


**ThinkAskLearn**  
Health Professional Education

## Drugs of Intubation

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## Rapid Sequence Induction

- **Definition**
  - “... the administration of a potent induction agent followed immediately by a rapidly acting neuromuscular blocking agent to induce unconsciousness and motor paralysis for tracheal intubation.”

Walls (2022)



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## Pre-oxygenation

- What is the purpose of pre-oxygenation?
  - Increases amount of oxygen in lungs (FRC)
  - Safety buffer against development of hypoxaemia
- Why does it work?
  - Displaces nitrogen from FRC and replaces it with oxygen
  - Oxygen content in the lungs can be increased substantially
  - Increase can occur rapidly (2-3 minutes)



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Effect of Pre-oxygenation

- FRC is 30mL/kg (supine) which is 2,100mL in a 70kg adult
- Normally contains about 13% O<sub>2</sub> which is 270mL O<sub>2</sub>
  - Usual rate of consumption (250mL/min)
  - Just over 1 minute supply of O<sub>2</sub>
- If the patient is pre-oxygenated with 100% O<sub>2</sub> for several minutes
  - Alveolar gas equation predicts a maximal alveolar PO<sub>2</sub> of about 660mmHg (= 760 - 47 - 40/0.8)
  - This is 87% oxygen in alveolus and about 1825mls O<sub>2</sub> in FRC
- This represents ~ 7 mins O<sub>2</sub> consumption at 250 mL/min at ideal resting conditions



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Key Points

- Oxygen is good for you.
- Use it for 3-5 minutes before attempting intubation.



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RSI Pharmacology

- What do we need to achieve optimum intubating conditions?
  - No memory = **Sedation**
  - No pain = **Analgesia**
  - No movement, cough, gag = **Paralysis**
- How do we achieve these conditions?
  - Drugs!
  - Ensure a free flowing IV line on pump set



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Drug Comparison

Drug	Sedation	Analgesia	Paralysis
Fentanyl	✓	✓ ✓	✗
Midazolam	✓ ✓	✗	✗
Propofol or Thiopental	✓ ✓	✗	✗
Sux/Rocuronium	✗	✗	✓ ✓
Vecuronium	✗	✗	✓ ✓
Ketamine	✓ ✓	✓	✗
Morphine	✓	✓ ✓	✗



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What Do I Need To Know?

- Pharmacology
  - How the drug works...
- Ampoule
  - How much in what volume...
- Dilution
  - How you draw it up...
- Dosage
  - How much to give...



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Stages of Anaesthesia



- Stage I-Stage of Analgesia - alert - ends with of consciousness
- Stage II- Stage of Delirium- LOC to loss of eye lid reflexes - vomiting, laryngospasm, vagal inhibition & fitting may occur
- Stage III- Surgical Anaesthesia- absence of response



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### The Seven P's of RSI

- Preparation
- Preoxygenation
- Pretreatment
- Paralysis with induction
- Protection and positioning
- Placement with proof
- Postintubation management



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### Pretreatment

- Prevent changes caused by stimulation responses caused by airway manipulation (laryngoscopy) or intubation.
- Raised intracranial pressure(ICP), increase pulse and blood pressure, and stimulation of the upper and lower respiratory tract resulting in increases in airway resistance
- Causes- Duration > 15 sec  
Aggressiveness of laryngoscopy  
Stimulation of the carina



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### Drugs in Pretreatment

- **Opioid** –Fentanyl (500mcg in 10mls) no need to dilute
- rapid onset
- short duration of action.
- Cardiovascularly stable and tends to support blood pressure.
- To decrease sufficiently the amount of sympathetic response to laryngoscopy, large doses anaesthetic agents are required. This then produces significant hypotension. Using fentanyl helps to decrease the amount of sympathetic response
- Fentanyl 2-10 mcg/kg TBW



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Drugs in Pretreatment

- **Atropine**
- Indications in children under 10 years old
- Airway stimulation causes sympathetic response. This triggers vagal stimulation of the SA node causing bradycardia. In adults causes tachycardia.
- Also reduces salivary, gastric and respiratory tract secretions therefore aids in the prevention of aspirations.
- ILOCR recommendation – evidence poor, to make a recommendation ‘speculative’



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Drugs in Paralysis with Induction

- “A rapid acting agent is given ... to produce prompt loss of consciousness ... followed immediately by a neuro-muscular blocking agent.”
- Does not involve slow administration
- No ‘titration to end point’ approach
- Aim for loss of consciousness and decrease in respirations within seconds rather than minutes.
- Rapid control of airway.



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Drugs in Paralysis with induction

- **Induction**-Benzodiazepines- **Midazolam 10mg in 10mls**
- Provides amnesia, anxiolysis, central muscle relaxation, sedation, anticonvulsant and hypnosis.
- “the more lipid soluble the benzodiazepine, the quicker time of onset and offset” Midazolam most lipid soluble
- Rapid onset 30-45 seconds
- Variability in dosing requirements amongst patients.
- Used post intubation as well.
- Midazolam 0.1-0.3 mg/kg TBW



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Drugs in Paralysis with induction

- **Induction-** Propofol
- Lipid soluble - Milky Liquid (Mother’s milk)
- 200mg in 20mls
- Shorter half life
- Shorter sequelae
- Does not raise ICP
- Myocardial depressant
- May cause pain at injection site.



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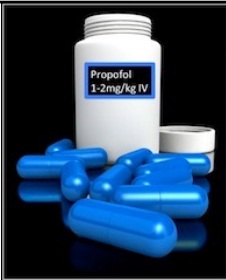
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		<b>Propofol</b>
	Onset of Action	10 – 50 sec
	Peak Effect	2 min
	Duration of Action	2 – 5 min
	Advantages	Ultra-Short Acting, Anti-Emetic, Anxiolytic
	Disadvantages	Dose Dependent Hypotension, Respiratory Depression, Apnea, No Analgesia, Burns at IV site with Administration

Propofol 1-2.5 mg/kg IBW + (0.4 x TBW) (others simply use 1.5 mg/kg x TBW as the general guide)



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Drugs in Paralysis with induction

- **Induction-** Thiopental
- Class - Barbiturate- sedation, anticonvulsant
- Does not raise ICP
- Rapid onset
- Brief duration
- Predictable side effects- resp depression, venodilation, cardiac depression
- Powder formation 500mg amp
- Mix up with 20mls N/S
- Tissue necrosis if subcutaneous extravasation



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Drugs in Paralysis with induction

- Ketamine
- Dissociative effects
- Some analgesic properties
- Protects airway reflexes
- Does not raise ICP as once thought
- Can cause vomiting (usually late in post sedation)
- Emergence phenomenon



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Ketamine	
Onset of Action	30 sec (IV); 3 – 4 min (IM)
Peak Effect	1 – 2 min (IV); 4 – 5 min (IM)
Duration of Action	5 – 10 min (IV); 12 – 25 min (IM)
Advantages	Preservation Respiratory Drive & Airway Reflexes, Analgesic
Disadvantages	Emetogenic, Post Procedural Agitation, Elevated BP, Tachycardia
Inconclusive Evidence	Elevation of IOP & ICP

Ketamine 1.5-2 mg/kg IBW



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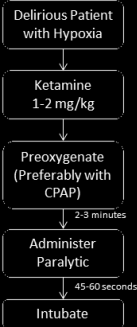
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DELAYED SEQUENCE INTUBATION (DSI)



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Ketafol

- No dosing regime
- Mixing drugs
- Good analgesia effects
- Rapid sedation
- 100mg of Ketamine mixed with 100mg of Propofol
- 10mg per ml of Ketafol
- 0.5mg/kg of Ketafol + 0.5mg/kg of Ketafol



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Drugs in Paralysis with induction

- **Paralysis** - Succinycholine- Suxamethanionium
- Depolarizing muscle relaxant
- Attaches to acetylcholine receptors of the nerves and causes the nerve to depolarize - muscle fasciculations
- **Rapid onset 30 sec- rapid (ultra short) offset 5 min**
- Suxamethonium 1-2 mg/kg TBW



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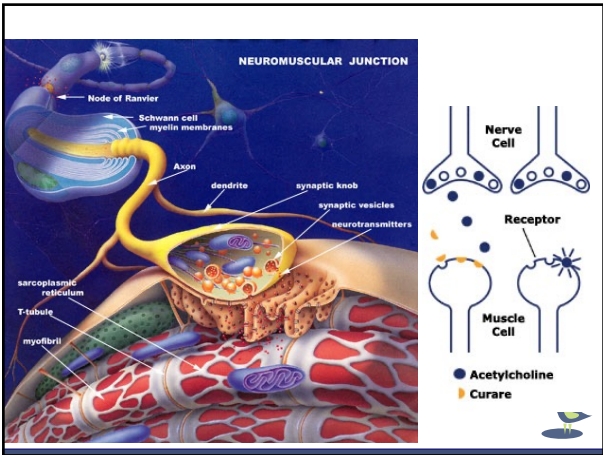
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Suxamethanious

- Cardiovascular effects are minimal
- No sedative or analgesic properties (as with all)
- Fasciculations can cause a transient rise in serum potassium. Used in caution (if at all) with hyperkalaemia - burns, crush injuries, temperature extremes - Causes cardiac irritability & VF
- Raises intra ocular pressure- penetrating eye trauma
- Suxamethonium 1-2 mg/kg TBW



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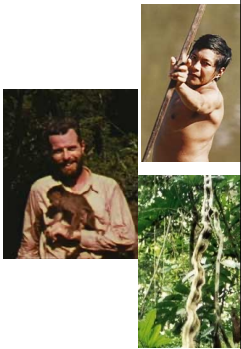
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A Pause for a bit of history

- Richard Gill (1901-1958)
- Enquiring mind, wunderlust led him to Ecuador
- Develop MS- lots of spasms
- Recovered and returned to Ecuador
- Seriously investigated curare



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Drugs in Paralysis with induction

- **Paralysis** - Vecuronium / (Compare Pancuronium)
- Non- depolarizing muscle relaxant
- Competes with acetylcholine for sites to attach



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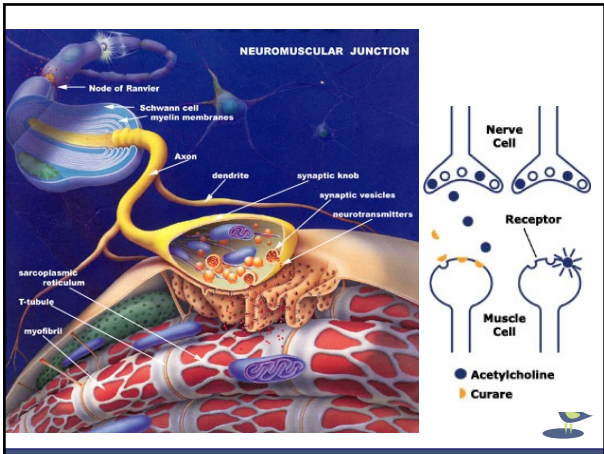
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Drugs in Paralysis with induction

- **Paralysis** - Vecuronium / (Compare Pancuronium)
- Non- depolarizing muscle relaxant
- Competes with acetylcholine for sites to attach
- Slow onset 3 min
- Lasts 30-45mins/ Pancuronium 60mins
- Minimal cardiovascular effects
- Used post intubation
- Vecuronium 0.15-0.25 mg/kg IBW (8mg+4mg)



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Drugs in Paralysis with induction

- Rocuronium
  - Fast acting non depolarising (as quick as sux)
  - Long acting (reversal agent)
  - Protects against hypoxia
  - Can be used on all patients (except allergies)
  - 1.2mg/kg at induction dose
- Study show roc use led to increase in delay to sedation use Emerg Med J doi:10.1136/emmermed-2012-201812



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