These guidelines are based upon medical literature review and expert opinion and are intended to provide recommendations for Rapid Sequence Induction & Intubation in the care of critically ill patients.

Best Practice Guidelines

- **Indications:**

Rapid sequence induction and intubation (RSII) is a technique commonly used to secure the airway quickly and protect against aspiration of gastric contents[1].

  It is indicated when residual stomach content is expected:
  - Oral intake (excluding clear liquids) within 6 h
  - Delayed gastric emptying due to gastroparesis, diabetes mellitus, medications and/or trauma
  - Gastrointestinal obstruction, e.g. pyloric or small bowel obstruction

Other indication may include:

  - Severe hypoxia requiring immediate intubation and mechanical ventilation[2]
  - Imminent (as in looming) airway obstruction, e.g. facial burn and/or progressive stridor

- **Medications:**

  **Premedication:** Only considered if patient condition and time allow (see footnote 1)

  **Induction agents:**

  Typical:
  - Propofol (1.5-2.5 mg/kg)

  Others:
  - Etomidate (0.25-0.5 mg/kg), may be helpful in patients with unstable hemodynamics.
  - Ketamine (1-2 mg/kg), is an excellent choice in many RSII particularly hypotensive patients as it increase sympathetic tone which offset its own myocardial depressant effect.

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1 Typical:

  - Fentanyl (1 to 3 μg/kg), fast and short acting narcotic, decreases induction agent requirement, hemodynamic stability and blunts airway reflexes to intubation.

**Others to consider:**

  - Midazolam (1-2 mg): fast acting anxiolytic may facilitate preparation for RSII
  - 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.
  - Lidocaine (100 mg): despite lack of efficacy in recent studies, it remains in use to blunt airway reflexes during intubation[3].
Neuromuscular blockers (NMB)

Typical:
• 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. Rocuronium
  o Contraindication to Succinylcholine
    • Absolute:
      • Burn patients 24h to 1 year
      • Lower motor neuron disease (e.g. Paraplegia)
      • Massive trauma (rhabdomyolysis)
      • Hyperkalemia, K >5.5 mEq/L
      • Malignant hyperthermia susceptibility (History of MH, muscular dystrophy)
    • Relative:
      • Increased intraocular pressure
      • Increased intracranial pressure
  • Rocuronium (0.6-1.2 mg/kg): A non-depolarizing NMB which produces good intubating conditions in 90 seconds at 1 mg/kg dose.

Cardio-vascular medication:
In anticipation of hemodynamic perturbation, Cardio-vascular medication may need to available prior to the procedure.

Typical:
• Phenylephrine (100 ug/cc):

Others:
• Epinephrine (10 ug/cc), Esmolol (10 mg/cc), (Labetalol 10 mg/cc) and intravenous fluids may all be considered depending on patient history and/or other medical needs

• Equipment:
  o Self-inflating bag and mask connected to oxygen
  o Yankauer suction tip connected to working suction source
  o Portable airway equipment available in a standard airway bag (Please see standard ICU airway bag policy) which include, direct laryngoscopes, Endotracheal tubes, Intubating catheter, Stylets, Oral and nasal Airways, laryngeal mask airway and other backup intubating devices, e.g. Video laryngoscope.
  o Choice of medication: Premedication, Induction agent, muscle relaxant and cardiovascular medication
  o Proper support personnel as outlined below

• Personnel & Procedure:
  o Qualified personnel:
    • Personnel qualified and/or certified to perform endotracheal intubation.
RAPID SEQUENCE INDUCTION & INTUBATION

- Drug preparation and administration nurse
- Respiratory therapist
- Personnel for Cricoid pressure (CP)

 Procedure:
- Airway assessment: Quick airway assessment (if condition permits) 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 cease.
- 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 1st tracheal ring (Cricoid) and will continue until ETT placement is confirmed.
- 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 require longer period of time.
- Confirming correct placement
  - Confirm ETT placement with 2 methods, e.g. Auscultation and CO2 detector

**Background Information and Literature Review**

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[1]. The combination of preparation, medication choices, and the swift technique facilitate securing the airway of patients in an emergency.

Optimal pharmacokinetic properties for all RSII medications[4] include; rapid onset, short duration of action, negligible hemodynamic effects, minimal side effect profile, and being quickly reversible[4]. 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[5]. Ketamine is an excellent choice in many RSII particularly hypotensive patients as it increase 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[4]. 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 [6].
Pre-oxygenation. Spontaneous or assisted mask ventilation with 100% O2 for 5 min improves O2 content of the functional residual lung volumes and delay onset of hypoxia when ventilation cease[2]. In Classic RSII, mask ventilation is avoided after induction anesthesia for fear of stomach insufflation despite that it is part of the original description of RSII made in the middle 1950s [7]. Another controversial maneuver in RSII is CP. While it is not part of the originally described RSII, it is widely practiced and considered the standard of practice in modern anesthesiology[8]. Worth noting that the original RSII was performed in sitting or semi sitting position and since CP became popular in the early 60s, supine position during RSII became the gold standard[7].

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Approval

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References