

Fiji School of Medicine Research Project

Does locally produce teaching method on critical
incident improve skills and knowledge?

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I. Introduction

Colonial War Memorial Hospital (CWMH) the largest hospital in Fiji consisting of 800 beds. CWMH is a central referral hospital that receives patients from all other outlying hospitals around Fiji.¹ The CWMH is also a sitting area for the postgraduate training of the Fiji School of Medicine (FSM) in Surgery, Anaesthesia, Obstetrics, Medicines and Pediatrics. The CWMH Anaesthetic department varies in number of anaesthetist every month and ranges from 7 to 15 Anaesthetists per month. Currently, the Anaesthetic department consists of 5 consultants, 1 Anaesthetic lecturer and 6 registrars. The department also enjoys the lectures from visiting Anaesthetic lecturers and consultants through the Fiji School of Medicine since the beginning of postgraduate training in Anaesthesia at CWMH. The current staff at CWMH both trainees, lecturers and consultant comes from Australia, India, Europe, Fiji and other Pacific Islands. Due to differences in educational backgrounds which the consultant and lecturers in Anaesthesia comes from or train from, they have a different set of guidelines that are unique to individual country regarding **critical incidence management**. These differences in educational background and knowledge are passed on to the training registrars and local Anaesthetists. **CWMH lacks clear guidelines to follow when dealing with critical incidence in Anaesthesia and few donated troubleshooting protocols from seminars and drug companies are on display in the theatre.** The different kind of Critical Anaesthetic incidence teaching together with the lack of clear guidelines from CWMH on critical Anaesthetic incidence sometimes leads to differences in management.

The **aim** of this study is to evaluate knowledge and skills based on internationally accepted **Anaesthesia Critical Incidence Management Guidelines before and after one practical session.**^{2, 3} The **two objectives** of this study are teaching critical incidence **established guidelines and improve skill and knowledge on the three critical incidences namely failed intubation, anaphylaxis shock and malignant hyperthermia.**

In developed countries, Anaesthetist particularly in UK, USA, Canada and Australia have access to modern teaching technology inform of human simulators, a computerized teaching mannequin that can display human vital signs. Standardized clinical scenarios can be generated and trainee's response can be measured without the need to intervene for patient safety. The simulators may provide a structured way in which doctors can practice decaying skills. It also allows us to rehearse events that are rarely seen. These rare events can be recreated to evaluate individual or group performance. Errors can be permitted to occur and reveal elements of team dysfunction in a crisis.^{4, 5} Simulators have been compared with teaching crisis using video alone and the results shows no significant changes between the simulator and video group.⁶ Simulators have not been compare with the traditional teaching method. In the Pacific, particularly the CWMH these simulators are not available and critical incidence courses of any kind are not routinely done. Critical incidences at CWMH are reviewed only when the actual incidence occurs in the theatre and discussions can be conflicting due to the differences in skills and knowledge among consultants and registrars.

II. Methodology

The study was conducted in CWMH Operating Theatre over a four months period from July 2005 to October 2005. A questionnaire for fail intubation drill, anaphylaxis shock, and malignant hyperthermia was formulated based on the protocol for crisis management in anaesthesia.

The fail intubation drill was used for this study because it is common especially in obstetric population, 1 in 200 general anaesthesia administered.⁷ Anaphylaxis shock drill was also appropriated because patient going under anaesthesia are expose to large number of drugs and substances over a relatively short period of time and can produce potentially life-threatening immune-mediated anaphylaxis.⁸ Malignant Hyperthermia is quite rare but known triggering agents are anaesthetic drugs.

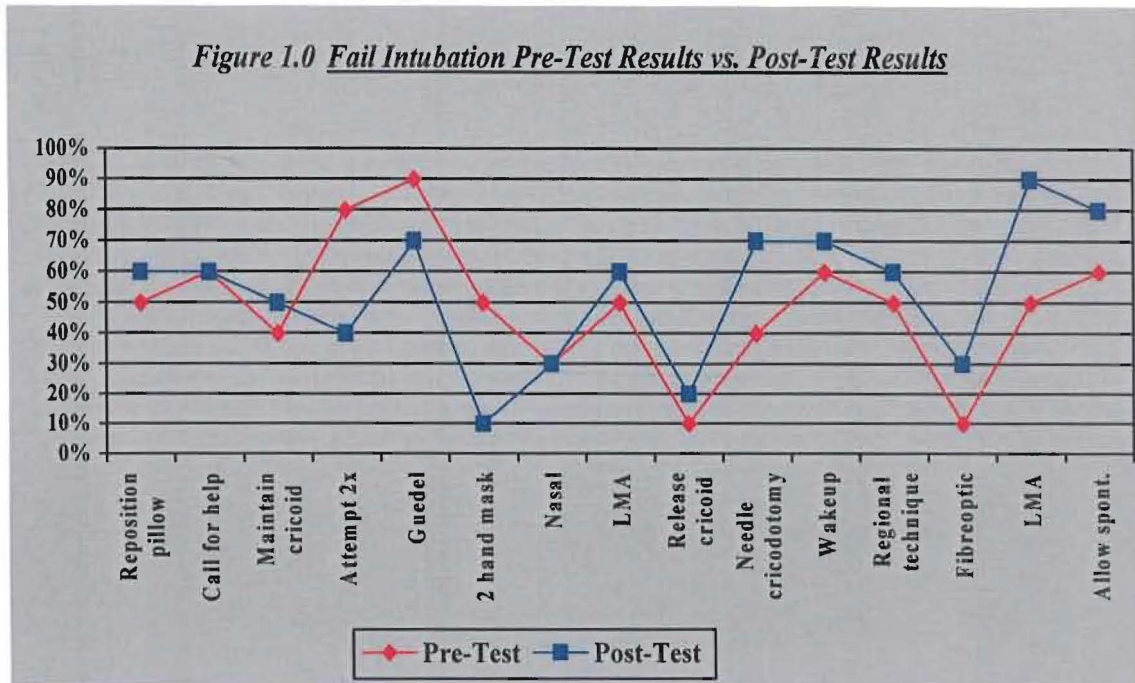
Ten Anaesthetists participated in this study, five consultants and five registrars. Their names were written on a piece of paper and dropped into one of the two marked consultant or registrar envelope. Once the names were deposited, each envelope contents were shuffled. Two names from the consultant's envelope and three names from the registrar's envelope were drawn and these names formed group one. The remaining names from both envelopes formed the second group consisting of three consultants and two registrars.

All participants Anaesthetist were tested individually on clinical skills using a dummy and also were asked questions based on critical incidence of fail intubation, anaphylaxis shock and malignant hyperthermia. They were asked not to discuss the test with anyone or one another. After the initial testing, they were assigned to their respective groups.

Both groups were taught on protocols for Anaesthetic Crisis Management for failed intubation, anaphylaxis shock and malignant hyperthermia at different times with a month interval between each group. A month after teaching the first group, the second group was taught on the same protocol. The testing of both groups using the initial test was done a month after the second group teaching and two months after the first group teaching.

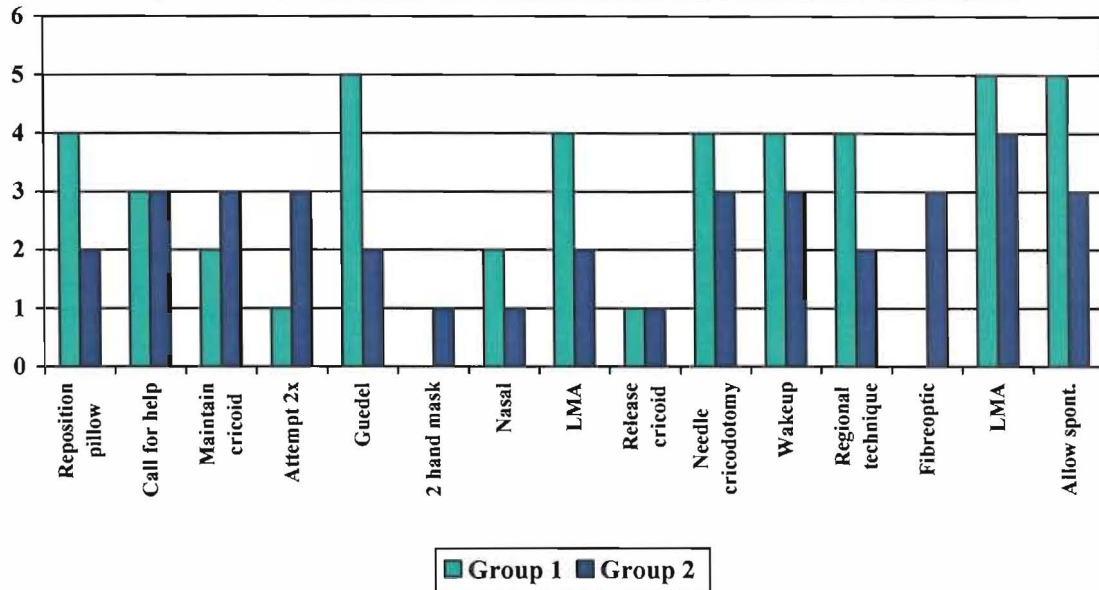
The data collected from both pre and post test were compiled and tallied manually. Microsoft Excel was also used to analyze the data to formulate graphs of the results.

Results



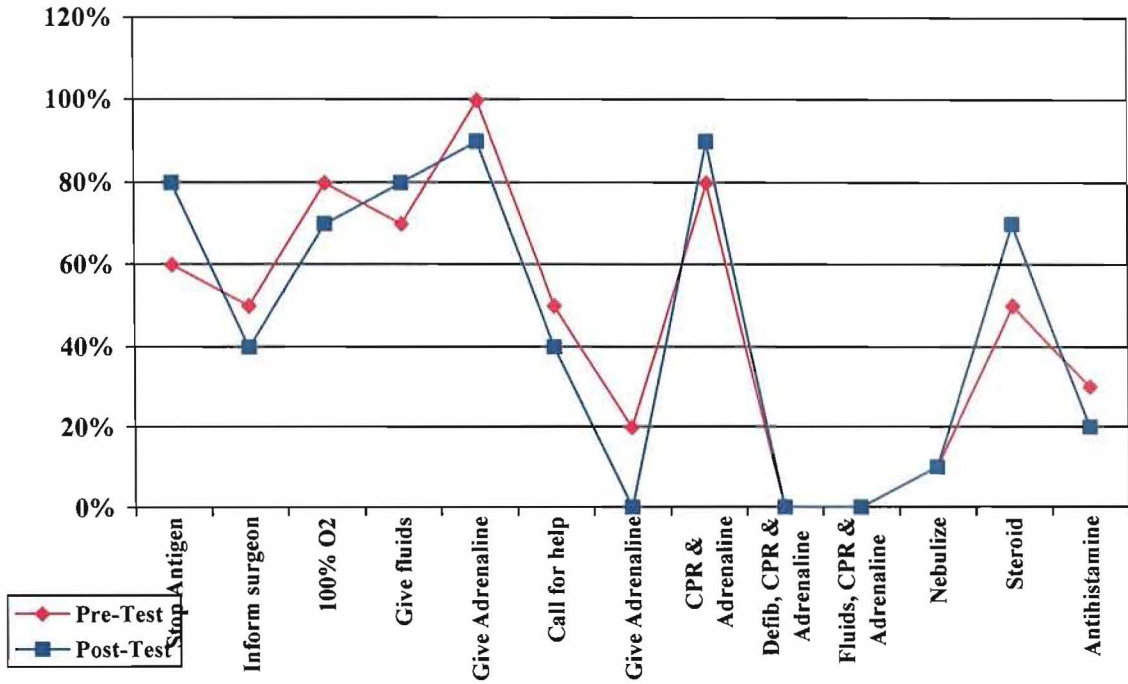
This table shows the result of pre and post test. It shows that the first part of the clinical skills was very similar on both tests. 50 and 60% on reposition, equal percentage on calling for help, 60% and use of nasal airway at 30%. Attempt to intubate twice and use of guedel's airway and 2 hands ventilation was higher in pretest. Use of LMA to allowing spontaneous ventilation was slightly higher at post test ranging from 10 to 40%

Figure 1.1 *Fail Intubation Post-Test Results (Group 1 vs. Group 2)*



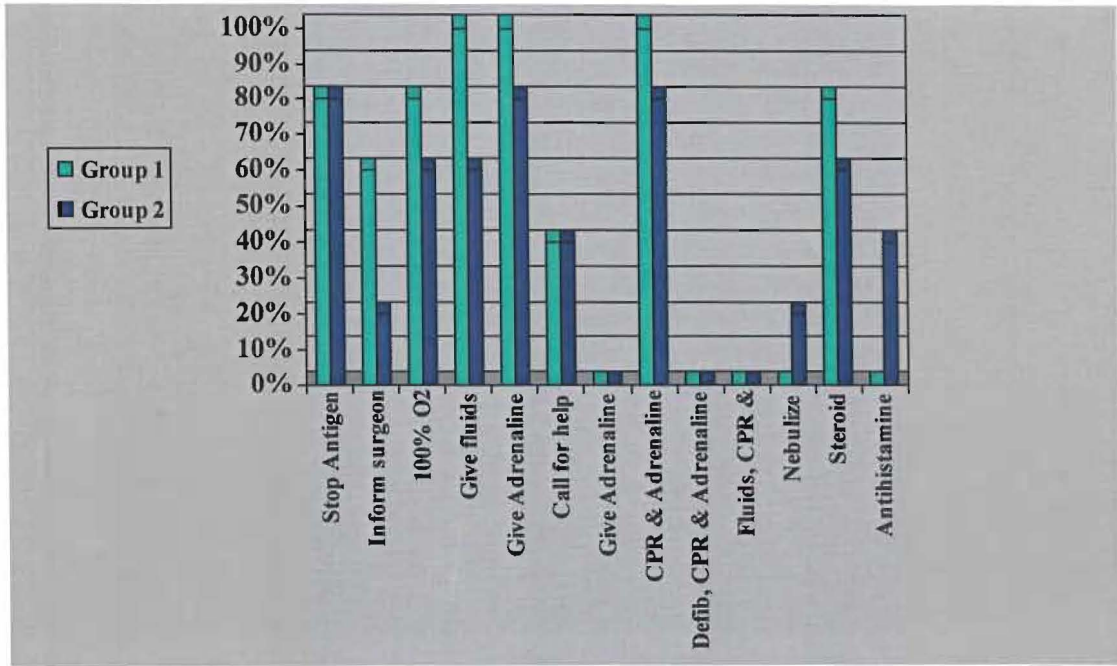
The table shows the post test result of both group 1 and 2. Group1 doing far better than group 2. Group 1 was not better than group in calling for help, maintaining cricoid pressure, attempt to intubate 2x and releasing cricoid.

Figure 2.0 *Anaphylaxis Shock Pre-Test Results vs. Post-Test Results*



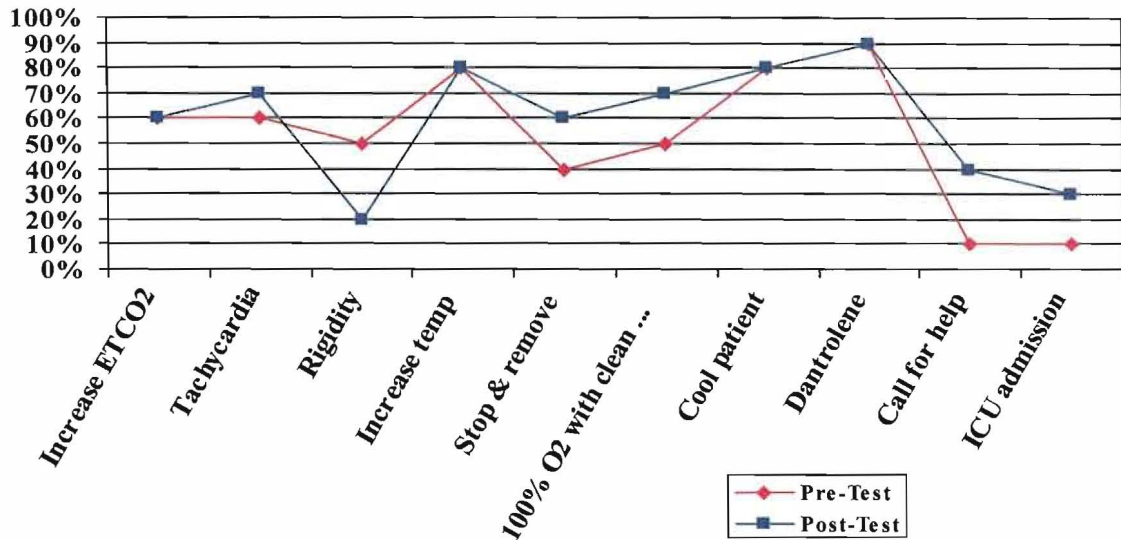
Pre and post test result of anaphylaxis drill. There was no clear advantage between pre and post except in stopping the antigen that the post test shows improvement.

Figure 2.1 Anaphylaxis Shock Post-Test Results (Group 1 vs. Group 2)



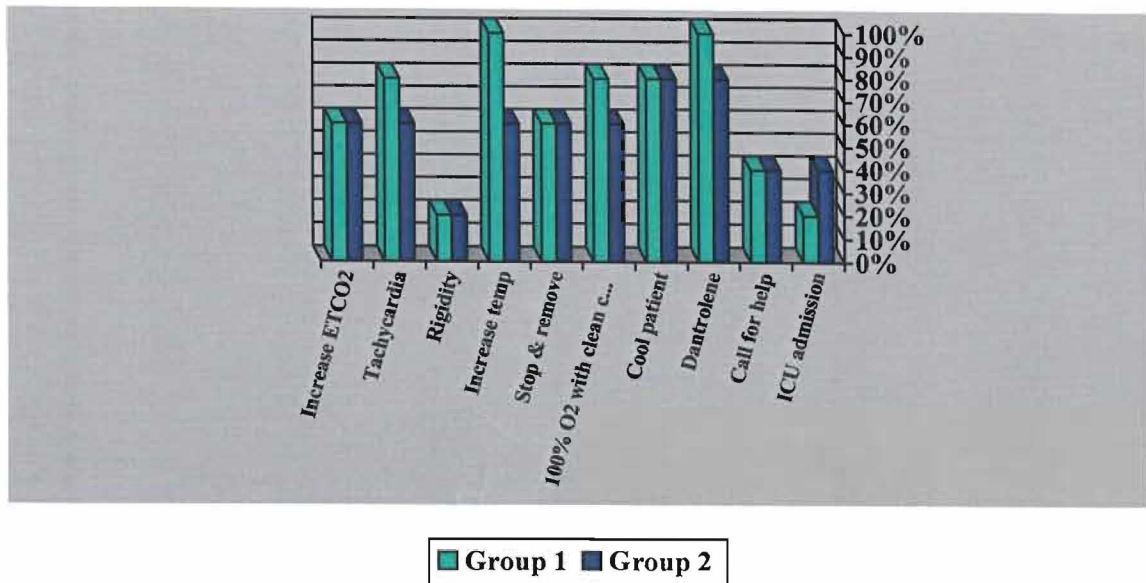
This table shows the result post-test for both groups. Group1 shows marked improvement as compare to group 2.

Figure 3.0 Malignant Hyperthermia Pre-Test Results vs. Post-Test Results



This table shows the result of pre and post test result of sign and treatment for MH. Post test results shows improvement in recognizing signs and improvement in treatment.

Figure 3.1 Malignant Hyperthermia Post-Test Results (Group 1 vs. Group 2)



The table shows the post-test result of both group in recognizing and treatment of MH. Group 1 shows slight improvement in recognizing signs. Treatments in both groups were relatively equal.

Discussions

In table 1 shows that the teaching of the guidelines, the participants were able to learn that in fail intubations there is a need to provide oxygen quickly. They tend to jump over other maneuvers. The pretest shows that most spend still trying to intubate when it was not possible. After going over the guidelines, attempting to intubate over and over again decrease by 20% among the participant. Other means of providing oxygen slightly improved by 10% except LMA which was increase by 40%. This show that even with low cost, in- house can improve some practice.

The other table of post-test for fail intubations between group 1 and group 2 shows that time was not the factor for improve results or poor results of both group. Group 1 was taught guidelines 2 months before the post-test whereas group 2 was taught guidelines 1 month prior to post-test. The only explanation that can probably explain the results is that most members of groups 2 were much older, nearing the retiring age of work. Because of older population, probably has to do with the decreased information retention. Similar results are also present in post-test in Anaphylaxis and Malignant Hyperthermia.

In Anaphylaxis drill, the result in pre and post-test results shows that not much differences. I think this is because participants were either been exposing to this type of problem before and are comfortable in dealing with them or because they are usually

called to resuscitate patient more times than anybody. The Anaphylaxis shock is circulatory collapse and respiratory as well which the participant deals with them almost on daily basis and this might have gave them an edge.

Malignant hyperthermia drill shows participant knew what it was. There was a slight difficulty in recognizing early signs and administer appropriate treatment. After the one time course on guidelines of recognizing and treatment, there was general improvement in dealing with this problem. This is kind show that this type of learning does improve skills and knowledge.

The study is quite small and also needs lots of improvement in the future to come up with better one to try and get true results that this type of learning is good. Skills and knowledge are hard to measure and this study did try and attempt measure. It is not perfect but at least I have learn a lot from it. Although, it is small, the result hopefully give us something to think about in regards to high technology methods of learning, diagnosis etc..that are far too expensive for our setting, the Pacific Islands.

Conclusion

The result shows that there was slight improvement in skills and knowledge in Fail Intubations drill and Malignant Hyperthermia. Anaphylaxis Drill did not show much improvement. Knowledge and skills in Fail intubation did shows improvement airway management from 10 to 40% in some areas. The time of teaching also shows that it was not a factor in information retention. Group 1 in Fail intubations group show slight better results, 20 to 40 %, than group 2 but were train in the guidelines 1 month earlier than group 2, and 2 months before post-test.

The Anaphylaxis drill did not show much difference in pre and post-test result. Yet, the post-test result in group 1 did slightly better than group 2.

In Malignant Drill, the post-test results show 10% improvement in recognizing and treatment, both skills and knowledge. Between the 2 groups, the post-test shows that group 1 did slightly better than group 2 min some areas. Most areas there was not much difference between the two groups.

Recommendations

- To establish formal routine training in CWMH on critical incidence in Anaesthesia;
- To formulate an internationally accepted guidelines for critical incidence in Anaesthesia at Colonial War Memorial Hospital.

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Fail Intubation Drill

Last Name

First Name

Age

Sex

Nationality

Position

Can't Intubate

- Reposition pillow
- Call for help
- Maintain cricoid pressure

Try a gum elastic bougie STOP trying if unsuccessful x 2 attempts

Skills

Can't Ventilate

- Insert Guedel airway
- Two hands to mask
- Nasal airway
- LMA
- Release cricoid
- Needle cricothyroidotomy

Knowledge

Can Ventilate and Oxygenate

- Wake up the patient and postpone surgery
- Regional technique
- Awake fiberoptic
- Continue an LMA
- Allow spontaneous ventilation

Level

- Confident, can work alone
- Some confidence, can't work alone
- Can work alone only if help is nearby

Knowledge

- Very good
- Good
- Need improvement

Anaphilaxis Drill

Stop administration of any possible antigens?

Call for help and inform Surgeon's

Start ABC

- Give 100% O₂
- Give fluids
- Give Adrenaline
- Call for help

If still no pulse after the above treatment then what?

- Give adrenaline
- Start CPR and give adrenaline as necessary
- Defib. Adrenaline and CPR
- Give more fluids, start CPR and adrenaline as necessary

Other Treatment

- Salbutamol Nebulizer
- Steroids
- Antihistamine

Level

- Confident, can work alone
- Some confidence, can't work alone
- Can work alone only if help is nearby

Knowledge

- Very good
- Good
- Need improvement

Malignant Hyperthermia Drill

Knowledge

Early signs of MH

- Unexplained high ETCO₂
- Concomitant Tachycardia

Other signs

- Muscle Rigidity/Jaw Rigidity on Intubation
- Increasing Temperature

Skills

Treatment

- Stop Anaesthesia and remove the anaesthetic machine
- Hand ventilate with 100% oxygen using a clean circuit
- Start cooling patient by any available method
- Give Dantrolene if available
- Call for help
- Consider ICU admission

Level

- Confident, can work alone
- Some confidence, can't work alone
- Can work alone only if help is nearby

Knowledge

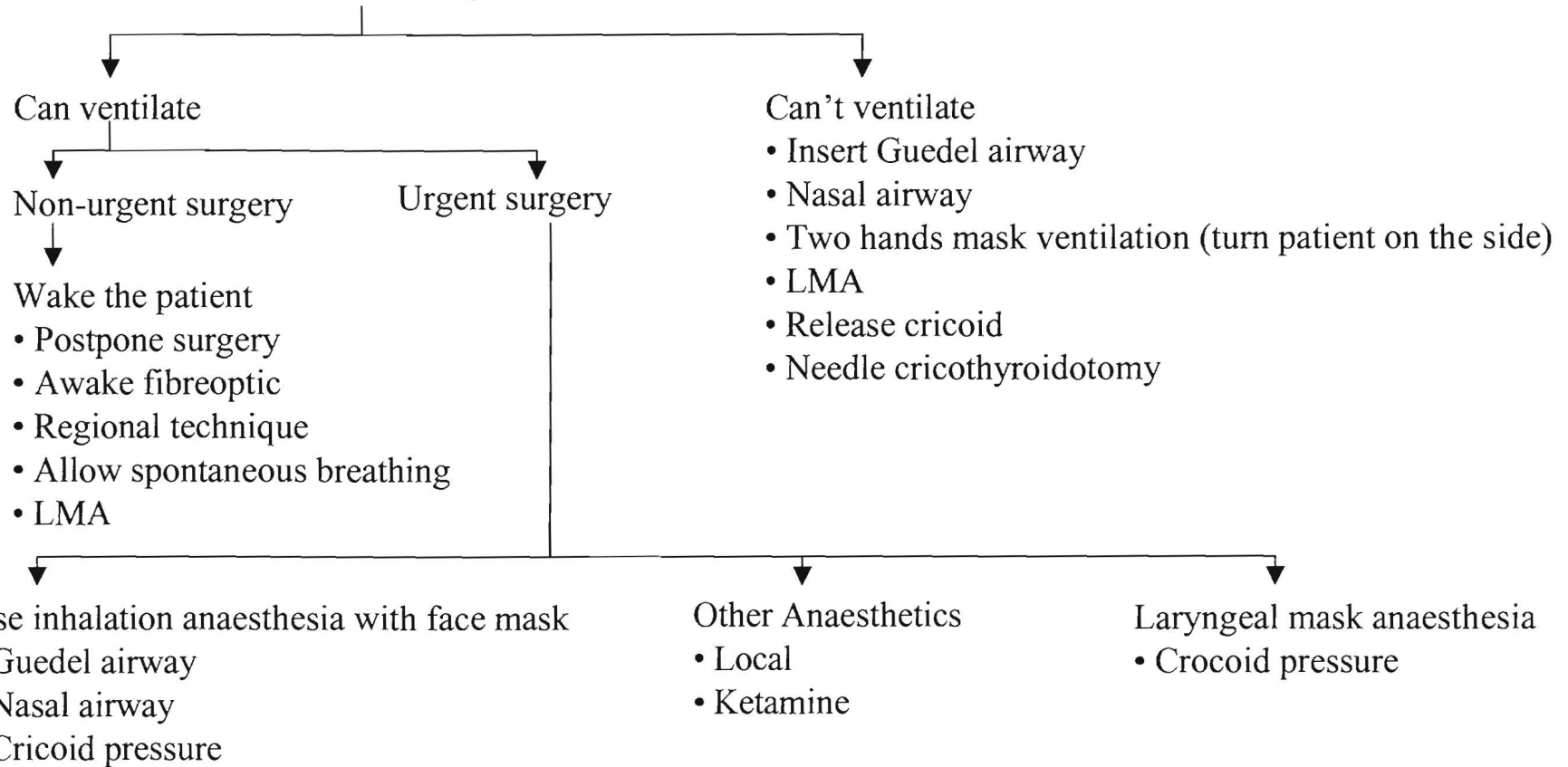
- Very good
- Good
- Need improvement

Fail Intubation Drill

- Call for help
- Maintain cricoid pressure if risk of aspiration
- Continue to ventilate with face mask with oxygen
- Reposition



Attempt 2x with elastic bougie, STOP if unsuccessful



Anaphilaxis Crisis

Initial Therapy

- Stop administration of drug(s) likely to have caused the anaphilaxis
- Call for help
- Maintain airway: give 100% O₂
- Inform the surgeon, if possible stop surgery
- Lay patient flat with feet elevated
- Give Adrenaline
0.5 – 1mg (0.5 – 1ml of 1:10,000) im./IV
- Start intravascular volume expansion with suitable crystalloid or colloid

Secondary Therapy

- Antihistamines
 - Corticosteroids
 - Bronchodilators
-

Malignant Hyperthermia Crisis

Consider MH if:

- Unexplained, unexpected increase in end-tidal CO₂
- Unexplained, unexpected tachycardia
- Masseter muscle spasm after Suxamethium
- Increasing temperature

Early Management

- Call for help
- Withdraw all trigger agents (all volatile agent)
- Install clean anaesthetic breathing system
- Hyperventilate with 100% O₂
- Abandon surgery if feasible
- Give Dantrolene IV (1 mg/kg)
- Surface cooling
- Measure core temperature
- Measure ABGs, K⁺ and CK

Intermediate Management

- Control serious arrhythmias with B blockers
- Control hyperkalaemia and metabolic acidosis

Later Management

- Promote Diuresis with Fluids-Mannitol
 - Observe urine output for renal failure
 - Clotting factors screen
 - Consider ICU admission
-