DRUGS USED IN ICU

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POLICY OF DRUG USE IN ICU

- Patients admitted to the ICU must have a complete drug history documented:

a) Premorbid and current medications.

b) Previous adverse drug reactions and allergies.

c) Note potential drug interactions.

- All drugs, infusions and fluids are reviewed and transcribed at least daily.
- Drugs should be prescribed according to Unit protocols and guidelines.

- Where possible:

a) Use drugs that can be measured to monitor therapeutic drug levels.

b) Avoid drugs with narrow therapeutic indices (e.g. digoxin, theophylline), particularly in patients with associated hepatic or renal dysfunction.

c) Cease a drug if there is no apparent benefit.

d) If two drugs are of equal efficacy, choose the cheaper drug as the cost of drugs in ICU is significant

DRUGS USED

1. Cardiovascular drugs
2. Respiratory drugs
3. Sedation, analgesia & muscle relaxants
4. Anticoagulation
5. Endocrine drugs
6. Renal drugs
7. G I drugs
8. Antibiotics
9. Fluid & Electrolytes

CARDIOVASCULAR DRUGS

- Inotropic Agents
- Vasopressors
- Antihypertensive & Vasodilator Agents
- Antiarrhythmic Agents
- Antiplatelet Agents

Inotropes

a) *General principles:*

i) Defence of blood pressure in critically ill patients forms the basis of haemodynamic resuscitation and organ perfusion

ii) Hypovolaemia is the most common cause of hypotension and low cardiac output in ICU

iii) The main indications for the use of inotropes are to increase myocardial contractility, heart rate and/or vascular tone.

iv) The use of inotropes requires regular haemodynamic monitoring.

v) No single inotrope has been shown to be superior to another.

vi) There is marked inter-individual variation in the response to inotropes.

CVS EFFECTS OF INOTROPIC DRUGS

Agent	β_1 effects	β_2 effects	α_1 effects	α_2 effects
	↑ Chronotropy ↑ Dromotropy ↑ Inotropy	↑ Inotropy Vasodilatation Bronchodilatation ↑ glucose/lactate	↑ Inotropy Vasoconstriction	↑ Inotropy Vasoconstriction
Adrenaline Noradrenaline Dopamine	β effects predominate at low dose		α effects predominate at high dose	
Dobutamine	+	+	(+)	-
Isoprenaline	+	(+)	-	-

+ = strong effect (+) mild effect - = no effect

INOTROPIC DRUGS

Agent	Standard Infusion	Uses
Noradrenaline	6 mg / 100 ml 5% dextrose (ml/hr = µg/min)	▪ First line drug in septic shock ▪ Maintenance of cerebral perfusion pressure
Adrenaline	6 mg / 100 ml 5% dextrose (ml/hr = µg/min)	▪ Cardiopulmonary resuscitation ▪ Acute severe asthma ▪ Anaphylaxis ▪ Cardiogenic shock ▪ Second line drug in septic shock after noradrenaline ▪ Medical pacing
Dobutamine	500 mg / 100 ml 5% dextrose (ml/hr approx µg/kg/min)	▪ Primarily a vasodilator, weak inotropic action ▪ Traditionally used in cardiogenic shock or low output, high afterload states or when filling pressures high ▪ Often used in combination with noradrenaline
Dopamine	400 mg / 100ml 5% dextrose (ml/hr approx µg/kg/min)	▪ No advantage over adrenaline/noradrenaline ▪ “Renal dose” dopamine is not used ▪ Endocrine side effects

VASOPRESSOR AGENTS

General principles

i) Vasopressors usually act directly on the peripheral vasculature and are primarily used to acutely elevate blood pressure

ii) The catecholamines have variable effects on the peripheral vasculature.

iii) The most common cause of hypotension in ICU patients is **hypovolaemia.**

iv) Pressor agents should not be used as an alternative to fluid resuscitation

Indications (In ICU)

i) Tissue infiltration with local anaesthesia.

ii) Topically prior to nasal intubation.

iii) Hypotension following sympathetic block (e.g. epidural anaesthesia).

iv) Hypotension refractory to large doses of catecholamines (vasoplegia):

- ♦ Consider relative hypoadrenalism
- ♦ Consider use of vasopressin

VASOPRESSORS

Agent	Standard Infusion / Dose	Uses
Metaraminol	10mg / 10ml 5% dex: titrate	▪ Potent short acting vasoconstrictor
Ephedrine	30mg / 10ml 5% dex: titrate	▪ Synthetic indirect sympathomimetic. ▪ Commonly used in anaesthesia, little benefit over adrenaline.
Vasopressin	20units/20ml 5%dex: 1.8mls/hrs (0.03u/min)	▪ Noradrenaline resistant hypotension. ▪ *May be useful in septic shock*

Complications

i) Rebound hypertension

ii) Vagal reflex bradycardia

iii) Tachyphylaxis

ANTIHYPERTENSIVE AGENTS

General principles

i) The most common cause of hypertension in ICU patients is sympathetic drive due to pain, agitation or delirium.

ii) Patients in the recovery phase of acute renal failure are often hypertensive.

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iii) Hypertension following an intracranial event (haemorrhagic or ischaemic) is common and the underlying mechanism dictates therapy

iv) Target therapy should be titrated against the patient's *premorbid BP.*

v) In the absence of adverse effects, the maximal therapeutic dose of a selected agent should be used prior to commencing a second or third agent.

Indications

ACUTE

- Acute perioperative control of hypertension
- Hypertensive crisis
- Pre-eclampsia / eclampsia
- Phaeochromocytoma
- Untreated aneurysm or vascular injury

CHRONIC

- Sustained essential hypertension
- Ischaemic heart disease
- Cerebrovascular disease

ANTIHYPERTENSIVE AGENTS&VASODILATORS

Agent	Infusion & Dose	Uses
Glyceryl trinitrate (GTN)	30mg / 100ml 5%D (non PVC bottle and giving set) Range 2-25 ml/hr *First line drug in RAH ICU* Can be given topically.	▪ Mainly venodilation: ▪ Useful in cardiac ischaemia ▪ Less predictable control of BP than SNP ▪ Tachyphylaxis develops within 24-48hr ∴ will need additional agents for persistent ↑BP
Sodium nitroprusside (SNP)	50mg / 250 ml 5%D Range 3-40 ml/hr	▪ Rapid control of hypertensive crises. ▪ Tachyphylaxis and metabolic acidosis may imply cyanide toxicity (total dose > 1.5mg/kg/24 hrs)
Phentolamine	10mg / 10ml 5%D: titrate	▪ Pure α-blockade, short acting antihypertensive
Hydralazine	5-10 mg as bolus 20-40 mg 6-8 hourly	▪ Short to medium term IV agent. ▪ Often use with β-blockers to control reflex tachycardia ▪ Useful in renovascular hypertension

ANTIHYPERTENSIVE AGENTS&VASODILATORS

Amlodipine	5-10mg oral bd	▪ Long acting oral Ca^{++} antagonist. ▪ Caution in renal impairment
Captopril	Start low dose ~ 5-6.25mg ↑ up to 50mg orally 8 hrly Syrup: 5mg/ml or tablets Acute hypertension: 5-25mg sublingually prn	▪ Treatment of hypertension ▪ Left ventricular dysfunction, esp post-MI ▪ Left ventricular failure ▪ Diabetic nephropathy ▪ Caution in renovascular disease and renal failure
Perindopril	Start 2.5mg daily ↑ up to 10mg daily orally	
Phenoxy-benzamine	Oral : 10mg/day and increase until postural hypotension IV : 1mg/kg/day dilute to 200-500ml 1/3 dose over 1/24 2/3 dose over 1/24	▪ Long acting α blocker ▪ Preoperative preparation of phaeochromcytoma ▪ Idiosyncratic hypotension may occur
Prazosin	Start with 0.5mg, and increase up to 5mg tds orally	▪ α-blocker ▪ Potent antihypertensive agent ▪ Beware first dose effect, esp if under-filled

ANTIHYPERTENSIVE AGENTS&VASODILATORS

Metoprolol	Oral: 25-100mg bd IV: 1-2mg bolus every 2-3 minutes up to 10 mg.	▪ High sympathetic drive states: neurogenic BP ▪ All grades of hypertension, inc renovascular ▪ Cardiac ischaemia ▪ Control of reflex tachycardia with vasodilators ▪ Thyroid crisis ▪ Caution in poor LV function, asthma ▪ Mainly eliminated by hepatic metabolism
Esmolol	Loading dose 0.5 mg/kg Infuse 100mg/10ml and titrate	▪ Ultra-short acting β-blocker ▪ Useful as trial for patients with poor LV function. ▪ Adjunct to vasodilators post cardiac surgery
Clonidine	25µg boluses of up to 150µg/24hrs Oral: 75µg bd ↑ up to 150-300µg tds.	▪ Acute, centrally mediated hypertension ▪ Useful post cardiac surgery ▪ Withdrawal states ▪ Care with hepatic or renal dysfunction ▪ Rebound hypertension with chronic use ▪ Sedation, especially 1st dose
Dexmedetomidine	400 µg in 40mls load 1µg/kg over 20min infuse 1-5ml/hr	▪ Selective alpha-2-agonist ▪ Acute, centrally mediated hypertension ▪ Not a first line drug. ▪ Selected use by senior medical staff only ▪ Sedation

ANTIARRYTHMIC AGENTS

General principles

i) Prior to administration of antiarrhythmic agents, optimise correction of the following:

- ♦ Hypovolaemia
- ♦ Metabolic abnormalities
- ♦ Myocardial ischaemia
- ♦ Sepsis
- ♦ Pain and agitation.

ii) All antiarrhythmic drugs are potentially ***arrhythmogenic.***

iii) Virtually all depress myocardial contractility

Indications

i) Termination of an acute arrhythmia

ii) Prophylaxis against recurrence

iii) Rate control

ANTIARRYTHMIC AGENTS

Agent	Infusion & Dose	Uses
Amiodarone	*Acute use:* 900mg / 250ml 5%D: Load 100ml / 1 hr (5mg/kg) Infuse 10 ml/h for 24-48 hrs (15mg/kg/day) Bolus Dose 150-300mg *Chronic*: 200-400 mg IV/oral daily	▪ Rapid AF / flutter or MAT ▪ Monomorphic ventricular tachycardia ▪ Generally does not suppress contractility ▪ Can cause acute hypotension if given too rapidly ▪ Less proarrhythmic than most other drugs ▪ Causes ↑QTc, but rarely Torsade de pointes ▪ Renal excretion is minimal – no need to change dose in renal failure ▪ Long term side-effects rare in short-term use. ▪ Interference with digoxin kinetics and assay. ▪ Interference with thyroid function tests.
Magnesium	5-10 mmol IV slow bolus Infuse at 2-5 mmol/hr. 2.4g $MgSO_4$ = 10mmol Mg^{++}	▪ Acts principally as a calcium blocker ▪ Useful in AF and Torsade de pointes
Verapamil	5-10 mg IV slow bolus	▪ Conversion atrial flutter → SR ▪ SVT – 2nd line to Adenosine

ANTIARRYTHMIC AGENTS

Digoxin	Loading dose: 0.5-1 mg IV. Maintenance: 62.5-250 µg IV/day Levels: 0.6–1.0 mmol/l	▪ Ventricular rate control in rapid AF (usually 2nd line t amiodarone in critically ill) ▪ Narrow therapeutic index esp in renal failure and metabolic abnormalities (↓ K^+, Mg, PO_4, alkalosis) ▪ Proarrhythmic potential high in critically ill patients ▪ Minimal inotropic effect in critically ill patients ▪ Hypokalaemia potentiates effects
Metoprolol	1-2mg IV bolus (up to 10 mg) 25-100mg oral bd	▪ Used in high sympathetic drive states : neurogenic hypertension ▪ Control of reflex tachycardia with vasodilators ▪ Caution in poor LV function, asthma ▪ Mainly hepatic metabolism

ANTIARRYTHMIC AGENTS

Sotolol	10-80 mg IV slow bolus (10-15 min)	▪ Class III and β-blocking actions ▪ Supraventricular tachyarrhythmias Conversion AF/flutter → SR ▪ Low pro-arrhythmic potential
Adenosine	6-12 mg rapid IV push	▪ Diagnosis / conversion of SVT
Lignocaine	0.4% solution = 4mg/ml : 60ml/hr (4mg/min) for 1-2 hrs 45ml/hr for 2-4 hrs 30ml/hr for 2-4 hrs	▪ 2nd line drug after amiodarone ▪ Sustained, recurrent VT ▪ No longer routinely used for prophylaxis for VT ▪ VF resistant to defibrillation (now questioned) ▪ Potent negative inotrope, pro-convulsant
Phenytoin	15mg/kg loading / 1 hr 300 mg/day (level 40-80 mmol/l)	▪ Digoxin toxicity ▪ Tricyclic induced malignant arrhythmias

ANTI PLATELET AGENTS

Agent	Usual dose	Indications/Comments
Aspirin	75-150 mg	▪ Post acute coronary syndrome ▪ Other thrombotic cardiac event ▪ Post TIA / stroke
Clopidogrel	75mg orally daily 300mg oral loading dose pre-PTCA (then 75mg daily)	▪ Irreversibly modifies platelet ADP receptor, inhibiting aggregation ▪ Uses: prevention of vascular ischaemic events e.g. MI, CVA, PTCA
ReoPro (abciximab)	Bolus: 0.25mg/kg IV over 1 min, 10mins before PTCA Infusion: 0.125µg/kg/min IV for 12hrs. (max rate = 10µg/min)	▪ Only to be ordered by Cardiology ▪ Binds to platelet glycoprotein IIb/IIIa receptor, inhibiting platelet aggregation and thrombus formation ▪ Primarily used with PTCA ▪ Used with aspirin and heparin (target ACT >200sec) ▪ Increased risk of major bleeding and thrombocytopaenia

ANTI PLATELET AGENTS(CONT.)

Tirofiban (aggrastat)	Bolus: 0.4 µg/kg/min for 30 mins Maintenance: 0.1 µg /kg/min for at least 48hrs NB: reduce doses by 50% with severe renal insuff. (e.g. creat clearance <30ml/min)	▪ Only to be ordered by Cardiology ▪ Blocks glycoprotein IIb/IIIa receptor ▪ Short half-life (1.4-1.8 hrs) ▪ Uses: unstable angina, non-Q wave MI ▪ Use with heparin and aspirin ▪ Continue through angiography, and for 12-24hrs post-PTCA ▪ Check platelet count 6hrs post-bolus, then at least daily. If <90,000 cease and contact cardiology ▪ SEs: bleeding (major 1.4%), thrombocytopenia, fever

RESPIRATORY DRUGS

- **BRONCHODILATORS**

A. B2 AGONIST

B. METHYLXANTHINES

C. ANTICHOLINERGICS

- **CORTICOSTEROIDS**

➢ INHALATIONAL

➢ SYSTEMIC

General Principles:

i) Treatment of bronchospasm in ICU .

ii) They are not routinely used in all ventilated patients.

iii) Once commenced, they must be reviewed frequently regarding efficacy:

- ♦ Audible wheeze, respiratory rate
- ♦ Subjective and objective work of breathing
- ♦ Lung compliance
- ♦ Blood gases.

Indications:

i) Pre-existing asthma / chronic obstructive pulmonary disease (COPD)

ii) Acute severe asthma or exacerbation of COPD

iii) Bronchospasm 2° to infection, aspiration or during mechanical ventilation,

iv) For the treatment of hyperkalaemia

ROUTES OF ADMINISTRATION

- INHALATION
  - MDI
  - NEBULIZED
  - CONTINOUS NEBULIZED
- SUBCUTANEOUS
- PER ORAL
- INTRAVENOUS
- I/V INFUSIONS

B-2 agonist & Anticholinergics

Drug	Infusion/ dose	Clinical uses
Salbutamol MDI	4 puffs every 4 to 6 hrs Max 10 puffs 4 hrly if needed	▪ First line bronchodilator ▪ Default method of administration
Salbutamol (nebulised)	Nebulised in N.Saline (1ml:1ml) continuously, 2 or 4 hrly	▪ Bronchospasm refractory to MDI ▪ Severe hyperkalaemia
Ipratropium MDI	4 puffs every 6 hrs Max 10 puffs 6 hrly if needed	▪ Chronic obstructive pulmonary disease ▪ Bronchorrhoea
Ipratroprium bromide	Nebulised in addition to salbutamol (1ml:1ml)	

The frequency of intermittent B^2 agonist administration vary with the severity of illness of the patient; in severely ill patients, the initial interval may be hourly

Mucolytic agents

- N – Acetyl cystiene
- Dornase (recombinant)
- SSKI (Saturated solution of potassium iodide)
- Guaifenesin

Continous nebulization

The following guidelines are used for 1 hour of nebulization. For prescribed dose of 10 mg/h at 15 L/min flow, add 2 mL salbutamol (5 mg/mL) to 48 mL saline for 50 mL/h output. For multiple hours of operation, multiply by the number of hours desired.

	High Flow					
Desired dose (mg/h)	5	10	15	5	10	15
Albuterol 5 mg/mL (mL)	1	2	3	1	2	3
Saline (mL)	29	28	27	49	48	47
Flow rate = Output	10 L/min = 30 mL/h			15 L/min = 50 mL/h		

	Low Flow					
Desired dose (mg/h)	5	10	15	5	10	15
Albuterol 5 mg/mL (mL)	1	2	3	1	2	3
Saline (mL)	3	2	1	8	7	6
Flow rate = Output	2 L/min = 4 mL/h			4 L/min = 9 mL/h		

	Very Low Flow					
Desired dose (mg/h)	2.5	5	7.5	10	12.5	15
Albuterol 5 mg/mL (mL)	0.5	1	1.5	2	2.5	3
Saline (mL)	7.5	7	6.5	6	5.5	5
Flow rate = Output	2 L/min = 8 mL/h					

INHALED CORTICOSTEROIDS

Budesonide (nebulised steroid)	Nebulised 1 mg b.d.	▪ Steroid dependent COPD ▪ Acute exacerbation of COPD
Beclomethasone MDI	2-4 puffs b.d.	▪ Use 4 puffs with a wet circuit
Fluticasone MDI	2-4 puffs twice daily	▪ Use 4 puffs for a wet circuit ▪ For patients on Seretide® Inhaler (Salmeterol & Fluticasone) → use Fluticasone MDI ▪ For patients on Symbicort® Turbuhaler (Eformoterol & Budesonide) → use Fluticasone or Beclomethasone MDI

Subcutaneous Agents

- Epinepherine
- Terbutaline

Parenteral therapy

Indications:

i) Adjunctive therapy for patients with acute severe asthma or COPD not responding to nebulised agents

ii) Selected patients who are difficult to wean from ventilation (due to COPD)

iii) Maintenance therapy in patients with COPD

BRONCHODILATORS

Adrenaline (IV)	6 mg / 100 ml 5%D (ml/hr = µg/min)	▪ Acute severe asthma ▪ Rapid onset and offset of action ▪ Titrate until clinical pressor response (may require up to 100 µg/min)
Salbutamol (IV)	6 mg / 100 ml 5%D (ml/hr = µg/min)	▪ Acute severe asthma ▪ Longer duration of action

METHYLXANTHINES

	Theophylline	Aminophylline	Comments
Loading Doses			
No prior theophylline or aminophylline	5 mg/kg IV over 30 min	6 mg/kg IV over 30 min	Theophylline = 80% Ã— aminophylline Loading dose administered over 30 min
Prior theophylline or aminophylline	Estimate	Estimate	Theophylline 1 mg/kg IV/PO increases the serum concentration 2 mg/L; aminophylline 1.2 mg/kg IV/PO increases the serum concentration 2 mg/L; therapeutic range 10â€"20 mg/L

METHYLXANTHINES

Maintenance Infusion			
Adults (smokers)	0.72 mg/kg/h	0.9 mg/kg/h	Maximum doses: theophylline 900 mg/d, aminophylline 1,080 mg/d
Adults (nonsmokers)	0.48 mg/kg/h	0.6 mg/kg/h	
Adults (heart failure, liver disease, cor pulmonale)	0.24 mg/kg/h	0.3 mg/kg/h	Maximum doses: theophylline 400 mg/d, aminophylline 480 mg/d

Corticosteroids

- Methylprednisolone
- Hydrocortisone

Complications

i) Hypokalaemia, metabolic alkalosis

ii) Arrhythmias - β2-agonists, theophylline

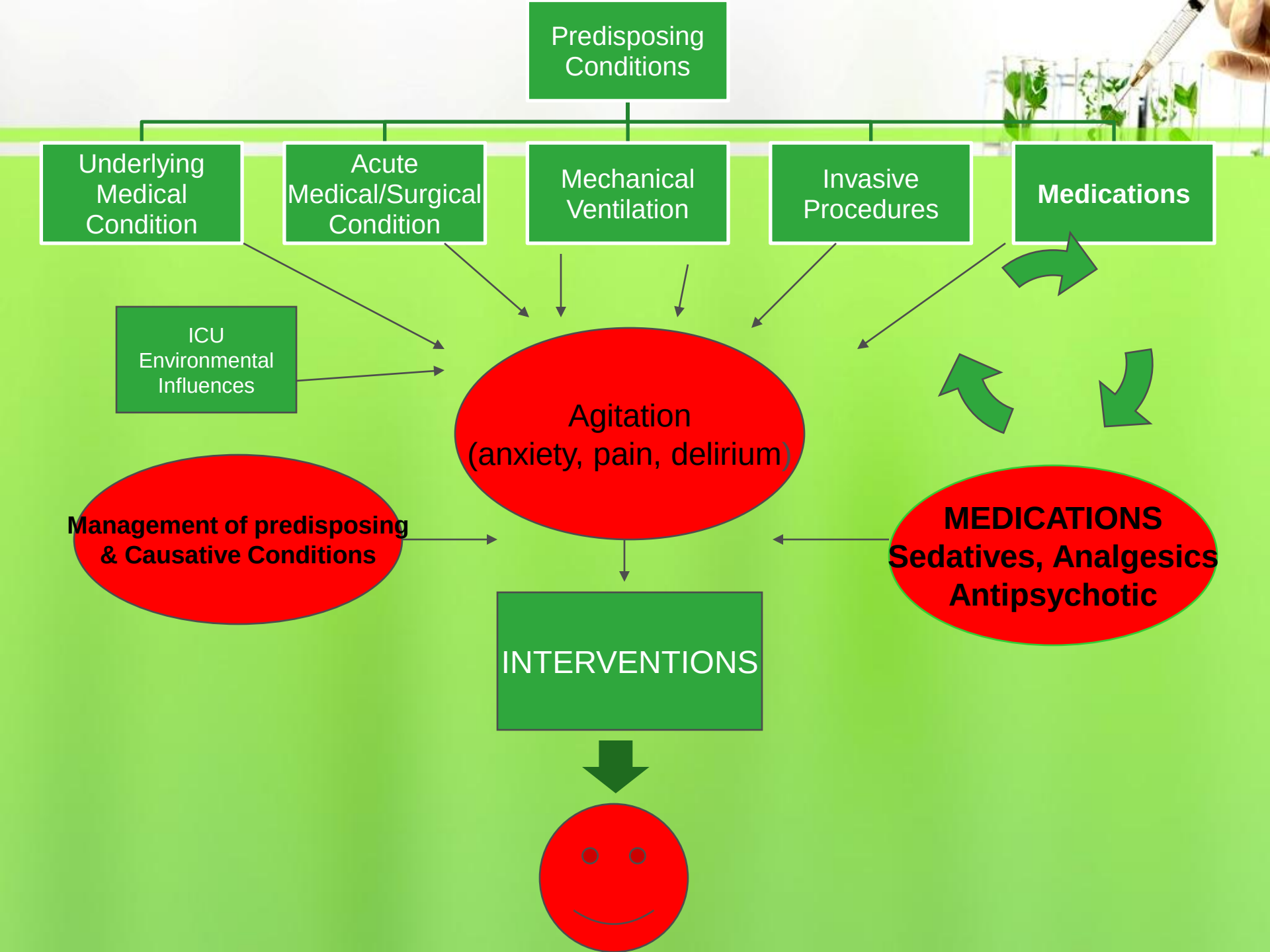
iii) Intercurrent infection - steroids

iv) Polyneuropathy - steroids

v) Increased lactate - β2-agonists

vi) Metabolic acidosis - β2-agonists

SEDATION ,ANALGESIA & MUSCLE RELAXANTS


Predisposing Conditions
Underlying Medical Condition
Acute Medical/Surgical Condition
Mechanical Ventilation
Invasive Procedures
Medications
ICU Environmental Influences
Agitation (anxiety, pain, delirium)
Management of predisposing & Causative Conditions
MEDICATIONS Sedatives, Analgesics Antipsychotic
INTERVENTIONS

Drugs used in treatment of Pain

- **Treatment of perceived & prevention of anticipated pain**

- **Opiates – principal agents in ICU**
  - **potent / lack of ceiling effects**
  - **mild anxiolytic & sedative**
  - **improved patient – ventilator synchrony**
  - **effective antagonist - naloxone**

- **Lack amnesic effects /additional sedatives required**

Routes of administration

- **I/V infusions / scheduled doses**
- **S/C when I/v route fails – infusions / bolus**
- **Oral, rectal, sublingual transdermal – unpredictable**
- **Epidural/ intrathecal routes for surgical patients**
- **PCA via any route - PCEA / nerve blocks/ oral/ nasogastric**

INTRAVENOUS OPIOD ANALGESICS

	MORPHINE	HYDROMORPHONE	FENTAYNL
Loading dose	5-10mg	1-1.5mg	50-100 microg
Onset of action	10-20min	5-15min	1-2min
Infusion rate	1-5 mg/hr	0.2-0.5 mg/hr	50-350 microg/hr
Duration	3-3.5 hrs	2-3 hrs	30-60 mins

- FENTANYL IS PREFFERED OVER MORPHINE

❖Faster acting & quicker onset of action.

❖No dose adjustment in RF.

❖Suitable in patients with hemodynamic compromise

EPIDURAL ANALGESIA

AGENT	CONCENTRATION
OPIODS	
Fentanyl	2-5 microg/ml
Morphine	20-100 microg/ml
LOCAL ANAESTHETIC	
Bupivacaine	0.06-0.125 %
Ropivacaine	0.1-0.2%

Sedation in ICU

- **In the agitated, ventilated & for procedure discomfort**
- **To avoid self extubation & removal of catheters**
- **NM blockade mandates analgesia & sedation**
- **Control of pain before sedation**
- **All have side effects – dose dependent**
-
- **Analgesics are not sedatives/ Sedatives are not analgesics**

SCCM RECOMMENDATIONS

- Midazolam or Propofol are the preferred agents for short term (under 24 hours) treatment of anxiety in critically ill patients.
- Lorazepam is the preferred agent for prolonged (over 24 hours) treatment of anxiety in critically ill patients.
- Haloperidol is the preferred agent for treatment of (true delirium) in critically ill patients

Medications for Sedation

Benzodiazepines

- Onset
  - midazolam<diazepam<lorazepam
- Duration
  - diazepam>lorazepam>midazolam
- Elimination
  - renal failure: active metabolites accumulate for midazolam and diazepam
  - cirrhosis: prolongation of metabolism to active metabolites for midazolam & diazepam

Medications for Sedation

Dosing for Benzodiazepines

- Begin with 1-2 mg bolus Lorazepam
- if goal not met, give 2nd dose (1-2 x 1st dose) in 5-10 min
- if goal still not met, give 3rd dose (1-2x2nd dose) in 5-10min
- Once sedated give dosing at the level of last dose given
- If goal still not met, consider continuous infusion at 0.5-8mg/hr

Medications for Sedation

Propofol

- Sedative hypnotic with mild amnestic properties, NO analgesia
- Rapid induction (30-40sec), rapid recovery
- Dosing:
  - Start dose at 5mcg/kg/min
  - Titration by 5-10mcg/kg/min q5 min
- Side Effects:
  - Hypotension 1/3 of all patients, Bradycardia, arrhythmia, Lipemia, hypertriglycerdemia, Pancreatitis, Infection Risk
  - Propofol Infusion Syndrome: acute refractory bradycardia and metabolic acidosis, rhabdomyolysis, hyperlipidemia or an enlarged fatty liver
  - Limit 2-3 days sedation therapy

Medications for Sedation

Dexmedatomidine

- Short acting alpha 2 agonist(8-10x increased binding than clonidine)
- Anxiolytic, anesthetic, hypnotic and analgesic
- Rapid onset: 6 min Elimination: 2 hours
- Pts can be arousable/alert with stimulation
- Sedation with less lethargy
- Dose:

  loading infusion for 1mg/kg for 10 min

  maintenance of 0.2 to 0.7 mcg/kg/hr
- Side effects:
  - Hypotension
  - Bradycardia
  - High doses can have alpha 1 agonist effect

Daily Wake-Ups

- Allows patients to “wake up” by stopping drug infusion
  - Clinicians are able to assess neurological status & examine patient while awake (calm or agitated)
  - Sedative doses are subsequently decreased

- Daily interruption of sedative drug infusions result in:
  - Decrease duration of mechanical ventilation
  - Decrease length of ICU stay
  - Less nosocomial infections/VAP
  - Improves hemodynamics/allows weaning of vasopressos and fluids

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Thank
You