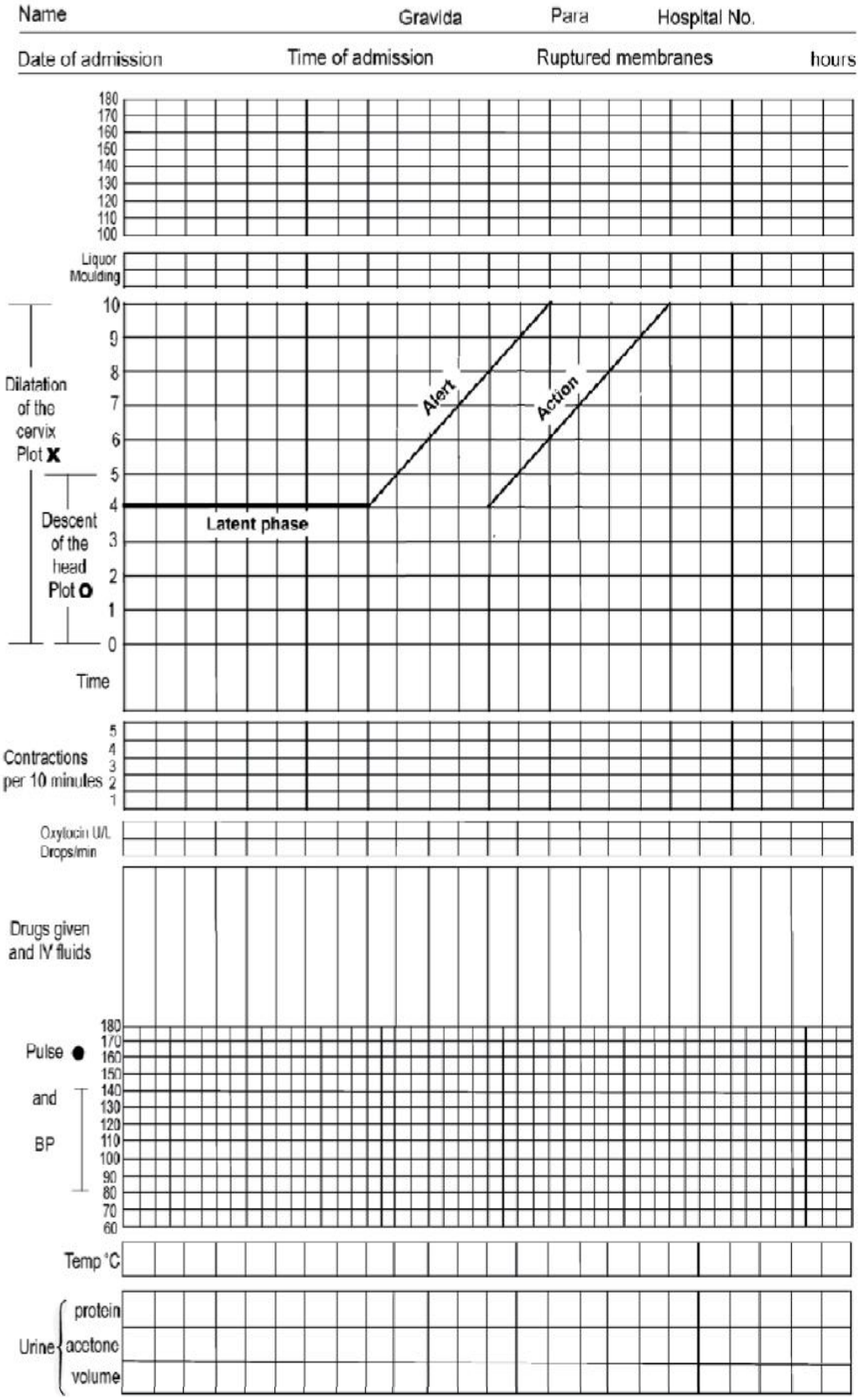


PARTOGRAM

A **partogram** or **partograph** is a composite graphical record of key data (maternal and fetal) during labour entered against time on a single sheet of paper. Relevant measurements might include statistics such as cervical dilation, fetal heart rate, durationof labour and vital signs.

Components

1. Patient identification
2. Time: It is recorded at an interval of one hour. Zero time for spontaneous labour is time of admission in the labour ward and for induced labour is time of induction.
3. Fetal heart rate: It is recorded at an interval of thirty minutes.
4. State of membranes and colour of liquor: "I" designates intact membranes, "C" designates clear and "M" designates me conium stained liquor.
5. Cervical dilatation and descent of head
6. Uterine contractions: Squares in vertical columns are shaded according to duration and intensity.
7. Drugs and Fluids
8. Blood pressure: It is recorded in vertical lines at an interval of 2 hours.
9. Pulse rate: It is also recorded in vertical lines at an interval of 30 minutes.
10. Oxytocin: Concentration is noted down in upper box; while dose is noted in lower box.
11. Urine analysis
12. Temperature record


Name
Gravida
Para
Hospital No.
Date of admission
Time of admission
Ruptured membranes
hours
180
170
160
150
140
130
120
110
100
Liquor
Moulding
10
9
8
7
6
5
4
3
2
1
0
Dilatation of the cervix Plot X
Descent of the head Plot O
Alert
Action
Latent phase
Time
Contractions per 10 minutes
5
4
3
2
1
Oxytocin U/L
Drops/min
Drugs given and IV fluids
Pulse ●
and
BP
180
170
160
150
140
130
120
110
100
90
80
70
60
Temp °C
Urine
protein
acetone
volume

NON PNEUMATIC ANTISHOCK GARMENT

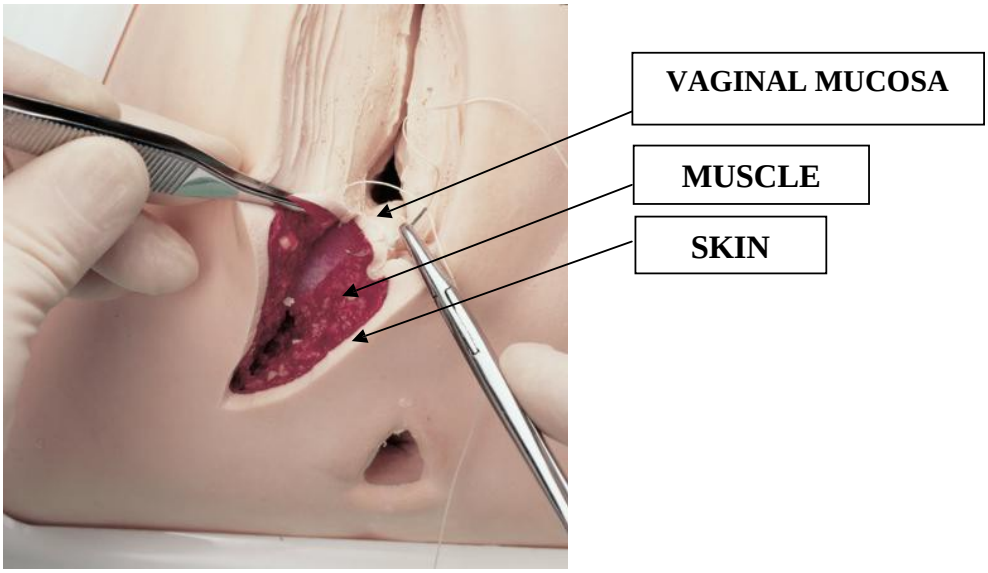
The **non-pneumatic anti-shock garment** (NASG) is a low-technology first-aid device used to treat hypovolemic shock that happens during post-partum haemorrhage

ACTIVE MANAGEMENT OF THE THIRD STAGE OF LABOR (AMTSL)

Active management of the third stage of labor (AMTSL) includes three steps:

1. Administration of a uterotonic drug (oxytocin, 10 IU injection, is the drug of choice)
2. Controlled cord traction
3. Uterine massage after delivery of placenta

LAYERS OF EPISIOTOMY



Repairing an episiotomy

Preparations for repairing an episiotomy

1. This is an uncomfortable procedure for the patient. Therefore, it is essential to explain to her what is going to be done.

2. The patient should be put into the lithotomy position if possible.

3. It is essential to have a good light that must be able to shine into the vagina. A normal ceiling light usually is not adequate.

4. Good analgesia is essential and is usually provided by local anaesthesia which is given before the episiotomy is performed. As 20 ml of 1% lignocaine may be safely infiltrated, 5–10 ml usually remains to be given in sensitive areas. An episiotomy should not be sutured until there is good analgesia of the site.

5. In order to prevent blood which drains out of the uterus from obscuring the episiotomy site, a rolled pad or tampon should be

carefully inserted into the vagina above the episiotomy wound. As this is uncomfortable for the patient, she should be reassured while this is being done.

6. Absorbable suture material should be used for the repair. Non-absorbable suture material should not be used. Remember that the patient has to sit on her wound.

The following important principles apply to the suturing of an episiotomy

1. The apex (highest point) of the episiotomy must be visualised and a suture put in at the apex.
2. Dead space must be closed.
3. The same opposing tissue must be brought together using the skin vaginal epithelium juncture as an anatomical landmark.
4. Tissues must be brought together but not strangulated by excessive tension on the sutures.
5. Haemostasis must be obtained.
6. The needles must be handled with a pair of forceps and not by hand, and should be removed from the operating field as soon as possible.

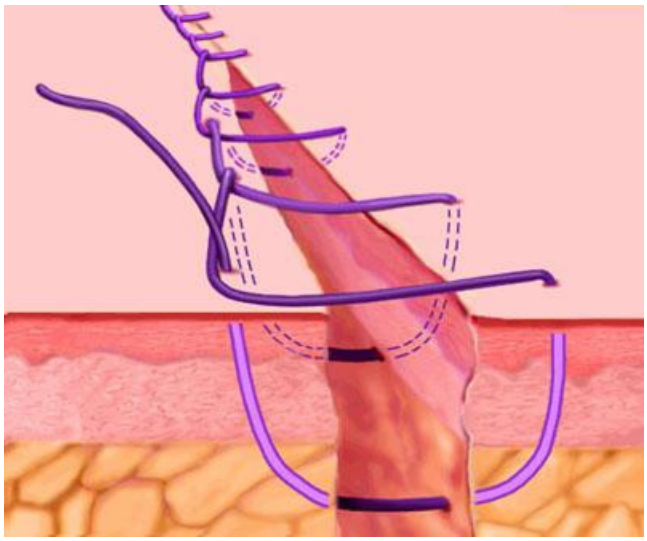
The method of suturing an episiotomy

Three layers have to be repaired:

1. The vaginal epithelium.
2. The muscles.
3. The perineal skin.

There are three important steps in the repair of an episiotomy wound.

Step 1: Place a suture (stitch) at the apex of the incision in the vaginal epithelium. Then start making continuous locking sutures. When placing the suture at the apex, be very careful not to prick your finger with the needle



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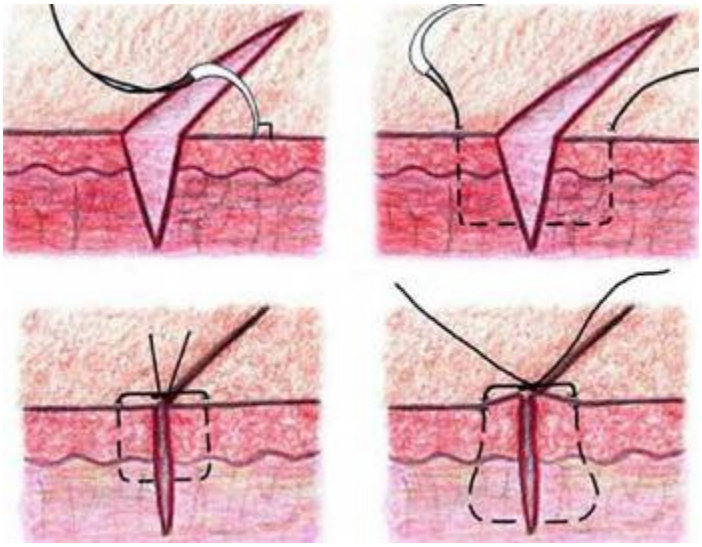
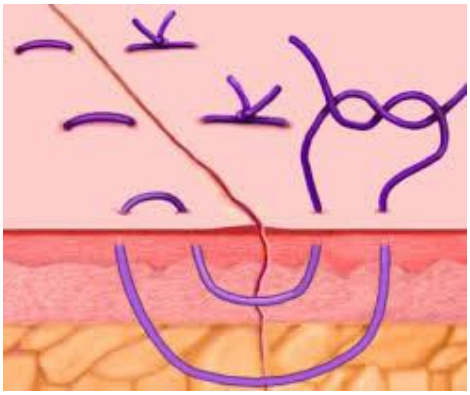
Step 2: Insert interrupted sutures in the muscles. Start at the apex of the wound. The aim is to bring the muscles together firmly and to eliminate any ‘dead space’, i.e. any spaces between the muscles where blood can collect. Remember that the sutures must be inserted at 90 degrees to the line of the wound.

When suturing the muscles, be careful not to put the suture through the rectum. If you make sure that the point of the needle is seen when crossing from the one side to the other of the deepest part of the wound, the stitch will not be too deep



Step 3: Use mattress sutures with an absorbable suture material to repair the perineal skin. Do not pull the sutures tight as they only need to bring the edges of the skin together. Sutures that are too tight become uncomfortable for the patient.



When the suturing is complete:

1. Remove the pad from the vagina. Be gentle as this will be uncomfortable for the patient.
2. Put a finger into the rectum and feel if a suture has been placed through the rectal wall by mistake.
3. Make sure that the uterus is well contracted.
4. Get the patient out of the lithotomy position and make sure that she is comfortable.

PAEDIATRICS - GUIDELINES FOR CRRI

Model Case Sheet – Paediatrics

Name Informant

Age Reliability

Sex

IP.No.

Consanguinity

Complaints (in Chronological Order)

1)

2)

3)

4)

} duration

History of Presenting Illness

Elaborate presenting illness

Past history

Yes No

Ante Natal History Booked

Immunised

IFA tablets

AN Care

Morbidities

Natal history

Birth weight

Birth Place

Mode of delivery

Complications

Post Natal History Cried immediately at birth / not

Diet history

Development history

Fine motor
Gross motor
Social
Language
} Milestones

Immunisation history

Last Immunised

BCG Scar present / not

Family history

Pedigree chart

Allergy history Allergy to food / Drug

Contact history of TB Present / not

Anthropometry

Height / Length

Weight

Mid arm

Circumference

(6 mon-5years)

BMI

Observed	Expected	Inference

General Examination

Vitals

Systemic Examination

Diagnosis **Treatment**

Plan

Discharge Format **_____ Medical College**

Institute of Social Paediatrics

Name:

Age:

Sex:

IP No.

Diagnosis:

Unit:

Specialty Registration No.

1. Paediatric Neurology No.
2. Paediatric Nephrology No.
3. Cardiology No.

Discharge Weight

Specialty Opinion

Discharge Weight

Course during treatment

Investigation

Treatment

Advice on discharge	Follow up

Common Drugs prescribed in the OPD

Antibiotics

1.	Amoxicillin	25-40mg/kg/day in 2-3 divided doses
	>20 kg	50mg/kg/dose tds for severe infections
2.	Erythromycin	20-30mg/kg in 3-4 divided doses.
3.	Azithromycin	10mg/kg/dose (max 500mg) on day 1 5mg/kg/dose (max 250mg) 2^{nd}-5^{th} day as single dose
4.	Doxycycline	5mg/kg in 2 divided doses – day 1 2.5mg/kg in 2 divided doses – day 2 onwards
5.	Ciprofloxacin	(child >8 years) 1-15mg/kg/day in 2 divided doses
6.	Cephalexin	25-50mg/kg/day in 4 divided doses
7.	Cefixime	10-15mg/kg/day in 12 hrs
8.	Cefpodoxime	10mg/kg in 2 divided doses
9.	Sulphamethoxazole + Trimethoprim	(30mg/kg/day) + (6mg/kg/day) in 2 divided doses
10.	Chloroquine	10mg/kg base (loading dose) 5mg/kg 6hrs later on 1^{st} day 5mg/kg/day x2days
11.	Albendazole	400mg single dose 200mg (1-2years of age) single dose

Antipyretic

1.	Paracetamol	40-65mg/kg/day in 4 divided doses (lower dose in hepatic disease).

Antiulcer

1.	Ranitidine	2-4mg/kg/dose 12^{th} hourly
2.	Omeprazole	0.4-0.8mg/kg/day in 1-2 divided doses

Drugs in constipation

1.	Syrup lactulose	0.5mg/kg/dose 12-14hrs

Bronchodilator

1.	Salbutamol	0.1-0.15mg/kg dose every 8 hrs. (max 6mg)

Nebulisation

1. Total volume in nebulisation chamber must be at least 4mg NS (Normal Saline) which is used as a diluting solution?
2. Nebulise o_2 using flow rate 8-10 l/min
3. nebulisation can be given more frequently than medicated

Anti-Histaminics

1.	Chlorpheniramine maleate	0.35mg/kg/day in 4 divided doses
2.	Cetrizine	2.5-5mg/day for children 2-6 years 5-10mg/day for children 6-12 years
3.	Levocetrizine	6-11 years 2.5mg od > 12 years 5mg od

Anti Emetic

1.	Domperidone	0.2-0.4mg/kg/dose 2hrs
2.	Ondansetron	0.1-0.2mg/kg/dose 26-12hrs

Zinc (in diarrhoea)

1. < 6 months 10mg once daily X 14days
2. <6 months 20mg once daily X 14days 0.1-0.2mg/kg/dose 26-12hrs

Vitamin A supplementation in measles infection

1. < 6 months 40,000 IU /day PO x 2 doses
2. 6 -12 months 1,00,000 IU /day PO x 2 doses
3. > 1years 2,00,000 IU /day PO x 2 doses

MANAGEMENT OF PNEUMONIA

The IMNCI algorithm classifies children with cough and rapid breathing as pneumonia and further grades it as severe or very severe pneumonia

TREATMENT OF CHILD WITH COMMUNITY ACQUIRED PNWEUMONIA

SIGNS AND SYMPTOMS	CLASSIFICATION	TREATMENT
1. central cyanosis 2. severe respiratory distress 3. not able to drink due to respiratory distress	Very severe pneumonia	Admit to hospital Manage the airway Give oxygen give recommended antibiotic Treat high fever if present
1. chest indrawing	Severe pneumonia	Admit to hospital Give recommended antibiotics Treat high fever if present
1. Fast breating a. 2-12 mon(>50breaths/ min) b. 12 mon-5years(>40 /min) 2. Definite crackles on auscultation	Pneumonia	Give appropriate antibiotics for 5 days Soothe the throat and relieve cough with a safe remedy Treat high fever if present

Treatment of very severe pneumonia:

1. Obtain chest X-ray
2. Stabilize ,oxygenate the child before sending for a chest X-ray
3. Antibiotics:
   Inj ampicillin 50mg/kg im/iv every 6 hrs and gentamycin 7.5mg/kg im/iv OD
4. Good response- discharge after 5 days with oral amoxicillin 15mg/kg/dose for 3 times a day for 3 days

MANAGEMENT OF ACUTE ASTHMA

1. Mild attack: alert child with no signs of severe respiratory distress

MILD ATTACK

↓

Salbutamol nebulisation 2.5mg/dose (5mg/ml solution) by nebulizer every 20 mins * 3 times

Or

Salbutamol inhalation by MDI spacer 4 puffs (100µcg/puff) at 2-3 mins interval repeated every 20 mins * 3 times

Or

Inj adrenaline 0.01ml/kg (max 0.3ml) of 1 in 1000 solution sc every 20 mins* 3 times

↓

GOOD RESPONSE

Home treatment

Continue inhaled or oral salbutamol 6th hrly

↓

INCOMPLETE OR POOR RESPONSE

Add steroids

Observe for 4 hours

Continue salbutamol inhalation 4-6hrly

Discharge if improvement is seen

HOME TREATMENT

Continue oral/ inhaled salbutamol 6th hrly

hort course steroids 3-5 days then stop without tapering

MODERATE TO SEVERE ATTACK OF ASTHMA

Initial treatment:

Salbutamol inhalation 2.5mg/dose(5mg/ml solution), by nebulizer every 20 mins * 3 times
Or
Salbutamol inhalation by MDI spacer 4 puffs (100 µcg/puff) at 2-3 mins interval. Repeated every 20 mins * 3 times
Or
Inj adrenaline 0.01 ml /kg (max of 0.3ml) of 1 in 1000 solution sc every 20 mins * 3 times
Oxygen

Reassess every 60

Good response

Follow the principle of ” last in first out” omit ipratropium inhalation in next 12- 24 hours

Poor response

Repeat initial treatment as before
And add ipratropium bromide inhalation
Oxygen
Oral prednisolone (1-2 mg/kg)

Reassess every 60 mins

Poor respone

Get expert opinion

Poor response

Continue bronchodilator 1- 2 hrly and ipratropium 8th hrly
Continue steroids
Give 1 dose of magnesium sulphate

DIARRHOEA AND DEHYDRATION

Assess for

1. signs of dehydration
2. Duration of diarrhoea
3. Blood in stools

Severe dehydration	Two of the following signs 1. Lethargic or unconscious 2. Sunken eyes 3. Skin pinch very slow	Manage severe dehydration Plan C Start antibiotics admit
Some dehydration	Two of the following signs 1. Restless or irritable 2. Sunken eyes 3. Skin pinch slow	Manage dehydration as plan B Start antibiotics if signs of sepsis or low weight admit
No dehydration	Not enough signs	Plan A (Home care) Advice mother when to return Follow up in 5 days if not improving

Plan C

1. Start iv fluids immediately
2. If child can drink give ORS by mouth while the drip is being set up
3. Give 100 ml/kg RL

Age	First 30 ml/kg in	Next 70 ml/kg
< 1 year	1 hour	5 hours
>1 year	½ hour	2 and half hours

Reassess every 20- 30 mins

Also give ORS 5ml/kg/hour as soon as the child is able to drink for 3- 4 hours
If iv is not possible give ORS 20ml/kg/hr for 6 hours by NG tube

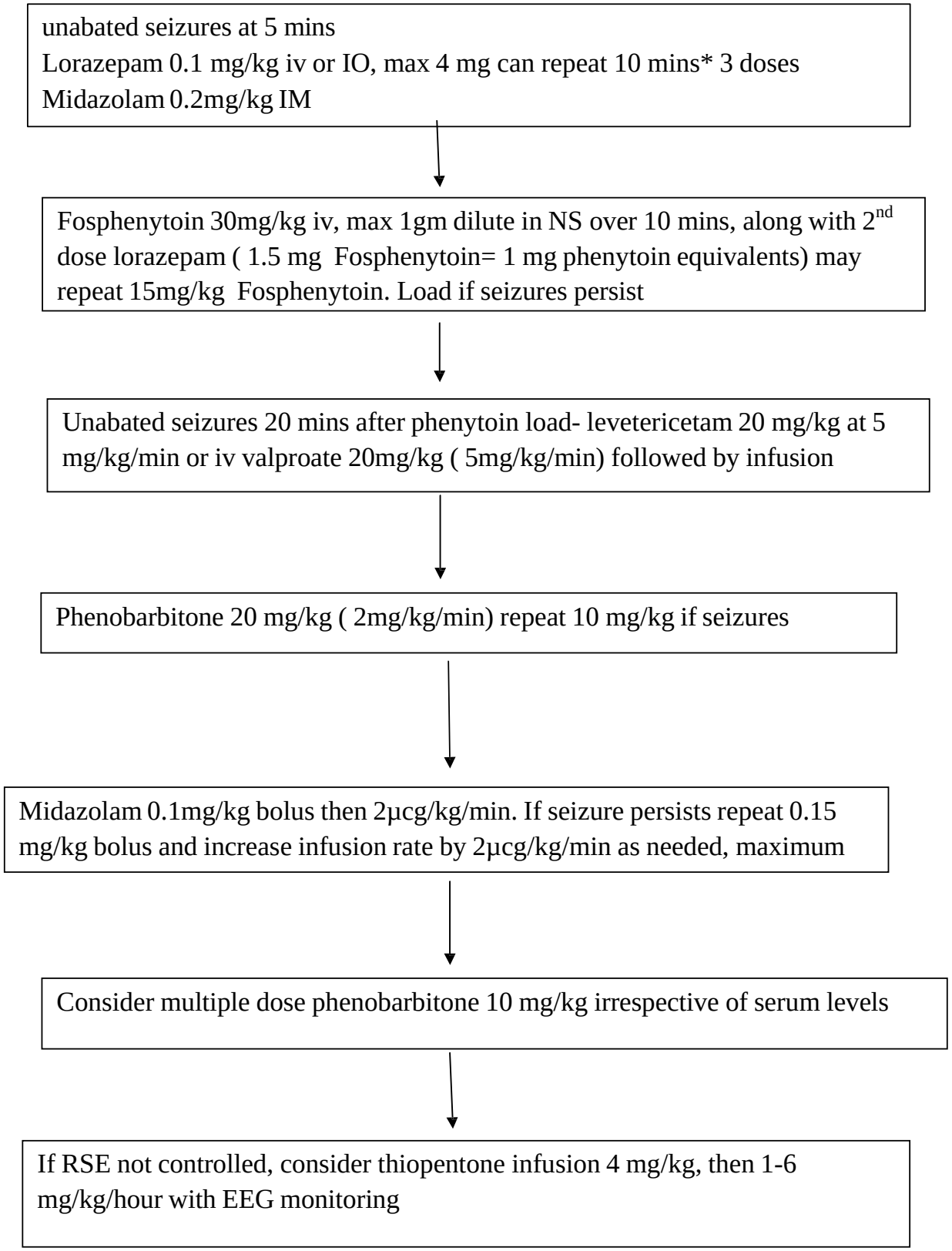
Plan B

75 ml/ kg over 4 hours

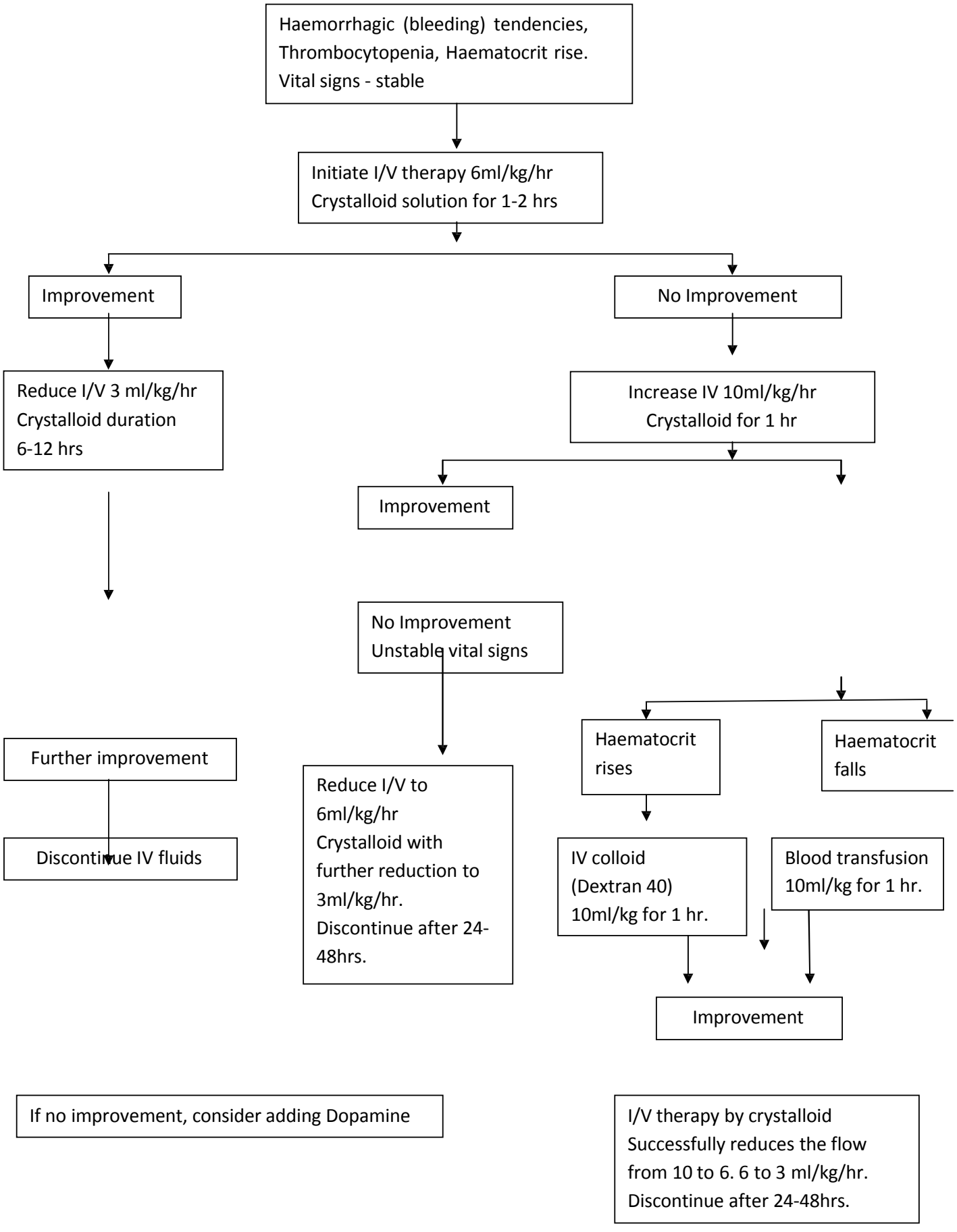
Plan A

Home based fluids

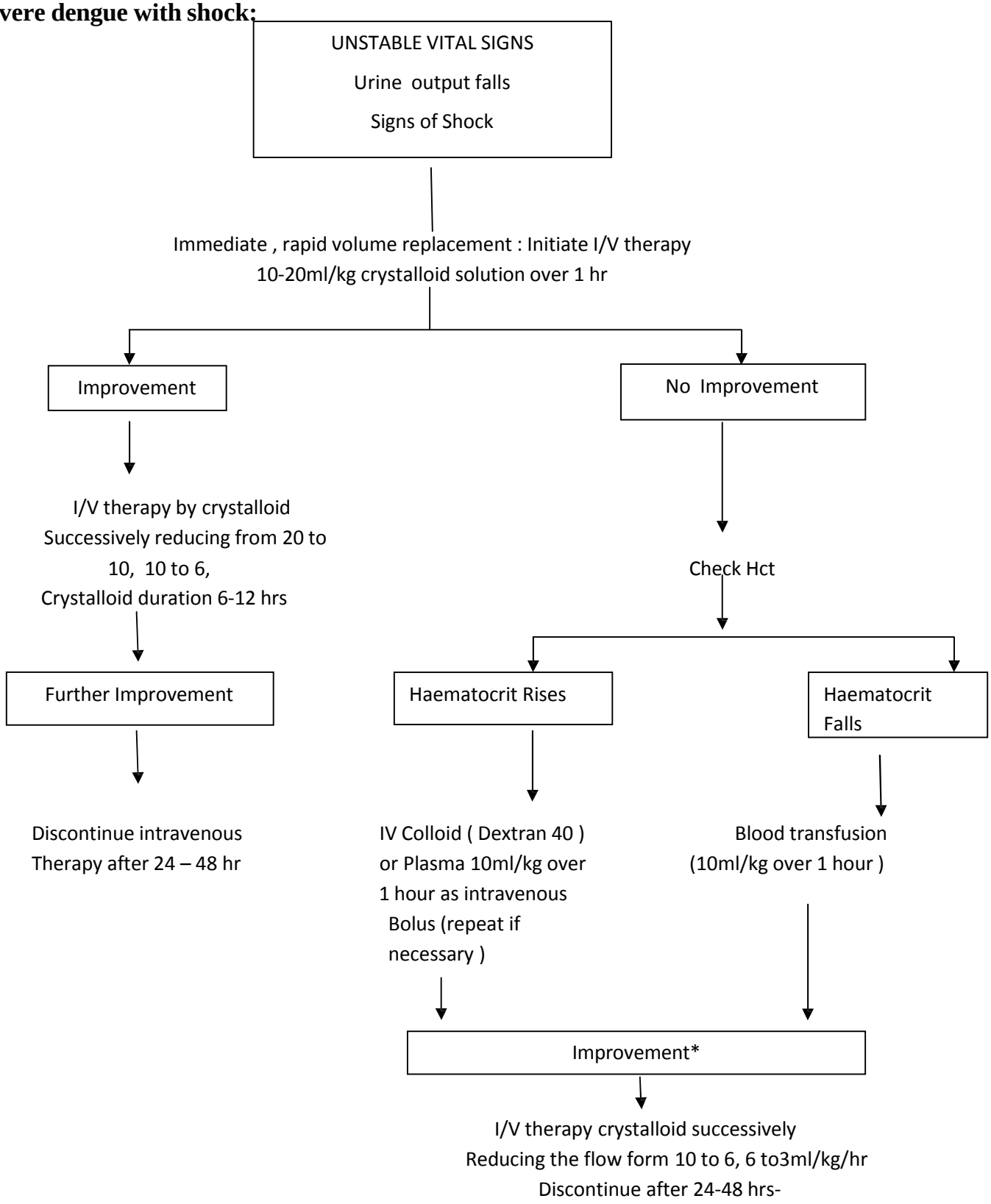
STATUS EPILEPTICUS MANAGEMENT



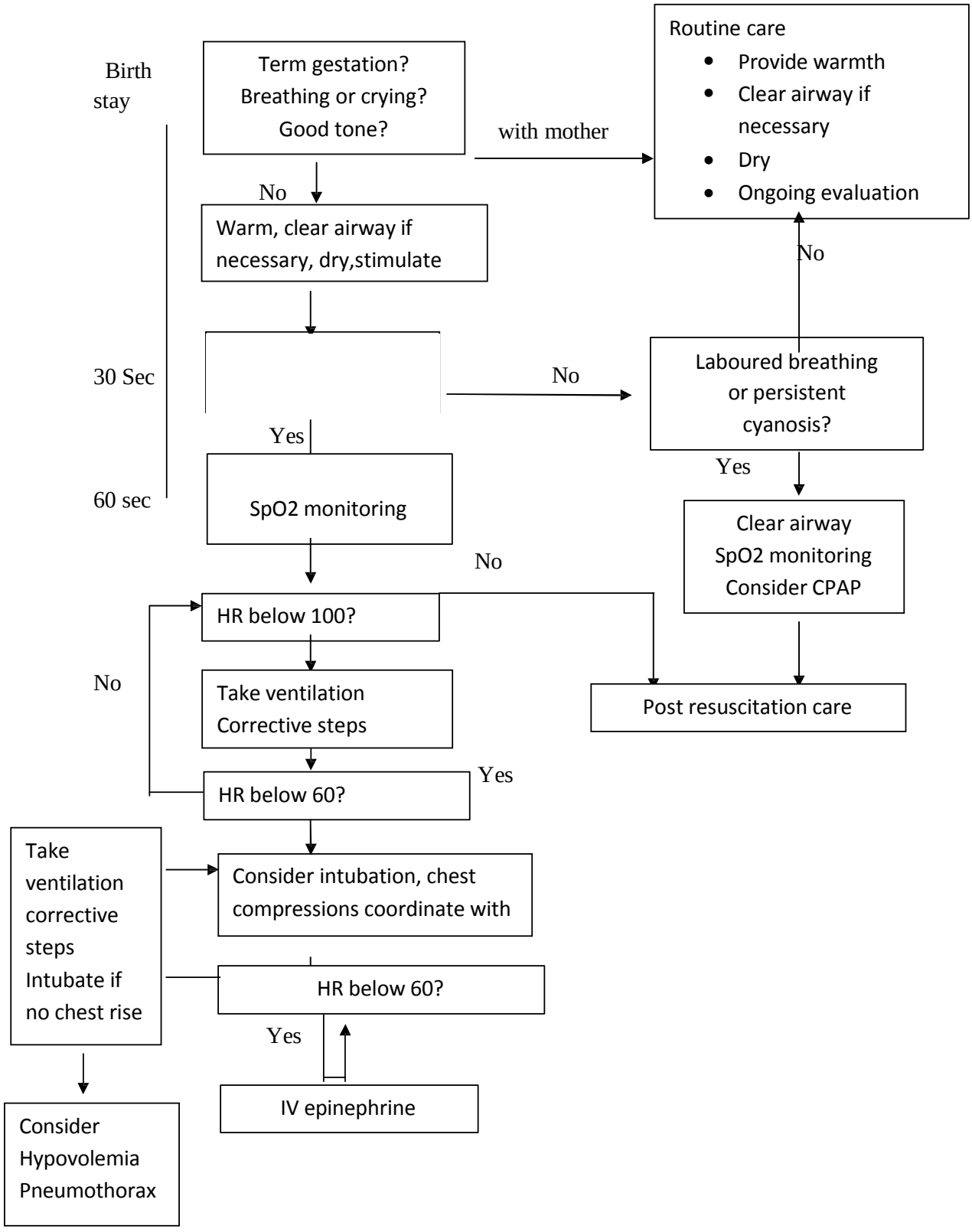
Fluid management – severe dengue without shock DHF – Grade I or II



Severe dengue with shock:



Neonatal resuscitation algorithm



COMMUNITY MEDICINE

FUNDAMENTALS FOR CRRI

ETHICAL ISSUES IN BIOMEDICAL RESEARCH

BACK GROUND

"Hippocratic oath is one of the earliest codes of Ethics. Every medical student recites this oath as a part of graduation ceremony. The Hippocratic oath is based firmly on the qualities of human dignity and religious responsibility. In 1973, the U.S. Supreme Court rejected the Hippocratic oath as a guide to medical ethics and practice and opined that the oath is insufficient in the light of the latest developments and methods of medical practice and research.

LEGAL, MORAL AND ETHICAL

Legality is "correct behavior governed externally or enforced by the state".

Morality is "norms for correct behavior laid out but not forced".

Ethics may be defined as "correct behavior dictated internally by one's own moral integrity".

CURRENT SCENARIO

Nuremberg Code (1947) Post Second World War (1939-45) trial of German medical practitioners the first International Statement on the ethics of medical research

Helsinki Declaration in 1964 the World Medical Association formulated general principles and specific guidelines for medical research

Indian Council of Medical Research (February 1980) released a **'Policy Statement on Ethical Considerations involved in Research on Human Subjects'** for the benefit of all those involved in clinical research in India.

All the research involving human participants should be conducted in accordance with the four basic ethical principles, namely autonomy (respect for person / participant) beneficence, non-maleficence (do not harm) and justice.

Indian Council of Medical Research has released the revised guidelines in 2006 for undertaking research involving humans. Biomedical and related research must necessarily ensure that –

(i) The **PURPOSE,** of such research is that it should be directed towards the increase of knowledge about the human condition

(ii) Such research is **CONDUCTED** under conditions that no person or persons become a mere means for the betterment of others .

(iii) Such research must be subjected to a regime of **EVALUATION** at all stages of the proposal i.e., research design and experimentation, declaration of results and use of the results there of, and that each such evaluation shall bear in mind the objects to be achieved, the means by which they are sought to be achieved, the anticipated benefits and dangers, the potential uses and abuses of the experiment and its results, and above all, the premium that civilised society places on saving and ensuring the safety of each human life as an end in itself.

Any research using the human beings as participants shall follow the principles given below –

1. Principles of essentiality
2. Principles of voluntariness, informed consent and community agreement
3. Principles of non-exploitation
4. Principles of privacy and confidentiality
5. Principles of precaution and risk minimization
6. Principles of professional competence
7. Principles of accountability and transparency
8. Principles of the maximisation of the public interest and of distributive justice
9. Principles of institutional arrangements
10. Principles of public domain
11. Principles of totality of responsibility
12. Principles of compliance

The **Principal Investigator** is the person responsible for not only undertaking research but also for observance of the rights, health and welfare of the participants recruited for the study. She/he should have qualification and competence in biomedical research methodology for proper conduct of the study and should be aware of and comply with the scientific, legal and ethical requirements of the study protocol.

GENERAL ETHICAL ISSUES

Informed Consent of Participants

For all biomedical research involving human participants, the investigator must obtain the informed consent of the prospective participant or in the case of an individual who is not capable of giving informed consent, the consent of a legal guardian. Informed consent protects the individual's freedom of choice and respect for individual's autonomy and is given voluntarily to participate in research or not. Adequate information about the research is given in a simple and easily understandable unambiguous language in a document known as the **Informed Consent Form with Participant/Patient Information Sheet.**

The latter should have the following components as may be applicable:

1. Nature and purpose of study stating it as research
2. Duration of participation with number of participants
3. Procedures to be followed
4. Investigations, if any, to be performed
5. Foreseeable risks and discomforts adequately described and whether project involves more than minimal risk
6. Benefits to participant, community or medical profession as may be applicable
7. Policy on compensation
8. Availability of medical treatment for such injuries or risk management
9. Alternative treatments if available

10. Steps taken for ensuring confidentiality

11. No loss of benefits on withdrawal

12. Benefit sharing in the event of commercialization

13. Contact details of PI or local PI/Co-PI in multicentric studies for asking more information related to the research or in case of injury.

14. Contact details of Chairman of the IEC for appeal against violation of rights

15. Voluntary participation

16. If test for genetics and HIV is to be done, counselling for consent for testing must be given as per national guidelines

17. Storage period of biological sample and related data with choice offered to participant regarding future use of sample, refusal for storage and receipt of its results.

Compensation for participation

Participants may be paid for the inconvenience and time spent, and should be reimbursed for expenses incurred, in connection with their participation in research. They may also receive free medical services. However, payments should not be so large or the medical services so extensive as to make prospective participants consent readily to enrol in research against their better judgement, which would then be treated as undue inducement. All payments, reimbursement and medical services to be provided to research participants should be approved by the IEC.

Conflict of interest

A set of conditions in which professional judgment concerning a primary interest like patients' welfare or the validity of research tends to be or appears to be unduly influenced by a secondary interest like non-financial (personal, academic or political) or financial gain is termed as Conflict of Interest (COI).

Selection of special groups as research participants

i. *Pregnant or nursing women:* As a general rule, pregnant or nursing women should not be participants of any clinical trial except such trials as are designed to protect or advance the health of pregnant or nursing women or foetuses or nursing infant, and for which women who are not pregnant or nursing would not be suitable participants.

ii. Children: Before undertaking trial in children the investigator must ensure that –

iii. Vulnerable groups: Efforts may be made to ensure that individuals or communities invited for research be selected in such a way that the burdens and benefits of the research are equally distributed.

Others

- Essential information on confidentiality for prospective research participants
- Compensation for accidental injury
- Post - trial access
- International collaboration / assistance in biomedical / health research
- Researcher's relation with the media and publication practices

In addition to the above general guidelines, ICMR has specific guidelines for conducting drug trails, genetic research, epidemiological studies, transplantation research and assisted reproductive technologies which may be accessed at http://www.icmr.nic.in/ethical.pdf

Ethical Issues in Use of Experimental Animals

Animal research has long been guided by a reliance on ethical principles, called "the three Rs": That researchers should **reduce** the animals needed to the minimum number to prove the research valid, that they should **replace** animals with cell cultures or computer models when possible, and that they should **refine** the experiment to reduce any suffering, or the duration of use or to use the least sentience animal possible in the research. Research should aim at three goals: respect for life, seeking knowledge that is socially needed, and that avoids maleficence toward the animal subject. Nevertheless, the use of animals in research raises important moral and ethical questions.

Conclusions

Concerns raised in the media regarding practice of biomedical research have often been the results of the ignorance on the part of the investigators of the procedural formalities rather than deliberate mischief. Inclusion of ethics education as part of post graduate studies shall largely improve the situation. The pace at which new technologies are being employed in biomedical research is not matched by the pace of development of guidelines for the conduct of modern research. Unless substantial investments are made education, training of scientists and science administrators, instances of misconduct in biomedical research continue to plague the field.

"Clearly, the fruits of the breathtaking advances in modern biology can be savoured only after we have negotiated the ethical minefields of biomedical research"

RESEARCH METHODOLOGY

Introduction

Research Design

The research design is the master plan specifying the methods and procedures for collecting and analyzing the needed information on the research question

Methods used to obtain valid data to answer a research question

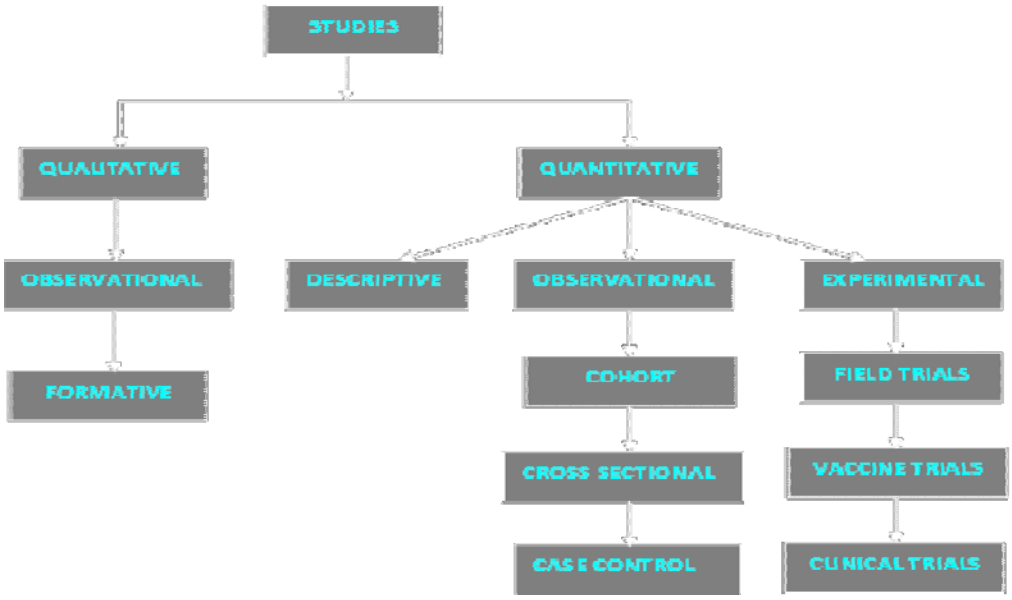
Many problems take many years to develop or improve, so not easy to study humans over the full course of the disease

Study Methodology

Depends on the research question

Need to balance study against ethical and logistic considerations

Types of Research Studies



Types of Studies

- Descriptive : Burden of illness
- Analytic : Causation, Prognosis
- Experimental : Randomized Trials

Qualitative Research

- Research is concerned with the generation & not testing of hypothesis
- Aim is to see the world through the eyes of the subjects
- The data collection are relatively open & unstructured

Quantitative Research

- Deals with numbers
- Can be Observational or Experimental
- Observational:
- Intelligent observation of things that happen
- Experimental:
- Making things happen and observe

TYPES OF RESEARCH STUDIES

The best study of mankind is man. This statement emphasizes the importance of making the best use of observations on individuals or populations exposed to suspected factors of diseases

Cross-sectional Studies

- Also known as Prevalence Survey

- Exposure and disease status assessed simultaneously
- Good for generating hypothesis
- Mapping of a disease/health status
- Useful for Public Health administrators

Cohort Study

- It is a prospective study
- Cohorts must be free from disease under study
- Both the groups (study and control Cohorts) should be equally susceptible to the diseases under study
- Both the groups should be comparable in all respects
- The diagnostic and eligibility Criteria must be defined

Case Control Studies

- It is Retrospective study
- Useful for evaluating strength of association between disease and suspected Risk factor (Exposure) especially in rare conditions

CASE CONTROL STUDIES

- Selection of cases
- Selection of controls
- Exposure
- Analysis

Selection of cases

- Sources of cases
- Geographically defined population
- Membership of a health care plan
- Occupational group
- Cancer registry Hospital
- Cases should be chosen independently of exposure

Selection of Controls

- Controls are individuals who are similar to cases in terms of risk characteristics, but who have not developed the disease under study
- Controls are selected from an appropriate sampling frame

Analysis

- Compare prior exposure experiences of cases and controls to estimate the association between the exposure (Risk factor) and the disease
- The strength of association is estimated by Odds Ratio (OR)

Bias in Case Control Studies

- Selection bias
- Measurement bias
- Confounding bias

COHORT STUDY

Types of cohort studies

- Prospective
- Retrospective
- Combination of Prospective & Retrospective

Elements of a cohort study

- Selection of study subjects
- Obtaining data on exposure

- Selection of comparison groups
- Follow up

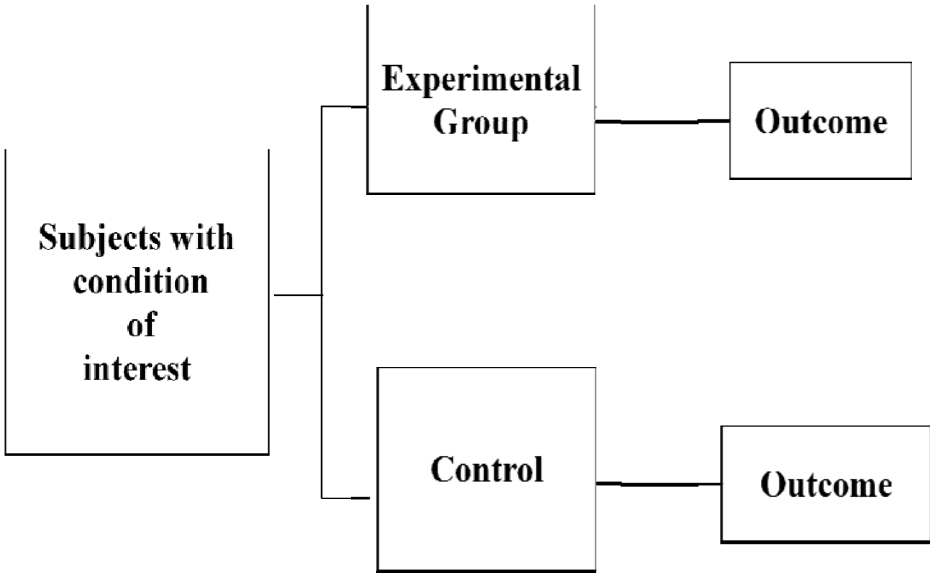
Analysis

- Incidence rates
- Relative risk
- Attributable risk

RANDOMIZED CONTROLLED TRIAL (RCT)

- Similar groups of individuals are allocated at random to receive or not receive a therapy
- Groups should be drawn from the same source population
- All participants are observed for the occurrence of the outcome
- Process of randomization of subjects is of critical importance

Diagrammatic Outline of an RCT



Advantages of RCT

- Randomization increases comparability of groups
- Design provides best chance of obtaining cause and effect
- Allows standardization of eligibility criteria
- Allows use of statistical methods that have few in-built assumptions

Disadvantages of RCT

- Maybe expensive in terms of money, time and people
- Many research questions not suitable due to ethics, rarity of outcome
- Tends to be artificial situation
    - those who volunteer may differ from those to whom results would be applied
    - standardized intervention may be different from common practice

Applications of RCT

Evaluation of treatment

- Chemotherapy
- Surgical procedures
- Any other treatment process
- Chemo-prophylaxis
- Immuno-prophylaxis

Interns shall acquire following skills to deal effectively with an individual and community in the context of primary health care

a. Gain expertise in immunisation against infectious diseases

b. Participate in programs in prevention and control of locally prevalent endemic diseases

c. Be capable of conducting a survey and employ its finding towards arriving at community diagnosis

d. i) Conduct program on health education

ii) Gain capabilities of using audio-visual aids

ii) Acquire capacity of utilisation of scientific information for promotion of community health

e. Be capable of establishing link with other agencies such as water supply, food distribution and other environmental/social agencies

f. Acquire qualities of being a Professional with dedication, resourcefulness and leadership

g. Acquire managerial skills by delegation of duties to paramedical staff and other health professionals and supervising their performance

h. Effectively participate with other members of the health team with qualities of leadership

i. Make a community diagnosis in specific situations such as an epidemic and institute relevant control measures for communicable diseases

j. Develop capacity for analysis of hospital based morbidity and mortality statistics

k. Use of essential drugs in the community with the awareness of availability, cost and side effects

l. Provide health education to an individual/community on

i) Tuberculosis

ii) Small family spacing by use of appropriate contraceptives

iii) Applied nutrition and care of mothers and children

iv) Immunisation

v) Participation in school health programs

m. Initiate & Participate in family composite health care (Birth to Death), Inventory of events

n. Participate in all the modules on field practice for community health e.g. motherhood, nutrition surveillance and rehabilitation , diarrhoeal disorders etc

o. Acquire competence in diagnosis and management of common ailments eg. malaria, tuberculosis, enteric fever, heart failure, hepatitis, meningitis, acute renal failure etc

p. Acquire proficiency in family welfare programmes (antenatal care, normal delivery, contraception etc)

FORENSIC MEDICINE

CRRI must obtain a reasonable working knowledge on

- Inquest
- Post-mortem procedures
- Opinion writing
- Medico-legal certificates
  - Age estimation
  - Wound certificate
  - Examination of victim/ accused of Sexual offence
  - Drunkenness certification
  - Sickness/ fitness certification
- Documenting and managing medico-legal cases in Casualty.
- Medical Law and Ethics

Inquest

An inquest is an enquiry or investigation into the cause of death. Two types of inquest are held in India

Police inquest (174 CrPC)

A police officer making the inquest is known as the Investigating officer(I.O).On receiving information of a death, the police officer proceeds to the place where the body of the deceased is kept and conducts inquiry in the presence of two or more respectable persons(panchas). He prepares a report of his inquiry and the inquest report(panchanama) is

signed by the I.O and the panchas. In case of suspected foul play or doubt, body is sent to nearest authorized hospital with a requisition to conduct autopsy.

Magistrate inquest (176CrPC)

Investigation is done by a Magistrate in cases of

- Death in police custody and while under police interrogation
- Death due to police firing
- Death in prison, reformatories, borstal school
- Death in psychiatric hospital
- Dowry deaths
- Exhumation

Post-mortem examination

After receiving the inquest and requisition to conduct autopsy, the dead body after identification by the relatives of the deceased and I.O. is transferred to the autopsy dissection table in the Mortuary. With due precautions examination is done of

- Clothes and belongings
- External examination to assess time since death and look for injuries
- Internal examination of organ systems
- Preservation of viscera for chemical analysis in case of suspected poisoning.

- Closure of the body after autopsy and handing over of dead body to the I.O.

- Prepare a post-mortem report mentioning all salient features of the post-mortem examination including cause of death, time since death is handed over to the I.O along with the belongings and viscera preserved if any.

Medico-legal certificates

During the course of medical practise, a doctor should be well versed with Medico-legal certification of various cases which include

- Age estimation
- Wound certificate
- Examination of victim/ accused of Sexual offence
- Drunkenness certification
- Sickness/ fitness certification

Apart from documentation, the doctor should also take due precautions while collecting biological samples and preservation which will be of paramount importance in judicial investigation.

Age estimation:

- On receiving requisition, the individual is examined after obtaining an informed written consent.

- If consent is not given by the individual, the informed refusal should also be duly documented along with signature/thumb impression of the individual.

- A woman should preferably be examined by a female doctor or in the presence of a female attendant whose presence should be documented

- After general and dental examination, the individual is subjected to radiological examination.

- On obtaining the X-rays, after considering the appearance and fusion of bony epiphysis, age of the individual is opined upon.

Wound Certificate

- While managing a Casualty, every medical officer must be well versed with documenting a medico-legal case.

- All preliminary details like name, age, gender, residential address should be noted

- After documenting the identifying marks, injuries are examined and described mentioning, the size, site, shape, margins, base and colour.

- Investigations to assess the severity of the injuries are done along with management of the injuries.

Examination of sexual offence victim

- The Ministry of Health and Family welfare has issued detailed guidelines for Medico-legal care of survivors/victims of sexual violence which is available at http://uphealth.up.nic.in/med-order-14-15/med2/sexual-vil.pdf.

- It is the duty of the medical officer to provide comprehensive care towards short term and long term physical health and psychological health consequences.

- After obtaining informed written consent, and eliciting history, general examination, local examination and biological sample collection are done.

- Samples including vaginal smear/swab, clothes with blood/seminal stain, matted pubic hair, blood of the victim to detect presence of sedative/narcotics, finger nail scrapings to detect debris under nails, etc are collected and preserved with due precautions.

- A provisional opinion is given as to whether sexual act has occurred/completed; whether the sexual act is of recent duration.

- After receiving the laboratory results, a final opinion is provided on the basis of presence/absence of genital/physical injuries and laboratory result positive/negative for semen.

Examination of sexual offence accused

- After obtaining informed written consent, and eliciting history, general examination, local examination and biological sample collection are done.

- Opinion as to whether the individual is capable of performing a sexual act is given.

- Urethral swabs to detect for presence of vaginal epithelial cells are collected and preserved with due precautions.

Drunkenness Certification

- On obtaining requisition, individual is examined. General examination, examination of higher mental function, reflexes are done and opinion is given whether the individual has consumed alcohol/ consumed and not under the influence/ consumed and under the influence/intoxicated.

Medical Law and Ethics

All medical practitioners should be well versed with the laws of the country. Medical profession is governed by a Code of Ethics and Etiquette. While ethics is a voluntarily self imposed code of conduct by the medical profession, Etiquette is the courtesy they observe among members of the profession. The broad principles of Medical ethics are formulated by National and State Medical councils. In its Professional conduct, Etiquette and Ethics Regulations (2002, amended upto February 2016), the Medical Council of India(MCI)has prescribed in detail the code of ethics to be followed by a medical practitioner (Available at http://www.mciindia.org/RulesandRegulations/CodeofMedicalEthicsRegulations2002.aspx). In enumerates and discusses in detail,

- Duties and responsibilities of a physician in general,
- Duties of physician to patients
- Duties of physician in consultation
- Responsibilities of physicians to each other
- Duties of physician to the public and paramedical profession
- Unethical acts
- Professional misconduct
- Punishment and disciplinary action.

The MCI has also recommended formats for leave or extension or communication of leave and for fitness, format for maintaining medical records, list of certificates, reports, notifications etc. issued by doctors for the purposes of various acts / administrative requirements which a practitioner should be aware of.

A practitioner should be aware that, while contravention of Code of Medical ethics can invoke disciplinary action by the State Medical Councils, professional negligence due to lack of care and skill or wilful negligence leading to bodily injury or death of a patient can lead to judicial proceedings in Civil and/or Criminal courts.

PHARMACOLOGY

FUNDAMENTALS FOR CRRI

ESSENTIAL DRUGS

WHO definition

Essential drugs are those drugs that satisfy the health care needs of the majority of the population. They should therefore be available at all times in adequate amounts and in appropriate dosage forms, at a price the individual and community can afford.

Two levels of list

1. The **core list**

   Minimum drug needs for a basic health care system, listing the most cost effective drugs for priority conditions

2. **The complimentary list**

   Drugs for priority diseases that are cost effective but not necessarily affordable, or may need specialised health care facilities.

Essential drugs for less frequent diseases.

Advantages of the concept:

- It improves the practioners knowledge of the drugs he is prescribing and hence the quality of his prescription.
- It reduces the cost of patient care
- The drugs from selected lists should be available at all places(even at remote places) , and at all times.

- The list will differ according to factors such as local disease pattern, disease incidence, available infrastructure and the financial resources at disposal.
- Only those drugs of proven value relatively safe and cost effective are included.
- Should be available in a form in which quality, including ,bioavailability and stability on storage can be assured.
- Fixed dose combinations are accepted only when the dosage of the ingredients meets the requirement of a defined population group.
- The combination should have advantage over single compound in therapeutic effect ,safety and compliance. Eg. anti tuberculous drugs
- Selection of essential medicines should be a continuous process which should take in to account the changing priorities for public health action, epidemiological conditions as well as availability of better medicines/formulations and progress in pharmacological knowledge.

RATIONAL USE OF DRUGS

"Rational use of drugs requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, and the lowest cost to them and their community"

These requirements will be fulfilled if the process of prescribing is appropriately followed.

This includes :

* Steps in defining patients problems (or diagnosis).
* In defining effective and safe treatments (drugs and non drugs)
* In selecting appropriate drugs, dosage and duration.
* In writing a prescription.
* In giving patients adequate information.
* In planning to evaluate treatment responses.

The rational prescribing should meet the following criteria:

Appropriate indications:

The decision to prescribe drug(s) is entirely based on medical rationale and that drug therapy is an effective and safe treatment.

Appropriate Drug:

The selection of drugs is based on efficacy, safety, suitability and cost considerations.

Appropriate Patient:

No contraindications exist and the likelihood of adverse reaction is minimal, and the drug is acceptable to the patient.

Appropriate Information:

Patients should be provided with relevant, accurate, important and clear information regarding his or her conditions and the medication(s) that are prescribed.

Appropriate Monitoring:

The anticipated and unexpected effects of medications should be appropriately monitored.

Unfortunately, in real practice, prescribing patterns do not always conform to these criteria and can be classified as "inappropriate" or "irrational" prescribing.

Irrational Prescribing

Common patterns of irrational prescribing may be manifested in the following forms :

* The use of drugs, when no drug therapy is indicated.

  Eg. Antibiotics for viral URI infections.

* The use of a wrong drug for a specific condition requiring drug therapy.

  Eg. Antibiotics in childhood diarrhoea requiring ORS.

* The use of drugs with doubtful / unproven efficacy.

  Eg. The use of antimotility agents in acute diarrhoea.

* The use of irrational Fixed dose combinations

Eg. Azithromycin+ Cefixime, Ciprofloxacin + Tinidazole combinations etc.

* Failure to provide available, safe and effective drugs

  Eg. Failure to vaccinate against measles, tetanus, etc.

  Failure to prescribe ORS for acute diarrhoea.

* The use of correct drug with incorrect administration, dosage and duration.

  Eg. The use of IV metronidazole, when oral or suppository formulations would be appropriate.

* The use of unnecessary expensive drugs

  Eg. The use of third generation, broad - spectrum antimicrobial, when a first line, narrow spectrum agent is indicated.

Some examples of commonly encountered, inappropriate prescribing practices in many health care settings include :

* Over use of antibiotics and antidiarrhoeals for non specific childhood diarrhoea.

* Indiscriminate use of injections.

* Multiple drug prescriptions.

* Excessive use of antibiotics for treating minor ARI.

* Over use Minerals and tonics .

Factors underlying the Irrational use of Drugs

There are many different factors which affect the irrational use of drugs, which can be categorised as those deriving from the following factors :

* **Patients - Drug misinformation**

- Misleading beliefs

- Patient demands / expectations.

* **Prescribers - Lack of education and training**

- Inappropriate role models

- Lack of objective drug information

- Generalization of limited experiences

- misleading beliefs about drugs

*** Work place**

- heavy patient load.

- Pressure to prescribe.

- Lack of adequate lab capacity

- Insufficient staffing.

*** Drug supply**

- unreliable suppliers system

- Drug shortages

- Expired drugs supplied

*** Industry**

- Promotional activities

- Misleading claims.

All these factors are affected by various attitudes that are prevailing among the prescribers and consumers.

In some areas the use of injections remains high due to the false assumption of the prescribers that injections will improve patients satisfaction and that they are always expected by the patient.

Impact of Irrational use of Drugs

This can be seen in many ways :

* Reduction in the quality of drug therapy leading to increased morbidity and mortality.

* Waste of resources leading to reduced availability of other vital drugs and increased costs.

* Increased risk of unwanted effects such as adverse drug reactions and the emergence of drug resistance.

PRINCIPLES OF PRESCRIPTION WRITING

'Prescribe right drug to right patient in right dose by right route at right time intervals'

- Write the prescription legibly on your letter head.
- Write the patient's name, age and address.
- **Do not abbreviate** names of drugs/ units/ instructions.
- When decimals are unavoidable, write , say, **50mcg not 0.05 mg**
- Write clearly dose, dosing interval, time of the day, relation to meals and duration of therapy
- When prescribing a drug 'as required', write the minimum dosing interval and maximum number of doses per day.
- **Sign the prescription**
- Write date and your registration number.

(Some abbreviations used in prescription orders : od – once a day, bid- twice a day, tid- thrice a day, qid – four times a day, HS- at night, sos- as required)

MODEL PRESCRIPTION FORMAT

INR HOSPITAL

Dr……...M.D.,(GENERAL MEDICINE)

Reg No :20……..

Address:

Ph.No:

Visiting hours:

Date:…….

Patient name:Mrs.K.Uma

Age/Sex:52 years/Female

Address:No:3,Mint street

Chennai-01

△Acid Peptic Disease

R_x

Cap.Omez20 mg ----------⑦ 0-0-1,P.O One capsule daily at night (after food)

*No Refill

INSTRUCTIONS/WARNINGS:

-To complete the course

-Bland diet, plenty of fluids

-Restrict coffee/Tea -2 Cups/Day

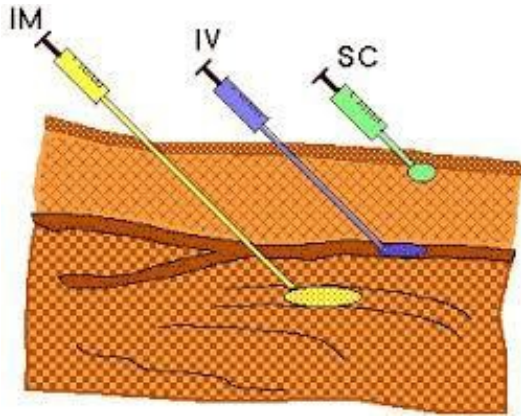
-Avoid smoking /alcohol

-Review after 1 week

SIGNATURE

Dr……
Reg …….

ADMINISTRATION OF DRUGS BY PARENTERAL ROUTE



- Strict sterile precautions is advocated
- Check for drug expiry date

Syringes :

Size – 1ml, 3ml,5ml

Tuberculin syringe

Insulin syringe

Needles

Shaft (length of needle)

Gauge (diameter)

Size

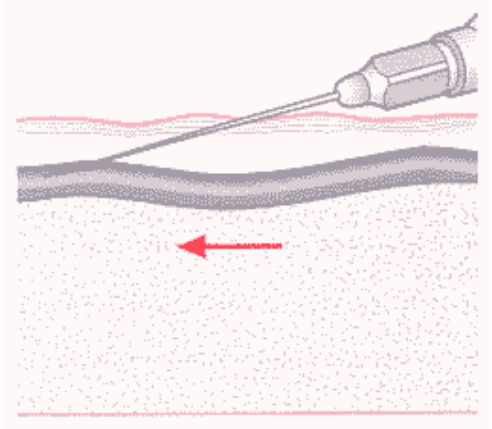
Smaller the number larger the diameter

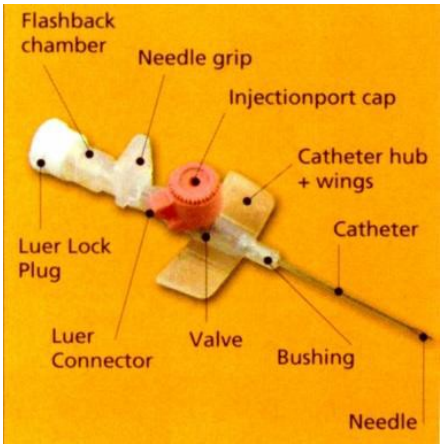
Eg. 18 gauge big

25 gauge small

INTRAVENOUS ROUTE

- Injection given directly into veins
- 100% Bioavailability





INTRADERMAL ROUTE

- Site – Inner forearm
- Volume – 0.01-0.05 ml
- Tuberculin syringe – 1 ml
- 10 – 15 degree angle

SUB-CUTANEOUS ROUTE

- Administration into sub-cutaneous tissue that lies between skin and muscle
- Volume – 1 ml
- Tuberculin or Insulin syringe
- 45 degree angle

INTRAMUSCULAR ROUTE

- Administered into muscle
- 1 to 5 ml syringe
- 90 degree angle

EG 1 - ADMINISTRATION INTO DELTOID MUSCLE

Y Palpate lower edge of acromion process.

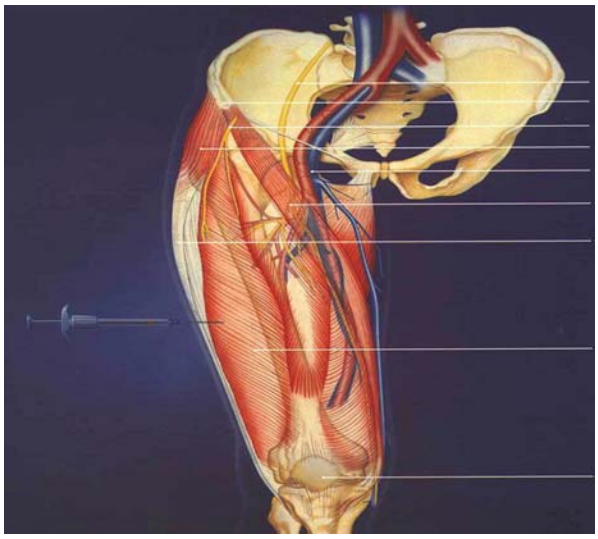
Y Place 4 fingers across the deltoid muscle with the top finger along the acromion process. This forms the base of a triangle.

Y Draw an imaginary line at the axilla. This forms the apex of the triangle.

Injection site is the center of the triangle, 3 finger widths (1-2 inches) below the acromion process.

EG 2 –VASTUS LATERALIS

- One hand above the knee.
- One hand below the greater trochanter.
- Locate midline of anterior thigh and midline of lateral thigh.
- Injection site is the lateral area of the thigh



PHARMACOVIGILANCE

DEFINITION

Pharmacovigilance, as defined by the World Health Organization, is the science and activities relating to the detection, assessment, understanding and prevention of adverse events or any other possible drug-related problems. Recent inclusions to this definition are: herbals, traditional and complementary medicines, blood products, biologicals, medical devices and vaccines.

ADVERSE DRUG REACTION (ADR)

It is a noxious response to a drug which is unintended and which occurs at doses normally used in man for prophylaxis, diagnosis, or therapy of disease or for modification of physiological function

SERIOUS ADR OR SERIOUS AE

A serious adverse event or adverse reaction is any untoward medical occurrence that at any dose:

1. Results in death
2. Is life-threatening
3. Requires in patient hospitalization or prolongation of existing hospitalization
4. Results in persistent or significant disability/incapacity or
5. Is a congenital anomaly or birth defect

PHARMACOVIGILANCE PROGRAMME OF INDIA (PvPI)

The Central Drugs Standard Control Organisation (CDSCO), New Delhi has initiated a nation-wide pharmacovigilance programme under the aegis of Ministry of Health & Family Welfare, Government of India.

The programme is coordinated by The Indian Pharmacopoeia Commission (IPC) located at Ghaziabad. The National Coordinating Centre is operating under the supervision of Steering Committee to recommend procedures and guidelines for regulatory interventions in India.

PRESCRIBED FORM TO BE USED IN MAKING REPORTS

There is a prescribed form that can be used in making reports to AMCs which can be downloaded from the websites of IPC (www.ipc.gov.in) or CDSCO (www.cdsco.nic.in)

MINIMUM CRITERIA FOR A VALID ADR REPORT

The following minimum criteria must be met to make an ADR report valid:

1. Patient details e.g., initials, or age or date of birth or sex

2. Name of suspected medicinal product (s)

3. Details of the suspected reaction

4. Reporter details (name, profession, institution, contact details)

PROCESSING OFADRs

The ADRs will be sent to WHO-Uppsala Monitoring Centre (UMC) for analysis and signal detection. Simultaneously ADRs are evaluated at NATIONAL COORDINATING CENTRE (NCC) and the inferences are used to recommend regulatory body i.e. CDSCO to take necessary regulatory interventions, besides communicating risks to healthcare professionals and the public.

CONFIDENTIALITY

Only the patient initials need to be filled in the ADR form and all the patient details are kept confidential.

MOBILE SOFTWARES

Recently PvPI launches the ADR reporting android softwares which can be downloaded from Google play store.

PATHOLOGY

GUIDELINES FOR CRRI

SERVICES PROVIDED

1)Histopathology – Surgical and autopsy specimens

2) Cytology – FNAC, body fluids and exfoliative cytology (Pap smear)

3) Clinical pathology – Hematological investigations and body fluids investigation

4) Immunohistochemistry

5) Immunofluorescence

6) Frozen section biopsy

HISTOPATHOLOGY

Ideal Requisition Form for histopathology:

Requisition form should have the following details

./ Name of the Patient

./ Age / Sex

./ IP/OP Number

./ Referring Unit

./ Details of Surgery

./ Indications for Surgery

./ Site of Biopsy

./ Type of Biopsy

./ Any previous biopsy/ FNAC done , if so details of the report

./ Any other surgeries done in the past- Details of the same

./ Any relevant tumor markers/Imaging techniques (XRay, CT, USG, MRI) done for the patient- Reports of the same

How to send the Histopathology specimen?

- Send specimens in 10% Formalin
- Volume of formalin is 10 –20 times the vol of specimen
- Container should be large enough to hold the specimen and fixative
- Container should be labeled .Label should have details of the patient – Name, Age, Sex, Unit, IP No, Nature of Surgery etc

Immunohistochemistry

- Special technique to identify Tissue Antigen using Ag-Ab technique

Frozen section

- For on table diagnosis of malignant tumours and to give regional clearance of margins
- To differentiate between benign and malignant tumours

Immunofluorescence technique

- Skin samples
- Kidney biopsy

<u>CYTOLOGY</u>

Specimens include

- FNAC
- Body fluids

- Pap smear
- Bronchial brush
- Bronchial wash
- USG/CT guided FNACs
- Imprint cytology

How to send the sample for cytology

- For FNAC- Slides should be immediately fixed in 95% isoprophyl alcohol
- For Fluids: Label the specimen with Name /age of patient & Clinical diagnosis,Volume,Time at which specimen was taken
- Minimum 10ml & maximum 200ml to be sent
- Send the specimen soon after aspiration
- Keep it in refrigerator if you expect a delay in transportation
- Fixative- 95% isoprophyl alcohol

CLINICAL PATHOLOGY

Instruction for sending blood samples to hematology lab:

- CBC- EDTA container; Violet capped tube-2ml blood
- PT/APTT- Citrated tube; Light blue capped tube- 2ml blood
- ESR-EDTA/3.8% sodium citrate solution-0.4ml sodium citrate+1.6ml blood

Anticoagulants used in hematology

- EDTA – For Blood Cell Counts & Morphological studies -1 to 2 mg / ml of blood

- Trisodium Citrate – For coagulation & Platelet Function studies(1: 9 ratio - 3.8%)
- Heparin – For Osmotic Fragility Tests

Parameters Assessed in Complete hemogram

- Done with Automated Coulter Counter

Ⲩ Hb

Ⲩ RBC count

Ⲩ PCV

Ⲩ MCV

Ⲩ MCH

Ⲩ MCHC

Ⲩ TC/DC

Ⲩ Platelet Count

Ⲩ RDW

Indications:

- Investigation of Anemias
- Preoperative Evaluation of patients
- In suspected cases of Leukemias
- 2 ml of Anticoagulated (EDTA)Venous Blood is the sample required

Peripheral Smear

- Send relevant history with CBC values for peripheral smear

- For evaluation of Anemias
- To identify Parasites – MP/MF
- In suspected Leukemias
- Rough Estimation of Platelet Count

Coagulation Profile

Ÿ Bleeding Time

Ÿ Clotting Time

Ÿ PTT

Ÿ APTT

Indications

Ÿ Bleeding Disorders

Ÿ Preop Evaluation

Complete urine analysis

./ Done Manually / Automatic Analyser

./ Random Sample / Early Morning sample (Preferred as it is concentrated)

./ Volume, Colour, PH, Specific gravity,

./ Glucose, Proteins, Blood, Acetone, Bile salts & pigments

./ Microscopy of sediment for Casts & Crystals

./ Specimen collected in lab or sent soon after collection

DEPARTMENT OF BIOCHEMISTRY

GUIDELINES FOR CRRI

Tests	Specimen/ vacutainer	Sample volume
BLOOD		
1.Glucose Fasting/PP/Random	Serum/ Red topped	2mL
2.Renal function tests Urea/ Creatinine	Serum/ Red topped	4mL
3.Lipid Profile Total Cholesterol /HDL/LDL/TGL/VLDL	Serum/ Red topped	4mL
4.Liver Function Tests Total/Direct Bilirubin/ SGOT/SGPT /ALP/Protein/Albumin	Serum/ Red topped	4mL
5.Electrolytes Sodium/ Potassium/ Chloride/Bicarbonate	Serum/ Red topped	4mL
6.Cardiac profile CK,CK-MB	Serum/ Red topped	4mL
7.Bone profile Calcium, Phosphorus, ALP	Serum/ Red topped	4mL
8. Pancreatic Enzymes Amylase, Lipase	Serum/ Red topped	4mL
9.Hormones TSH, Free T4	Serum/ Red topped	4mL
10.Electrophoresis Serum Protein	Serum/ Red topped	4mL
11.Uric acid	Serum/ Red topped	4mL
URINE		
1.Spot Protein Creatinine ratio	Urine	5 mL
2. 24 hrs protein	Urine	
3.Myoglobin/hemoglobin	Urine	10 mL
4.Metabolic screening	Urine	10 mL
5.Chromatography	Urine	10 mL
6.VMA(Vanillyl Mandelic acid) – Qualitative	Urine	10 mL
7.PBG(Porphobilinogen) - Qualitative	Urine	10 mL
8.BJP(Bence Jones Protein)- Qualitative	Urine	10 mL

FLUID ANALYSIS 1.CSF – Protein, Sugar 2.Ascitic, Pleural, Peritoneal fluid - Total protein	 Fresh CSF Fresh fluid	 10 mL 5 mL
Stone Analysis Calcium, phosphorus, uric acid, bile pigments, hemoglobin, oxalates, cholesterol	Calculi in a gauze piece or in formalin	

Sample collection:

- **Pt. identification** :
- Name
- Age/sex, I.P/O.P No, Ward and Provisional Diagnosis
- Labeling- use only Vacutainers, not any other container for sample collection
- **Preparation**
- Venipuncture-site-Median Cubital
- Preparation of the site – Use spirit, NO IODINE
- Needle size - 20 to 22, (19 to 22) - larger bore, less hemolysis.
- Draw the required amount of blood for each vacutainer. Excess/ insufficient anticoagulant leads to erroneous results.
- **Deliver the blood into the vacutainer only after removing the needle**
- Should not draw blood in the arm with IV line

- Do not select an arm the side of which mastectomy was done
- Collection in new-born-LATERAL ASPECT OF HEAL
- **Haemolysis - Should be avoided-** Potassium, glucose & enzymes are especially vulnerable for wrong results.
- Take minimum time as possible to reach the lab

Anticoagulants:

No EDTA for calcium (serum or heparinized blood)

- No oxalates(potassium oxalate) and EDTA for electrolytes

Reduce Pre-analytical Error

- Tourniquet time (TT) < 1 minute
- Longer TT or making a 'fist' will certainly affect results of potassium, calcium, protein, lactate and urea values
- Please give proper instruction to patients regarding fasting, drug intake and others
- Fasting (8-10 hours) is a must for thyroid hormones and lipid profile
- Do not collect blood when the 'drip' is on flow

Mark emergency only in absolute necessity

- Any doubt contact the lab/dept. esp. in collecting 24 hrs urine.

Test Interferences

- **Hemolysis**

Rupture of red blood cell

Mild dilution effect in some analytes

Significant increase in potassium, magnesium & phosphorus

- **Prolonged Venous stasis**

  Applying tourniquet for longer time- extravasation of water from vascular compartment.

  Significant increase in total protein, total calcium, iron, cholesterol & bilirubin

VACUTAINER

Plain Red (no additive)

- Clot activator tube, for serum determinations in chemistry testing.
- Tube inversions ensure mixing of clot activator with blood and clotting within 60 minutes. For optimum specimen quality, gently invert tube 5 times after collection to mix clot activator with blood, and allow blood to clot upright for 30 minutes before centrifuging for 15 minutes. Serum must be removed after spinning.
- Size: 4.0 mL

USES :

For serum determinations in chemistry.
May be used for routine blood donor screening and diagnostic testing of serum for infectious disease.

Sodium Citrate (blue)

- This tube produces a plasma when centrifuged.
- For optimal specimen quality, gently invert 7-8 times after collection. Specimens are generally centrifuged to produce a plasma specimen.
- This tube must be full.
- Size: 2.7 mL (also available in 1.8 mL draw)

USES :

Used commonly for coagulation determinations. Activated clotting time (ACT), PT, INR, APTT, TT, D-Dimers, Fibrinogen anti-thrombin III, ACP resistance, factor assays, lupus anticoagulation evaluation.

EDTA (Lavender)

- This tube produces whole blood or plasma.
- For optimal specimen quality, gently invert 7-8 times after collection.

Size: 4.0 mL (also available in 3.0 mL for non-Blood Bank testing) or 6.0 mL

Common Tests Include (4.0 mL):
B-type natriuretic pepticle (BNP), complete blood count (CBC), eosinophil count, erythrocyte sedimentation rate (ESR), glycohemoglobin, hemoglobin, hemoglobin AIC, hematocrit, reticulocyte count and sickle cell screen.

Common Tests Include (6.0 mL):
ABO grouping, Rh typing and antibody screening, BNP and Glycohemoglobin

Sodium Fluoride (Gray)

- Sodium fluoride is the antiglycolytic agent that will produce plasma samples most commonly used for glucose testing.
- Tube inversions ensure proper mixing of additive and blood.
- For optimum specimen quality, gently invert tube 5 times after collection to mix anticoagulant with blood.

Size: 4.0 Ml

USES :
Glucose screening with glucola (GTTs), fasting glucose.

MICROBIOLOGY

GUIDELINES FOR CRRI

Investigations done:

1) Bacteriology

Blood	culture and sensitivity – Conventional and Automated
Urine	culture and sensitivity, AFB
Sterile body fluids and solid tissues	culture and sensitivity, Gram stain, AFB
Sputum	culture and sensitivity, Gram stain, AFB
Stool	culture and sensitivity, Hanging drop preparation
Throat swab	culture and sensitivity Gram stain Albert's stain
Pus	culture and sensitivity, Gram stain, AFB

2) Mycology

a) KOH mount

b) Fungal culture

3) Serology

a) WIDAL

b) RPR

c) TPHA

d) CSF- VDRL

e) IgM ELISA for Leptospirosis

4) Parasitology

a) Stool for ova and cyst

b) Modified Acid fast stain for oocyst

c) Stool for trophozoites

d) QBC examination for malarial parasite

e) Corneal scraping for free living amoeba

5) Others

a) Scrub typhus IgM ELISA

b) CSF Viral markers for HSV, JE

c) HINI PCR

IDEAL REQUISITION FORM FOR MICROBIOLOGY

The requisition form should have the following details:

Name

Age/ Sex

IP/OP number

Date and time of collection

Ward / Department / Unit

Clinical diagnosis

Investigation needed

Type of specimen sent

Any other significant history

Signature of medical officer

PROTOCOL FOR THE COLLECTION OF VARIOUS SAMPLES FOR MICROBIOLOGICAL INVESTIGATION

Specimen : Blood

Container : Blood culture bottle containing Brain heart infusion broth

Volume : 10 – 15ml

Procedure :

1. Collect all equipment required (including personal protection equipment) and place on a clean trolley.

   -Sterile gloves, small dressing pack, cotton balls, tape, tourniquet(s), 70%alcohol, povidone iodine

2. Ensure that the relevant history and tests are stated on the blood culture request form.

3. Perform hand hygiene.

4. Check patient identification and inform patient of the procedure and its purpose

5. Remove the cap of blood culture bottle and scrub the top of bottle well using 70% alcohol and allow to dry completely

6. Keep the syringe ready.

7. Position patient appropriately, apply tourniquet to palpate and identify appropriate vein

8. Perform hand hygiene before the procedure

9. Put on sterile gloves

10. Using 70%alcohol first and then povidoneiodine, disinfect the venepuncture site with a scrubbing motion from centre to periphery. Use a fresh cotton ball for each scrub. Use 2-3 scrubs and do this for a total of 1-2 minutes, allowing the site to dry

11. Aspirate blood using syringe.

12. Apply cotton ball and pressure tovenipuncture site. Remove the tourniquet.

13. Place 10mL blood per 50ml of broth, keeping blood culture bottle erect. Do not recap the needle. Introduce blood through the needle slowly under aseptic precaution.Invert bottles gently several times to prevent clotting

14. Always collect/inoculate the blood culture bottles FIRST then, if required, collect blood for other investigations.

15. Discard sharps in puncture proof container, collect all dirty items and dispose of appropriately

16. Label each bottle with patient name, IP/OP number, date/time for collection of blood and location of site used for each set. Do not cover any bar codes or the bottom of the bottle if automated blood culture bottle is used.

17. Transport bottles at room temperature and arrange to send to the lab with request form duly signed with clinical details.

18. Remove gloves and perform hand hygiene after the procedure

19. Do not delay administering antibiotics, until you wait for results.

20. Ideally collect blood during spikes of fever and prior to administration of antibiotics. Its better to collect two samples from different sites than a single sample.

Specimen : Urine

Container: Sterile wide mouth container

Volume: 1 – 10ml

Procedure:

Indwelling Cathether:

1. Do not collect urine from drainage bag.
2. Disinfect catheter collection port with 70% alcohol.
3. Use a syringe to aseptically collect 1 - 10 mL of urine and transfer into a sterile container.

Clean catch, mid stream specimen: instruction to be given to the patients

Males:

1. Clean glans with soap and water.
2. Rinse area well.
3. While holding foreskin retracted, begin voiding.
4. After several mL have passed, collect midstream portion without stopping flow of urine.

Females:

1. Thoroughly clean urethral area with soap and water.
2. Rinse area well.

3. While holding labia apart, begin voiding.

4. After several mL have passed, collect midstream portion without stopping flow of urine.

Transport/Storage: Transport to the laboratory within 1 hour.

Specimen : Throat swab

Equipment : tongue depressor

Sterile swab in sterile tube (bacterial culture)

Sterile swab along with Viral transport medium (H1N1 PCR)

1. Identify the patient

2. Open sterile tube

3. Remove swabs.

4. Ask patient to open mouth.

5. Instruct the patient to say "AAH" as this opens the throat and sometimes blocks the gag reflex.

6. Depress tongue gently with tongue depressor.

7. Extend sterile swab between the tonsillar pillars and behind the uvula. Avoid touching the cheeks, tongue, uvula or lips.

8. Sweep the swab back and forth across the posterior pharynx, tonsillar areas, and any inflamed or ulcerated areas to obtain a sample

9. Insert the swab(s) into the transport tube.

10. Label the sample with the patients' full name, date and time of collection, and your initials.

Specimen : sterile body fluids and tissue culture

Body fluid and solid tissue cultures are those collected from normally sterile body sites. Common sterile body fluids submitted for culture include: CSF, amniotic, bile, bone marrow, culdocentesis fluid, paracentesis, pericardial, peritoneal, pleural, synovial, and thoracocentesis. Tissue specimens are collected by surgical or needle biopsy procedures after careful preparation of the skin site.

II. Specimen Collection, Transport and Handling

A. Specimen collection:

1. Body fluid cultures should be collected aseptically with a needle and syringe.

2. Cerebrospinal fluid cultures should be collected under aseptic conditions. The skin is disinfected and the spinal needle is directed into the spinal canal. Separate tubes of CSF are usually obtained.

3. Tissue specimens are obtained by surgical or needle biopsy procedures after careful preparation of the skin site.

B. Specimen transport and handling

1. Cerebrospinal fluid should be processed promptly on arrival in the lab, since fastidious organisms such as Neisseria meningitidis and Haemophilusinfluenzae may not survive prolonged storage. CSF should never be refrigerated prior to culturing because fastidious organisms may not survive lowered temperatures. If bacterial culture cannot be set up immediately, store the CSF in a 35 degree Celsius incubator, to maintain body temperature or leave a room temperature.

2. Body fluids specimens should be processed immediately.

3. Tissue specimens should be submitted in a sterile capped container with a small amount of saline to keep the tissue moist. Drying of the tissue will result in death of some microorganisms. Do not send the samples in formalin.

Lower respiratory tract specimen

Specimen types: Acceptable lower respiratory tract specimens include sputum, tracheal aspirate, BAL fluid, pleural fluid, or lung biopsy.

Specimens with less chance for upper airway contamination (i.e., BAL fluid, pleural fluid, lung biopsy) are preferred.

Container :wide mouth sterile container

Specimen collection:

i. BAL fluid, tracheal aspirate, pleural fluid - Collect specimens in sterile containers. Label each specimen container with the patient's name, ID number, the specimen type, and the date the specimen was collected.

ii. Sputum- Educate the patient about the difference between sputum and oral secretions. Have the patient rinse the mouth with water and then expectorate deep cough sputum directly into a sterile tube or sterile dry container

Specimen : Pus from wound and soft tissue infections

Container: sterile tube or sterile swab

1. Preferably collect specimen prior to initiation of therapy and only from wounds that are clinically infected or deteriorating or that fail to heal over a long period.

2. Cleanse skin and mucosal surfaces.

   a. For closed wounds and aspirates, disinfect as for a blood culture collection with 70% alcohol followed by an iodine solution (1 to 2% tincture of iodine or a 10% solution of povidone-iodine). Remove iodine with alcohol prior to specimen collection.

   b. For open wounds, debride, if appropriate, and thoroughly rinse with sterile saline prior to collection.

3. Sample viable infected tissue, rather than superficial debris.

4. Avoid swab collection if aspirates or biopsy samples can be obtained.

5. Specimen collection after proper disinfection

   a)Closed abscesses - Aspirate infected material with needle and syringe

   b) Fine Needle Aspirate - Insert the needle into the tissue, using various directions, if possible. Collect aspirate in syringe, remove the needle and submit with Luer-Lok on the syringe.

   c) Open Wounds - Cleanse the superficial area thoroughly with sterile saline, changing cotton with each application. Remove all superficial exudates. Remove overlying debris with scalpel and cotton. Collect a biopsy or curette sample from base or advancing margin of lesion.

   d) Collect swabs only when tissue or aspirate cannot be obtained. Limit swab sampling to wounds that are clinically infected or those that are chronic and not healing. Remove superficial debris by thorough irrigation and cleansing with sterile saline. If wound is relatively dry, collect with two cotton-tipped swabs moistened with sterile saline.

Specimen: blood component – serum

Serum is used for investigations like WIDAL, RPR, IgM ELISA for scrub typhus, leptospirosis.

Container: plain tube (red – topvacutainer)

For each serum specimen, collect 5 ml of whole blood into a sterile tube. A minimum of 1 ml of whole blood is needed for testing of pediatricpatients.

Allow whole blood to clot at room temperature for a minimum of 30 minutes and centrifuge.

Label the tube with the patient's name, ID number, specimen type, and date collected. Store refrigerated at 4ºC or frozen,

Specimen: blood component – plasma

Plasma is needed to do QBC examination.

Collect 5 ml of whole blood in an EDTA (purple-top) tube.

Label the tube with the patient's name, ID number, specimen type, and date collected.

Specimen :Feces

Container : clean, dry wide mouth container (ova and cyst)

Sterile container (culture, hanging drop)

- Collect stool specimens before taking antibiotics, anti-diarrhea compounds, barium, bismuth or mineral oil. If patient has taken medication, specimen collection should be delayed until effects of medication haspassed (7 days after barium and 2-3 weeks after medication is discontinued).

- The stool specimen should be passed directly into a clean, dry, wide-mouthed container.
- Stools must not be contaminated by urine or toilet water.
- Sample areas of stool which appear bloody, slimy, or watery.
- In formed stool sample size of a walnut is sufficient.Do not fill the cup. Tighten the lid to prevent leakage.
- Sterile collection containers with no preservative (sterile cup) must be delivered to the lab immediately.
- Specimens for parasites may be kept at room temperature if delay in transport is anticipated.

Investigations in the Department of Immunology

1) Viral hepatitis:

   A) ELISA – HBsAg (serum)
   B) ELISA – Anti HCV (serum)
   C) Quantitative PCR for HBV DNA (plasma) and HCV RNA (serum)

2) Rheumatoid factor - latex agglutination test - (serum)

3) Anti streptolysin-o antibody - latex agglutination test - (serum)

4) C- reactive protein - latex agglutination test - (serum)

5) Transplantation immunology

   A) HLA typing and crossmatching by lymphocytotoxicity (acd added blood)
   B) Cadaver cross matching (acd added blood)

6) Tumor markers
   ELISA – PSA, CEA, AFP (serum)

7) HIV testing
   A) HIV antibody testing in ICTC (serum)
   B) State referral lab for HIV.

8) Antinuclear antibodies by immunoflorescence (serum)

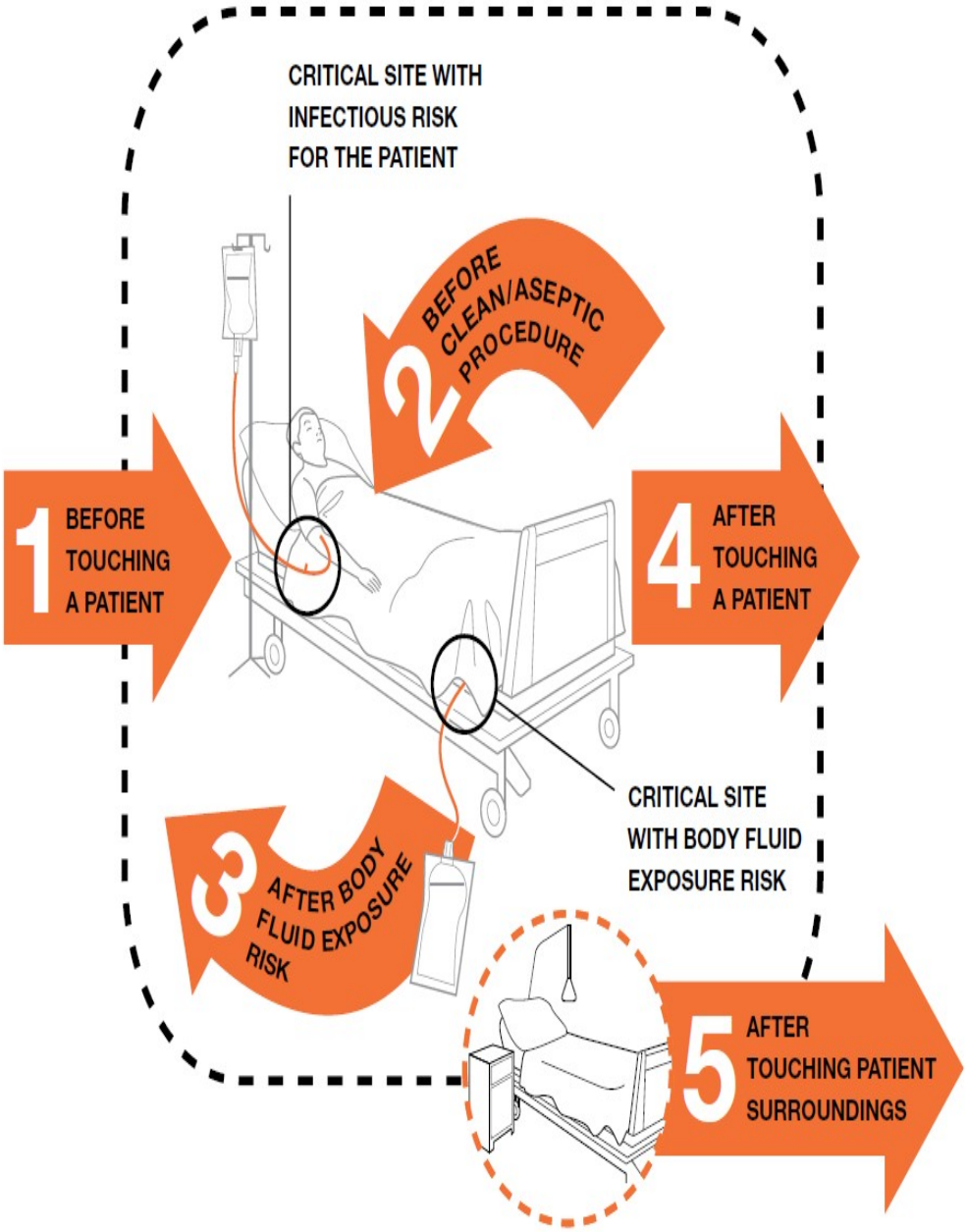
9) Dengue ELISA IGM (serum)

   Note: for serum sample send 3ml whole blood or 2ml of serum

INFECTION CONTROL

IT'S IN YOUR HANDS

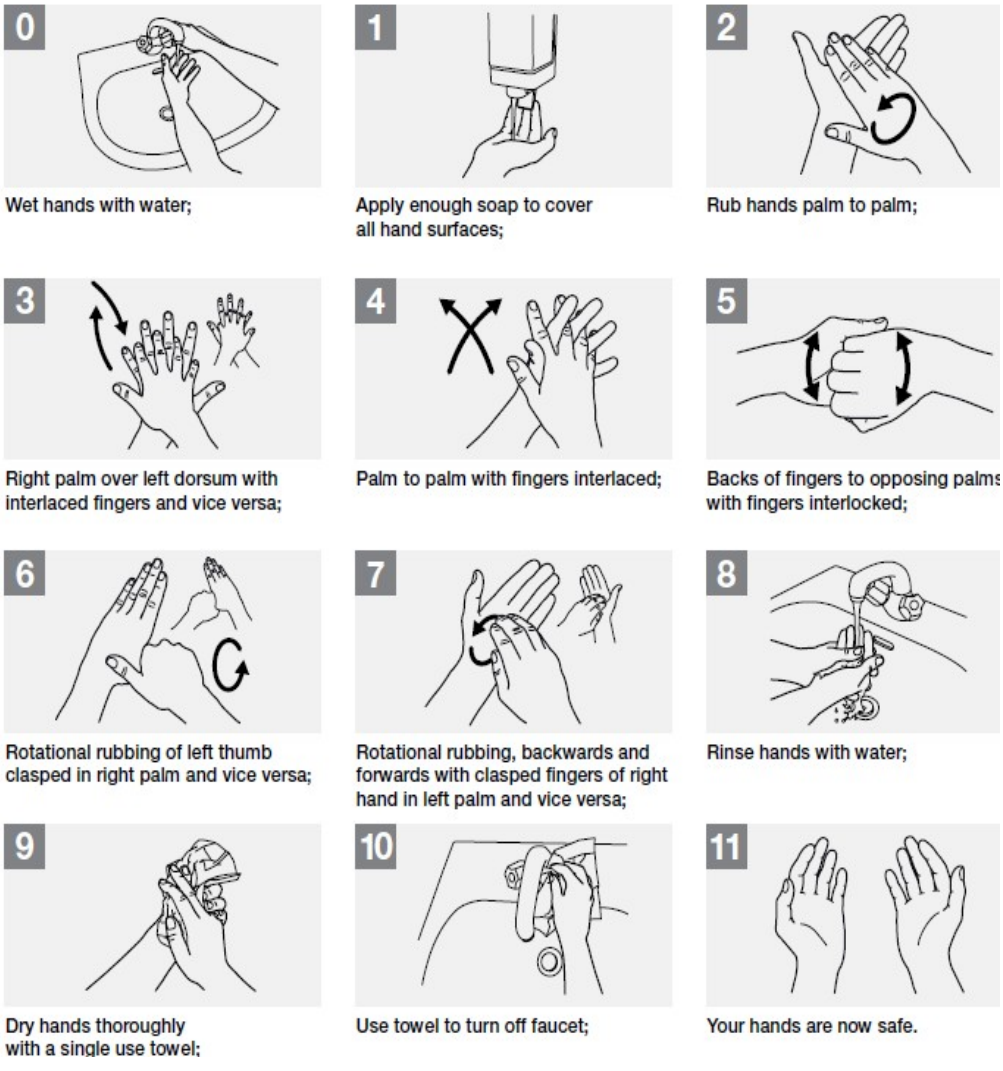
FIVE MOMENTS OF HAND HYGIENE



HAND HYGIENE TECHINQUE

STEPS OF HAND WASHING:

Duration of the entire procedure: 40-60 seconds



- WASH HANDS WITH SOAP AND WATER WHEN VISIBLY SOILED OTHERWISE USE ALCOHOL BASED HAND RUB FOLLOW STEPS 2-7 (20 – 30 SECONDS)

SURGICAL SCRUB

- SURGICAL SCRUBBING WITH SOAP AND WATER ALSO INVOLVES THE STEPS 2- 16 FOLLOWED BY WASHING WITH WATER

BIO-MEDICAL WASTE MANAGEMENT

Whereas the Bio-Medical Waste (Management and Handling) Rules, 1998 was published vide notification number S.O. 630 (E) dated the 20th July, 1998, by the Government of India in the erstwhile Ministry of Environment and Forests, provided a regulatory frame work for management of bio-medical waste generated in the country;

And whereas, to implement these rules more effectively and to improve the collection, segregation, processing, treatment and disposal of these bio-medical wastes in an environmentally sound management thereby, reducing the bio-medical waste generation and its impact on the environment, the Central Government reviewed the existing rules and published in the Gazette of India, New Delhi. Bio-Medical Waste Management Rules 2016 dated. 28th March 2016.

Biomedical wastes categories and their segregation, collection, treatment, processing and disposal options.

Category	Type of Waste	Type of Bag or Container to be used	Treatment and Disposal options
Yellow	**(a) Human Anatomical Waste:** Human tissues, organs, body parts and fetus below the viability period (as per the Medical Termination of Pregnancy Act 1971, amended from time to time).	Yellow coloured non-chlorinated plastic bags	Incineration or Plasma Pyrolysis or deep burial*
	(b)Animal Anatomical Waste: Experimental animal carcasses, body parts, organs, tissues, including the waste generated from animals used in experiments or testing in veterinary hospitals or colleges or animal houses		
	(c) Soiled Waste: Items contaminated with blood, body fluids like dressings, plaster casts, cotton swabs and bags containing residual or discarded blood and blood components.		Incineration or Plasma Pyrolysis or deep burial* In absence of above facilities, autoclaving or micro-waving / hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent for energy recovery.

	(d) Expired or Discarded Medicines: Pharmaceutical waste like antibiotics, cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials etc.	Yellow coloured non-chlorinated plastic bags or containers	Expired 'cytotoxic drugs and items contaminated with cytotoxic drugs to be returned back to the manufacturer or supplier for incineration at temperature >1200 °C or to common bio-medical waste treatment facility or hazardous waste treatment, storage and disposal facility for incineration at >1200°C Or Encapsulation or Plasma Pyrolysis at >1200°C. All other discarded medicines shall be either sent back to manufacturer or disposed by incineration.
	(e) Chemical Waste: Chemicals used in production of biological and used or discarded disinfectants.	Yellow coloured containers or non-chlorinated plastic bags	Disposed of by incineration or Plasma Pyrolysis or Encapsulation in hazardous waste treatment, storage and disposal facility.
	(f) Chemical Liquid Waste : Liquid waste generated due to use of chemicals in production of biological and used or discarded disinfectants, Silver X-ray film developing liquid, discarded Formalin, infected secretions, aspirated body fluids, liquid from laboratories and floor washings, cleaning, house-keeping and disinfecting activities etc.	Separate collection system leading to effluent treatment system	After resource recovery, the chemical liquid waste shall be pre-treated before mixing with other wastewater. The combined discharge shall conform to the discharge norms given in Schedule-III.
	(g) Discarded linen, mattresses, beddings contaminated with blood or body fluid.	Non-chlorinated yellow plastic bags or suitable packing material	Non-chlorinated chemical disinfection followed by incineration or Plazma Pyrolysis or for energy recovery. In absence of above facilities, shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent for energy recovery or incineration or Plazma Pyrolysis.

	(h) Microbiology, Biotechnology and other clinical laboratory waste: Blood bags, Laboratory cultures, stocks or specimens of micro-organisms, live or attenuated vaccines, human and animal cell cultures used in research, industrial laboratories, production of biological, residual toxins, dishes and devices used for cultures.	Autoclave safe plastic bags or containers	Pre-treat to sterilize with non-chlorinated chemicals on-site as per National AIDS Control Organisation or World Health Organisation guidelines there- after for Incineration.
Red	**Contaminated Waste (Recyclable)** (a) Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles and fixed needle syringes) and vaccutainers with their needles cut) and gloves.	Red coloured non-chlorinated plastic bags or containers	Autoclaving or micro-waving/ hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent to registered or authorized recyclers or for energy recovery or plastics to diesel or fuel oil or for road making, whichever is possible. Plastic waste should not be sent to landfill sites.
White (Translucent)	**Waste sharps including Metals:** Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and contaminated metal sharps	Puncture proof, Leak proof, tamper proof containers	Autoclaving or Dry Heat Sterilization followed by shredding or mutilation or encapsulation in metal container or cement concrete; combination of shredding cum autoclaving; and sent for final disposal to iron foundries (having consent to operate from the State Pollution Control Boards or Pollution Control Committees) or sanitary landfill or designated concrete waste sharp pit.
Blue	**(a) Glassware:** Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes.	Cardboard boxes with blue colored marking	Disinfection (by soaking the washed glass waste after cleaning with detergent and Sodium Hypochlorite treatment) or through autoclaving or microwaving or hydroclaving and then sent for recycling.
	(b) Metallic Body Implants	Cardboard boxes with blue colored marking	

Disposal by deep burial is permitted only in rural or remote areas where there is no access to common bio-medical waste treatment facility. This will be carried out with prior approval from the prescribed authority and as per the Standards specified

in Schedule-III. **The deep burial facility shall be located as per the provisions and guidelines issued by Central Pollution Control Board from time to time.**

GUIDELINS FOR CRRI IN CASUALTY

The casualty is a gateway to the hospital. It's the nerve centre from which every case is triaged and funneled without delay to the respective department. The casualty or zero delay as it is more aptly called at ---------- Hospital is where all emergency cases are brought for rapid assessment and immediate treatment 24 hours a day 7 days a week.

The first line of contact is always with CRRI and the casualty medical officer which is why their role is critical. A CRRI must first understand the concept of triage i.e which cases to give importance to, in the event of a flood of cases which is usually the situation.

Usually a polytrauma case is given the first preference as they have the highest potential of progressing to hypovolemic shock and sepsis. As the saying goes "vital signs are the most vital", couldn't be more appropriate for any setting apart from the casualty. Pulse rate , blood pressure, respiratory rate ,temperature and oxygen saturation give critical information regarding the patient's condition and immediate steps to stabilize the ABC(Airway, breathing and circulation) may be taken.

An astute CRRI must be competent enough to record these vitals without delayand be proficient in starting an intravenous line, obtaining blood samples for investigations and aid in emergency intubation if necessary. Following which the patient must be referred to the respective department for further management, which in case of trauma is usually general surgery or orthopedics.

The CRRI must gain a hands on experience to identify a surgical case from that of a medical case as very often they seem to have

overlapping features. These basic diagnostic skills will help the CRRI develop a foundation for his later years of clinical practice, as well as preventing unnecessary delay for the patient by prompt transfer to the required department.

Next the CRRI must be comfortable in all the litigious practices and formalities required of a medical officer viz a vis medico legal cases. A CRRI must capable of documenting injures as well as circumstantial evidence (date, place and time of the incident) accurately which will be presented in court later.

Finally the CRRI must be comfortable in diagnosing and treating minor ailments which do not require in-patient care, as after 12pm all out-patient departments are closed and the only source of treatment for out-patients is the casualty.

The casualty is an exciting , grueling and satisfying experience which will be etched in the mind of every house surgeon for many years to come. One hopes that the present batch will feel the same.

GOVT. STANLEY HOSPITAL CHENNAI - 1. 169-25-25,000-6.07.13.(MCL.S)

MEDICO LEGAL OPINION
(IN DUPLICATE)
TO GE FILLED BY THE MEDICAL OFFICER

Name of Injured:
(In block letters)
Address :

A.R. No.
Age : Sex :
Date of Admn & Time
Ward / Unit :

X-Ray if any

Name of the C.M.O. in block letters

Signature of C.M.O.

Opinion : Simple / Grevious

Name of Unit :

X-Ray Findings if any :

I.P. No. :

Date of Discharge & Time :

Name of Ward Asst. Surgeon
(In block letters)

Signature of Ward Assistant Surgeon

Medl/76

CERTIFICATE OF DRUNKENNESS 123801

This is to certify that I, Dr M. Vasalakshmi
Stly
Government Hospital Stanley have examined person by
name Thiru / Tmt. Stalin Soundhar aged 21 /M.
native of
residing at 171/5, GM pallai
Vyasarpuram. ch - 39

who was sent with from
and accompanied by PC 33151 ~~Thiru Arumugam~~ for
drunkenness. He / She was seen by me at 10.45 PM on 12.3.16.
Identification marks : (1) ABM (R) hand.
(2)

Symptms at the time of examination :
BS of alcohol ++ (confirmed by Alcometer)
~~Symptms~~ congestion Pupils dilated

(P.T.O)

ORIGINAL

ACCIDENT REGISTER

Sl. No. 2361119

Hospital No. 03208 தேதியும் நேரமும் 1.10PM & 25/3/16

பெயர் Kumaravel Saravanathi வயது 35.

ஆண்/பெண் Female செய் தொழில்

முகவரி W/o Kemaravel, 2/205, Thennal Koil St, Netaji Nagar, Alamathi, Ch-62.

ஆள் அடையாளக் குறிகள் (1) Scar Rt (L) Hand.

(2)

கொண்டு வந்தவர் Kumaravel Husband.

காவல் துறைக்குத் தெரிவிக்கப்பட்டதா? ஆம்/இல்லை

வாக்குமூலம் தேவை/வேண்டாம்

Nature of injury and treatment:
(State simple, grievous or opinion reserved) } Alleged H/O snake bite around 7.00am on 25/3/16 at Pallanni Road, DU Aullara water supply Alamathi C/E Conscious oriented. CNS, RS: NAD. P/A: Soft. L/E: No dang mark seen. Swelling (+) Rt (D) foot. Admit & Drew

Dr. Yuvan

GCP—Medl 1.25—20,000 Bks.—31-7-2000 [P2-1] [P.T.O]

GOVERNMENT STANLEY HOSPITAL, CHENNAI-600 001

POLICE CASE

Hospital No.

Admission time and date

Police intimation sent — Yes / No

Ward / O.P.

Drying declaration obtained — Yes / No

Admitted M.O. Signature

Discharge / Death time and date
Service

Autopsy

Discharge / Death intimation sent
In case of death the entry should be made 'as Dead'.

Signature of the Officer discharging the patient.

WHO GUIDELINES ON WITHDRAWING BLOOD

Step 1 – Assemble equipment

Collect all the equipment needed for the procedure and place it within safe and easy reach on a tray or trolley, ensuring that all the items are clearly visible. The equipment required includes:

- a supply of laboratory sample tubes, which should be stored dry and upright in a rack; blood can be collected in sterile glass or plastic tubes with rubber caps (the choice of tube will depend on what is agreed with the laboratory); vacuum-extraction blood tubes; or glass tubes with screw caps;
- a sterile glass or bleeding pack (collapsible) if large quantities of blood are to be collected;
- well-fitting, non-sterile gloves;
- an assortment of blood-sampling devices (safety-engineered devices or needles and syringes, see below), of different sizes;
- a tourniquet;
- alcohol hand rub;
- 70% alcohol swabs for skin disinfection;
- gauze or cotton-wool ball to be applied over puncture site;
- laboratory specimen labels;
- writing equipment;
- laboratory forms;
- leak-proof transportation bags and containers;

- a puncture-resistant sharps container.

Ensure that the rack containing the sample tubes is close to you, the health worker, but away from the patient, to avoid it being accidentally tipped over.

Step 2 – Identify and prepare the patient

Where the patient is adult and conscious, follow the steps outlined below.

- Introduce yourself to the patient, and ask the patient to state their full name.
- Check that the laboratory form matches the patient's identity (i.e. match the patient's details with the laboratory form, to ensure accurate identification).
- Ask whether the patent has allergies, phobias or has ever fainted during previous injections or blood draws.
- If the patient is anxious or afraid, reassure the person and ask what would make them more comfortable.
- Make the patient comfortable in a supine position (if possible).
- Place a clean paper or towel under the patient's arm.
- Discuss the test to be performed and obtain verbal consent. The patient has a right to refuse a test at any time before the blood sampling, so it is important to ensure that the patient has understood the procedure.

Step 3 – Select the site

General

- Extend the patient's arm and inspect the antecubital fossa or forearm.
- Locate a vein of a good size that is visible, straight and clear. The diagram in Section 2, 3, shows common positions of the vessels, but many variations are possible. The median cubital vein lies between muscles and is usually the most easy to puncture. Under the basilica vein runs an artery and a nerve, so puncturing here runs the risk of damaging the nerve or artery and is usually more painful. DO NOT insert the needle where veins are diverting, because this increases the chance of a haematoma.
- The vein should be visible without applying the tourniquet. Locating the vein will help in determining the correct size of needle.
- Apply the tourniquet about 4–5 finger widths above the venepuncture site and re-examine the vein.

Hospitalized patients

In hospitalized patients, do not take blood from an existing peripheral venous access site because this may give false results. Haemolysis, contamination and presence of intravenous fluid and medication can all alter the results (39). Nursing staff and physicians may access central venous lines for specimens following protocols. However, specimens from central lines carry a risk of contamination or erroneous laboratory test results.

It is acceptable, but not ideal, to draw blood specimens when first introducing an in-dwelling venous device, before connecting the cannula to the intravenous fluids.

Step 4 – Perform hand hygiene and put on gloves

- Perform hand hygiene; that is wash hands with soap and water, and dry with single-use towels; or if hands are not visibly contaminated, clean with alcohol rub – use 3 ml of alcohol rub on the palm of the hand, and rub it into fingertips, back of hands and all over the hands until dry.

- After performing hand hygiene, put on well-fitting, non-sterile gloves.

Step 5 – Disinfect the entry site

- Unless drawing blood cultures, or prepping for a blood collection, clean the site with a 70% alcohol swab for 30 seconds and allow to dry completely (30 seconds) (40–42).

Note: alcohol is preferable to povidone iodine, because blood contaminated with povidone iodine may falsely increase levels of potassium, phosphorus or uric acid in laboratory test results (6, 7).

- Apply firm but gentle pressure. Start from the centre of the venepuncture site and work downward and outwards to cover an area of 2 cm or more.

- Allow the area to dry. Failure to allow enough contact time increases the risk of contamination.

- DO NOT touch the cleaned site; in particular, DO NOT place a finger over the vein to guide the shaft of the exposed needle. It the site is touched, repeat the disinfection.

Step 6 – Take blood Venepuncture

Perform venepuncture as follows.

- Anchor the vein by holding the patient's arm and placing a thumb BELOW the venepuncture site.
- Ask the patient to form a fist so the veins are more prominent.
- Enter the vein swiftly at a 30 degree angle or less, and continue to introduce the needle along the vein at the easiest angle of entry.
- Once sufficient blood has been collected, release the tourniquet BEFORE withdrawing the needle. Some guidelines suggest removing the tourniquet as soon as blood flow is established, and always before it has been in place for two minutes or more.
- Withdraw the needle gently and apply gentle pressure to the site with a clean gauze or dry cotton-wool ball. Ask the patient to hold the gauze or cotton wool in place, with the arm extended and raised. Ask the patient NOT to bend the arm, because doing so causes a haematoma.

Step 7 – Fill the laboratory sample tubes

- When obtaining multiple tubes of blood, use evacuated tubes with a needle and tube holder. This system allows the tubes to be filled directly. If this system is not available, use a syringe or winged needle set instead.
- If a syringe or winged needle set is used, best practice is to place the tube into a rack before filling the tube. To prevent needle-sticks, use one hand to fill the tube or use a needle shield between the needle and the hand holding the tube.

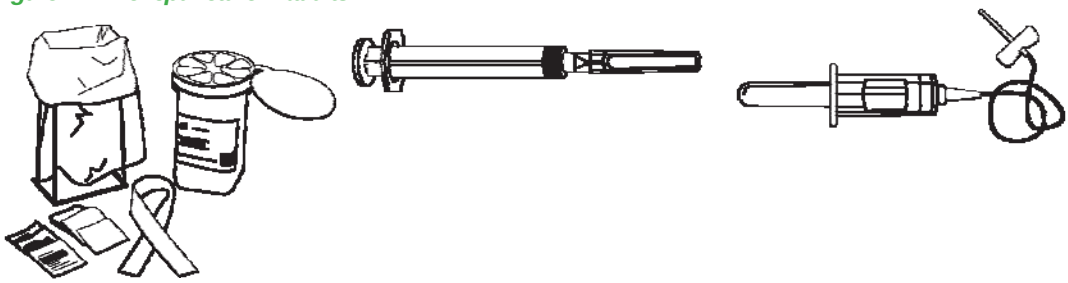
- Pierce the stopper on the tube with the needle directly above the tube using slow, steady pressure. Do not press the syringe plunger because additional pressure increases the risk of haemolysis.
- Where possible, keep the tubes in a rack and move the rack towards you. Inject downwards into the appropriate coloured stopper. DO NOT remove the stopper because it will release the vacuum.
- If the sample tube does not have a rubber stopper, inject extremely slowly into the tube as minimizing the pressure and velocity used to transfer the specimen reduces the risk of haemolysis. DO NOT recap and remove the needle.
- Before dispatch, invert the tubes containing additives for the required number of times (as specified by the local laboratory).

Step 8 – Draw samples in the correct order

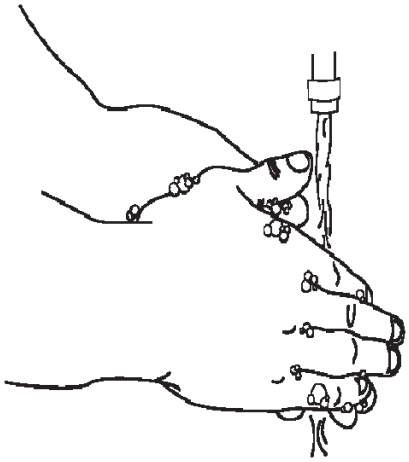
Draw blood collection tubes in the correct order, to avoid cross-contamination of additives between tubes. As colour coding and tube additives may vary, verify recommendations with local laboratories. For illustration purposes.

2.3 Illustrations for best practices in phlebotomy

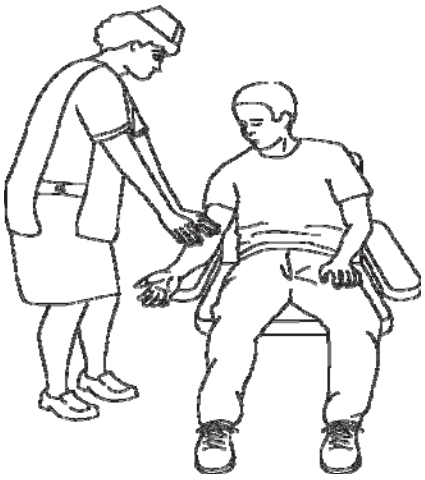
Figure 2. 1 Venepuncture in adults



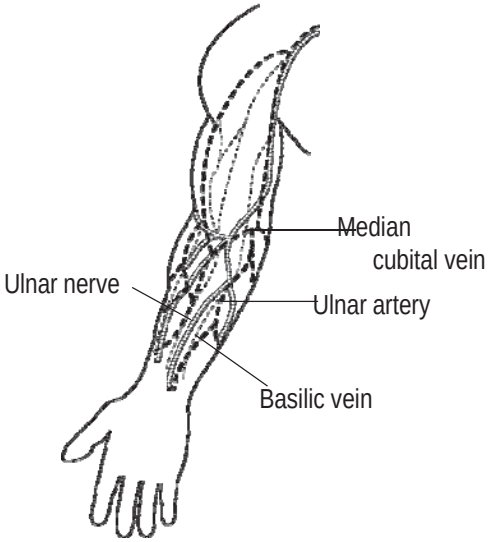
1. Assemble equipment and include needle and syringe or vacuum tube, depending on which is to be used.



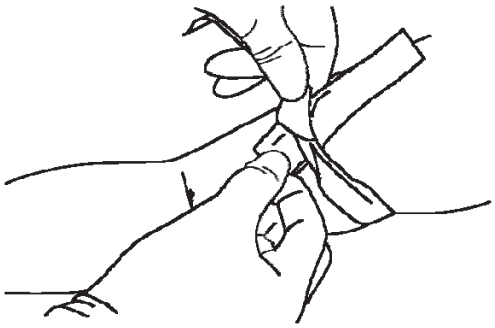
2. Perform hand hygiene (if using soap and water, dry hands with single-use towels).



3. Identify and prepare the patient.

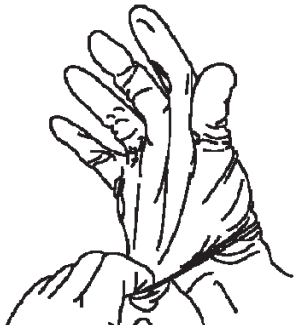


4. Select the site, preferably at the antecubital area (i.e. the bend of the elbow). Warming the arm with a hot pack, or hanging the hand down may make it easier to see the veins. Palpate the area to locate the anatomic landmarks. DO NOT touch the site once alcohol or other antiseptic has been applied.



5. Apply a tourniquet, about 4–5 finger widths above the selected venepuncture site.

6. Ask the patient to form a fist so that the veins are more prominent.

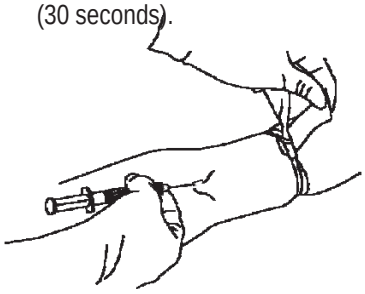


7. Put on well-fitting, non-sterile gloves.

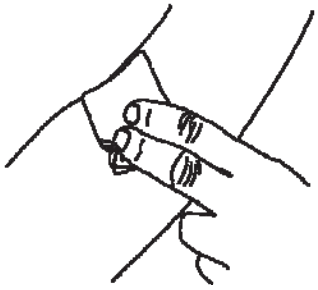
8. Disinfect the site using 70% isopropyl alcohol for 30 seconds and allow to dry completely (30 seconds).

9. Anchor the vein by holding the patient's arm and placing a thumb BELOW the venepuncture site.

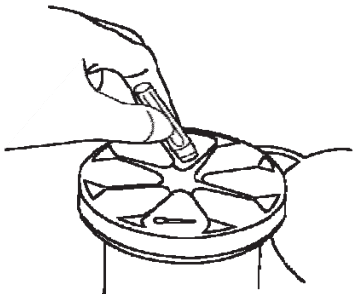
10. Enter the vein swiftly at a 30 degree angle.



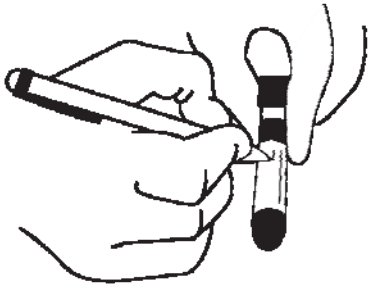
11. Once sufficient blood has been collected, release the tourniquet BEFORE withdrawing the needle.



12. Withdraw the needle gently and then give the patient a clean gauze or dry cotton-wool ball to apply to the site with gentle pressure.

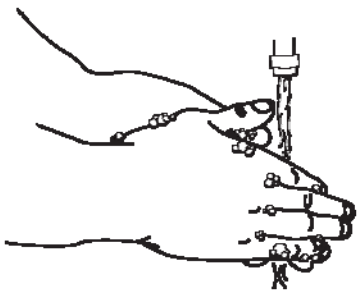


13. Discard the used needle and syringe or blood-sampling device into a puncture-resistant container.



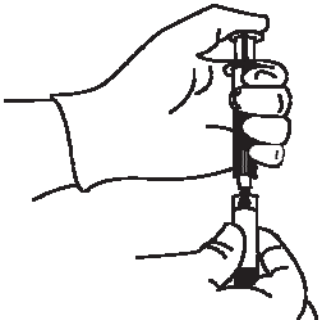
14. Check the label and forms for accuracy.

15. Discard sharps and broken glass into the sharps container. Place items that can drip blood or body fluids into the infectious waste.

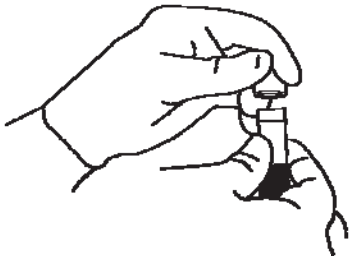


16. Remove gloves and place them in the general waste. Perform hand hygiene. If using soap and water, dry hands with single-use towels.

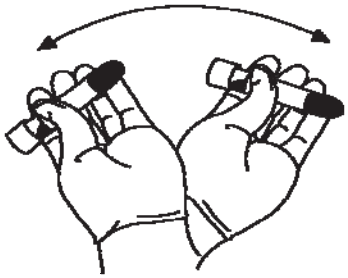
Figure 2.2 Filling tubes



1. If the tube does not have a rubber stopper, press the plunger in slowly to reduce haemolysis (this is safer than removing the needle).



2. Place the stopper in the tube.



3. Following laboratory instructions, invert the sample gently to mix the additives with the blood before dispatch.

CRITICAL VALUES IN LABORATRICAL INVESTIGATIONS

CHEMISTRY			
ANALYTE	**AGE RANGE**	**CRITICAL VALUE**	**UNITS**
Anion Gap	Any age	>30	mmol/L
Calcium *	Any age	<6.5 >13	mg/dL
Chloride	Any age Any age	<80 >120	mmol/L
CO_2	Any age	<10 >40	mmol/L
CO Hemoglobin	Any age	>20	%
Free (ionized) Calcium *	Any age	<0.8 >1.6	mmol/L
Glucose	0-2 days >2 days & <1 year >1 year	<35 <40 <55	mg/dL
	<30 days >30 days & <17 yrs >17 yrs	>200 >300 >450	mg/dL
Iron, Serum	Any age	◆350	ug/dL
Magnesium	Any age	<1.0 >3.5	mg/dL
pCO_2	Any age	>65	mmHg
pH	Any age	<7.20 >7.60	pH units
Phosphorus	<3 years of age 3-12 years of age >12 years of age	::2.5 ::2.0 ::1.5	mg/dL
pO_2 (arterial)	Any age	<50	mmHg
Potassium	Less than 1 week Older than 1 week Any age	<2.5 <3.0 >6.0	mmol/L
Procalcitonin	>1 month	>2	ng/mL
Sepsis Protocol Lactate	Any age	>4.0	mmol/L
Sodium	Any age Any age	<125 >160	mmol/L
Total Bilirubin	<1 day >1 day <2 days >2 days <30 days	◆8 ◆13 ◆15	mg/dL
Troponin 1	Any age	◆0.3	ng/mL

** Calcium: mmol/L (SI unit) = 0.25 (conversion factor) x **mg/dL** (conventional unit).*

COAGULATION

ANALYTE	AGE RANGE	CRITICAL VALUE	UNITS
Fibrinogen	Any age	<100	mg/dL
Heparin, unfractionated	Any age	<0.1 >0.7	IU/mL IU/mL
Heparin Induced Anti-Body (PF 4 Enhanced and PF 4 IgG, Elisa)	Any Age	PF4 Enhanced: Positive (O.D.≥0.400) PF4:IgG: Positive (O.D.≥0.400)	N/A
PTT	Any age	≥100	sec
PT INR	Any age	>5.0 INR	

HEMATOLOGY

ANALYTE	AGE RANGE	CRITICAL VALUE	UNITS
Absolute Neutrophil Count	Any age	≤0.5 (Outpatient only)	K/µL
Cell Count, Any body fluid	Any age	Intracellular organisms. (Non CSF-Blasts and Tumor cells to be called as soon as a provider is available, which for inpatients is immediate, for others called next business day.)	
Cell Count, CSF only	Any age	WBC Count >30 (excluding peripheral blood contamination)	/µL
Cell Count, CSF only	Any age	Blasts or Tumor Cells	
Gram Stain	Any age	Positive	N/A
Hematocrit (PCV)	Any age	≤21.0 ≥65.0	%
Hemoglobin	Any age	≤7.0	g/dL
Malaria Screening	Any age	Positive	N/A
Platelet Count	Any age	≤10,000 ≤50,000 (L&D, OB outpatient clinics, and Perinatal Diagnostic Center only)	/µL

		::100,000 with 2+microangiopathic changes	
Slide Review/Diff	Any age	Presence of intracellular organisms. Blasts on peripheral smear (1st time or relapse only).	%
Stool	Male/Female <18 Years	Sperm	N/A
Urinalysis	Female <18 Years	Sperm or Trichomonas	N/A
Urinalysis	Male <18 Years	Trichomonas	N/A
WBC	Any age	::0.5 (Outpatient only) <50	K/µL

MICROBIOLOGY

ANALYTE	AGE RANGE	CRITICAL VALUE	UNITS
Any assay: Potential Bioterrorism Agent	Any age	Presence of potential B. anthracis or any BT agent. Bacillus anthracis (Category A) Francisella tularensis (Category A) Yersinia pestis (Category A) Brucella species (Category B)	N/A
Blood Culture	Any age	Any clinically important positive result per protocol	N/A
Mycobacterium Tuberculosis PCR Test	Any Age	Positive on Tissue or Culture	N/A
Stool culture	<18 years	Positive Shiga toxin producing E. Coli	N/A

VIROLOGY

ANALYTE	AGE RANGE	CRITICAL VALUE	UNITS
Antigen test, culture, serology, or molecular test	Any age	Positive or suspicious for any Pandemic (Influenza or SARS) or Bioterrorism Agents (Smallpox, Viral hemorrhagic fever agents)	N/A
Any CSF Assay	Any age	Positive (including virus growth or molecular test)	N/A

STEPS IN INTRAVENUS CANNULATION

Introduce yourself to the patient and clarify the patient's identity. Explain the procedure to the patient and gain informed consent to continue. It is also worth explaining that cannulation may cause some discomfort but that it will be short lived.

- Introduce yourself to the patient

Ensure that you have all of your equipment ready as follows:

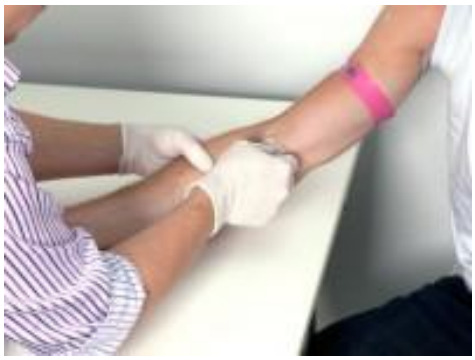
- alcohol gel
- gloves
- an alcohol wipe
- a tourniquet
- an IV cannula
- a suitable plaster
- a syringe
- saline
- a sharps bin

Sanitise your hands using alcohol cleanser.

Position the arm so that it is comfortable for the patient and identify a vein.

- Apply the tourniquet and re-check the vein.

- Put on your gloves, clean the patient's skin with the alcohol wipe and let it dry.

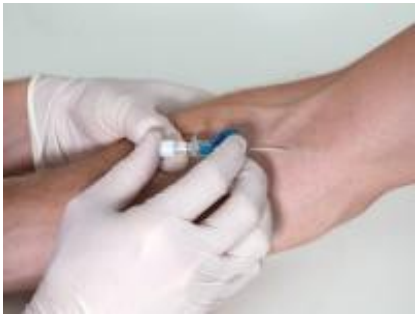


- Remove the cannula from its packaging and remove the needle cover ensuring not to touch the needle.

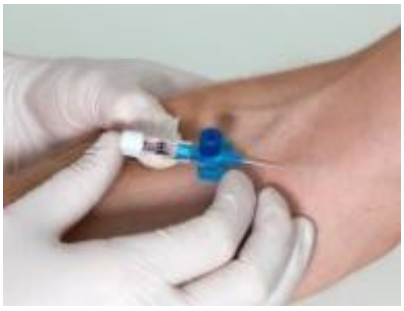
- Remove the needle cover

Stretch the skin distally and tell the patient to expect a sharp scratch.

Insert the needle, bevel upwards at about 30 degrees. Advance the needle until a flashback of blood is seen in the hub at the back of the cannula

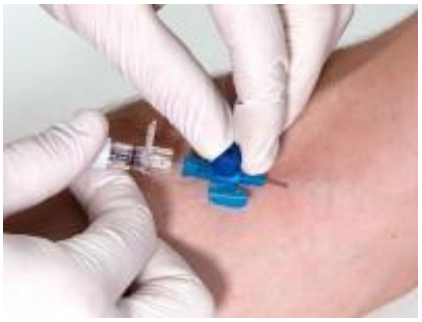


- Insert the needle, bevel upwards at about 30 degrees



- Flashback of blood is seen in the hub

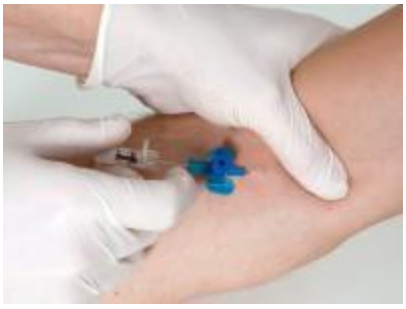
Once this is seen, progress the entire cannula a further 2mm, then fix the needle, advancing the rest of the cannula into the vein.



- Advance the rest of the cannula into the vein

Release the tourniquet, apply pressure to the vein at the tip of the cannula and remove the needle fully. Remove the cap from the needle and put this on the end of the cannula.

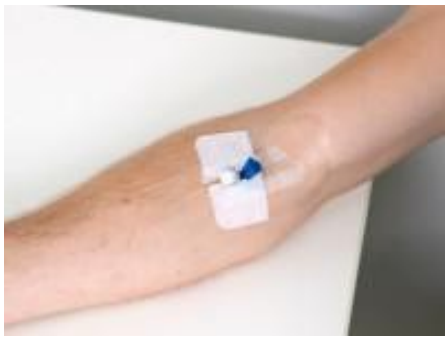
- Release the tourniquet



- Remove the needle

Carefully dispose of the needle into the sharps box.

Apply the dressing to the cannula to fix it in place and ensure that the date sticker has been completed and applied.



- Apply the plaster to the cannula

Check that the use-by date on the saline has not passed. If the date is ok, fill the syringe with saline and flush it through the cannula to check for patency. If there is any resistance, if it causes any pain, or you notice any localised tissue swelling; immediately stop flushing, remove the cannula and start again.

Dispose of your gloves and equipment in the clinical waste bin.

COMMONLY USED VENFLONS IN OUR HOSPITAL

Size	Color	Length	Flow Rate(ml/min)	Uses	Nursing Consideration
14G	ORANGE	45	250-300	• Used for adolescent and adult major surgery and trauma • infusion of large amount of fluids or colloids	• Painful insertion Required large insertion
16G	GREY	45	150-240	• adolescent and adult major surgery and trauma • infusion of large amount of fluids or colloids	Painful insertion Required large insertion
18G	GREEN	45	100-120	• adolescent and adult major surgery and trauma • infusion of large amount of fluids or colloids	Commonly used
20G	PINK	32	55-80	• Older children, adolescent and adult • Ideal for I.V. infusion and blood infusion • Medication administration • Emergency management	• Easy to insert into small, thin, fragile veins • Difficult to insert into though skin
22G	BLUE	25	22-50	• Older children, adolescent and elderly adult • I.V. infusion with moderate flow rates • Medication administration	• Insertion to though skin is difficult
24G	YELLOW	19	23	• Infant toddler, older children • Major surgery and trauma among children • Can administer fluids and medication	Less painful Insertion to though skin is difficult
26G	VIOLET	19	10-15	• Neonate, infant and elderly adults • Suitable for infusion but infusion rate is low	Insertion to though skin is difficult and less painful

Flow rate calculation:

When calculating the flow rate of IV solutions, remember that the number of drops required to deliver 1 ml varies with the type of administration set.
Administration sets are of **two types:**

- **Macro drip set (delivers 10-20 drops/ml)**
- **Micro drip set (60 drops/ml).**

$$\text{Flow rate} = \frac{\text{Volume of infusion in ml}}{\text{Time of infusion in minutes}} \times \text{Drip factor (in drops/ml)}$$

WHO CAUSALITY ASSESSMENT SCALE

Certain	• Event or laboratory test abnormality, with plausible time relationship to drug intake • Cannot be explained by disease or other drugs • Response to withdrawal plausible (pharmacologically, pathologically) • Event definitive pharmacologically or phenomenologically (i.e. an objective and specific medical disorder or a recognised pharmacological phenomenon) • Rechallenge satisfactory, if necessary
Probable/ Likely	• Event or laboratory test abnormality, with reasonable time relationship to drug intake • Unlikely to be attributed to disease or other drugs • Response to withdrawal clinically reasonable • Rechallenge not required
Possible	• Event or laboratory test abnormality, with reasonable time relationship to drug intake • Could also be explained by disease or other drugs • Information on drug withdrawal may be lacking or unclear
Unlikely	• Event or laboratory test abnormality, with a time to drug intake that makes a relationship improbable (but not impossible) • Disease or other drugs provide plausible explanations
Conditional/ Unclassified	• Event or laboratory test abnormality • More data for proper assessment needed, or • Additional data under examination
Unassessable/ Unclassifiable	• Report suggesting an adverse reaction • Cannot be judged because information is insufficient or contradictory • Data cannot be supplemented or verified

Version-1.2

SUSPECTED ADVERSE DRUG REACTION REPORTING FORM

For VOLUNTARY reporting of Adverse Drug Reactions by Healthcare Professionals

INDIAN PHARMACOPOEIA COMMISSION

(National Coordination Centre-Pharmacovigilance Programme of India)
Ministry of Health & Family Welfare, Government of India
Sector-23, Raj Nagar, Ghaziabad-201002

FOR AMC/NCC USE ONLY

AMC Report No. :

Report Type □ Initial □ Follow up

Worldwide Unique No. :

A. PATIENT INFORMATION

1. Patient Initials _____

2. Age at time of Event or Date of Birth _____

3. M □ F □ Other □

4. Weight_____Kgs

12. Relevant tests/ laboratory data with dates

B. SUSPECTED ADVERSE REACTION

5. Date of reaction started (dd/mm/yyyy)

6. Date of recovery (dd/mm/yyyy)

7. Describe reaction or problem

13. Relevant medical/ medication history (e.g. allergies, race, pregnancy, smoking, alcohol use, hepatic/renal dysfunction etc.)

14. Seriousness of the reaction: No ☐if Yes ☐ (please tick anyone)

☐ Death (dd/mm/yyyy)
☐ Life threatening
☐ Hospitalization/Prolonged
☐ Disability
☐ Congenital-anomaly
☐ Required intervention to Prevent permanent impairment/damage
☐ Other (specify)

15. Outcomes

☐ Recovered ☐ Recovering ☐ Not recovered
☐ Fatal ☐ Recovered with sequelae ☐ Unknown

C. SUSPECTED MEDICATION(S)

S.No	8. Name (Brand/Generic)	Manufacturer (if known)	Batch No. / Lot No.	Exp. Date (if known)	Dose used	Route used	Frequency (OD, BD etc.)	Therapy dates		Indication	Causality Assessment
								Date started	Date stopped		
i											
ii											
iii											
Iv											

S.No as per C	9. Action Taken (please tick)						10. Reaction reappeared after reintroduction (please tick)			
	Drug withdrawn	Dose increased	Dose reduced	Dose not changed	Not applicable	Unknown	Yes	No	Effect unknown	Dose (if reintroduced)
i										
ii										
iii										
iv										

11. Concomitant medical product including self-medication and herbal remedies with therapy dates (Exclude those used to treat reaction)

S.No	Name (Brand/Generic)	Dose used	Route used	Frequency (OD, BD, etc.)	Therapy dates		Indication
					Date started	Date stopped	
i							
ii							
iii							

Additional Information:

D. REPORTER DETAILS

16. Name and Professional Address:_____

_____

Pin:_____E-mail_____

Tel. No. (with STD code)_____

_____ Occupation:_____

_____Signature:_____

17. Date of this report (dd/mm/yyyy):

Confidentiality: The patient's identity is held in strict confidence and protected to the fullest extent. Programme staff is not expected to and will not disclose the reporter's identity in response to a request from the public. Submission of a report does not constitute an admission that medical personnel or manufacturer or the product caused or contributed to the reaction.

National Coordination Centre
Pharmacovigilance Programme of India
Ministry of Health & Family Welfare,
Government of India
Sector-23, Raj Nagar, Ghaziabad-201002
Tel.: 0120-2783400, 2783401, 2783392
Fax: 0120-2783311
www.ipc.nic.in

Pharmacovigilance Programme of India for Assuring Drug Safety

ADVICE ABOUT REPORTING

A. What to report

- Report serious adverse drug reactions. A reaction is serious when the patient outcome is:
  - Death
  - Life-threatening
  - Hospitalization (initial or prolonged)
  - Disability (significant, persistent or permanent)
  - Congenital anomaly
  - Required intervention to prevent permanent impairment or damage
- Report non-serious, known or unknown, frequent or rare adverse drug reactions due to Medicines, Vaccines and Herbal products.

B. Who can report

- All healthcare professionals (Clinicians, Dentists, Pharmacists and Nurses) can report adverse drug reactions

C. Where to report

- Duly filled Suspected Adverse Drug Reaction Reporting Form can be send to the nearest Adverse Drug Reaction Monitoring Centre (AMC) or directly to the National Coordination Centre (NCC).
- Call on Helpline (Toll Free) 1800 180 3024 to report ADRs.
- Or can directly mail this filled form to pvpi@ipcindia.net or pvpi.ipcindia@gmail.com
- A list of nationwide AMCs is available at:
  http://www.ipc.gov.in, http://www.ipc.gov.in/PvPI/pv_home.html

D. What happens to the submitted information

- Information provided in this form is handled in strict confidence. The causality assessment is carried out at AMCs by using WHO-UMC scale. The analyzed forms are forwarded to the NCC through ADR database. Finally the data is analyzed and forwarded to the Global Pharmacovigilance Database managed by WHO Uppsala Monitoring Centre in Sweden.
- The reports are periodically reviewed by the NCC-PvPI. The information generated on the basis of these reports helps in continuous assessment of the benefit-risk ratio of medicines.
- The information is submitted to the Steering committee of PvPI constituted by the Ministry of Health & Family Welfare. The Committee is entrusted with the responsibility to review the data and suggest any interventions that may be required.

E. Mandatory field for suspected ADR reporting form

- Patient initials, age at onset of reaction, reaction term(s), date of onset of reaction, suspected medication(s) and reporter information.

For ADRs Reporting Call on PvPI Helpline (Toll Free)

1800 180 3024

(9:00 AM to 5:30 PM, Working Days)

National Immunization Schedule

S No	Vaccine	Protection	Number of doses	Vaccination Schedule
1	**BCG (Bacillus Calmette Guerin)**	Childhood Tuberculosis	1	At birth (up to 1 year if not given earlier)
2	**Pentavalent [Diphtheria, Pertussis, Tetanus (DPT), Hepatitis B and Haemophilus influenza b (Hib)]**	Diphtheria, Pertussis, Tetanus, Hepatitis B, Haemophilus influenzae type B associated Pneumonia and Meningitis	3	Three doses at 6, 10 & 14 week
3	**DPT (Diphtheria, Pertussis and Tetanus Toxoid)**	Diphtheria, Pertussis and Tetanus	2	Two booster doses at 16-24 month and 5 years of age. Three primary doses at 6, 10 & 14 week are part of *Pentavalent vaccine.*
4	**Hepatitis B**	Hepatitis B	1	Birth dose for institutional deliveries with 24 hour. Three primary doses at 6, 10 & 14 week are part of *Pentavalent vaccine.*
5	**OPV (Oral Polio Vaccine)**	Polio	5	Birth dose for institutional deliveries. Three primary doses at 6, 10 & 14 week and one booster dose at 16-24 month of age. Given orally
6	**IPV (Inactivated Polio vaccine)** [$]	Polio	1	One dose at 14 weeks, along with OPV3. Injectable dose given.
7	**Japanese Encephalitis#**	Japanese Encephalitis	2	9-12 months of age and 2nd dose at 16-24 months
8	**Measles**	Measles	2	9-12 months of age and 2nd dose at 16-24 months
9	**Vitamin A**	Night Blindness	9	-1st dose at 9 months - 2nd dose at 18th months - 3rd to 9th dose given at 6 monthly interval upto 5 years.
10	**RotaVirus***	Rotavirus diarrhoea	3	Three doses at 6, 10 & 14 week. Given orally.
11	**TT (Tetanus Toxoid)**	Tetanus	2 2	- 10 years and 16 years of age - For pregnant woman, two doses given (one dose if previously vaccinated within 3 years)

$ At present in six states- Assam, Bihar, Gujarat, M.P., Punjab and U.P., and in process of expansion.
# In endemic districts,
* Phased introduction, at present in Andhra Pradesh, Haryana, Himachal Pradesh and Orissa from 2016.

REVISED NATIONAL TUBERCULOSIS CONTROL PROGRAMME

Tuberculosis is an infectious disease caused by Mycobacterium tuberculosis. Pulmonary tuberculosis is the most common form of TB (more than 85% of all TB cases), while extra pulmonary tuberculosis can affect almost any organ in the body. Transmission occurs by the airborne spread of infectious droplets and droplet nuclei containing the tubercle bacilli. The source of infection is a person with sputum smear-positive pulmonary TB. Transmission often occurs indoors, where droplets and droplet nuclei can stay in the air for a long time.

Pulmonary TB Suspects

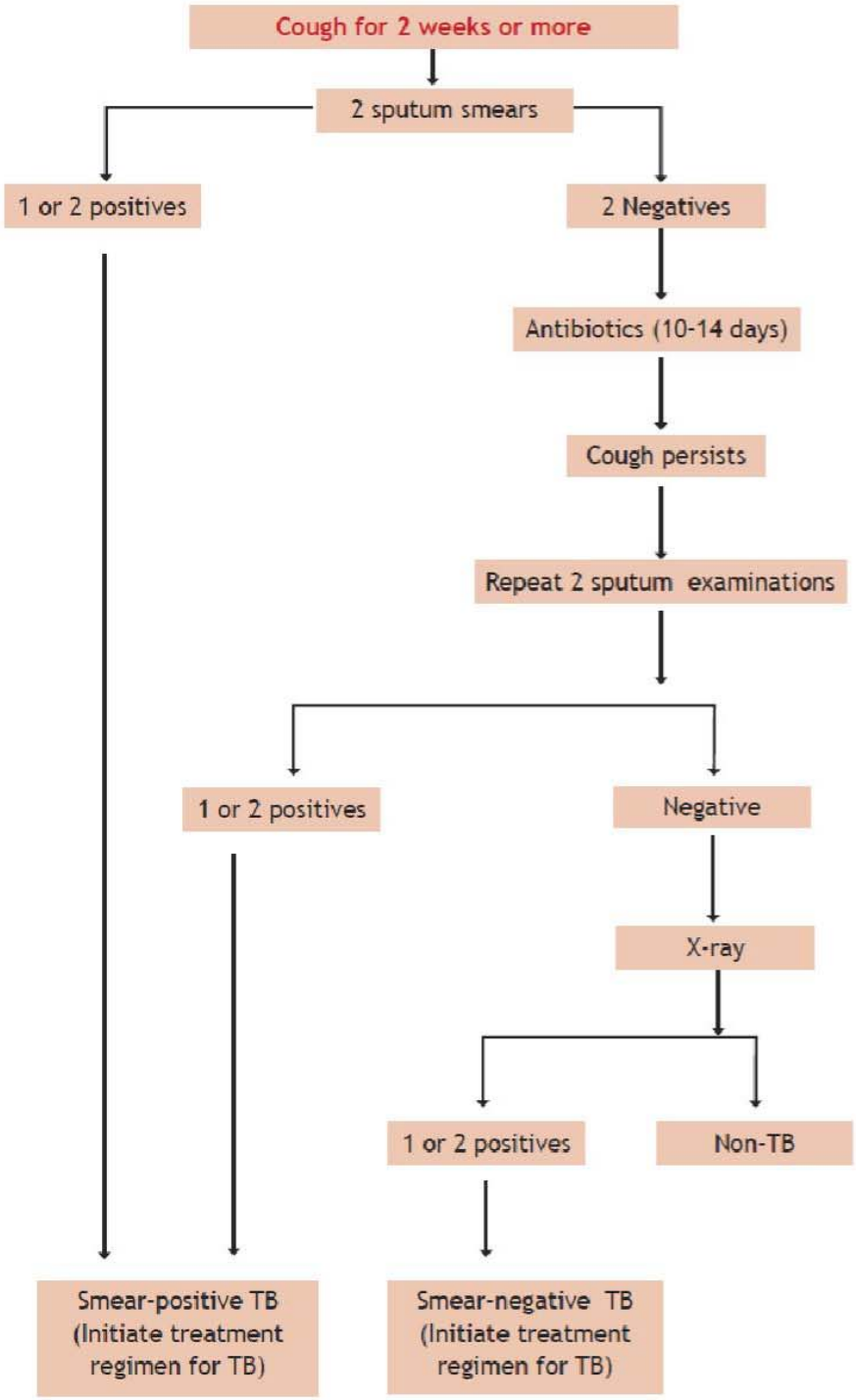
Pulmonary smear-positive tuberculosis patients expel tubercle bacilli into the air while coughing/sneezing. Contacts of undiagnosed/untreated pulmonary smear-positive patients become infected when they inhale these tubercle bacilli.

A pulmonary TB suspect is defined as:

- An individual having cough of 2 weeks or more
- Contacts of smear-positive TB patients having cough of any duration
- Suspected/confirmed extra-pulmonary TB having cough of any duration
- HIV positive patient having cough of any duration

Persons having cough of 2 weeks or more, with or without other symptoms, are referred to as pulmonary TB suspect. They should have 2 sputum samples examined for AFB.

Diagnostic Algorithm for Pulmonary TB



TREATMENT CATEGORIES AND SCHEDULE IN DOTS CHEMOTHERAPY.

Treatment groups	Type of patient	Regimen[1]	
		Intensive Phase (IP)	Continuation Phase (CP)
New*	Sputum smear-positive Sputum smear-negative Extra-pulmonary Others	$2H_3R_3Z_3E_3$	$4H_3R_3$
Previously Treated**	Smear-positive relapse Smear-positive failure Smear-positive treatment after default Others[2]	$2H_3R_3Z_3E_3S_3$ / $1H_3R_3Z_3E_3$	$5H_3R_3E_3$

1. The number before the letters refers to the number of months of treatment. The subscript after the letters refers to the number of doses per week. The dosage strengths are as follows: Isoniazid (H) 600 mg, Rifampicin (R) 450 mg, Pyrazinamide (Z) 1500 mg, Ethambutol (E) 1200 mg, Streptomycin (S) 750 mg.

   - Patients who weigh 60 kg or more receive additional rifampicin 150 mg.
   - Patients who are more than 50 years old receive streptomycin 500 mg. Patients who weigh less than 30 kg, receive drugs as per Paediatric weight band boxes according to body weight.

2. In rare and exceptional cases, patients who are sputum smear-negative or who have extra-pulmonary disease can have recurrence or nonresponse.

This diagnosis in all such cases should always be made by an MO and should be supported by culture or histological evidence of current, active TB. In these cases, the patient should be typed as ‘Others’ and given treatment regimen for previously treated.

* New includes former categories I and III.

** Previously treated is former category II.

CENTRAL LAB INVESTIGATIONS

INVESTIGATIONS DONE:

OUT PATIENTS		IN –PATIENTS (24 Hours)	
1.	CBC	1.	CBC
2.	ESR	2.	ESR
3.	Peripheral Smear with Reticulocyte Cont	3.	Peripheral Smear
4.	Urine routine	4.	Reticulocyte Count
5.	Stool – Occult Blood	5.	PT, APTT
6.	Urine – Analysis	6.	BT, CT
7.	Semen	7.	urine Analysis
8.	Absolute Eosinobhil Count	8.	Bone Marrow Aspiration
9.	Absolute Neutrophil Count		

MICROBIOLOGY:

MICROBIOLOGY	
1.	Urine Culture
2.	Blood culture
3.	Sputum Culture
4.	Stool Ova, Cyst
5.	Stool Routine
6.	Tip Culture
7.	WIDAL

8.	QBC
9.	MSAT
10.	VDRL / RPR
11.	AFB- Sputum / Fluid
12.	Pus- Culture & Sensitivity
13.	Theatre Swap- culture, Sensitivity

IMMUNOLOGY:

IMMUNOLOGY	
1.	CRP
2.	ASO
3.	RA
4.	ANA
5.	Dengue
6.	HBS Ag
7.	HCV
8.	PSA

HIV TEST

BIOCHEMISTRY:

BIOCHEMISTRY	
1.	RFT
2.	LFT
3.	Fasting BS, PPBS, Random BS, OGTT
4.	Fasting Lipid Profile
5.	Serum Calcium
6.	Serum Phosphorus
7.	Uric Acid
8.	Electrolytes
9.	Urine PCR
10.	Serum Amylare Lipase
11.	CK, CKMB
12.	Bilirubin
13.	Fluids- Sugar Proteins
14.	Thyroid Profile

MEDICAL COLLEGE

OUTPATIENT DEPARTMENT FRAME WORK

Sl..NO.	DEPARTMENT
01	OP Token counter
02	Orthopaedics
03	ECG
04	TB & Chest Medicine
05	Rheumatology
07	Cardiology
09	Nephrology
11	ICTC
12	Medicine (Male)
12A	Fever Clinic
13	Pharmacy
14	X-Ray
15	Medicine (Female)
16	Surgery (Female)
21	BP Clinic
22	Central Lab
23	Urology
23A	FNAC
24	Clinical Pathology
26	Diabetology
27	Physical medicine & Rehabilitation
28	ENT & Head and Neck Surgery
29	Vascular Surgery / Neuro Surgery
30	Neurology / Cardiothoracic Surgery
31	Ophthalmology

Psychiatry Ward	
CRRL Mess	
Yoga & Naturopathy	
Susruta Surgery Demo Hall	
Cancer Ward	
	Institute for Research and Rehabilitation of Hand & Department of Plastic surgery
	Institute of surgical Gastroenterology & Liver Transplantation, Department of Medical Gastroenterology, Stemcell Research Centre
	Department of Radiology (CT-1, MRI, Digital X-Ray, Mammography)
	Department of Radiotherapy
	Department of Psychiatry
	Leprosy OP & Ward
	STD Clinic & ART Centre