

MEDICAL CENTER

Category

Clinical Practice

**Protocol:** BICU Rapid Sequence Induction and Intubation

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**Applicable to**

VUH       VCH       DOT       VMG Off-site locations       VMG       VPH       Other

**Team Members Performing**

All faculty & staff       Faculty & staff providing direct patient care or contact       MD       House Staff       APRN/PA       RN       LPN

Other:

**Content Experts**

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**I. Goal**

To induce unconsciousness and paralysis to facilitate rapid tracheal intubation

**II. Indication**

Rapid sequence induction and intubation (RSII) is a technique commonly used to secure the airway quickly and protect against aspiration of gastric contents.

- When residual stomach content is expected
  - Oral intake within 6 hours
  - Delayed gastric emptying due to gastroparesis, diabetes mellitus, medications (opioids) and/or trauma
  - Gastrointestinal obstruction, e.g. ileus, pyloric or small bowel obstruction, colonic obstruction, large upper GI bleeding
- Other indications
  - Severe hypoxia requiring immediate intubation and mechanical ventilation
  - Imminent (as in looming) airway obstruction, e.g. facial burn and/or progressive stridor

**III. Contraindications**

Anticipation of a difficult airway, especially if rescue oxygenation may be difficult or impossible

**IV. Medications**

- Premedications
  - **Preoxygenation**- 100% NRB, bag-assisted ventilation
    - If time allows: **Fentanyl** (1 to 3  $\mu\text{g}/\text{kg}$ ), fast and short acting narcotic, decreases induction agent requirement, improves hemodynamic stability and blunts airway reflexes to intubation
    - **Midazolam** (1-2mg): fast acting anxiolytic may facilitate preparation for RSI
    - **Atropine** (0.01 mg/kg): helpful with patients with bradycardia or with anticipated bradycardia after induction of anesthesia. Also, may be helpful in patients with copious secretions
- Induction Medications
  - **Propofol** (1.5-2.5 mg/kg)
  - **Etomidate** (0.25-0.5mg/kg), may be helpful in patients with unstable hemodynamics
  - **Ketamine** (1-2mg/kg), is an excellent choice in many PRII particularly hypotensive patients as it increases sympathetic tone which offset its own myocardial depressant effect

- Neuromuscular Blockers (NMB)
  - **Succinylcholine** (1-2 mg/kg): A depolarizing NMB which ensures adequate intubating condition in 60 seconds and is short acting (5 min). However, there are many contraindications to its use which dictate the use of non-depolarizing NMBs, e.g.
  - **Contraindication to Succinylcholine**
    - Absolute:
      - Burn patients 24h to 1 year
      - Increased intraocular pressure
      - Increased intracranial pressure
      - Lower motor neuron disease (e.g. paraplegia)
      - Massive trauma/crush injury (rhabdomyolysis)
      - Hyperkalemia,  $K > 5.5$  mEq/L
      - History of MH, muscular dystrophy
  - **Rocuronium** (0.6-1.2mg/kg): a non-depolarizing NMB which produces good intubating conditions in 90 seconds at 1 mg/kg dose
- Cardiovascular Medications
  - If hemodynamic compromise is anticipated/expected, have the following medications at the bedside
    - **Phenylephrine** 100mcg/ml
    - **Epinephrine** 10mcg/ml
    - **Esmolol** 10mg/ml
    - **IVFs**

## V. Equipment

- Self-inflating bag ana mask, connected to oxygen
- Yankaur suction connected to working suction source
- Portable airway equipment in standard Airway Bag (includes: direct laryngoscopes, endotracheal tubes, intubating catheter, stylets, oral and nasal airways, laryngeal mask airway and other backup intubating devices, e.g. McGrath videolaryngoscope)
- ETCO2 detection
- Stethoscope
- If anticipated difficult airway, emergency cricothyroidotomy and/or tracheostomy kit nearby

**VI. Personnel and Procedure**

- Qualified Personnel
  - Qualified and/or certified to perform endotracheal intubation
  - Respiratory therapist
  - Someone to apply cricoid pressure (CP)
  - In the event of difficult intubation, or anticipated difficult intubation, someone to perform an emergency surgical airway
- Procedure
  - Airway assessment: if condition permits, it is recommended to help with additional equipment and/or personnel who may be needed to insert the ETT.
  - Pre-oxygenation (de-nitrogenation): may delay onset of hypoxia when ventilation ceases
  - Pre-induction check:
    - Working IV (not on same side as NIBP cuff)
    - Working NIBP cuff or A-line. If NIBP, set to q2-3 min
    - Working pulse oximetry (not on same side as NIBP), set to QRS volume at least 2
    - All necessary drugs and equipment (as listed above)
    - All necessary personnel
  - Induction of anesthesia: using the chosen medication as outlined above
- Typical RSII:
  - After induction of anesthesia, mask ventilation is avoided
  - CP: Personnel with experience (or with clear instructions) will apply firm pressure with the index finger and thumb on 1<sup>st</sup> tracheal ring (cricoid) and will continue until ETT placement is confirmed (bilateral auscultation).
- Modified RSII:
  - Mask ventilation after induction: when interruption of ventilation is expected to result in hypoxia due to limited reserve, mask ventilation may be continued throughout the procedure
  - It will also decrease hypoxia if endotracheal intubation requires longer period of time
- Confirmation: using bilateral auscultation, +ETCO<sub>2</sub> detection

**VII. Background**

Rapid sequence induction and intubation (RSII) is designed to expeditiously secure the airway to reduce the incidence of aspiration of gastric content, minimize hypoxia and avoid insufflation of the stomach. RSI has been shown to be associated with increased first pass success (ie, successful tracheal tube placement on first attempt) and reduced incidence of complications.

Succinylcholine (SCh) may be used as a part of a rapid sequence intubation during the first 48 hours following a severe burn, but not thereafter for at least 1 year. Administration of SCh to burn patients after this time carries the risk of acute severe hyperkalemia and life-threatening arrhythmias. This is due to upregulation of immature extrajunctional nicotinic acetylcholine receptor (nAChR receptors has been demonstrated as soon as 24 hours after injury in the alpha-7 and gamma gene subunits, and risk is increased in burn patients with infection, sepsis, or immobilization.

Optimal pharmacokinetic properties for all RSII medications include; rapid onset, short duration of action, negligible hemodynamic effects, minimal side effect profile, and being quickly reversible. While Propofol appears to be the default induction agent in RSII, Etomidate may be helpful in patients with unstable hemodynamics. While it may cause relative adrenal insufficiency in critically ill patients, there is no strong evidence to advocate or to avoid its use. Ketamine is an excellent choice in many RSII particularly hypotensive patients as it increases sympathetic tone which offset its own myocardial depressant effect. Ketamine induced hypertension and tachycardia may pose problems in patients who are unable to tolerate them, e.g. coronary artery disease and elevated intracranial pressure. Rocuronium, a non-depolarizing NMB that produces good intubating conditions in 90 seconds at higher doses is used frequently when Succinylcholine is contraindicated. However, the duration of action is longer (60-90 min) which made some advocate the need to have a reversal agent Sugammadex.

## VIII. References

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