CAWANGAN PERKHIDMATAN
PENOLONG PEGAWAI PERUBATAN

STANDARD PRACTICE GUIDELINES

ASSISTANT MEDICAL OFFICERS IN ANAESTHESIA & INTENSIVE CARE SERVICES

- ANAESTHETIC ASSISTANT & TECHNOLOGISTS (AAT)
- INTENSIVE CARE TECHNOLOGISTS (ICT)

STANDARD PRA
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GUIDELINES

Ministry Of Health, Malaysia

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DIRECTOR GENERAL OF HEALTH MALAYSIA FORWARD MESSAGE

Ministry of Health is currently intensifying health care delivery as part of the Millennium Development Goals as there is a growing acknowledgement that optimal health care cannot be delivered by simply ensuring coexistence of infrastructure, medical supplies and health care providers. Strengthening our health care delivery requires a deliberate focus on quality of health services, which involves providing effective, safe, patient-centred care that is timely, equitable, integrated and efficient. There are three sub-disciplines in Anaesthesia and Intensive Care services, which are Anaesthesia (Anaesthesiologist Assistant - AA), Intensive Care Unit (Intensive Care Technologist - ICT) and Peri-anaesthesia (Anaesthetic Assistant and Technologist - AAT). This Standard Practice Guidelines (SPG) are prepared for AMO working in Anaesthesia and Intensive Care Services.

The SPG are aimed at providing useful information for quality patient management and I hope the guidelines will be used as primary source reference for AMO throughout the country in the execution of their duties and efforts to provide quality health care to the community. It is my sincere hope that this SPG endeavour AMO in clinical practice to move to greater heights. It also serves to enhance the quality standards management of patients by AMO in Anaesthesia and Intensive Care services.

I believe with the adoption of this first edition, the services rendered by AMO will be enhanced to its optimum level. It also will serve as a reference to those who are new in the field of anaesthesia and intensive care services. I am delighted as in this SPG, the role and responsibilities of AMOs are deliberately explained. In recognizing the competency of the AMOs in each subspeciality, credentialling already ongoing process, which has started on 2018. I am confident the SPG will be well accepted. We will ensure that updates with new emerging protocols, activities and procedures will be introduced in future editions in line with current practice.

I am always impressed with efforts to strive for excellence in service delivery and such efforts by the AMO in Anaesthesia and Intensive Care services are most commendable indeed. On behalf of the Ministry of Health, I would like to extend my distinguished congratulations to the Medical Practices Division, Assistant Medical Officers Services Section and esteemed Anaesthesiologists, as well as the AMO Technical Committee for their tireless efforts and commitment to publish the 1st Edition of Standard Practice Guidelines for AMO in Anaesthesia and Intensive Care services. My personal heart-warming appreciation tributes to AMO in Anaesthesia and Intensive Care services throughout the country who uphold high standard of professionalism in the execution of their duties in order to provide quality health care to the community. The Ministry of Health Malaysia takes special pride in the fraternity's continuous determination for excellence in service delivery to the nation.

Tan Sri Dato' Seri Dr. Noor Hisham bin Abdullah
Director General of Health Malaysia

DIRECTOR MEDICAL PRACTICE DIVISION FORWARD MESSAGE

Throughout the years, the standard of practice among the Assistant Medical Officers in Anaesthesia and Intensive Care services under Ministry of Health has shown some great enhancement in clinical practice for the better management of patient care. It is noted many years back, as there were few reference documents available, these Assistant Medical Officer need to learn from their seniors through hands-on training with guidance of Anaesthesiologists and Intensivists to acquire knowledge and skills in providing good quality of patient care.

It is time to have a dedicated SPG for AMOs in Anaesthesia and Intensive Care services as it will provide a greater impact on the services and performance of AMO in their clinical settings. This SPG is very essential and relevant in the current practice of AMOs in Anaesthesia and Intensive Care services with the aim of having uniformity and standardization with consistency of practice in this discipline where performance of AMO could be strengthened. We believe with the adoption of this new SPG, the services rendered by AMO in Anaesthesia and Intensive Care services will be enhanced to its optimum level. It also will serve as a reference to those who are new in Anaesthesia and Intensive Care services.

It is our sincere hope that this new version of SPG would form part of an important document to be complied with by the AMO in providing better care to patients. It is noted the task in preparing the new edition is not an easy one, where it requires good leadership, teamwork, commitment, knowledge and dedication. With that, I would like to congratulate to those involved in developing this first edition of SPG for AMO in Anaesthesia and Intensive Care services and our heartfelt appreciation to them for their passion and endless effort.

Dr. Mohamed Iqbal bin Hamzah
Director
Medical Practice Division

HEAD OF SERVICE FORWARD MESSAGE

The Anaesthetic and Intensive Care Service is arguably one of the biggest services in the hospitals. With increasing demands from the public and clinicians, the anaesthetic departments face many encounters in meeting these expectations. Clearly, there is a need for this critical service to be delivered in an efficient, structured and coordinated manner consistent with the vision and mission of the Ministry of Health. I believe that with this in mind, the idea of developing the Standard Practice Guideline (SPG) by Assistant Medical Officers Services Section was mooted. I would like to congratulate all those who have contributed by sharing their experience and knowledge during the preparation of SPG.

The first structured form of Anaesthesiology and Intensive Care Services by Assistant Medical Officer was published in 2007, which only cover roles of Assistant Medical Officers (AMO) in Anaesthesia (East Malaysia). Currently the new SPGs for AMO in Anaesthesia and Intensive Care services are formed is a written instruction of a particular procedure which consist of scope, purpose, materials or equipment, work process, references, flow chart and revision history. It is vital for AMO in Anaesthesia and Intensive Care services so that quality and uniformity is maintained all times. Therefore, it is necessary for AMO to adhere to the SPG while carrying out their duties.

I believe this first edition of SPG for Assistant Medical Officer in Intensive Care Unit (Intensive Care Technologists – ICT) and Peri-anaesthesia (Anaesthetic Assistant and Technologist - AAT) will provide a greater impact on the services and performance of AMO. This SPG is very essential and relevant in the current practice of AMO in anaesthesia and intensive care services with the aim of having uniformity and standardization with consistency of practice in this discipline where performance of AMO could be strengthened.

This SPG will also benefit AMO managers in formulating local hospital policies and procedures, coordinating interdepartmental collaboration, and planning for facilities and service development, thereby ensuring that available resources are utilised optimally. This handbook is excellent as a guide to all AMO in Anaesthesia and Intensive Care service who are learning as well as for those already active in the practice.

Overall, I hope that this book will be very useful for all AMO and I would like to take this opportunity to express my gratitude to all of the contributors for their outstanding work and hope this SPG will be a useful reference for all AMO. Lastly, I would like to thank Medical Practices Division, Assistant Medical Officers Services Section and esteemed Anaesthesiologists, as well as the AMO Technical Committee for their tireless efforts and commitment to publish the 1st Edition of Standard Practice Guidelines for AMO in Anaesthesia and Intensive Care Service

Dr. Zalina binti Abdul Razak
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HEAD OF ASSISTANT MEDICAL OFFICER MESSAGE

Despite many achievements of our healthcare delivery system in the past and present, an increasingly expectancy on better services from our Assistant Medical Officers (AMO) from public continues. Clearly, there is still much room to improve AMO services. Better approaches and processes for the delivery of hospital-based services have to be articulated and implemented, and we should have the fortitude and courage to put planned approaches into action.

We also need to ensure that proper structures are put in place in our hospitals that are acceptable, evidence-based, outcome-oriented, quality driven, practical, and above all suit the needs and benefits of our patients in order to meet the requirement of AMO Professional Development Plan (6P) 2016-2030 by Assistant Medical Officers Services Section. Having a well-documented SPG for AMO in Anaesthesia and Intensive Care service as this will help to ensure that services are executed efficiently, while utilising existed resources. SPG shall be among our strategies to improve the AMO services in Anaesthesia and Intensive Care, apart from measures like infrastructural and human capital development.

This SPG will achieve uniformity, standardization, correctness, accuracy and effectiveness as well consistency in performance and competency of AMO in Anaesthesia and Intensive Care service. Hence, compliance to SPG would ensure patient's safety in accordance to Ministry Of Health policies and guidelines. Developing this SPG, I am sure, this is a challenging task to the committee. It requires a great depth of knowledge, consistency, team approach and the courage to decide on what should constitute standard methods. I deeply indebted to the esteemed Anaesthesiologists, Intensivist and AMO Technical Committee of Anaesthesia and Intensive Care service for their indefatigable efforts upon completion of this SPG. I would like to express my gratitude to the Anaesthesia and Intensive Care fraternity for their involvement in producing of this new format of SPG.

I once again congratulate the AMO Technical Committee of Anaesthesia and Intensive Care service to be the first clinical discipline to develop and publish such a comprehensive document which consists of scope, purpose, materials, equipment, work process, references, flow chart and revision history.

Warm regards,

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2. The Deputy Director General of Health (Medical).
3. The Director of Medical Development Division, MOH.
4. The Director of Medical Practice Division, MOH.
5. The Technical Advisors of SPG.
6. All Senior Consultant Anaesthesiologists, MOH.
7. Head of National Anaesthesiology Services.
8. The Members of Technical Committee.
9. The Panel of Reviewers.
10. The Panel of Contributors.
11. Assistant Medical Officer Service Section.
12. Malaysian Society of Anaesthesiology for Nurses and Assistant Medical Officers (MSANAMO).
13. All other colleague individuals and organization who have contributed directly or indirectly towards the success of this publication.

CONTENT

LIST OF ABBREVIATION	
ABG	Arterial Blood Gas.
ABP	Arterial Blood Pressure.
ART	Artery.
AED	Automated External Defibrillator.
ALS	Advance Life Support.
AFBI	Awake Flexible Bronchoscope Intubation.
AGSS	Anaesthetic Gas Scavenging System.
AMO	Assistant Medical Officer.
APS	Acute Pain Service.
ASA	American Society of Anaesthesiologist.
ASIS	Asset & Service Information System.
BAL	Bronchoalveolar Lavage.
BEMS	Biomedical Engineering Maintenance Services.
BHT	Bed Head Ticket.
BIS	Bispectral Index.
BP	Blood Pressure.
BPP	Basic Procedure Pack.
BURP	Backward, Upward, Rightward Pressure.
BVF	Bacterial Viral Filter.
BVM	Bag Valve Mask.
CA	Concession Agreement.
cm	centimetre.
cmH2O	centimetre water.
CNS	Central Nervous System.
CFI	Cardiac Function Index.

LIST OF ABBREVIATION	
CNS	Central Nervous System.
CO	Cardiac Output.
CO2	Carbon Dioxide.
CI	Cardiac Index.
CCO	Continuous Cardiac Output.
CPAP	Continuous Positive Airway Pressure.
CSE	Combine Spinal Epidural.
CSF	Cerebrospinal Fluid.
CT	Computed Tomography.
CVP	Central Venous Pressure.
CVS	Cardiovascular System.
DAS	Difficult Airway Society.
ECT	Electroconvulsive Therapy.
EBB	Endobronchial Blocker.
eFEMS	Electronic Facility Engineering Maintenance Services.
ERCP	Endoscopic Retrograde Cholangiopancreatography.
ETCO2	End Tidal Carbon Dioxide.
ETT	Endotracheal Tube.
EVLW	Extravascular Lung Water.
EVLWI	Extravascular Lung Water Index.
FFP	Filtering Face-piece Respirator.
FiO2	Fraction of Inspired Oxygen.
Fr	French Scale Measurement System.
GA	General Anaesthesia.
GCS	Glasgow Coma Scale.

LIST OF ABBREVIATION	
GEDI	Global End Diastolic-Volume Index.
GEDV	Global End Diastolic Volume.
HCW	Health Care Worker.
HEPA	High Efficiency Particulate Air.
HFNC	High Flow Nasal Cannula.
HLD	High Level Disinfectant.
HME	Heat Moisture Exchanger.
HSIP	Hospital Specific Implementation Plan.
HSS	Hospital Support Service.
IBP	Invasive Blood Pressure.
ICL	Invasive Cardiac Laboratory.
ICP	Intra Cranial Pressure.
ICU	Intensive Care Unit.
IPPA	Inspection, Palpation, Percussion, Auscultation.
IPPV	Intermittent Positive-Pressure Ventilation.
ITBV	Intrathoracic Blood Volume.
ITBI	Intrathoracic Blood-Volume Index.
IV	Intravenous.
LMA	Laryngeal Mask Airway.
L/min	Litre per minute.
LAST	Local Anaesthetic Systemic Toxicity.
MAC	Minimum Alveolar Concentration.
MAD	Mucosal Atomization Device.
MDI	Metered Dose Inhaler.
MH	Malignant Hyperthermia.

LIST OF ABBREVIATION	
ml	millilitre.
MLT	Microlaryngoscopy Tube.
mmHg	millimetre mercury.
MO	Medical Officer.
MR	Magnetic Resonance.
MRI	Magnetic Resonance Imaging.
MySpa	Sistem Pemantauan Pengurusan Aset Kerajaan Malaysia.
NBM	Nil By Mouth.
NIV	Non-invasive Ventilator.
N/Saline	Normal Saline.
N2O	Nitrous Oxide.
NMBA	Neuromuscular Blocking Agent.
NORA	Non-Operating Room Anaesthesia.
OPA	Oropharyngeal Airway.
OT	Operation Theatre.
O2	Oxygen.
OR	Operation Room.
PAPR	Powered Air Purifying Respirator.
PCA	Patient Controlled Analgesia.
PiCCO	Pulse Index Contour Cardiac Output.
POG	Project Operational Guidelines.
PPE	Personnel Protective Equipment.
psi	per square inch.
PISS	Pin Index Safety System.
RR	Respiration Rate.

LIST OF ABBREVIATION	
RSI	Rapid Sequence Intubation.
SAB	Subarachnoid Block.
SGA	Supraglottic Airway.
SpO2	Saturation of Peripheral Oxygen.
SSSL	Safe Surgery Safe Life.
SV	Stroke Volume.
SVI	Stroke Volume Index.
SVR	Systemic Vascular Resistance.
SVRI	Systemic Vascular Resistance Index.
SVV	Stroke Volume Variation.
TCI	Target Controlled Infusion.
TIVA	Total Intravenous Anaesthesia.

STANDARD PRACTICE GUIDELINES FOR AMO IN ANAESTHESIA AND INTENSIVE CARE SERVICES

A.1. CLEANING, DECONTAMINATION AND STERILIZATION OF MEDICAL APPARATUS

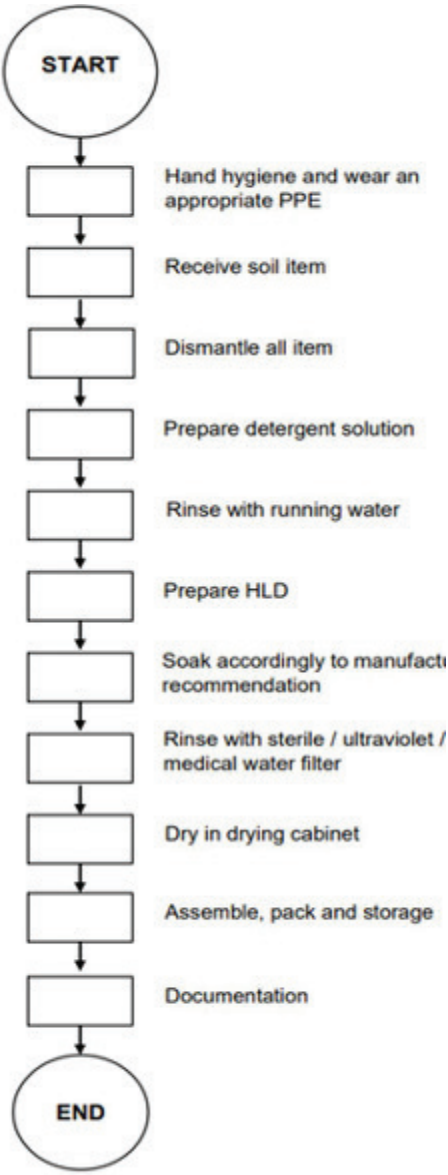
Scope	Assistant Medical Officers are responsible for verifying any medical apparatus used in the provision of care to patients are being cleaned, disinfected and sterilized according to the current standards and hospital infection control guidelines.
Purpose	To achieve effective disinfection and sterilization of medical apparatus in order to prevent any transmission of infectious pathogens to patient and HCW.
Materials / Equipment	1. PPE:- i. mask (3 ply or R95 or N95). ii. goggles or face shield. iii. long-sleeved fluid repellent gown (isolation gown). iv. apron (long apron, disposable apron). v. gloves. vi. boots (shoes or boots cover). 2. HLD. 3. Detergent solution or enzymatic cleaning solution. 4. Tap water. 5. Tube dryer. 6. Cleaning brush. 7. Sterile or ultraviolet or disposable water filter. 8. Drying cabinet. 9. Transparent plastic bag. 10. Sealer machine.

Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Receive soil item. 4. Dismantle all items. 5. Prepare detergent solution (refer manufacturer recommendation for dilution and contact time). 6. Clean with brush and rinse with running water to remove visible foreign material. 7. Prepare HLD (refer manufacturer recommendation for dilution and contact time). 8. Soak accordingly to manufacturer recommendation. 9. Rinse with sterile or ultraviolet or medical water filter. 10. Dry in drying cabinet. 11. Assemble, pack and storage. 12. Documentation.
References	Baheti, K. B. & Laheri, V. V. (2015). Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Council Members, College of Anaesthesiologists, Academy of Medicine of Malaysia. (2014). Guidelines on infection control in anaesthesia. College of Anaesthesiologists, Academy of Medicine of Malaysia. Geneva: World Health Organization; (2014). Infection Prevention and Control of Epidemic- and Pandemic- Prone Acute Respiratory Infections in Health Care. Annex I, Cleaning and disinfection of respiratory equipment. Available from: https://www.ncbi.nlm.nih.gov/books/NBK214361/ Josephs-Spaulding, J., & Singh, O. V. (2021). Medical Device Sterilization and Reprocessing in the Era of Multi drug-Resistant (MDR) Bacteria: Issues and Regulatory Concepts. Frontiers in medical technology, 2, 587352. https://doi.org/10.3389/fmedt.2020.587352.

References	Juwarkar, C. S. (2013). Cleaning and sterilization of anaesthetic equipment. Indian journal of anaesthesia. 57(5), 541– 550. doi:https://doi.org/10.4103/0019-5049.120152. Ling, M. L., Ching, P., Widitaputra, A., Stewart, A., Sirijindadirat, N., & Thu, L. (2018). APSIC guidelines for disinfection and sterilization of instruments in health care facilities. Antimicrobial resistance and infection control, 7, 25. https://doi.org/10.1186/s13756-018-0308-2. Lee, C. Y. (2006). Manual of anaesthesia. Singapore: McGraw Hill Education. MOH, M. (2010). Policies and procedures on infection control (2nd ed.). Ministry of Health Malaysia. Shintani H. (2017). Ethylene oxide gas sterilization of medical devices. Biocontrol Sci. 22:1–16. World Health Organization. (2016). Decontamination and reprocessing of medical devices for health-care facilities. World Health Organization. Retrieved from https://apps.who.int/iris/handle/10665/250232.
Flow Chart	Refer Appendix A.1.
Revision history	Not applicable.

Appendix A.1.

FLOW CHART CLEANING, DECONTIMINATION & STERILIZATION OF MEDICAL AND NON-MEDICAL APPARATUS



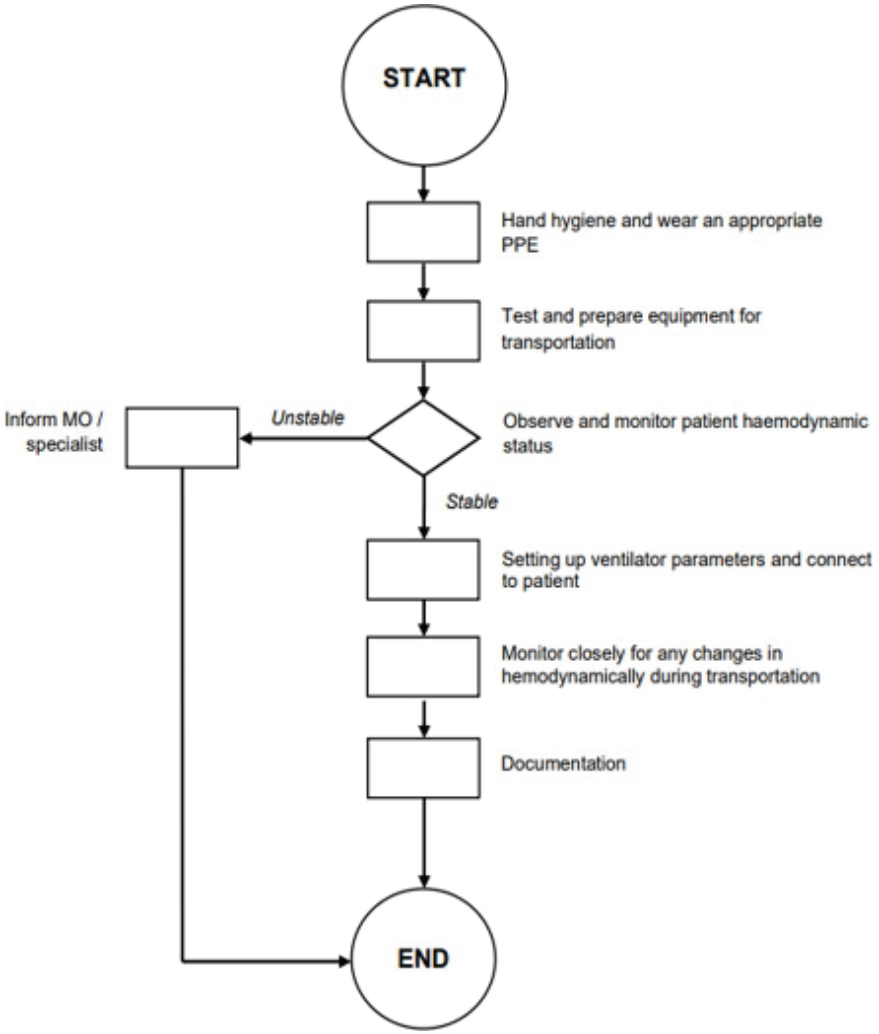
A.2. MANAGEMENT IN TRANSPORTATION OF CRITICALLY ILL PATIENT

Scope	Assistant Medical Officers are responsible to conduct intrahospital and interhospital transportation of critically ill patient.
Purpose	To ensure patient safety during transportation by providing an equivalent or higher degree of monitoring and medical care.
Materials / Equipment	1. PPE. 2. Ventilator; transport. 3. Oxygen cylinder. 4. Schrader valve regulator or pin index regulator. 5. Physiological monitor; transport. 6. Resuscitation kit. 7. Pump; infusion; syringe. 8. Pump; suction, transport. 9. Defibrillator or AED. 10. Documentation: Referral record, BHT.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Test and prepare equipment for transportation. 4. Observe and monitor haemodynamically status of patient. If unstable, inform MO or specialist. 5. Setting up ventilator parameters as per order by MO or specialist or based on previous ventilator setting and connect ventilator circuits to patient. 6. Monitor closely for any hemodynamic changes during transportation. 7. Documentation

References	College of Anaesthesiologists, Academy of Medicine of Malaysia Recommendations of Minimum Standards for Inter- Facility Transport of The Critically Ill Patients – 2016. D. C. Jayasekera, D. B. Goonathillake, D. S. Hapuarachchi et al., (2015). Guidelines for Transport of Adult Critical Care Patient in Sri Lanka November, Critical Care of Medicine, Sri Lanka. Droogh, J. M., Smit, M., Hut, J., de Vos, R., Ligtenberg, J. J., & Zijlstra, J. G. (2012). Inter-hospital transport of critically ill patients; expect surprises. Critical care (London, England), 16(1), R26. https://doi.org/10.1186/cc11191. Eiding H, Kongsgaard UE, Braarud A. (2019). "Interhospital transport of critically ill patients: experiences and challenges, a qualitative study." Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine 27(1): 27. Kiss T, Bölke A, Spieth PM. (2017). Interhospital transfer of critically ill patients. Minerva Anesthesiology.;83:1101–1108. Parveez, M. Q., Yaddanapudi, L. N., Saini, V., Kajal, K., & Sharma, A. (2020). Critical events during intra-hospital transport of critically ill patients to and from intensive care unit. Turkish journal of emergency medicine, 20(3), 135–141. https://doi.org/10.4103/2452-2473.290067.
Flow Chart	Refer Appendix A.2.
Revision history	Not applicable.

Appendix A.2.

FLOW CHART MANAGEMENT OF TRANSPORTATION CRITICALLY ILL PATIENT



A.3. REPROCESSING AND PREPARATION OF BAG VALVE MASK DEVICE

Scope	Assistant Medical Officers are responsible in reprocessing (according to hospital infection control guidelines) and preparation of BVM to ensure it is functioning well before use on patient.
Purpose	To ensure BVM functioning well and safe to use on patient.
Materials / Equipment	1. PPE. 2. Bag valve mask device. 3. Oxygen tubing. 4. Storage container. 5. Transparent plastic bag. 6. HLD.
Work Process	1. Cleaning: i. hand hygiene. ii. wear an appropriate PPE. iii. dismantle the bag valve mask parts iv. ensure all parts are complete. v. check the valves and reservoir bag are intact. vi. wash all the BVM parts thoroughly with running water before soaking in the HLD solution. vii. rinse in sterile water and dry it in drying cabinet. 2. Assemble**:** i. ensure all parts are assemble according to manufacturer operating manual: - face mask. - expiratory valve. - pressure relief valve. - self-inflating bag. - air-inlet and pressure release valves. - air-inlet one-way valve. - reservoir bag.

Work Process	3. Function test: i. ensure all accessories attached to BVM. ii. self-inflating bag: - squeeze the BVM with one hand and close neck opening with the other hand. - release the grip on the bag. - rapid bag re-expansion confirms the efficient air intake. - close the neck opening and squeeze the bag. - If the bag cannot be squeezed with reasonable force, it is evidence of no leakage at air-inlet one-way valve. iii. attach the patient valve to the self-inflating bag to test the oxygen nipple: - squeeze the self-inflating bag. - release it while closing the reservoir valve. - slow re-expansion of the bag observed and it confirmed the oxygen nipple is intact. iv. squeeze the self-inflating bag several times and inspect the lip valve opens during squeezing. v. hold reservoir bag over the patient port connector then squeeze: - filling of the reservoir bag confirms that the patient valve efficiently directs air to the patient. vi. reservoir bag: - held firmly to the valve connector. - continue squeezing while watching the external disk membrane. - lifting of the disk membrane confirms that air is correctly directed to atmosphere instead of being returned to the self-inflating bag.

vii. reservoir flap valves:
- attach patient valve to the reservoir bag.
- fill the bag with ambient air.
- attach reservoir bag to the intake valve and press on reservoir bag.
- squeeze the reservoir bag and visual rise of the outlet flap valve as it confirms the reservoir valve efficiently vents excessive gas to atmosphere.
- with the patient valve in place, attach the reservoir assembly to the intake valve.
- perform several compression-release cycles on the self-inflating bag until reservoir bag is flat and empty.
- rapid re-expansion of the self-inflating bag after flattening of the reservoir bag and visual movement of the inlet membrane confirm the reservoir valve efficiently lets in ambient air to compensate for lack of gas in the reservoir or insufficient gas flow through oxygen tubing and nipple.

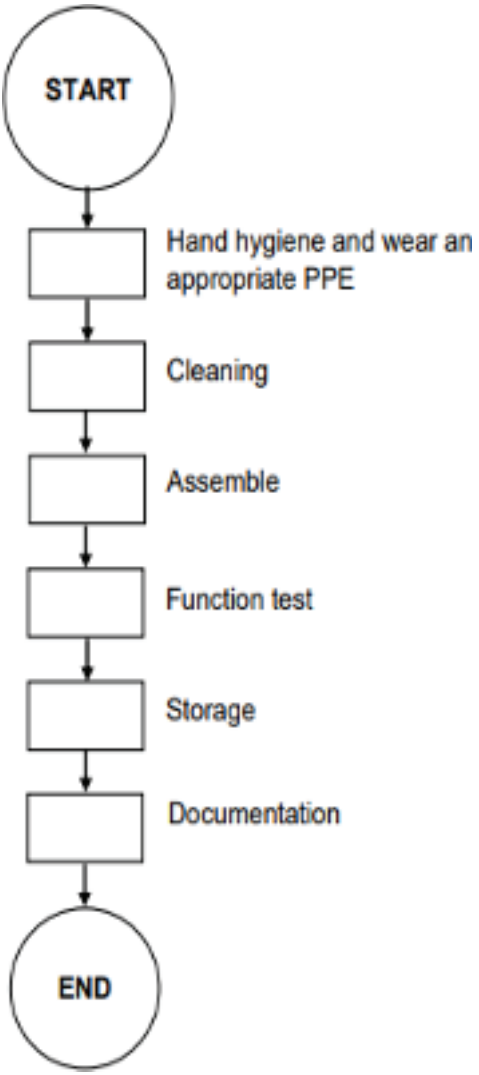
4. Storage:
   i. store in storage container or transparent plastic bag for the next patient use.

5. Documentation.

	Bucher JT, Vashisht R, Ladd M, et al. (2022) Bag Mask Ventilation. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; Available from:https://www.ncbi.nlm.nih.gov/books/NBK441924/? report=classic. Carlson, J. N., & Wang, H. E. (2018). Updates in emergency airway management. Current opinion in critical care, 24(6), 525–530. https://doi.org/10.1097/MCC.0000000000000552. Kroll, M., Das, J., & Siegler, J. (2019). Can Altering Grip Technique and Bag Size Optimize Volume Delivered with Bag-Valve-Mask by Emergency Medical Service Providers? Prehospital emergency care: official journal of the National Association of EMS Physicians and the National Association of State EMS Directors, 23(2), 210–214. https://doi.org/10.1080/10903127.2018.1489020 Sall, F. S., De Luca, A., Pazart, L., Pugin, A., Capellier, G., & Khoury, A. (2018). To intubate or not: ventilation is the question. A manikin-based observational study. BMJ open respiratory research, 5(1), e000261. https://doi.org/10.1136/bmjresp-2017-000261. Strzelecki, C., Shelton, C. L., Cunningham, J., Dean, C., Naz-Thomas, S., Stocking, K., & Dobson, A. (2020). A randomized controlled trial of bag-valve-mask teaching techniques. The clinical teacher, 17(1), 41–46. https://doi.org/10.1111/tct.13008.
Flow Chart	Refer Appendix A.3.
Revision history	Not applicable.

Appendix A.3.

FLOW CHART REPROCESSING AND PREPARATION OF BAG VALVE MASK DEVICE



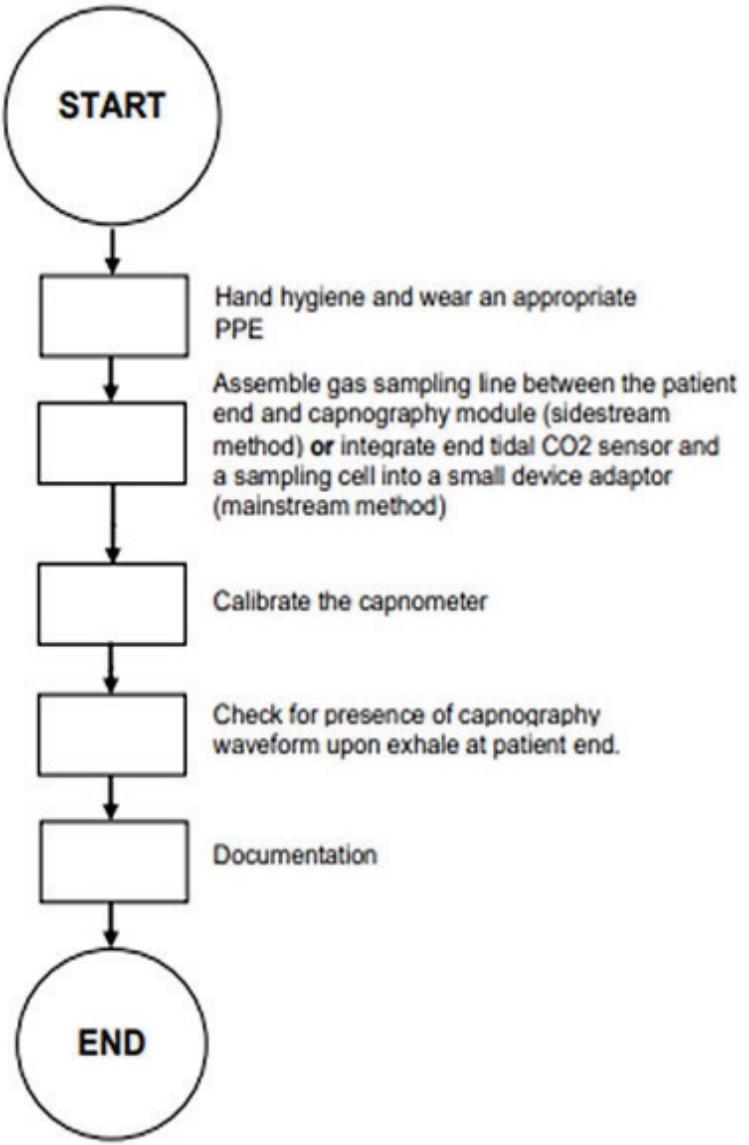
A.4. PREPARATION AND SETTING UP OF CAPNOGRAPHY MONITORING

Scope	Assistant Medical Officers are responsible to facilitate measurement and monitoring of patient's end tidal carbon dioxide concentration using graphic and numeric display.
Purpose	To provide continuous and instantaneous measurement of physiologic information on ventilation and be able to identify potential breathing complications (airway obstruction, hyperventilation, hypoventilation or apnoea).
Materials / Equipment	1. PPE. 2. Gas sampling line (150cm to 200cm in length). 3. Capnography module (main-stream or side-stream). 4. Capnometer (with display of end tidal carbon dioxide waveform and numeric). 5. Water trap.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Assemble gas sampling line between the patient end and capnography module. 4. For mainstream method, end tidal CO2 sensor and a sampling cell are integrated into a small device adaptor that connects directly at the airway between the breathing circuit and ETT. 5. Calibrate the capnometer (follow manufacturer's recommendations). 6. Check for presence of capnography waveform upon exhale at patient end. 7. Documentation: i. document any related information and inform MO or specialist if any abnormalities observed.

References	Brochard L. Martin GS, Blanch L, et.al (2012). Clinical Review: Respiratory monitoring in the ICU-a consensus of 16. Critical Care, April 36:16(2):219. Karaali, R., Çakır, A., Bora, E. S., Akyol, P. Y., Kavalcı, C., & Acar, H. (2022). The Evaluation of End Tidal Carbon Dioxide Values in Intubated Patients with COVID-19. Acta bio-medica: Atenei Parmensis, 93(1), e2022032. https://doi.org/10.23750/abm.v93i1.11989. Long, B., Koyfman, A., & Vivirito, M. A. (2017). Capnography in the Emergency Department: A Review of Uses, Waveforms, and Limitations. The Journal of emergency medicine, 53(6), 829–842. https://doi.org/10.1016/j.jemermed.2017.08.026. Richardson M, Moulton K, Rabb D, et al. (2016). Capnography for Monitoring End-Tidal CO2 in Hospital and Pre- hospital Settings: A Health Technology Assessment [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health. (CADTH Health Technology Assessment, No. 142.) 1, Introduction. Available from: https://www.ncbi.nlm.nih.gov/books/NBK362376/. Shah, R., Streat, D. A., Auerbach, M., Shabanova, V., & Langhan, M. L. (2022). Improving Capnography Use for Critically Ill Emergency Patients: An Implementation Study. Journal of patient safety, 18(1), e26–e32. https://doi.org/10.1097/PTS.0000000000000683.
Flow Chart	Refer to Appendix A.4.
Revision history	Not applicable.

Appendix A.4.

FLOW CHART PREPARATION AND SETTING UP CAPNOGRAPHY MONITORING



A.5. PREPARATION AND SETTING UP OF PRESSURE TRANSDUCER SYSTEM

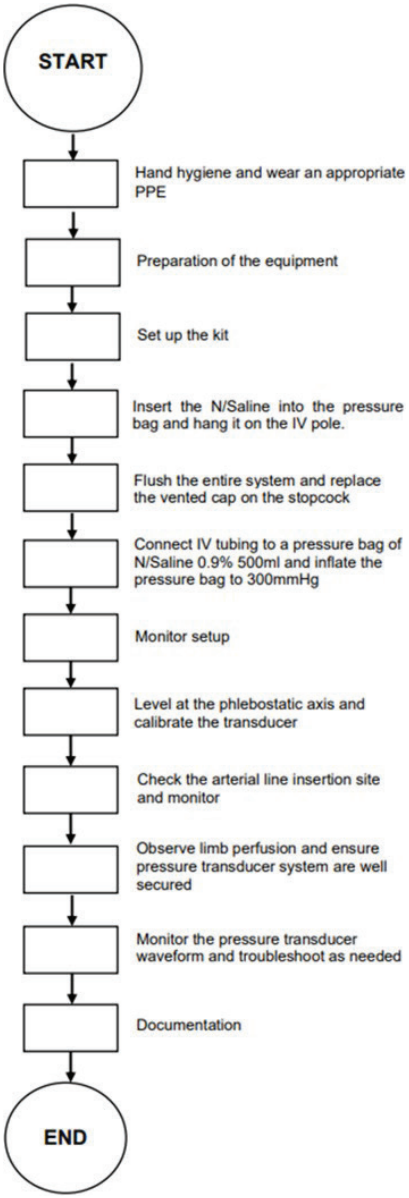
Scope	Assistant Medical Officers are responsible to assist in preparation of pressure transducer system on critically ill patients that requires close monitoring in ICU.
Purpose	To provide MO or specialist with real-time access to their patient's haemodynamic and cardiovascular status in anaesthesia and intensive care settings.
Materials / Equipment	1. Physiological monitoring system with IBP capability. 2. Pressure transducer kit. 3. Non-compressible rigid-walled, fluid filled tubing, length of 150-200cm. 4. Transducer cable – interface connection with physiological monitor. 5. Normal Saline 0.9% 500ml. 6. Pressure infusion bag (500ml) at 300mmHg - automated slow infusion (1-3ml/hr) of pressurized saline (exclude for ICP). 7. IV pole (if applicable). 8. Transducer holder (attach to IV pole).
Work Process	1. Wear an appropriate PPE. 2. Preparation of the equipment. 3. Set up the kit: i. prepare the pressure infusion bag and transducer system (exclude for ICP). ii. open the pre-packed pressure transducer kits, using aseptic technique. - single-pressure tubing kit for arterial monitoring. - double-pressure tubing kit can be used for CVP and arterial monitoring. - double-pressure tubing kit can be used for CVP and arterial monitoring. iii. ensure all connections are tight. iv. invert the N/Saline bottle. v. spike the outlet port of the N/Saline bottle with the pressure tubing, keeping the drip chamber upright.

Work Process	4. Insert the N/Saline into the pressure bag (exclude for ICP) and hang it on the IV pole. 5. Flush the entire system, including the transducer, stopcock, and pressure tubing, with the flush solution. 6. Replace the vented cap on the stopcock with a non-vented cap. 7. Connecting the IV tubing to a pressure infusion bag of N/ Saline. 8. Inflate the pressure infusion bag to 300mmHg (exclude for ICP). 9. Monitor setup: i. turn on the physiologic monitor. ii. plug the pressure cables into the appropriate pressure modules or jacks in the bedside monitor. iii. some monitors are pre-programmed to display the waveform that corresponds to the module or jack (e.g., first position, arterial; second position, PA; third position, RA). iv. select the desired waveform label. 10. Level the arterial line at the phlebostatic axis. 11. Attach the transducer into the pole mount transducer holder. 12. Calibrate the transducer: i. suspend the monitor alarms. ii. turn off the three-way stop cock connector tap at the transducer. This blocks all pressure readings from the patient. iii. remove the cap. iv. select the “ART or ABP” parameter display on the monitor. v. press the “Zero” icon. vi. flattened pressure waveform will be appear and the pressure value will be seen to return to ‘0’. vii. turn off to air the three-way stop cock at the transducer, replace the red cap and turn on towards the patient. viii. the pressure waveform and values will reappear on the monitor. 13. Observe limb perfusion distal to the insertion site especially when withdrawing blood or flushing the cannula.

Work Process	14. Ensure the pressure transducer system are well secured at a secondary anchorage point to reduce the risk of accidental removal. 15. Pressure transducer system needs to be re-calibrated upon disconnection of patient. 16. Continuous monitoring the pressure transducer waveform and troubleshoot if needed. 17. Documentation.
References	American Association of Critical-Care Nurses (AACN). Pulmonary artery/central venous pressure monitoring in adults. Critical Care Nurse, 2016:36*(4)*. Bernd Sauger, Karim Kouz, Agnes S. Meidert, Leonie Schulte-Uentrop and Stefano Romagnoli. How to measure blood pressure using an arterial catheter: a systematic 5-step approach. Critical Care. 2020:24(172). McGee, W.T, Young, C., Frazier, J.A. (Eds.). Edwards clinical education: Quick guide to cardiopulmonary care *(4th ed.)*. 2018. Salik JR, Sen S, Picard MH, Weiner RB, Dudzinski DM: The application of appropriate use criteria for transthoracic echocardiography in a cardiac intensive care unit. Echocardiography 2019;36(4): 631–8. Soliman-Aboumarie H, Pastore MC, Galiatsou E, Gargani L, Pugliese NR, Mandoli GE, Valente S, Hurtado-Doce A, Lees N, Cameli M. Echocardiography in the intensive care unit: An essential tool for diagnosis, monitoring and guiding clinical decision-making. Physiol Int. 2021 Nov 25. doi: 10.1556/1647.2021.00055. Epub ahead of print. PMID: 34825894. Wiegand, D.L. (Ed.). AACN procedure manual for high acuity, progressive, and critical care *(7th ed.)*. St. Louis: Elsevier. 2017.
Flow Chart	Refer to Appendix A.5.
Revision history	Not applicable.

Appendix A.5.

FLOW CHART OF PRESSURE TRANSDUCER SYSTEM



A.6 PREPARATION AND REPROCESSING OF HIGH FLOW NASAL CANNULA DEVICE

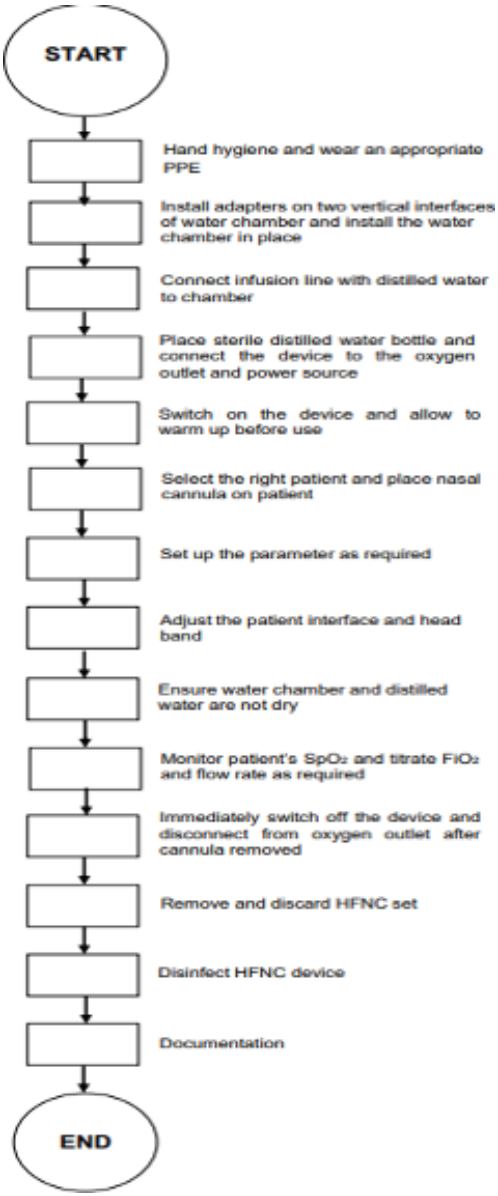
Scope	Assistant Medical Officers are responsible in preparation and reprocessing of HFNC device according to hospital infection control guidelines and perform troubleshooting according to manufacturer protocols.
Purpose	To accomplishes reduction of nasopharyngeal airway resistance, leading to improved ventilation and oxygenation through the application of a positive pressure environment.
Materials / Equipment	1. PPE. 2. HFNC. 3. Disinfection wipes. 4. Humidifier chamber. 5. Heated inspiratory circuit. 6. Nasal Cannula. 7. Sterile distilled water 500ml (IV bottle). 8. Physiological Monitoring System. 9. Oxygen flow meter and tubing.
Work Process	1. Pre-use: i. hand hygiene. ii. wear an appropriate PPE. iii. install adapters on two vertical interfaces of water chamber according to the direction and press tightly with force. iv. install the water chamber in place. v. connect infusion line with distilled water to chamber. vi. sterile distilled water bottle must run freely and be placed high above the humidifier to achieve free flow of water into the humidifier. vii connect the device to the oxygen outlet and power source. viii. switch on the device and allow to warm up before use. ix. select the right mode with the right category of patient (adult or paediatric). x. place nasal cannula on patient; - ensure cannula sit snugly in the patient's nares xi. set up the parameter as required.

Work Process	2. Intra-use: i. the patient interface and head band are adjusted, so that the patient feels comfortable. ii. always ensure that the water chamber and distilled water bottle are not dry. iii. monitor patient's SpO2 status. iv. titrate FiO2 and flow rate as required. 3. Post-use: i. once cannula is removed, immediately switch off the device. ii. disconnect from oxygen outlet. iii. remove and discard HFNC set. iv. disinfect HFNC device as per manufacturer disinfection guideline. 4. Documentation.
References	Corley, A., Rickard, C. M., Aitken, L. M., Johnston, A., Barnett, A., Fraser, J. F., Lewis, S. R., & Smith, A. F. (2017). High-flow nasal cannula for respiratory support in adult intensive care patients. The Cochrane database of systematic reviews, 5(5), CD010172. https://doi.org/10.1002/14651858.CD010172.pub2. Hacquin, A., Perret, M., Manckoundia, P., Bonniaud, P., Beltramo, G., Georges, M., & Putot, A. (2021). High- Flow Nasal Cannula Oxygenation in Older Patients with SARS-CoV-2-Related Acute Respiratory Failure. Journal of clinical medicine, 10(16), 3515. https://doi.org/10.3390/jcm10163515. Lewis SR, Baker PE, Parker R, Smith AF. (2021). "High-flow nasal cannula for respiratory support in adult intensive care patients." Cochrane Database of Systematic Reviews doi: 10.1002/14651858.CD010172.pub3.

References	Parke, R., McGuinness, S., & Eccleston, M. (2009). Nasal high-flow therapy delivers low level positive airway pressure. British journal of anaesthesia, 103(6), 886– 890. https://doi.org/10.1093/bja/aep280. Rodriguez, M., Ragot, S., Coudroy, R. (2021). “Non-invasive ventilation vs. high-flow nasal cannula oxygen for preoxygenation before intubation in patients with obesity: a post hoc analysis of a randomized controlled trial.” Annals of Intensive Care 11(1): 114.
Flow Chart	Refer Appendix A.6.
Revision history	Not applicable.

Appendix A.6.

FLOW CHART MANAGEMENT OF HIGH FLOW NASAL CANULA



A.7. PREPARATION AND REPROCESSING OF POWERED AIR PURIFYING RESPIRATOR

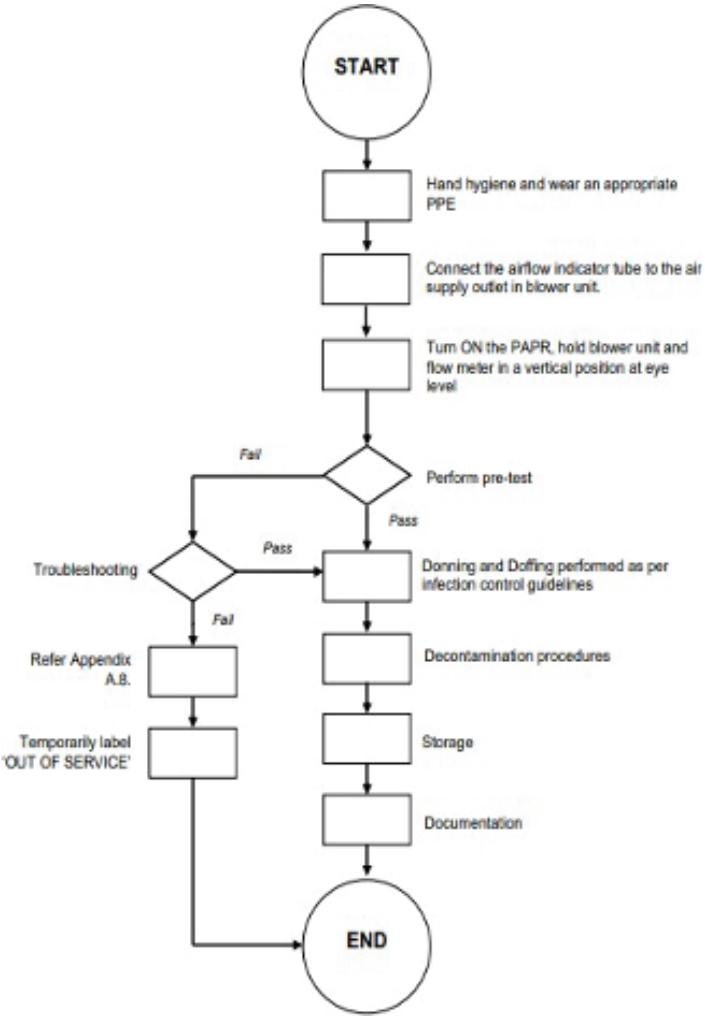
Scope	Assistant Medical Officers are responsible to management and reprocessing of PAPR device according to hospital infection control guidelines.
Purpose	To safeguard HCW against contaminated air or during performing high-risk aerosol generating procedures.
Materials / Equipment	1. PPE. 2. Filtering face piece respirator or N95 mask. 3. Face piece or visor or long hood. 4. Hose. 5. HEPA filter. 6. Blower unit. 7. Battery pack (power source). 8. Waist band.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Connect the airflow indicator tube to the air supply outlet in blower unit. 4. Turn ON the PAPR. 5. Hold blower unit and ensure flow meter in a vertical position at eye level (follow the manufacturer's recommendations). 6. Perform pre-test as recommended by manufacturer. Do not use the PAPR if test failed and refer to Appendix A.8. 7. Donning and doffing are performed as per infection control guidelines. 8. Consideration for filter change, if: i. there is airflow blockage alarm either by sound alarm or change in the colour. ii. visibly dirty, wet, damaged or bad odour. iii. the device does not pass the airflow test even with a fully charged battery. iv. after 30 days from initial use as per manufacturer recommendation.

Work Process	9. Decontamination procedures: i. while wearing gloves, disconnect all component parts of PAPR; battery pack, breathing hose and head hood from the blower unit. ii. inspect all parts for any damage. iii. clean the external surfaces with HLD spray (head-hood, blower unit, battery pack). iv. replace the plastic cover of breathing hose after each use and immersed in water for cleaning if visibly dirty or contaminated. v. disinfect all component parts by using antimicrobial wipes. vi. do not spray the blower unit directly. vii. do not clean cartridges or filters. viii. wipe the interior part of the hood with an antimicrobial wipe. ix. allow air dry for the blower unit, breathing hose, battery pack, and hood or helmet. 10. Storage: i. store in a clean, contaminant free environment, protected from prolonged exposure to heat, sunlight, radiation and chemicals. ii. the motor or blower should be run at least once per year for 5 minutes to ensure continued proper lubrication of the motor according to manufacturer recommendations. iii. PAPR filters should not be stored long-term in the motor or blower as this may damage the filter gasket. iv. the battery must be charged after each use. v. recharge the battery pack. 11. Documentation.

References	Aerosol Generating Procedures https://www.rdash.nhs.uk/wp-content/uploads/2017/08/Appendix-46-Aerosol-Generating Procedures Cleaning Reusable Respirators and Powered Air Purifying Respirator Assemblies https://multimedia.3m.com/mws/media/774949O/inspec tion-cleaning-and-storageprocedures-for-3m-tr-300- papr-assemblies-technical Occupational Safety and Health Administration (OSHA) CFR 1910.134 https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=12716 Versaflo-powered-air-purifying-respirator-tr-300-user-instructions www.3m.com/3M/en_US/worker-health-safety-us/all-stories/full-story-detail/?storyid Video link for airflow check https://www.youtube.com watch?v=rUXEAiLQt04 Video link for donning and doffing procedure https://www.youtube.com/watch?v=Mr3MMZ6HUJg
Flow Chart	Refer to appendix A.7.
Revision history	Not applicable.

Appendix A.7.

FLOW CHART PREPARATION AND PROCESSING PURIFIED AIR PURIFYING RESPIRATOR



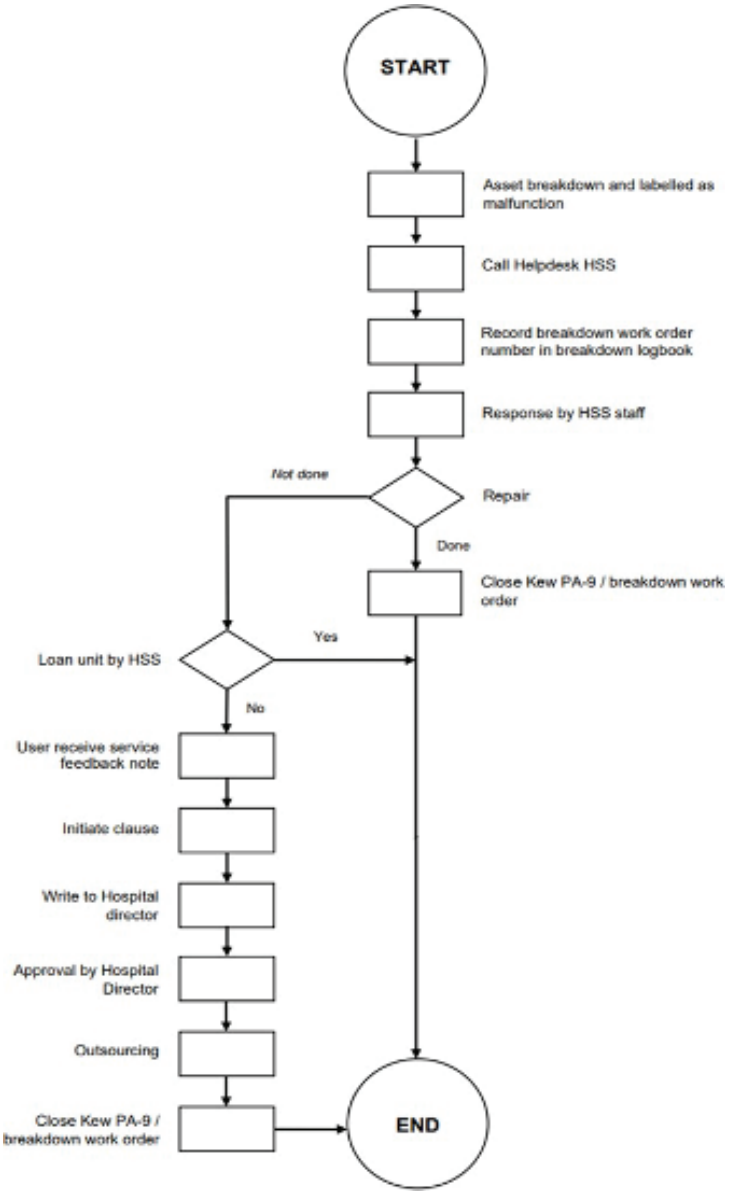
A.8. HANDLING OF MALFUNCTION MEDICAL EQUIPMENTS

Scope	Assistant Medical Officers are responsible to facilitate and coordinate in handling of malfunction equipment according to HSS guideline.
Purpose	To minimize interruption in services and patient safety are not compromised as the result of malfunctioned equipment.
Materials / Equipment	1. Computer. 2. Networking – ASIS, MySpa. 3. Malfunction equipment. 4. KEW.PA-9. 5. Breakdown logbook. 6. COC Form.
Work Process	1. Identify malfunction equipment and labelled as malfunction. 2. Call HSS help desk immediately. 3. Receive work order number from HSS and end user record it in breakdown logbook. 4. Physical respond by HSS – response time: i. BEMS - emergency (critical equipment within 15 minutes). - normal (non-critical equipment within 2 hours). ii. eFEMS - emergency (criticalequipment within30 minutes). - normal (non-critical equipment within 3 hours). 5. User verify work order and acknowledging response time. 6. Onsite repair by HSS; i. if onsite repair successful, user verify it before closing the work order. ii. if onsite repair unsuccessful, HSS staffs are allowed to move the equipment to HSS workshop by filling up COC form (HSS) and KEW.PA-9 (user).

Work Process	7. HSS provide a loan unit if equipment is not able to repair. 8. HSS to submit repair progress after 7 working days to end user (feedback note). 9. If repair is done within 7 working days, close the work order and KEW.PA-9. 10. If loan unit not provided, end user request and gain consent from hospital director to initiate. i. Clause 12.1 (14 days) : - Government's Right to Procure Third Party. ii. Clause 44.1 (emergency) : - Event Of Emergencies. iii. Clause 44.2 (24 hours) : - Immediate diagnosis and/or treatment of patients (Immediately). 11. Once approval gained from Hospital director, end user will initiate out sourcing repairing and inform hospital engineering department. 12. Once unit has been repaired, end user closes the work order of HSS and KEW.PA-9.
References	Borang Permohonan Pergerakan/Pinjaman Aset Alih (KEW. PA-0P Pekeliling Perbendaharaan Malaysia. General Hospital Operational Policy, Medical Development Division, Ministry of Health Malaysia, 1st edition, August 2013. http://asis.moh.gov.my. http://sppa-hq.moh.gov.my. Hospital Specific Implementation Plan – HSIP. Project Operational Guidelines - POG. Pekeliling Perbendaharaan Bil 5 Tahun 2007 (Sistem Pengurusan Aset).
Flow Chart	Refer to appendix A.8.
Revision history	Not applicable.

Appendix A.8.

FLOW CHART HANDLING OF MALFUNCTION MEDICAL EQUIPMENT



STANDARD PRACTICE GUIDELINES FOR AMO IN ANAESTHESIA SERVICES (PERI-ANAESTHESIA)

ANAESTHETIC ASSISTANT & TECHNOLOGISTS (AAT)

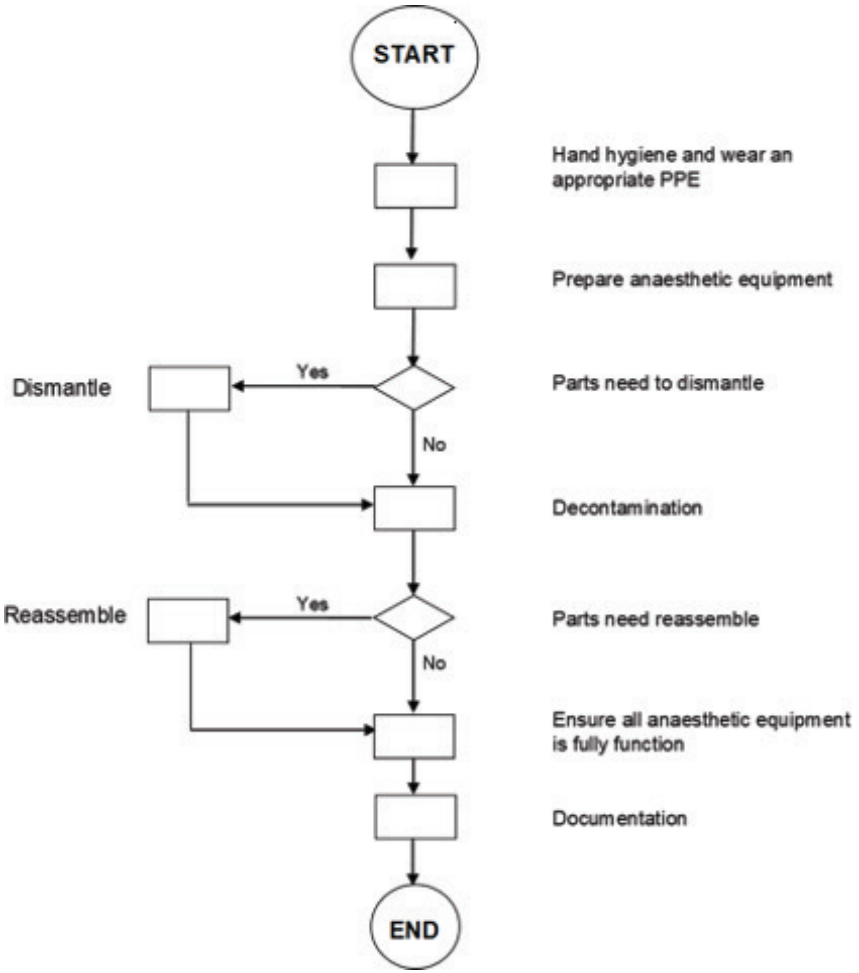
B.1. DECONTAMINATION OF ANAESTHETIC MACHINE, EQUIPMENT AND PHYSIOLOGIC MONITORS

Scope	AMO is responsible in decontamination of anaesthetic machine, equipment and physiologic monitors.
Purpose	To ensure all equipment used are clean and safe for patients to reduce the risk of transmission of pathogens.
Materials / Equipment	1. PPE. 2. Anaesthetic machine. 3. Anaesthetic equipment. 4. Physiological monitoring system. 5. Gauze. 6. Drying machine. 7. CO2 absorbent cannister. 8. HLD (refer to current Guidelines on Infection Control in Anaesthesia). 9. New circle breathing circuit with BVF and HME. 10. Record book.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Prepare anaesthetic equipment . 4. Dismantle part of equipment. 5. Decontamination: i. clean external parts of anaesthetic machine or ventilator and monitor with surface disinfectant wipes or HLD: - before starting OT list. - in between cases. - when any visible foreign materials or stains. ii. terminal cleaning: - perform weekly. - thoroughly clean. • GA machine component. • monitoring accessories. • all anaesthetic equipment surfaces.

Work Process	6. Reassemble : i. prepare cleaned anaesthetic machine, ventilator and monitors and ready to be used: - anaesthetic machine, ventilator and monitors are functioning properly and safe to be used. - frequency of changing anaesthetic circuit as accordance to current Guidelines on Infection Control in Anaesthesia. 7. Ensure all anaesthetic equipment is fully function. 8. Documentation.
References	Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Council Members, College of Anaesthesiologists, Academy of Medicine of Malaysia. (2014). *Guidelines on infection control in anaesthesia.* College of Anaesthesiologists, Academy of Medicine of Malaysia. Juwarkar, C. S. (2013). Cleaning and sterilisation of anaesthetic equipment. Indian journal of anaesthesia. *57*(5), 541–550. doi:https://doi.org/10.4103/0019-5049.120152 Lee, C. Y. (2006). Manual of anaesthesia. Singapore: McGraw Hill Education. MOH, M. (2010). Policies and procedures on infection control (2nd ed.). Ministry of Health Malaysia.
Flow Chart	Refer to Appendix B.1.
Revision history	Not Applicable

Appendix B.1.

FLOW CHART DECONTAMINATION OF ANAESTHETIC MACHINE, EQUIPMENT AND PHYSIOLOGIC MONITORS



B.2. CHECKING GENERAL ANAESTHETIC MACHINE

Scope	Assistant Medical Officers are responsible in checking GA machine.
Purpose	To ensure GA machine is in fully functioning for safe delivery of anaesthesia.
Materials / Equipment	1. Hand hygiene. 2. PPE. 3. Anaesthetic machine with ventilator and alarm system. i. gases: - central supply – 58.01 psig (4 bar) • O_2. • N_2O. • medical air. - cylinders: • O2 – 0.7 m^3. • N2O – 0.7 m^3. • cylinder keys. - breathing circuit system. - test lung. ii. flowmeters: - O_2. - N_2O. - air. iii. vaporisers: - sevoflurane. - desflurane. iv. breathing system - circle circuit. 4. AGSS. 5. Documentation i. record book - GA machine check list

Work Process	Level One: - performed by trained service personnel, of all systems before being placed into use. This applies to all new systems, as well as all systems after servicing or repair. Level Two - performed at the start of each anaesthetic list. Level Three - performed before commencing anaesthesia for each patient.
	1. Power supply: i. plugged in to uninterrupted power supply (UPS). ii. switch on. iii. back-up battery charged. 2. Gases i. check O2, N2O and medical air supply: - central supply: • check central supply gas warning light. • correctly connected with tug test. • pressure gauge shown pressure @ ± 4 bar. - cylinder supply: • disconnect central supply to the machine. • ensure: - the pressure is appropriate. - the cylinder can be turned on and off. - the content is sufficient. - no leak. • after completing the checks, turn off cylinder. - test warning device on O2 failure. - with N_2O and O_2 flowing at 2 l/min, disconnect O_2 supply. - press O_2 bypass button to release O_2 pressure in machine. • ensure:

Work Process	- the pressure is appropriate. - the cylinder can be turned on and off. - the content is sufficient. - no leak. • after completing the checks, turn off cylinder. - test warning device on O2 failure. - with N_2O and O_2 flowing at 2 l/min, disconnect O_2 supply. - press O_2 bypass button to release O2 - pressure in machine. • one gas test for anaesthetic machine (to eliminate possibility of crossed pressure hoses). - calibrate O_2 sensor when indicated. 3. Flowmeters: i. ensure that flowmeter bobbins rotate freely within the column. ii. urn off each flowmeter control and see O_2 flowmeter bobbin is at the minimum position (200-300 ml/min). iii. verify the function of the O_2 supply failure warning and associated anti-hypoxic delivery system. 4. Vaporiser: i. ensure electricity is connected to vaporisers that required. ii. check the level of inhalation agent. iii. ensure: - all filling ports are sealed. - correct seating, locking and interlocking of detachable vaporisers or cassettes. iv. test for circuit leaks for each vaporiser in the “on” and “off” state. v. check for machine leaks upstream from the common gas outlet or breathing system, using a protocol appropriate for the anaesthesia delivery system.

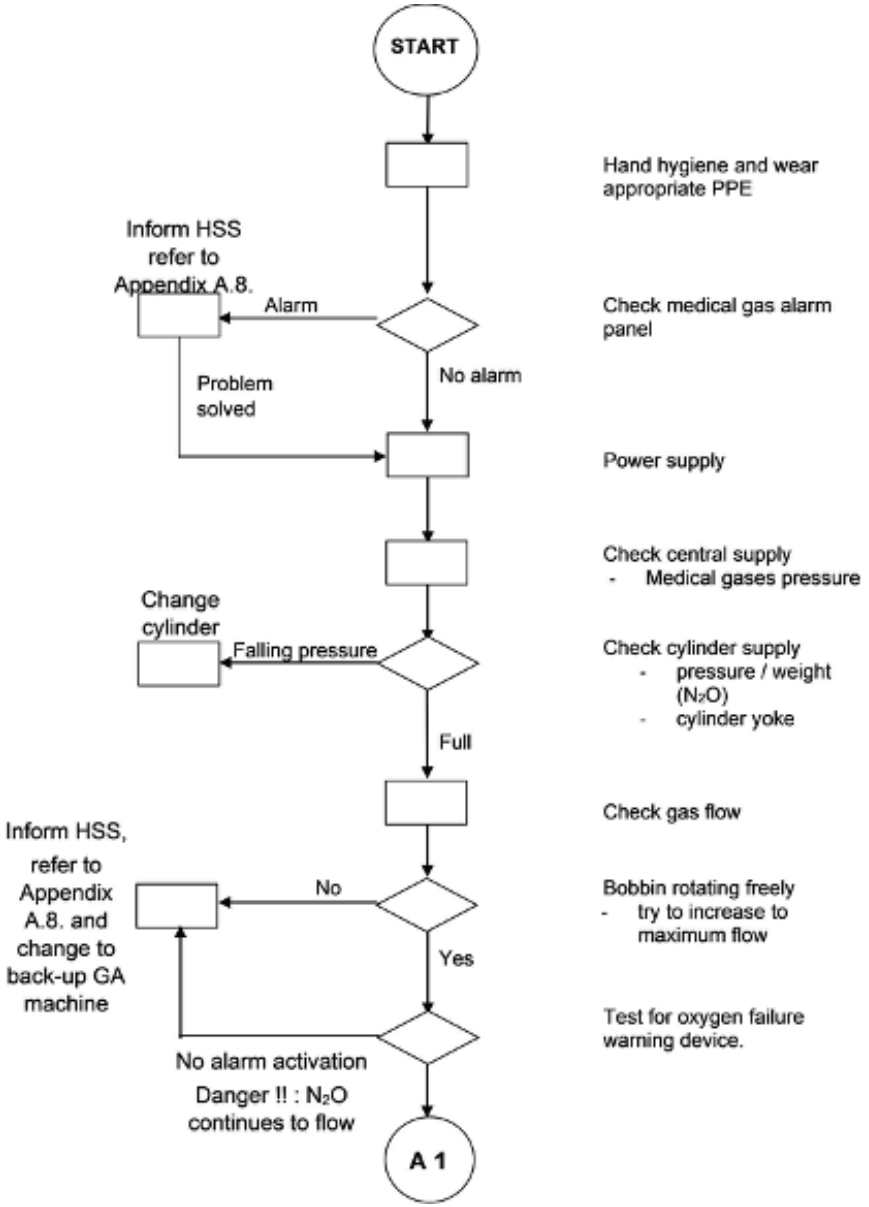
Work Process	5. Breathing System: i. circle system: - inspect the breathing system to be used. - connect and commence the tests as below: • check the indicator colour of the carbon dioxide absorbent according to the manufacturer specifications. • change when carbon dioxide absorbent 2/3 exhaustion or presence of CO_2 in rebreathing capnograph @ 5 mmHg. • check the breathing system by closing APL valve to 30cmH_2O at a gas flow of 300 ml/min for 5 second: ○ as a guide, the system should maintain a test pressure>30 cm H_2O at a gas flow of 300 ml/min for 5 seconds. • test the integrity of the circle breathing system: ○ connect a breathing bag to the patient Y- piece. ○ set an appropriate fresh gas flow and ventilate the breathing system manually using a hand bagging method. ○ observe inflation and deflation of the attached breathing bag, associated movement of visible unidirectional valves and feel the system has normal resistance and compliance. ○ at the conclusion of the test, check for easy spill through the adjustable pressure limiting valve by simultaneously squeezing the hand bag and breathing bag. • check compliance for each new breathing system.

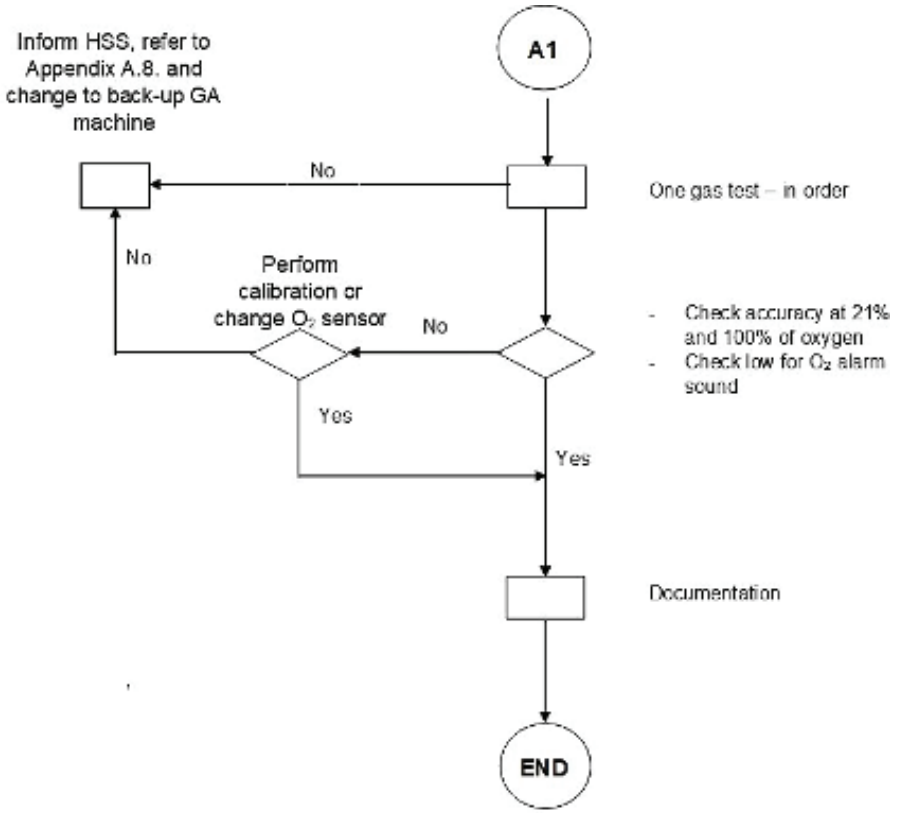
Work Process	6. Scavenging system: i. the scavenging flow is adjusted appropriately. ii. ensure external ports or mechanical valves are not blocked. 7. Other apparatus: i. HME. ii. BVF. 8. Documentation.
	Level three check: - before starting anaesthesia for each patient.
	1. Check the inhalational anaesthesia delivery device (vaporiser) if it has been changed as in item No. 4. 2. Check the breathing system if it has been changed as in item in No. 5. 3. Check other apparatus as in item No. 7. 4. Documentation of the level three check.
References	Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. Chu, L. F. & Fuller, A. J. (2012). *Manual of clinical anaesthesiology.* China: Lippincott Williams & Wilkins. Lee, C. Y. (2006). *Manual of anaesthesia.* Singapore: McGraw Hill Education.
Flow Chart	Refer to Appendix B.2.a – B.2.f
Revision history	Not applicable

* As for newer generation of GA Machine – please follow manufacturer's manual

Appendix B.2.a

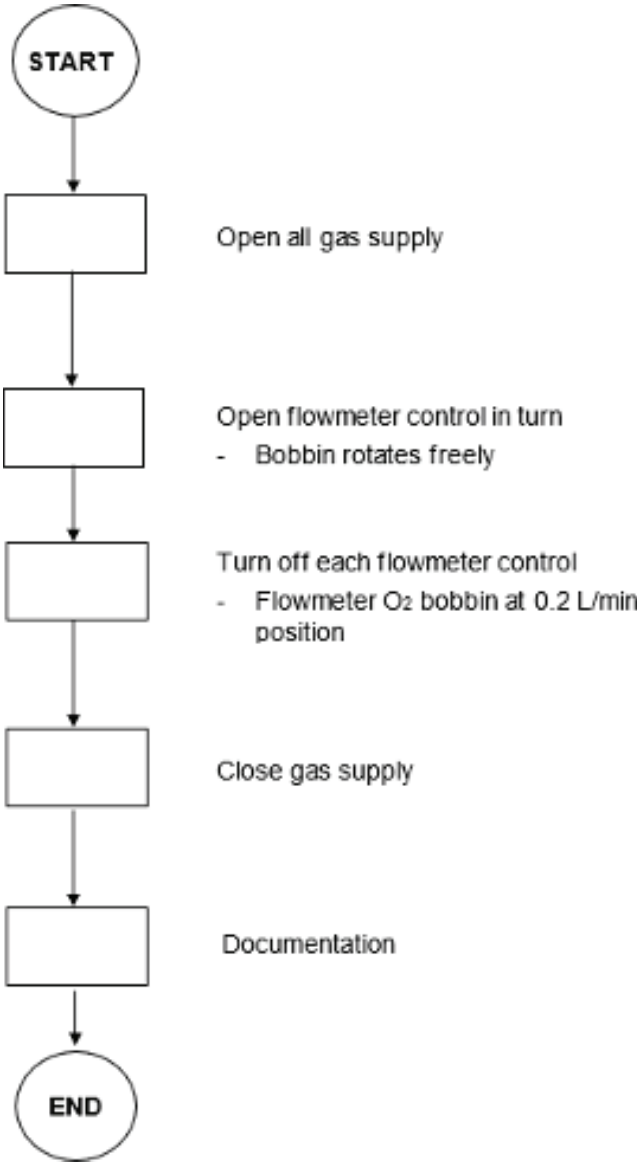
FLOW CHART OF CHECKING GA MACHINE




Inform HSS, refer to Appendix A.8. and change to back-up GA machine
A1
No
One gas test – in order
No
Perform calibration or change O_2 sensor
No
- Check accuracy at 21% and 100% of oxygen
- Check low for O_2 alarm sound
Yes
Yes
Documentation
END

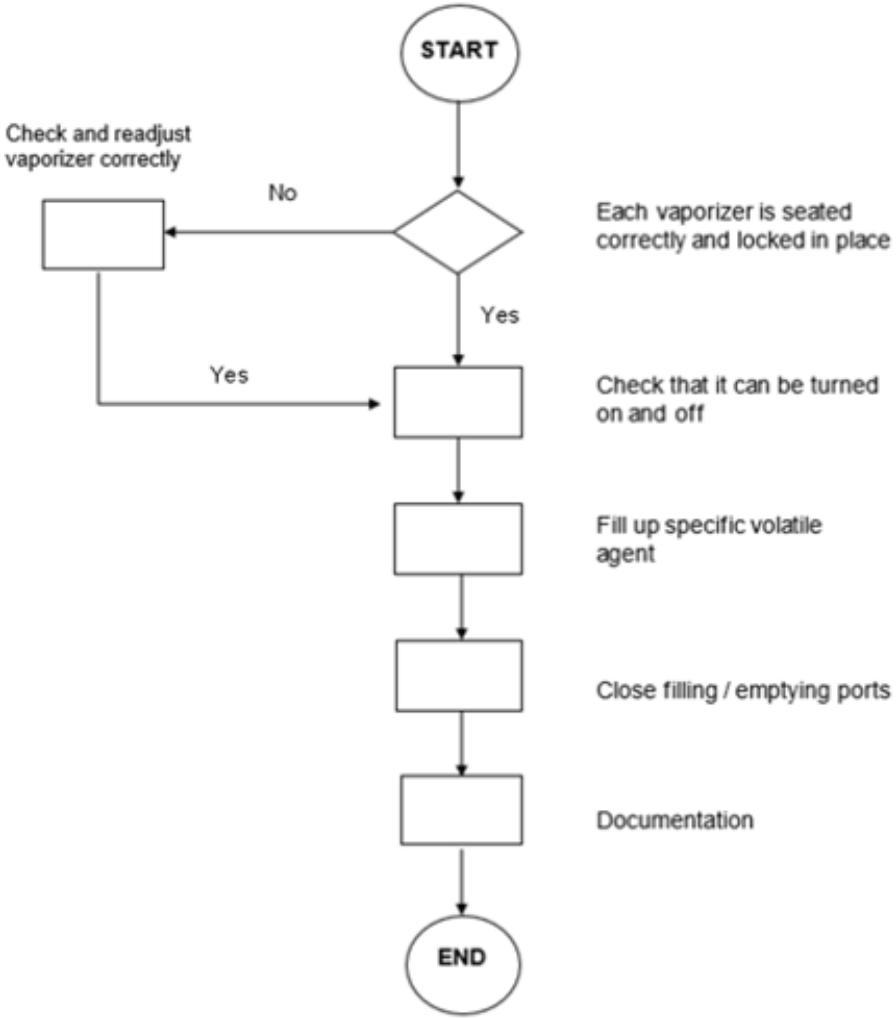
Appendix B.2.b

FLOW CHART CHECKING OF FLOWMETER



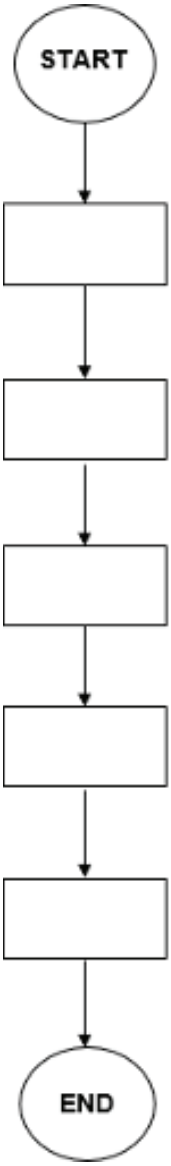
Appendix B.2.c

FLOW CHART OF CHECKING OF VAPORIZER



Appendix B.2.d

FLOW CHART OF PRECIRCUIT LEAKS TEST



Turn on gases supply

Turn on oxygen flowmeter at 2 L/min

Occlude common gas outlet for 10 seconds

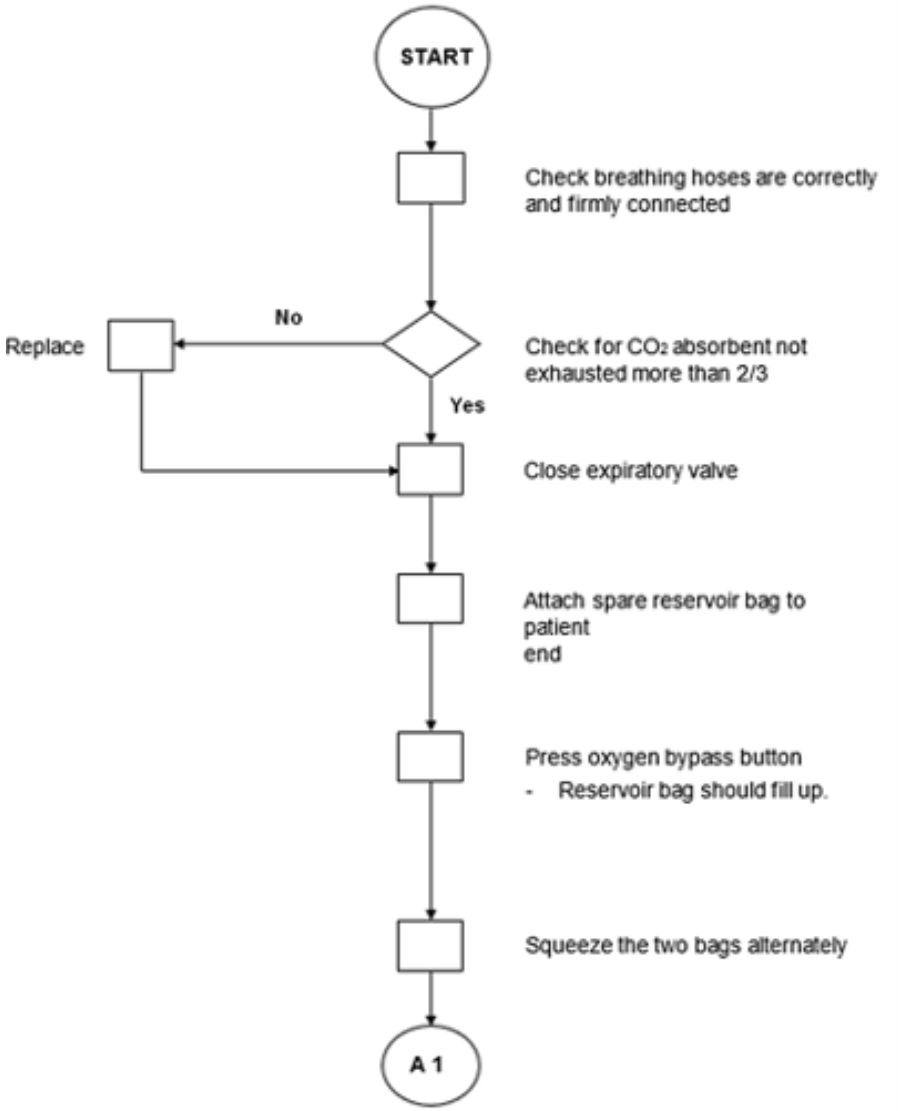
- bobbin should dip

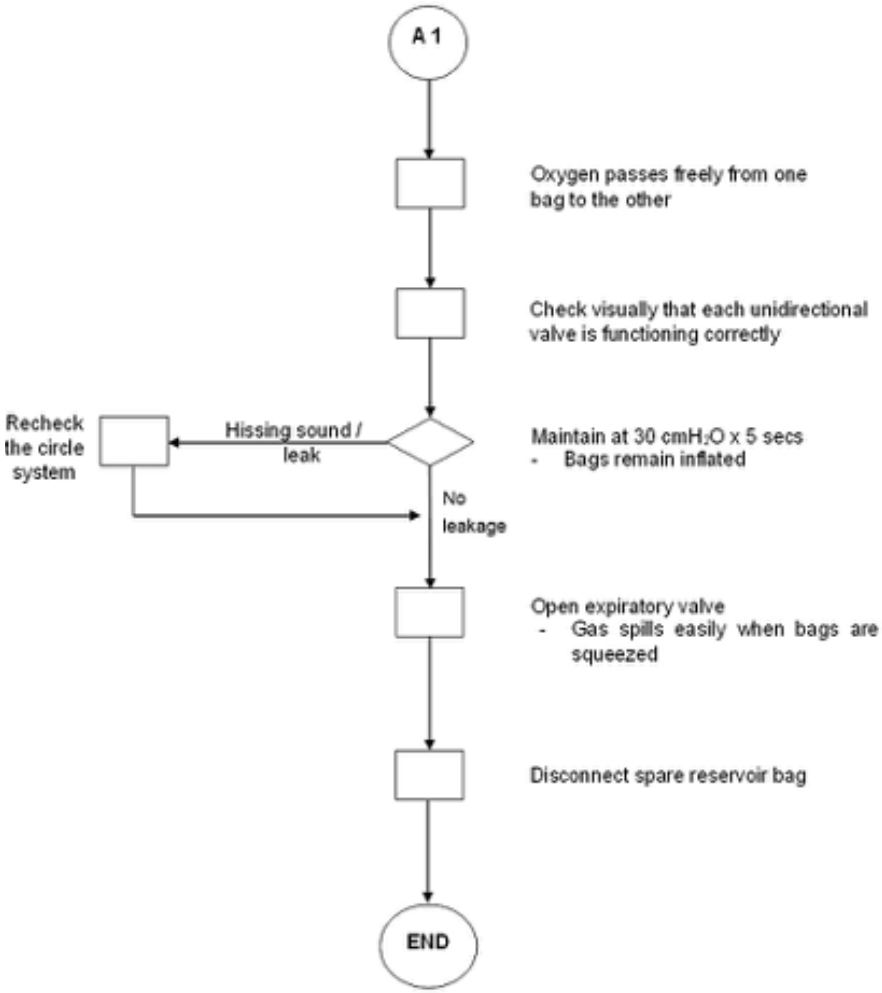
Test each vaporizer 'on' and 'off' in turn

Documentation

Appendix B.2.e

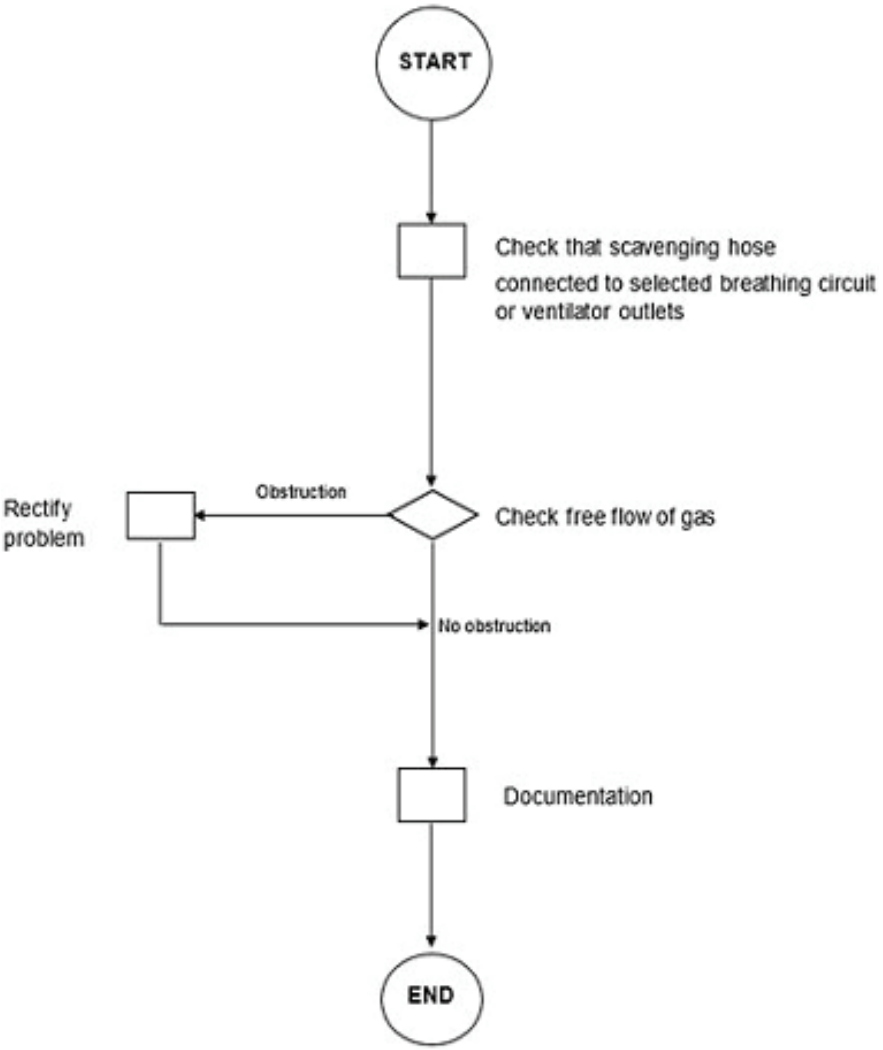
FLOW CHART BREATHING SYSTEM




A 1
Oxygen passes freely from one bag to the other
Check visually that each unidirectional valve is functioning correctly
Maintain at 30 cmH2O x 5 secs
- Bags remain inflated
Hissing sound / leak
Recheck the circle system
No leakage
Open expiratory valve
- Gas spills easily when bags are squeezed
Disconnect spare reservoir bag
END

Appendix B.2.f

FLOW CHART CHECKING SCAVENGING SYSTEM



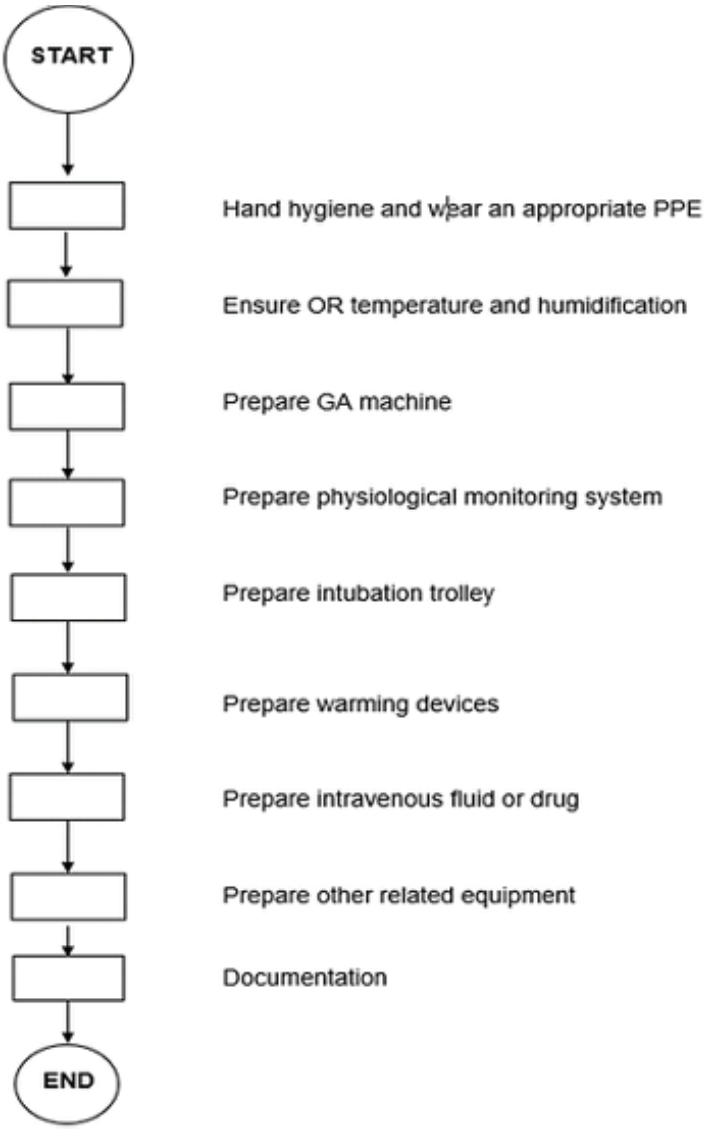
B.3. MANAGEMENT OF OPERATING ROOM BEFORE THE CONDUCT OF ANAESTHESIA

Scope	Assistant Medical Officers are responsible in ensuring operating room is safe and optimized before administration of anaesthesia.
Purpose	To ensure safety conduct of anaesthesia.
Materials / Equipment	1. PPE. 2. GA machine. 3. Physiological monitoring system. 4. Volatile agents. 5. Intubation trolley. 6. Suction apparatus via central supply or suction machine: i. suction catheter. ii. suction tubing. iii. yankauer tip. 7. Warming devices: i. warming blanket or mattress. ii. radiant warmer. iii. infusion warming unit (single or double line). 8. Intravenous solution: i. crystalloid. ii. colloid. 10. Case notes or BHT. 11. SSSL form. 14. GA form.
Work Process	1. Ensure operating room temperature and humidification. i. operating room temperature – 18 - 22°C. ii. humidity – 50 – 60%. 2. Hand hygiene. 3. Wear an appropriate PPE.

Work Process	4. Prepare anaesthetic machine. 5. Prepare capnograph. 6. Prepare intubation set. 7. Prepare, test and perform suctioning. 8. Prepare and set warming apparatus – blanket, mattress and radiant warmer. 9. Intravenous requirement: i. prepare IV fluid. ii. GA Tray with anaesthetic drug. 10. Prepare other related equipment. 11. Documentation.
References	Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. Chu, L. F. & Fuller, A. J. (2012). *Manual of clinical anaesthesiology.* China: Lippincott Williams & Wilkins. Lee, C. Y. (2006). *Manual of anaesthesia.* Singapore: McGraw Hill Education.
Flow Chart	Refer to Appendix B.3.
Revision history	Not applicable.

Appendix B.3.

FLOW CHART MANAGEMENT OF OPERATING ROOM BEFORE THE CONDUCT OF ANAESTHESIA



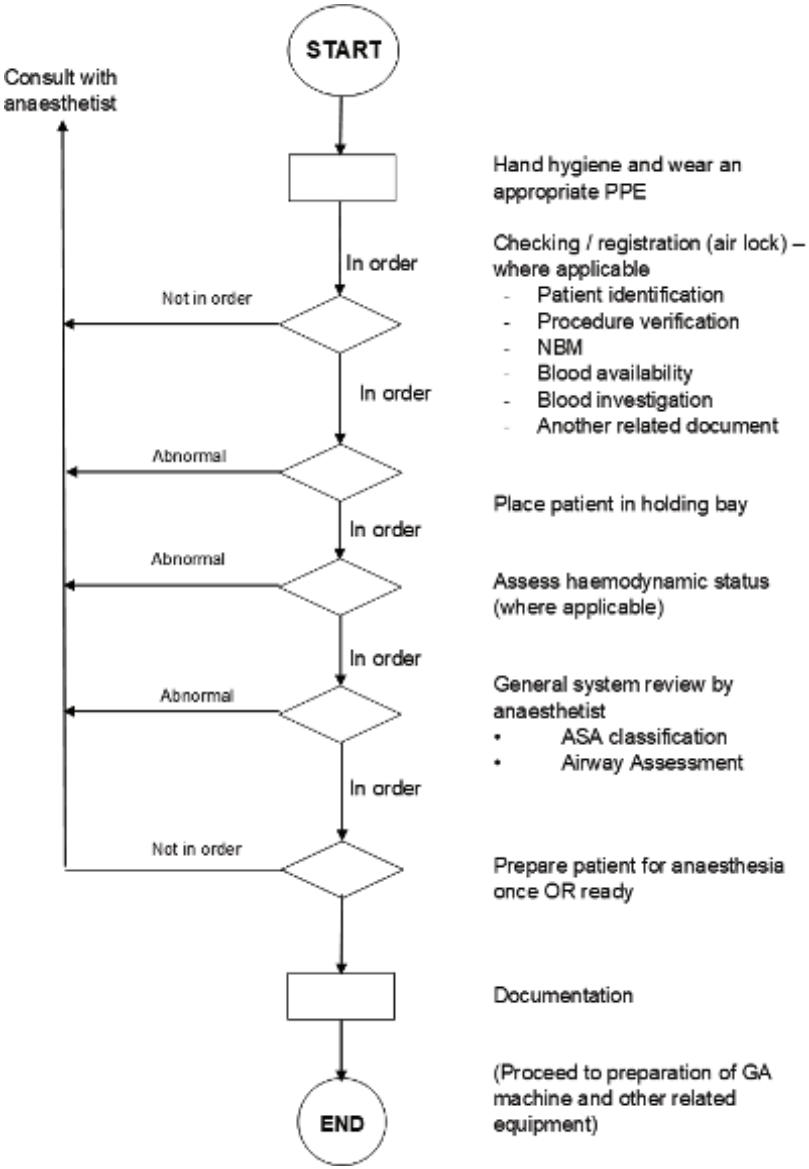
B.4. FINAL ASSESSMENT OF PATIENT IN OPERATING THEATRE

Scope	Assistant Medical Officers are responsible in performing final assessment of patient undergoing anaesthesia.
Purpose	To verify patient status before undergoing anaesthesia.
Materials / Equipment	1. PPE. 2. SSSL form. 3. GA form. 4. Surgical consent. 5. Anaesthesia consent. 6. High risk consent. 7. Blood transfusion consent form. 8. Physiological monitoring system. 9. IV cannulation set. 10. Warming devices. 11. Documentation.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Checking and registration (air lock): i. patient identification. ii. procedure verification. iii. register patient. iv. ensure laboratory investigations results and chest X-ray obtained. 4. Final assessment of patient in holding bay: i. check and reassess patient's haemodynamic status. ii. general systems review by anaesthetist. iii. check availability and function of intravenous access. iv. prevent hypothermia by providing warming devices. v. continuous monitoring patient's hemodynamically until operating room is ready. 5. Documentation.

References	Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. Lee, C. Y. (2006). *Manual of anaesthesia.* Singapore: McGraw Hill Education. Lee, C.Y. & Lim, F. (2014). Recommendations on pre-anaesthetic assessment. Kuala Lumpur, Kuala Lumpur, Malaysia: College of Anaesthesiologist, Academy of Medicine of Malaysia. Patient Safety Unit & Safe Surgery Saves Life Steering Committee. (2018). *Guidelines on Safe Surgery Saves Lives Programme* (2nd ed.). Kuala Lumpur: Ministry of Health Malaysia. Retrieved February 22, 2022, from https://patientsafety.moh.gov.my/v2/?page_id=867 Somerset, W. B. (2021). Pre-operative evaluation. In B. M. Keech, *Anaesthesia Secret* (6th ed., pp. 11-17). Philadelphia: Elsevier.
Flow Chart	Refer to Appendix B.4.
Revision history	Not applicable

Appendix B.4.

FLOW CHART OF FINAL ASSESSMENT OF PATIENT IN OPERATING THEATRE



B.5. ASSISTING IN ENDOTRACHEAL INTUBATION

Scope	Assistant Medical Officers are responsible in preparing and assisting in endotracheal intubation.
Purpose	To protect patient's airway, prevent aspiration and for the administration of general anaesthesia.
Material / Equipment	1. PPE. 2. SSSL form. 3. GA form. 4. Anaesthesia consent. 5. High risk consent. 6. Intubation – MALES: i. M: - mask. - medication. - Magill Forcepss. - machine or manual resuscitation bag. - physiological monitoring system. ii. A: - airway (oropharyngeal, nasopharyngeal). iii. L: - laryngoscope (assorted size of blade & type, assorted handle). - lubricant gel. iv. E: - ETT – size according to patient (1 – smaller size, 1 – actual size & 1 – bigger size). - EtCO2 – confirmation of ETT placement. - emergency trolley.

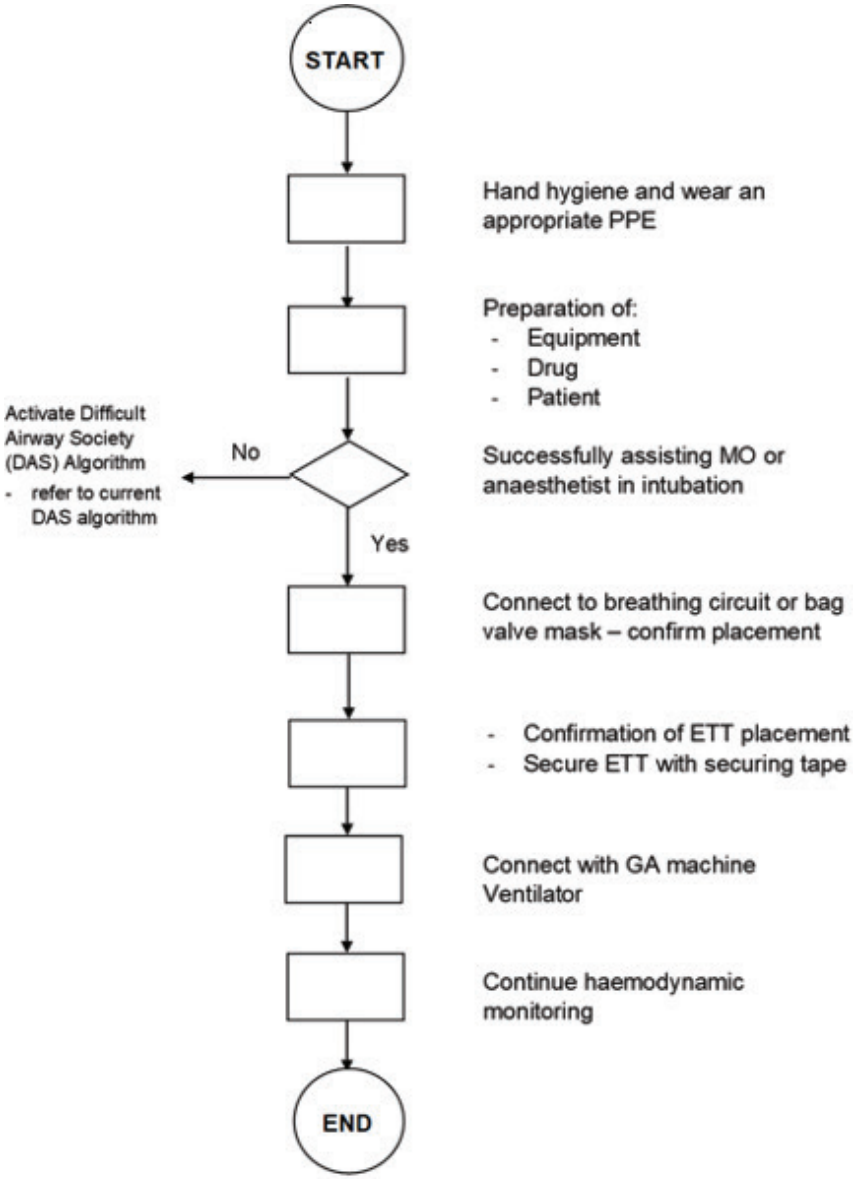
Material / Equipment	v. S: - stylet. - SGA. - stethoscope. - suction apparatus: - suction catheter: ½ size of ETT X 3. - yankauer – appropriate size. - syringe: 10ml or 20ml. - securing tape – anchoring ETT. - scissor. - spatula. 7. Medication: i. analgesia. ii. induction or sedative agent. iii. neuromuscular blocking agent. 8. O-ring headrest. 9. GA machine. 10. Physiological monitoring system. 11. Adequate IV access. 12. Fluid management system.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Preparation of equipment: i. MALES. ii. medication. iii. anaesthesia workstation.

Work Process	4. Preparation of patient: i. patient identification. ii. procedure verification: consent. iii. ensure IV line is patent and functioning. iv. monitor haemodynamic parameters continuously. v. place patient in sniffing position. 5. Assist MO or anaesthetist in intubation process: i. apply BURP (backward, upward, rightward pressure) manoeuvre (external laryngeal manipulation) on the thyroid cartilage to improve visualization of larynx during intubation – when needed. ii. inflate ETT cuff (until leaking sound is disappeared during auscultation) or 5 – 10ml – where applicable. iii. remove stylet. iv. level of ETT – measures at incisor teeth: i. female: 18 – 20cm. ii. male: 20 – 22cm. 6. Connect to breathing circuit. 7. Confirmation of ETT placement: i. visible chest rises. ii. water vapor in ETT. iii. capnograph – normal EtCO2 (35 – 45 mmHg). iv. 5 – point auscultation: equal air entry. v. evaluation of oxygenation via skin signs. vi. chest X-Ray – when applicable. 8. Secure ETT with securing tape. 9. Connect to GA machine. 10. Continue haemodynamic monitoring.

References	Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. Grable, B. &. (2015). Patient Monitoring. In P. K. Sikka, *Basic Clinical Anaesthesia* (pp. 70 - 74). New York: Springer. doi:10.1007/978-1-4939-1737-2 Lee, C. Y. (2006). *Manual of anaesthesia.* Singapore: McGraw Hill Education. Williamson, D., & Nolan, J. (2015). Airway assessment. In A. B. Burtenshaw (Ed.), *Emergency Airway Management* (2nd ed., Vol. 41). London: Cambridge University Press.
Flow chart	Refer to Appendix B.5.
Revision history	Not applicable

Appendix B.5.

FLOW CHART ASSISTING IN ENDOTRACHEAL INTUBATION



B.6. ASSISTING IN EXTUBATION OF ENDOTRACHEAL TUBE

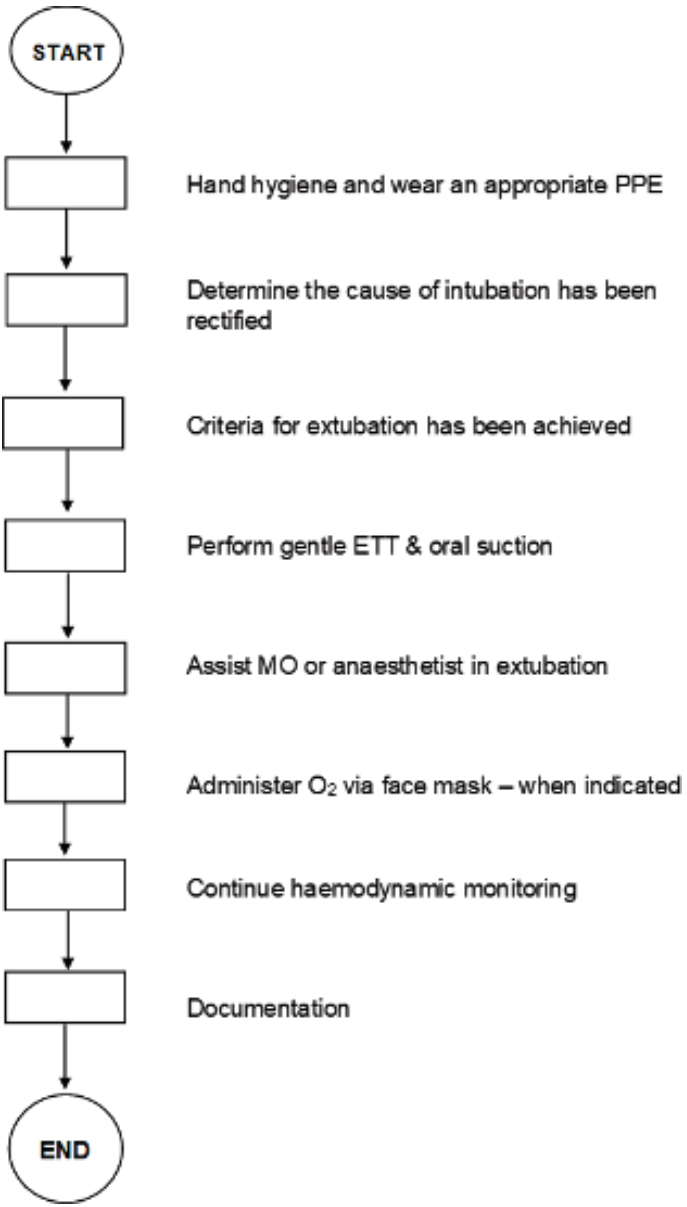
Scope	Assistant Medical Officers are responsible in preparing and assisting the extubation procedure.
Purpose	Extubation is the removal of an ETT when the indication of intubation has been rectified.
Materials / Equipment	1. PPE. 2. Intubation – MALES: 3. M: i. mask. ii. medication. iii. magill forceps. iv. machine or manual resuscitation bag. v. physiological monitoring system. 4. A: i. airway (oropharyngeal, nasopharyngeal). 5. L: i. laryngoscope (assorted size of blade & type, assorted handle). ii. lubricant gel. 6. E: i. ETT – size according to patient. ii. EtCO2 – confirmation of ETT placement. iii. emergency trolley. 7. S: i. stylet. ii. SGA. iii. stethoscope. iv. suction apparatus: a. suction catheter: ½ size of ETT X 3. b. yankauer – appropriate size. c. syringe: 10ml or 20ml. d. securing tape – anchoring ETT. e. scissor. f. spatula.

Materials / Equipment	8. Medication: i. reversal + anticholinergic and antisialagogue 9. O-ring head rest. 10. GA machine or bag valve mask. 11. Physiological monitoring system. 12. Emergency trolley. 13. SSSL form. 14. GA form.
Work process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Determine the indication of intubation has been rectified. 4. Reassess patient's condition on: i. MAC – MACawake < 0.5 (Operating Room). ii. respiration – spontaneous breathing with good exhaled tidal volume. iii. capnography reading: EtCO2 at 35 – 45 mmHg. iv. CNS – alert & conscious or deep. v. CVS – blood pressure and pulse rate within 20% from pre anaesthetic value (OT). vi. presence of gag and cough reflex. vii. baseline arterial blood gas (ICU patient). 3. Prop up position – 15 - 30°. 4. Perform gentle endotracheal & oral suction. 5. Assist MO or anaesthetist in extubation: i. remove or open securing tape. ii. deflate ETT cuff. 6. Administer O2 via face mask – when indicated. 7. Continue haemodynamic monitoring. 8. Documentation.

References	Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. Grable, B. &. (2015). Patient Monitoring. In P. K. Sikka, *Basic Clinical Anaesthesia* (pp. 70 - 74). New York: Springer. doi:10.1007/978-1-4939-1737-2 Lee, C. Y. (2006). *Manual of anaesthesia.* Singapore: McGraw Hill Education. Sturgess, D. J. (2014). Hemodynamic Monitoring. In A. D. Bersten, *Oh's Intensive Care Manual* (7th ed., pp. 122 - 137). China: Butterworth Heinemann Elsevier.
Flow Chart	Appendix B.6.
Revision history	Not applicable

Appendix B.6.

FLOW CHART ASSISTING IN EXTUBATION OF ENDOTRACHEAL TUBE



B.7. ASSISTING IN AWAKE FLEXIBLE BRONCHOSCOPE INTUBATION

Scope	Assistant Medical Officers are responsible in assisting in AFBI procedure.
Purpose	To ensure safety of patient during procedure.
Materials / Equipment	1. PPE. 2. Flexible bronchoscope with monitor. 3. Bronchoscope set. 4. ETT or reinforced tube. 5. Syringe: 5ml & 10ml. 6. Water for irrigation. 7. Plain white gauze. 8. Lignocaine 2% (non-preservative). 9. Lidocaine spray. 10. Atomizer or Mucosal Atomization Device (MAD) if available. 11. Suction tubing. 12. Airway: optional Berman Airway. 13. Endoscopy mask. 14. Nasal cannula. 15. Catheter mount. 16. Nebulizer mask. 17. BPP. 18. SSSL form. 19. GA form.

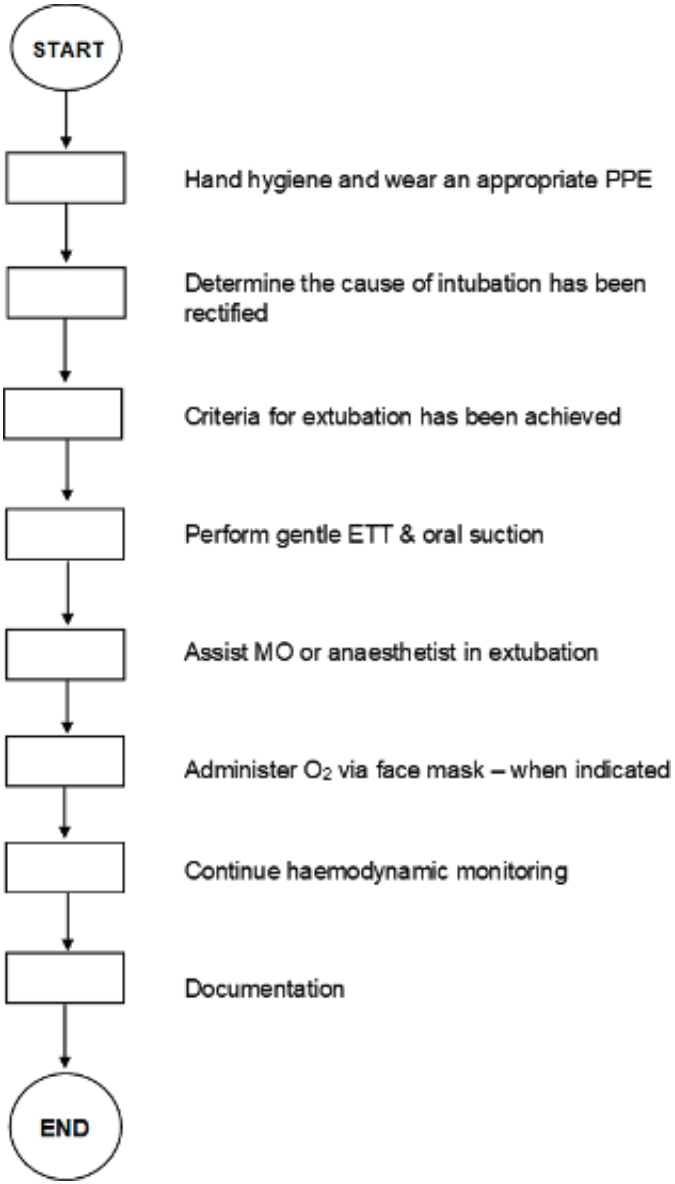
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Preparation of patient: i. determine route for AFBI (nasal or oral). ii. explain to patient regarding AFBI procedure. iii. adequate intravenous access for drugs administration and volume expansion. iv. nebuliser 10ml of Lignocaine of 2% upon arrival. 4. Preparation of equipment: i. layout equipment on trolley and maintain the sterility. ii. prepare ETT according to patient or anaesthetist order, check for functionality and lubricate the cuff. iii. check for functioning of the flexible bronchoscope and lubricate the shaft. iv. pass the flexible bronchoscope through the ETT and secure it at the proximal of the flexible scope. v. check and perform white balance (if required). vi. prepare two gallipots, fill up one with water for irrigation, another one with 10ml of Lignocaine 2%. vii. syringe out 3ml Lignocaine 2% for spray-as-you-go technique. viii. connect suction tubing to suction port at the flexible bronchoscope. 5. Positioning of the patient i. position patient according to anaesthetist order (sitting or supine). ii. make patient comfortable. iii. O2 supplement via nasal cannula 2-3 l/min during procedure. iv. continue monitoring patient.

Work Process	6. Assist Mo or anaesthetist in intubation i. hand over flexible bronchoscope to anaesthetist. ii. once anaesthetist visualized the vocal cord, assist anaesthetist as ordered. iii. inflate the endotracheal tube cuff once in position. iv. assist MO or anaesthetist to remove the flexible bronchoscope when required: - ensure the ETT is held securely during removal of the scope to prevent dislodgement. - ensure the tip of flexible bronchoscope is in neutral position. v. connect catheter mount to ETT. vi. secure ETT once placement confirmed. vii. clean up flexible bronchoscope using gauze and flush out any secretion left in flexible bronchoscope using water for irrigation. 7. Documentation. 8. Cleaning of flexible bronchoscope.

References	Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. Glosser, L. (2017). Assessment of endotracheal tube intubation. Review of existing scales. *Disaster and Emergency Medicine Journal, 2*(2), 91-93. doi:10.5603/DEMJ.2017.0017 Lee, C. Y. (2006). *Manual of anaesthesia.* Singapore: McGraw Hill Education. Teoh, W. H. & Kristensen, M. S. (2016, July). Prediction in airway management: what is worthwhile, what is a waste of time and what about the future? *BJA: British Journal of Anaesthesia, 117*(1), 1-3. doi:https://doi.org/10.1093/bja/aew148
Flow Chart	Refer to Appendix B.7.
Revision history	Not applicable

Appendix B.7.

FLOW CHART ASSISTING IN AWAKE FLEXIBLE BRONCHOSCOPE INTUBATION



B.8. ASSISTING IN RAPID SEQUENCE INTUBATION

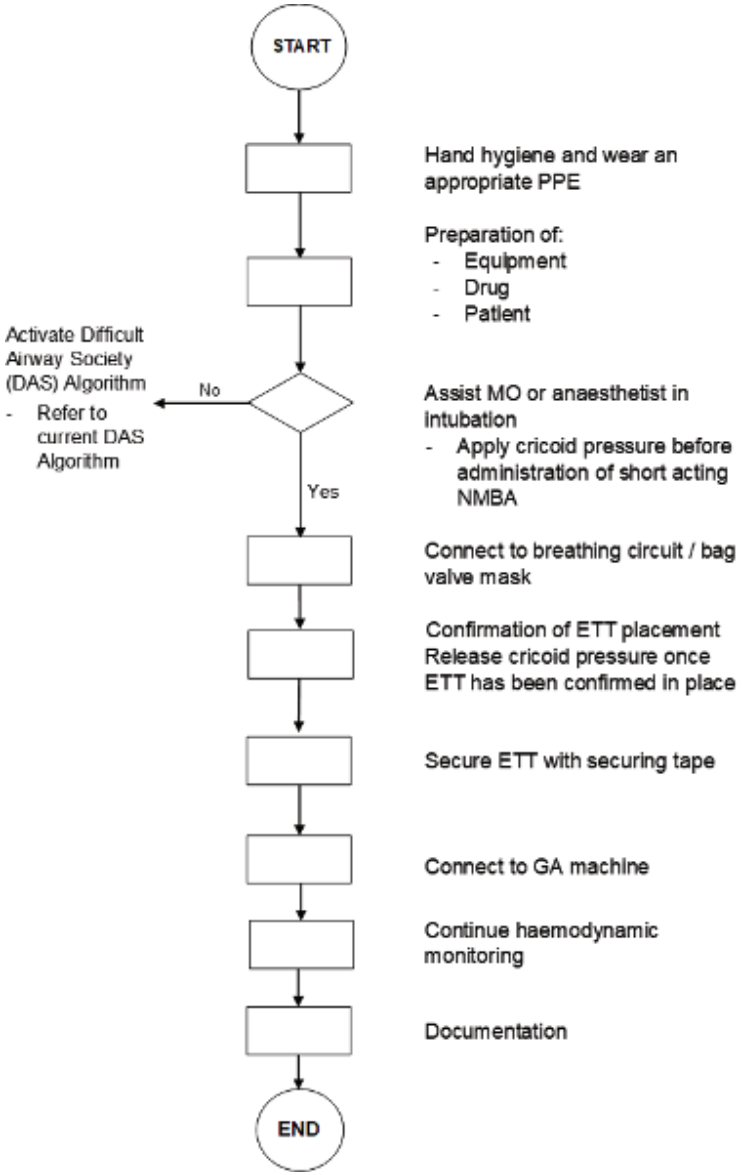
Scope	Assistant Medical Officers are responsible in assisting in RSI.
Purpose	To achieve rapid control of the airway whilst minimising the risk of regurgitation and aspiration of gastric contents.
Materials / Equipment	1. PPE. 2. SSSL form. 3. GA form. 4. Anaesthesia consent. 5. High risk consent (where applicable). 6. Intubation – MALES. i. M: - mask. - medication. - magill forceps. ii. A: - airway (oropharyngeal, nasopharyngeal). iii. L: - Laryngoscope. - lubricant gel. iv. E: - ETT. - EtCO2. - emergency trolley. v. S: - stylet. - SGA - stethoscope. - suction apparatus: • suction catheter: ½ size of ETT X 3. • yankauer – appropriate size. - syringe: 10ml or 20ml. - securing tape. - scissor. - spatula.

Materials / Equipment	7. Medication: i. short acting opioid: fentanyl. ii. induction agent: propofol or sodium thiopentone. iii. neuromuscular blocking agent: suxamethonium or rocuronium. iv. pre-treatment: iv lignocaine, atropine. 8. O-ring head reast. 9. GA Machine. 10. Physiological monitoring system. 11. Adequate IV access.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Preparation equipment – as for intubation. 4. Preparation of medication – as above. 5. Preparation of patient: i. ensure IV line is patent and functioning. ii. monitor haemodynamic parameters continuously. iii. place patient in sniffing position. 6. Assist anaesthetist: i. preoxygenation 3 – 5 minutes with 100% O2 or 4-8 vital capacity breaths. ii. administration of short acting anaesthetic agent. - short acting opioid: fentanyl. - induction agent: propofol or sodium thiopentone. - neuromuscular blocking agent: suxamethonium or rocuronium. - pre-treatment drug – whenever indicated. ii. apply cricoid pressure (Sellick Manoeuvre) before the administration of short acting neuromuscular blocking agent: - cricoid pressure: 20 – 30 Newton. 7. Assist MO or anaesthetist in intubation process: i. inflate ETT cuff (until leaking sound is disappeared during auscultation) or 5–10ml. ii. remove stylet. iii. level of ETT – measures at incisor teeth: - female: 18 – 20cm. - male: 20 – 22cm.

Work Process	8. Connect to breathing circuit. 9. Confirmation of ETT placement: i. visible chest rises. ii. water vapor in ETT. iii. capnograph – normal EtCO2. iv. 5 – point auscultation: equal air entry. v. evaluation of oxygenation via skin signs. vi. chest X-Ray – when applicable. 10. Release cricoid pressure once ETT placement has been confirmed. 11. Secure ETT with securing tape. 12. Connect to GA machine. 13. Continuous monitoring patient. 14. Documentation.
References	Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. Grable, B. &. (2015). Patient Monitoring. In P. K. Sikka, *Basic Clinical Anaesthesia* (pp. 70 - 74). New York: Springer. doi:10.1007/978-1-4939-1737-2 Lee, C. Y. (2006). *Manual of anaesthesia.* Singapore: McGraw Hill Education. Williamson, D., & Nolan, J. (2015). Airway assessment. In A. B. Burtenshaw (Ed.), *Emergency Airway Management* (2nd ed., Vol. 41). London: Cambridge University Press.
Flow Chart	Refer to Appendix B.8.
Revision history	Not applicable

Appendix B.8.

FLOW CHART ASSISTING IN RAPID SEQUENCE INTUBATION



B.9. ASSISTING IN SUPRAGLOTTIC AIRWAY DEVICE INSERTION

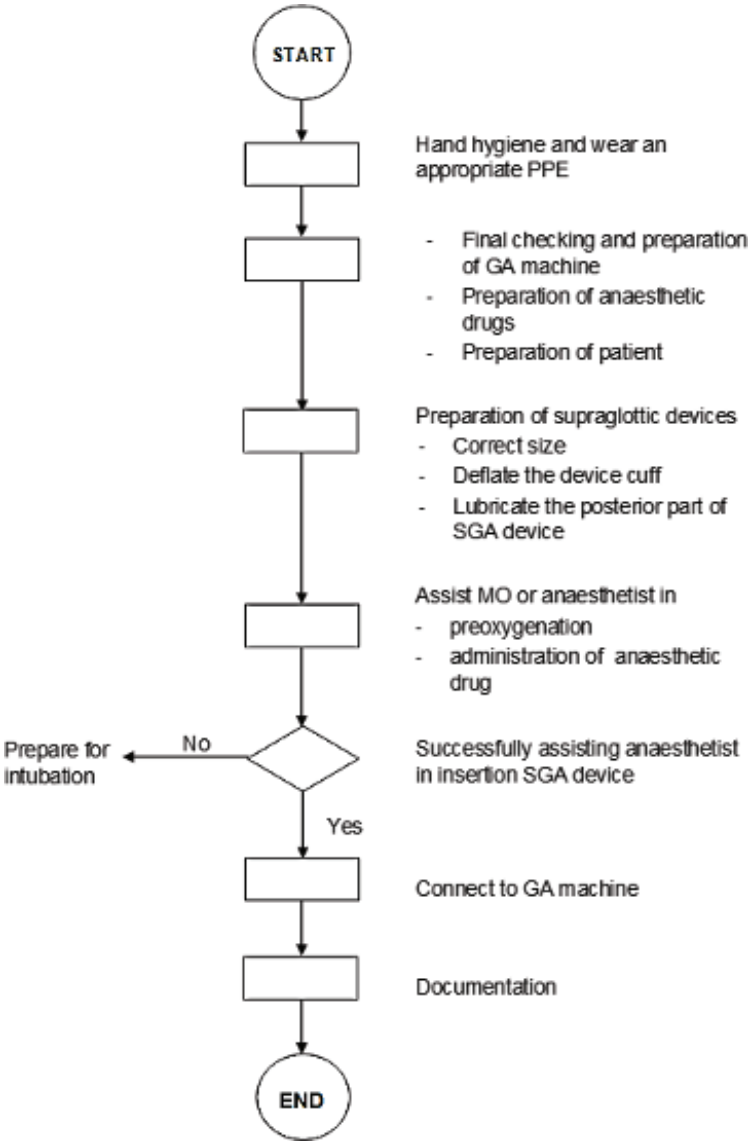
<table>
<tr><td>Scope</td><td colspan="2">Assistant Medical Officers are responsible in preparing and assisting in SGA device insertion.</td></tr>
<tr><td>Purpose</td><td colspan="2">To allow ventilation, oxygenation, anaesthetic gases. and administration of</td></tr>
<tr><td>Materials / Equipment</td><td colspan="2">1. PPE.
2. Intubation equipment (MALES).
3. SGA devices according to body weight of patient.
4. Introducer: Proseal or flexible LMA.
5. Syringe: 20ml.
6. Lubricant gel.
7. O2 supply.
8. GA form.
9. SSSL form.</td></tr>
<tr><td rowspan="3">Work Process</td><td colspan="2">1. Hand hygiene.
2. Wear an appropriate PPE.</td></tr>
<tr><td>3. Final assessment.
4. Final checking and preparation of machine.
5. Preparation of anaesthetic drugs.
6. Preparation of patient.</td><td>Refer to relevant procedure</td></tr>
<tr><td colspan="2">7. Preparation of SGA devices:
i. selection of size – according to patient’s body weight.
ii. standby 1 size bigger and 1 size smaller.
iii. deflate cuff with cuff deflator (where applicable).
iv. ensure stiff wedge and wrinkle free.
v. lubricate the posterior SGA surface.
vi. SGA device incorporated with a gastric drainage tube placed lateral to the main airway tube and which ends at the tip of the mask - assemble with introducer to facilitate insertion (where applicable).</td></tr>
</table>

Work Process	8. Assist in preoxygenation: i. place patient in sniffing position. ii. keep suction machine on, ready for use. iii. ask patient to inhale 4-8 vital capacity breaths with 100% O2. iv. O2 gas flow 8-10 l/min. v. ensure SpO2 above 98%. 9. Assist in the administration of anaesthetic drugs: i. depth of anaesthesia must be adequate to ensure successful insertion. 10. Assist Mo or anaesthetist in the SGA device insertion: i. stand at the patient's head end and place the patient in the sniffing position. ii. ensure patient is unresponsive with relaxed jaw. iii. insert the supraglottic device into hypopharynx and advanced posteriorly along the hard palate until resistant. iv. procedure should not take more than 30 seconds. v. inflate the cuff according to the size of the SGA device: - inflate cuff till no audible air leakage or at 45-60 cmH2O. vi. Ventilate lungs manually: - observe chest expansion on each ventilation. - no abdominal distension. - confirm by capnograph and auscultation, listen for equal air entry in both lungs. 11. Secure the SGA device and connect to GA machine. 12. Documentation.

References	Abedini, N., Parish, M., Farzin, H., Pourfathi, H., & Akhsham, M. (2018). The Determination of an Appropriate Time for Placement of the Classic Laryngeal Mask Airway in Patients Undergoing General Anaesthesia. *Anaesthesiology and pain medicine, 8*(2), e64427. doi:https://dx.doi.org/10.5812%2Faapm.64427 Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. Lee, C. Y. (2006). *Manual of anaesthesia.* Singapore: McGraw Hill Education. Sorbello, M., & Petrini, F. (2017). Supraglottic Airway Devices: the Search for the Best Insertion Technique or the Time to Change Our Point of View? *Turk J Anaesthesiol Reanim, 45*(2), 76–82. doi:https://dx.doi.org/10.5152%2FTJAR.2017.67764
Flow chart	Refer to Appendix B.9.
Revision history	Not applicable

Appendix B.9.

FLOW CHART ASSISTING IN SUPRAGLOTTIC AIRWAY DEVICE INSERTION



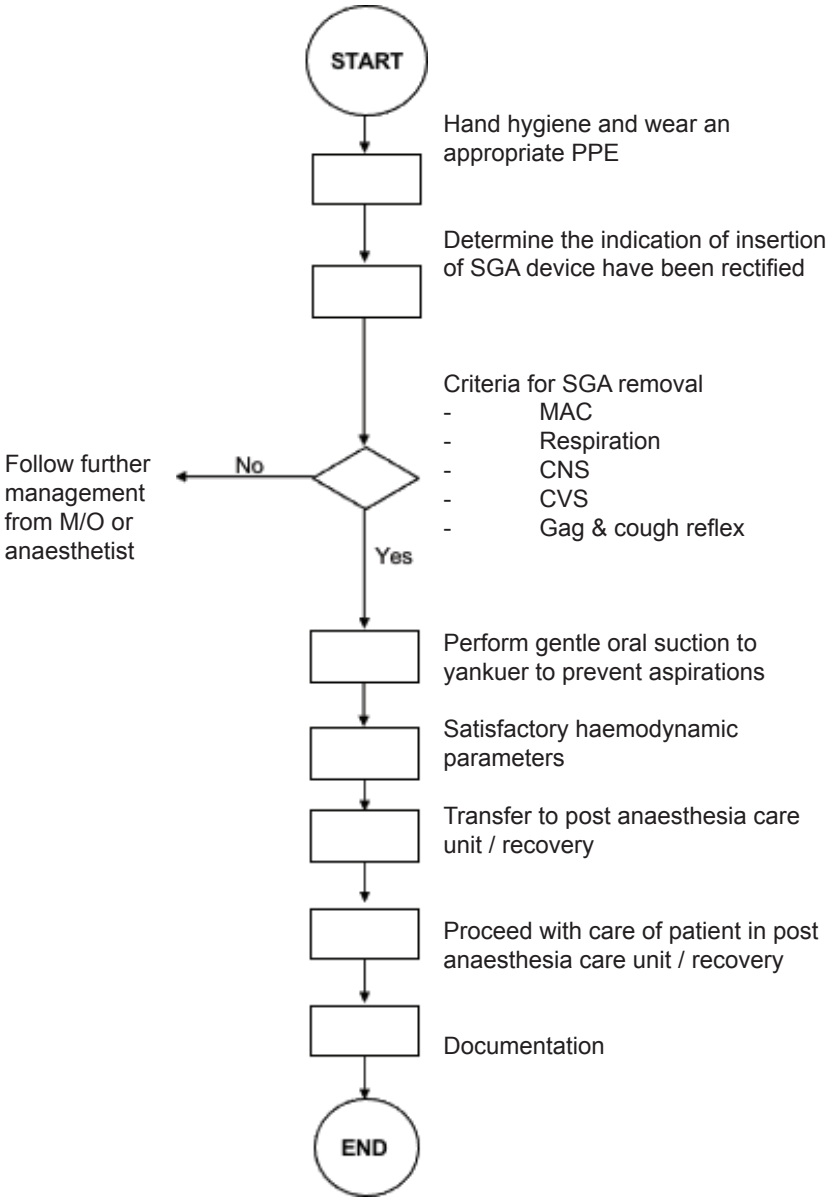
B.10. REMOVAL OF SUPRAGLOTTIC AIRWAY DEVICE

Scope	Assistant Medical Officers are responsible in the removal of SGA device upon recover from anaesthesia.
Purpose	Allow patient with spontaneous breathing to protect his own airway after anaesthesia procedure.
Materials / Equipment	1. PPE. 2. Suction device. 3. Face mask. 4. O2 supply. 5. GA form. 6. SSSL form.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Reassess patient's condition: i. MAC – MACawake < 0.5. ii. respiration – spontaneous breathing with good exhaled tidal volume. iii. capnography reading. iv. CNS – alert and conscious or deep. v. CVS – blood pressure and pulse rate within 20% from pre anaesthetic value. vi. presence of gag and cough reflex. 4. Perform gentle oral suction to clear the airway with suction yankauer to prevent aspirations. 5. Allow patient to push out the SGA device: i. do not deflate cuff to avoid pulmonary aspiration. ii. remove SGA device and perform suctioning simultaneously. iii. administer 100% O2 via face mask. 6. Transfer patient to post anaesthesia care unit or recovery once haemodynamic parameters are stable. 7. Proceed with care of patient in post anaesthesia care unit or recovery. 8. Documentation.

References	Abedini, N., Parish, M., Farzin, H., Pourfathi, H., & Akhsham, M. (2018). The Determination of an Appropriate Time for Placement of the Classic Laryngeal Mask Airway in Patients Undergoing General Anaesthesia. *Anaesthesiology and pain medicine, 8*(2), e64427. doi:https://dx.doi.org/10.5812%2Faapm.64427 Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. Lee, C. Y. (2006). *Manual of anaesthesia.* Singapore: McGraw Hill Education. Sorbello, M., & Petrini, F. (2017). Supraglottic Airway Devices: the Search for the Best Insertion Technique or the Time to Change Our Point of View? *Turk J Anaesthesiol Reanim, 45*(2), 76–82. doi:https://dx.doi.org/10.5152%2FTJAR.2017.67764
Flow chart	Refer to Appendix B.10.
Revision history	Not applicable

Appendix B.10.

FLOW CHART OF REMOVAL OF SUPRAGLOTTIC AIRWAY DEVICE



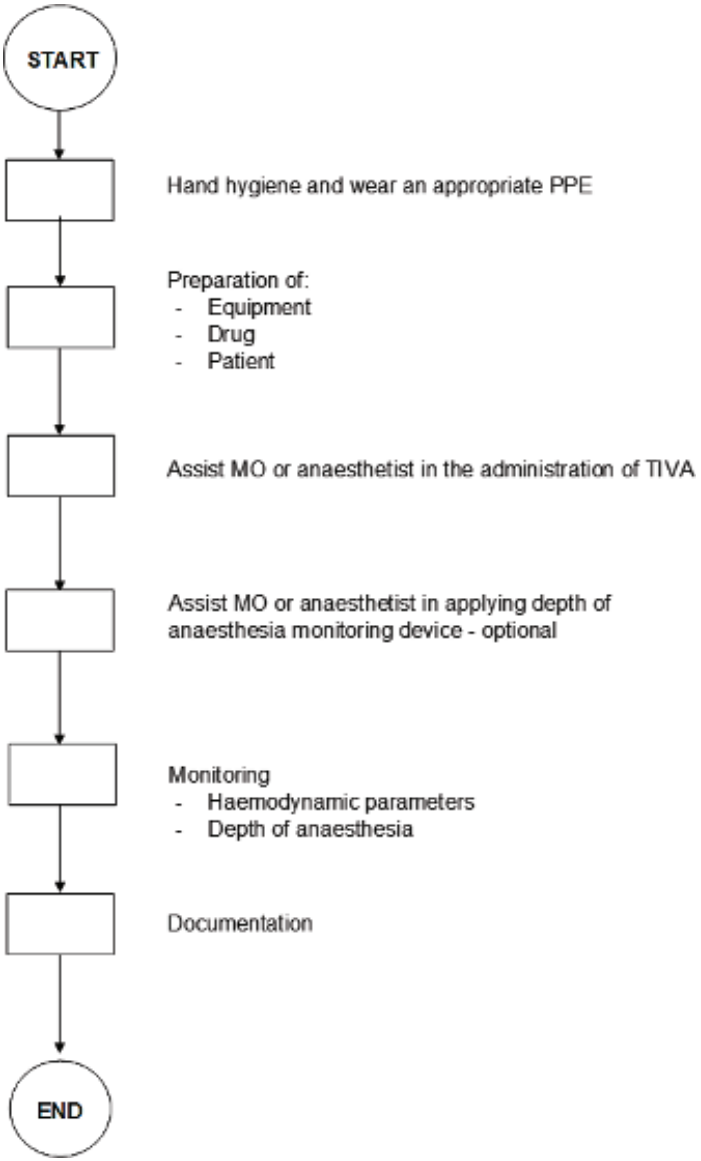
B.11. ASSISTING IN TOTAL INTRAVENOUS ANAESTHESIA

Scope	Assistant Medical Officers are responsible in preparing and assisting in TIVA.
Purpose	To provide anaesthesia administered exclusively via the intravenous route using TIVA pump, where it allows administration of intravenous agents based on real-time pharmacokinetic simulations.
Materials / Equipment	1. PPE. 2. GA machine. 3. Intubation trolley. 4. Physiological monitoring system. 5. SSSL form. 6. GA form. 7. Surgical consent. 8. Anaesthesia consent. 9. High risk consent (where applicable). 10. TIVA pump. 11. TIVA infusion set (non-return valves, 2 three ways stopcock). 12. Drugs: Propofol and Remifentanil. 13. Depth of anaesthesia monitoring device.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Preparation of equipment: i. ensure TIVA pump is connected to power supply. ii. priming IV infusion set and TIVA infusion set with N/ Saline 0.9%. 4. Assist anaesthetist in the preparation of drug: i. propofol. ii. remifentanil. iii. other drugs: atropine, inotropic support, emergency drugs. 5. Preparation of patient: i. monitoring of patient's haemodynamic status. ii. ensure IV line is patent and running well.

Work Process	6. Assist MO or anaesthetist in the administration of TIVA: i. provide details on age, weight, height, and gender. ii. load the luer-lock 50 ml syringe with medication to TIVA infusion set. iii. use dedicated IV line and should always visible during surgery. iv. ensure no leakage, tighten all connections. 7. Assist anaesthetist in the application of depth of anaesthesiamonitoring device – optional. 8. Continuous monitoring of: i. haemodynamic parameters. ii. depth of anaesthesia. 9. Documentation.
References	Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. College of Anaesthesiologists. (2015). *Total Intravenous Infusion: using target-controlled infusion. A pocket guide* (3r ed.). Academy of Medicine Malaysia. Davies, C., Katyayani, K., Kunst, G., Taylor, C. C. , Wang, Y., Barber, S. & Milan, Z. (2019). Comparing Bispectral Index and Narcotrend monitors in patients undergoing major hepatobiliary surgery: a case series. *Clinical Audit, 11*, 17 - 25. doi:https://doi.org/10.2147/CA.S183400 Kelly, S. D. (2007). *Monitoring Consciousness: Using the Bispectral Index During Anaesthesia, A Pocket Guide for Clinicians.* (2. edition, Ed.) USA. Retrieved March 30, 2022, from https://www.uoflhealthnetwork.org/documents/Nursing/BIS%20Pocket%20Guide.pdf
Flow chart	Refer to appendix B.11.
Revision history	Not applicable

Appendix B.11.

FLOW CHART ASSISTING IN TOTAL INTRAVENOUS ANAESTHESIA (TIVA)



B.12. ASSISTING IN THE NEURAXIAL I BLOCKADE (SPINAL OR EPIDURAL OR COMBINED SPINAL EPIDURAL) ANAESTHESIA PROCEDURES

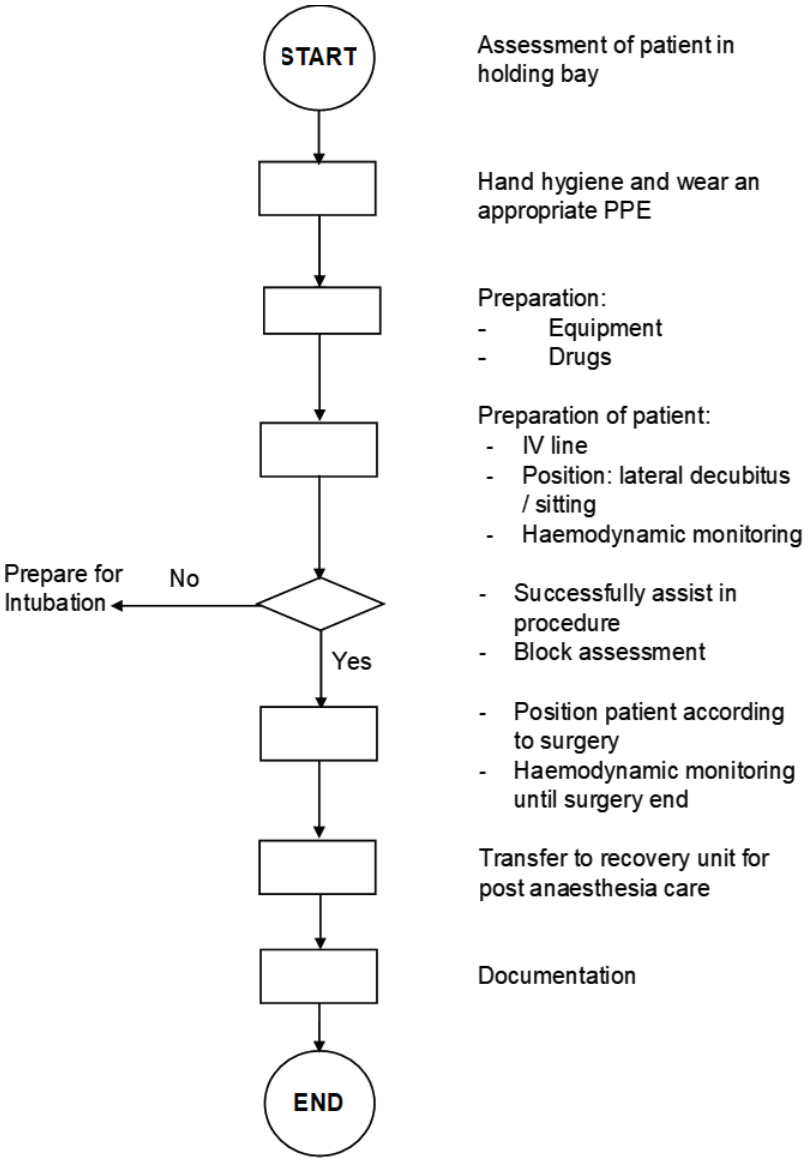
Scope	Assistant Medical Officers are responsible in preparing and assisting in the Neuraxial I Blockade (Spinal or Epidural or Combined Spinal Epidural) anaesthesia procedure.
Purpose	To ensure safety of patient and surgery under Neuraxial I Blockade take place.
Materials / Equipment	1. PPE. 2. SSSL form. 3. GA form. 4. Surgical consent. 5. Anaesthesia consent. 6. High risk consent (where applicable). 7. GA machine. 8. Intubation trolley. 9. Physiological monitoring system. 10. IV cannulation set. 11. Warming devices. 12. Specific needles for different type of neuraxial blockade: i. SAB – pencil point or cutting needle (25G or 27G). ii. epidural anaesthesia – epidural set. iii. CSE – CSE set. 13. Drug: i. local anaesthetic drugs: Bupivacaine in Dextrose, Bupivacaine, Ropivacaine, Levobupivacaine. ii. opioids: Morphine, Fentanyl. iii. intubation drugs: Hypnotic agent, NMBA. iv. anticholinergic agent: Atropine. v. antisialagogue agent: Glycopyrrolate. vi. vasoconstrictor agent: Ephedrine, Phenylephrine. vii. emergency drugs: Adrenaline. 14. BPP. 15. Spinal set.

Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Final assessment - refer to relevant procedure. 4. Management of OR before anaesthesia - refer to relevant procedure. 5. Preparation of equipment and drug: i. according to procedure: - spinal set. - subarachnoid block – pencil point or cutting needle (25G or 27G). - epidural anaesthesia – epidural set. - CSE – CSE Set. ii. drugs: - local anaesthetic drug: • SAB – Bupivacaine in Dextrose. • epidural anaesthesia: Bupivacaine, Levobupivacaine, Ropivacaine. - other drugs - as above. 6. Preparation of patient: i. introduction and explanation. ii. ensure IV line is functioning. iii. assist in preloading patient with crystalloid. iv. assemble physiological monitoring system and continuous monitoring. v. positioning patient: sitting or lateral decubitus. 7. Assisting MO or anaesthetist in the procedure: i. position patient according to surgery once procedure completed. 8. Allow surgery or procedure to proceed: i. assist anaesthetist in performing the effectiveness of block with bromage score, cold test, and pin prick test.

Work Process	9. Monitoring: i. continuous monitoring patient until surgery end. ii. observe for side effects and complications. iii. transfer to recovery unit once surgery end. 10. Documentation.
References	Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. Lee, C. Y. (2006). *Manual of anaesthesia.* Singapore: McGraw Hill Education. Lee, R. S. & Hsiung, R. L. (2012). Epidural Anaesthesia. In L. F. Chu, & A. J. Fuller (Eds.), *Manual of Clinical Anaesthesiology* (pp. 237 - 247). China: Wolter Klower/ Lippincott Williams & Wilkins. Lee, R. S. & Hsiung, R. L. (2012). Spinal Anaesthesia. In C. F. Larry, & F. J. Andrea (Eds.), *Manual of Clinical Anaesthesiology* (pp. 225 - 236). China: Wolter Kluwer / Lippincott Williams & Wilkins. Patient Safety Unit & Safe Surgery Saves Life Steering Committee. (2018). *Guidelines on Safe Surgery Saves Lives Programme* (2nd ed.). Kuala Lumpur: Ministry of Health Malaysia. Retrieved February 22, 2022, from https://patientsafety.moh.gov.my/v2/?page_id=867
Flow chart	Refer to Appendix B.12.
Revision history	Not applicable

Appendix B.12.

FLOW CHART ASSISTING IN THE NEURAXIAL I BLOCKADE (SPINAL OR EPIDURAL OR COMBINED SPINAL EPIDURAL) PROCEDURES



B.13. ASSISTING IN THE NEURAXIAL II BLOCKADE (PERIPHERAL NERVE BLOCK) ANAESTHESIA PROCEDURE

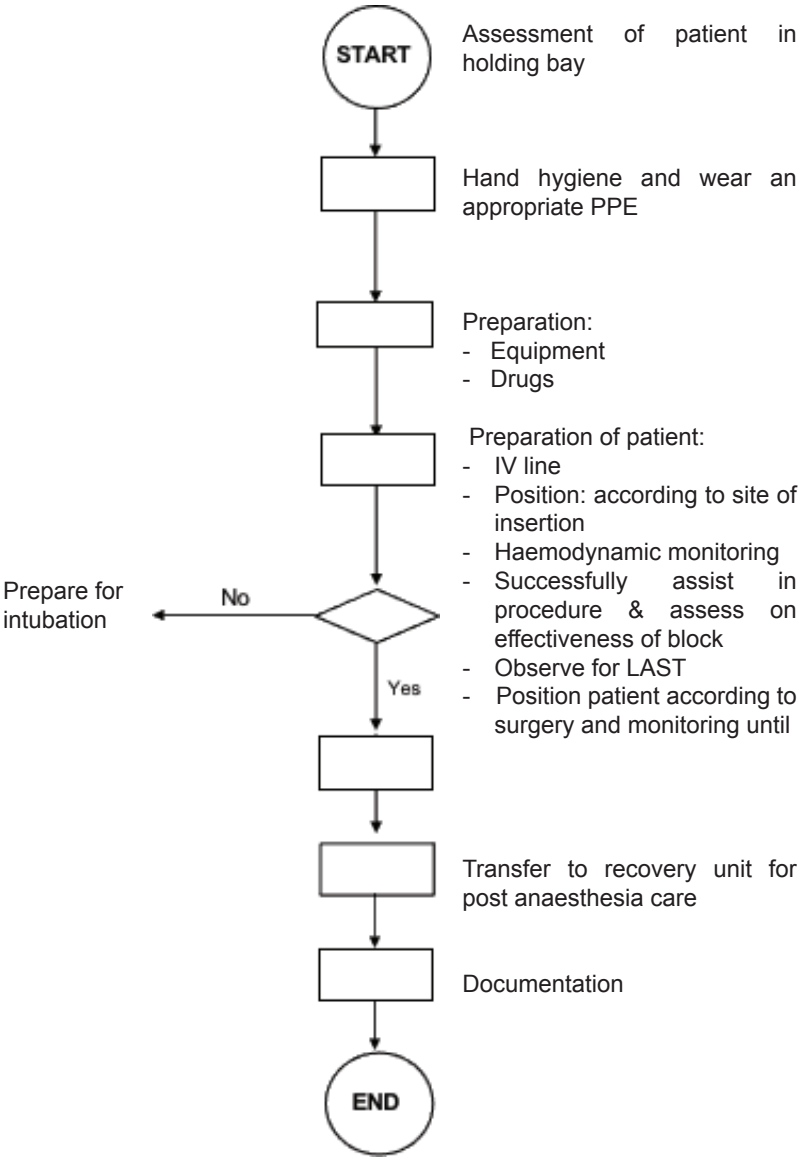
Scope	Assistant Medical Officers are responsible in preparing and assisting in Neuraxial II Blockade (Peripheral Nerve Block) anaesthesia procedure.
Purpose	To ensure safety of patient and surgery under Neuraxial II Blockade (Peripheral Nerve Block).
Materials / Equipment	1. PPE. 2. GA machine. 3. SSSL form. 4. Surgical consent. 5. Anaesthesia consent. 6. High risk consent (where applicable). 7. Intubation trolley. 8. Physiological monitoring system. 9. IV cannulation set. 10. Warming devices. 11. Specific needles for different type of neuraxial II blockade. 12. Ultrasound machine. 13. Sterile ultrasound gel. 14. Train of Four (TOF) machine. 15. Drug: i. local anaesthetic drugs: Bupivacaine, Ropivacaine, Levobupivacaine. ii. opioids: Morphine, Fentanyl. iii. intubation drugs: Hypnotic agent, NMBA. iv. anticholinergic agent: Atropine. v. antisialagogue agent: Glycopyrrolate. vi. vasoconstrictor agent: Ephedrine, Phenylephrine. vii. emergency drugs: Adrenaline, Midazolam. 16. Sterile ultrasound probe cover. 17. BPP.

Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Final assessment - refer to relevant procedure. 4. Management of OR before anaesthesia - refer to relevant procedure. 5. Preparation of equipment and drug: i. according to site of peripheral nerve block: - upper limb. - lower limb. ii. drugs: - local anaesthetic drug: • Bupivacaine, Levobupivacaine, Ropivacaine. • Other drugs – as above. 6. Preparation of patient: i. introduction and explanation. ii. ensure IV line is functioning. iii. assemble physiological monitoring system and continue monitoring. iv. positioning patient: according to site of insertion. v. O_2 therapy – where applicable. 7. Assisting anaesthetist in the procedure: i. continue haemodynamic monitoring. ii. position patient according to surgery once procedure completed. 8. Allow surgery or procedure to proceed: i. assist anaesthetist in performing the procedure. ii. assist in performing test for block effectiveness. iii. observe for signs and symptoms of LAST. 9. Monitoring: i. continue physiological monitoring system until surgery end. ii. observe for side effects and complications. iii. transfer to recovery unit once surgery end. 10. Documentation.

References	Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. College of Anaesthesiologists. (2019). *Recommendations for Peripheral Nerve Blocks.* Academy of Medicine of Malaysia. Cousins, M. J., Carr, D. B., Horlocker, T. T. & Bridenbaugh, P. O. (2009). *Cousins & Bridenbaugh's Neural Blockade in Clinical Anaesthesia and Pain Medicine.* China: Lippincott Williams & Wilkins, a Wolters Kluwer. Lee, C. Y. (2006). *Manual of anaesthesia.* Singapore: McGraw Hill Education.
Flow chart	Refer to Appendix B.13.
Revision history	Not applicable

Appendix B.13.

FLOW CHART ASSISTING IN NEURAXIAL II BLOCKADE (PERIPHERAL NERVE BLOCK) PROCEDURE



B.14(a). ASSISTING IN ONE LUNG VENTILATION (Double Lumen Endotracheal Tube)

Scope	Assistant Medical Officers are responsible in the preparation and assisting in one lung ventilation.
Purpose	To allow ventilation of only one lung, while the other lung is compressed by the surgeon or allowed to passively deflate.
Materials / Equipment	1. PPE. 2. SSSL form. 3. GA form. 4. Surgical consent. 5. Anaesthesia consent. 6. High risk consent (where applicable). 7. GA machine. 8. Physiological monitoring system. 9. Intubation trolley with the following: i. double lumen ETT. ii. syringe – according to the choice of ETT. iii. spencer well artery forceps. 10. Flexible bronchoscope – sterile preparation: i. upper shelf: - flexible bronchoscope. - suction: connector and catheter. - gauze. ii. lower shelf: - N/Saline 0.9% - 10ml. - IV Lignocaine 2%. - alcohol 70% solution. - lubricating gel. - catheter mount. - sterile glove – appropriate size.

Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Instruction receives from anaesthetist. 4. Preparation: i. standard intubation trolley with appropriate size of double lumen ETT. ii. GA machine - refer to relevant procedure. iii. patient: - place patient in sniffing position. - monitor haemodynamic patient closely. iv. preparation of flexible bronchoscope: - flexible bronchoscope sterilised. - check tip movement. - suction functioning. - light source attached and operational (where applicable). - ensure correct orientation of flexible bronchoscope. - defog tip of scope and white balance (where applicable). - focus the eyepiece or monitor on some written words to confirm integrity of image. - set up all equipment of bronchoscope and connect to system. 5. Assist MO or anaesthetist in: i. administering anaesthetic drugs prior to intubation. ii. intubation. iii. connect to GA machine. 6. Assisting anaesthetist during bronchoscope procedure to confirm the placement of bronchial cuff: i. hand over flexible bronchoscope to anaesthetist. ii. assist anaesthetist in adjusting the position of bronchial cuff tube when needed. iii. monitor patient's haemodynamic parameter while anaesthetist doing the procedure. 7. Decontamination of flexible bronchoscope - refer to relevant procedure. 8. Documentation

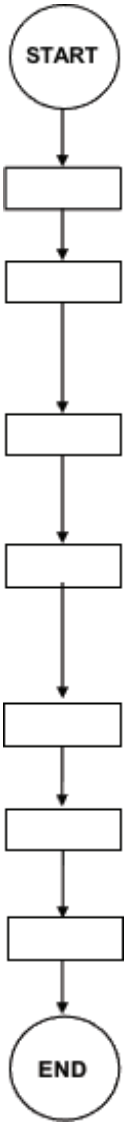
References	Campos, J. H. (2009). Update on tracheobrochial anatomy and flexible fibreoptic bronchoscopy in thoracic anaesthesia. *Curr Opin Aneaesthesiol, 22*(1), 4-10. doi:10.1097/ACO.0b013e32831a43ab Campos, J. H. (2019). Lung isolation. In *Principles and Practice of Anaesthesia for Thoracic Surgery.* Switzerland AG: Springer Nature. doi:https://doi.org/10.1007/978-3-030-00859-8_16 Collin, S. R. & Blank, R. S. (2014, June). Fibreoptic Intubation: An Overview and Update. *Respiratory Care, 59*(6), 865-880. doi:https://doi.org/10.4187/respcare.03012 Cooper, R. & Ellard, L. (2012, March 20). *Awake bronchoscopic intubation*. Retrieved March 15, 2022, from Toronto General Hospital Department of Anaesthesia Perioperative Interactive education: http://pie.med.utoronto.ca/BI/index.htm Ramkumar, V. (2011). Preparation of the patient and the airway for awake. *Indian Journal of Anaesthesia*(5), 422-427. Retrieved March 24, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles PMC3237141/pdf/ IJA-55-442.pdf
Flow Chart	Refer to Appendix B.43(a).
Revision history	Not applicable

Table B.14(a): Selection of double lumen endotracheal tube

Height Gender	Size DLT	
	Male	**Female**
< 160 cm	37 Fr	35 Fr
160 - 170 cm	39 Fr	37 Fr
> 170 cm	41 Fr	39 Fr

Appendix B.14(a).

FLOW CHART ASSISTING IN ONE LUNG VENTILATION (DOUBLE LUMEN ENDOTRACHEAL TUBE)



Hand hygiene and wear an appropriate PPE

Preparation of equipment
- Standard Intubation Trolley with
  - Endotracheal Tube
  - EBB Set
- Flexible Bronchoscope Trolley

Preparation of patient:
- position – sniffing position
- haemodynamic monitoring

Assist MO or anaesthetist in
- intubation
- endobronchial blocker placement
- bronchoscopy procedure to confirm the placement of bronchial cuff

Connect to GA Machine once procedure is completed

Decontamination of flexible bronchoscope- Refer to relevant procedure

Documentation

B.14(b). ASSISTING IN ONE LUNG VENTILATION (Endobronchial Blocker)

Scope	Assistant Medical Officers are responsible in preparing and assisting in one lung ventilation.
Purpose	To allow ventilation of only one lung to facilitate surgery.
Materials / Equipment	1. PPE. 2. SSSL form. 3. GA form. 4. Surgical consent. 5. Anaesthesia consent. 6. High risk consent (where applicable). 7. GA machine. 8. Physiological monitoring system. 9. Intubation trolley with the following: i. ETT. ii. EBB set: iii. syringe: 3ml and 5ml. 10. Flexible bronchoscope trolley – sterile preparation: i. upper shelf: - flexible bronchoscope with monitor. - suction: connector and catheter. - gauze. ii. lower shelf - N/Saline 0.9%. - IV Lignocaine 2%. - alcohol 70% solution. - lubricating gel. - catheter mount. - sterile glove – appropriate size.

Work process	1. Receive instruction from anaesthetist. 2. Hand hygiene. 3. Wear an appropriate PPE. 4. Preparation: i. intubation trolley with EBB set ii. GA machine. iii. patient: - place patient in sniffing position. - monitor haemodynamic patient closely. iv. preparation of flexible bronchoscope: - flexible bronchoscope. - check tip movement. - suction functioning. - light source attached and operational (where applicable). - defog tip of scope and white balance (where applicable). - focus the eyepiece or monitor to confirm integrity of image. - set up all equipment of bronchoscope and connect to system. 5. Assist anaesthetist in: i. administering anaesthetic drugs prior to intubation. ii. intubation. 6. Assist anaesthetist in EBB placement: i. the bronchial blocker is passed through its port and placed at the entrance of the tracheal tube. ii. the bronchoscope is passed through its port and then through the wire loop at the end of the bronchial blocker. iii. the bronchoscope and bronchial blocker are then passed under direct vision as a single unit into the main bronchus of the operative side. iv. the bronchoscope is withdrawn into the trachea, and the balloon is inflated under direct visualization. v. when correct placement has been confirmed, remove the wire loop. vi. connect to GA machine once procedure is completed.

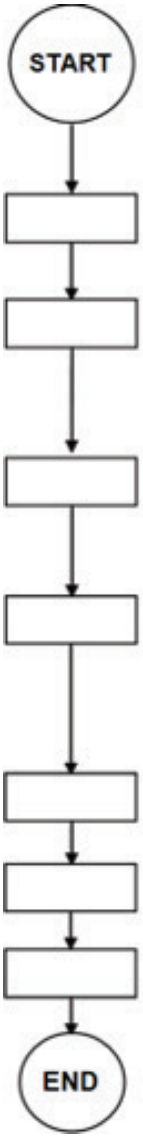
References	Fiadjoe, J., Feldman, J., & Cohen, D. (2011). Equipment. Smith's Anaesthesia For Infants And Children, 293-321. https://doi.org/10.1016/b978-0-323-06612-9.00010-9 Campos, J. H. (2019). Lung isolation. In Principles and Practice of Anaesthesia for Thoracic Surgery. Switzerland AG: Springer Nature. https://doi.org/10.1007/978-3-030-00859-8_16 Campos, J. H. (2009). Update on tracheobronchial anatomy and flexible bronchoscope in thoracic anaesthesia. Curr Opin Aneaesthesiol, 22(1), 4-10. doi:10.1097/ACO.0b013e32831a43ab
Flow chart	Refer to Appendix B.14(b).
Revision history	Not applicable

Table B.14(b).: Selection of endobronchial blocker

ETT Size	Endobronchial Blocker Size
4.5 – 5.5 mm	5 F
6 – 7 mm	7 F
³ 7.5 mm	9 F

Appendix B.14(b).

FLOW CHART ASSISTING IN ONE LUNG VENTILATION (ENDOBRONCHIAL BLOCKER)



Hand hygiene and wear an appropriate PPE

Preparation of equipment
- Standard Intubation Trolley with
  - Endotracheal Tube
  - EBB Set
- Flexible Bronchoscope Trolley

Preparation of patient:
- position – sniffing position
- haemodynamic monitoring

Assist MO or anaesthetist in
- intubation
- endobronchial blocker placement
- bronchoscope procedure to confirm the placement of bronchial cuff

Connect to GA Machine once procedure is completed

Document the procedure

Decontamination of flexible bronchoscope - Refer to relevant procedure

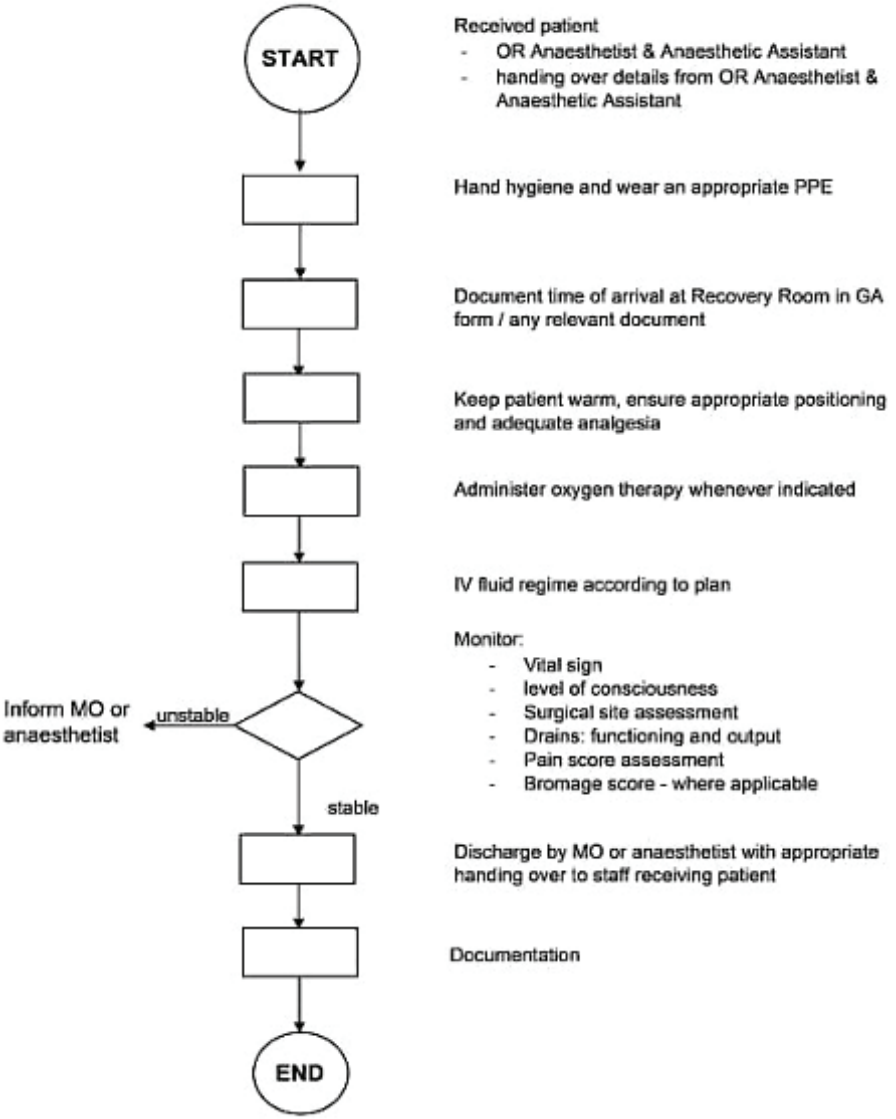
B.15. CARE OF PATIENT IN RECOVERY ROOM

Scope	Assistant Medical Officers are responsible in the care of patient in Recovery Room.
Purpose	To ensure safety of patient during post anaesthesia period.
Materials / Equipment	1. PPE. 2. SSSL form. 3. GA form. 4. O2 supply. 5. Physiological monitoring system. 6. Emergency trolley. 7. Warming devices.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Received patient from OR Anaesthetist & Anaesthetic Assistant. 4. Document time of arrival at recovery room in GA form or any relevant document. 5. Received patient with the handing over of the following: i. passing over every detail intraoperatively upon arrival in recovery room. ii. completed anaesthetic record together with important details of surgery. iii. specific verbal and written instructions for postoperative care. 6. Comfort the patient with appropriate positioning for surgery. 7. Administer O2 therapy whenever indicated. 8. Ensure IV fluid regime followed as order by anaesthetist. 9. Monitor the following closely: i. continuous vital sign monitoring. ii. level of consciousness. iii. surgical site assessment. iv. drains: functioning and output. v. pain score assessment. vi. bromage score (for patient receiving SAB). 10. Discharge: i. by MO or anaesthetist.

Work Process	ii. ensure Post Anaesthesia Recovery Score are completed prior to discharge. iii. document all relevant information in GA form, SSSL form or any other relevant document before handing over the patient. 11. Handing over to staff receiving the patient with the following: i. adequate information to staff receiving the patient: - post operative instruction as ordered by surgeon. - pass over every relevant information or event. ii. post operative pain management if any (PCA or Epidural). iii. blood product or specimen or tissue (placenta) – where applicable. iv. x-rays and results – where applicable. 12. Documentation.
References	Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach*. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. Lee, C. Y. (2006). *Manual of anaesthesia*. Singapore: McGraw Hill Education. Patient Safety Unit & Safe Surgery Saves Life Steering Committee. (2018). *Guidelines on Safe Surgery Saves Lives Programme* (2nd ed.). Kuala Lumpur: Ministry of Health Malaysia. Retrieved February 22, 2022, from https://patientsafety.moh.gov.my/v2/?page_id=867 Vimlati, L., Gilsanz, F. & Goldik, Z. (2009). Quality and safety guidelines of post anaesthesia care: Working Party on Post Anaesthesia Care (approved by the European Board and Section of Anaesthesiology, Union Européenne des Médecins Spécialistes). *European Journal of Anaesthesiology*, 26(9), 715 - 721. doi:10.1097/EJA.0b013e32832bb68f.
Flow Chart	Refer to Appendix B.15.
Revision history	Not applicable

Appendix B.15.

FLOW CHART CARE OF PATIENT IN RECOVERY ROOM



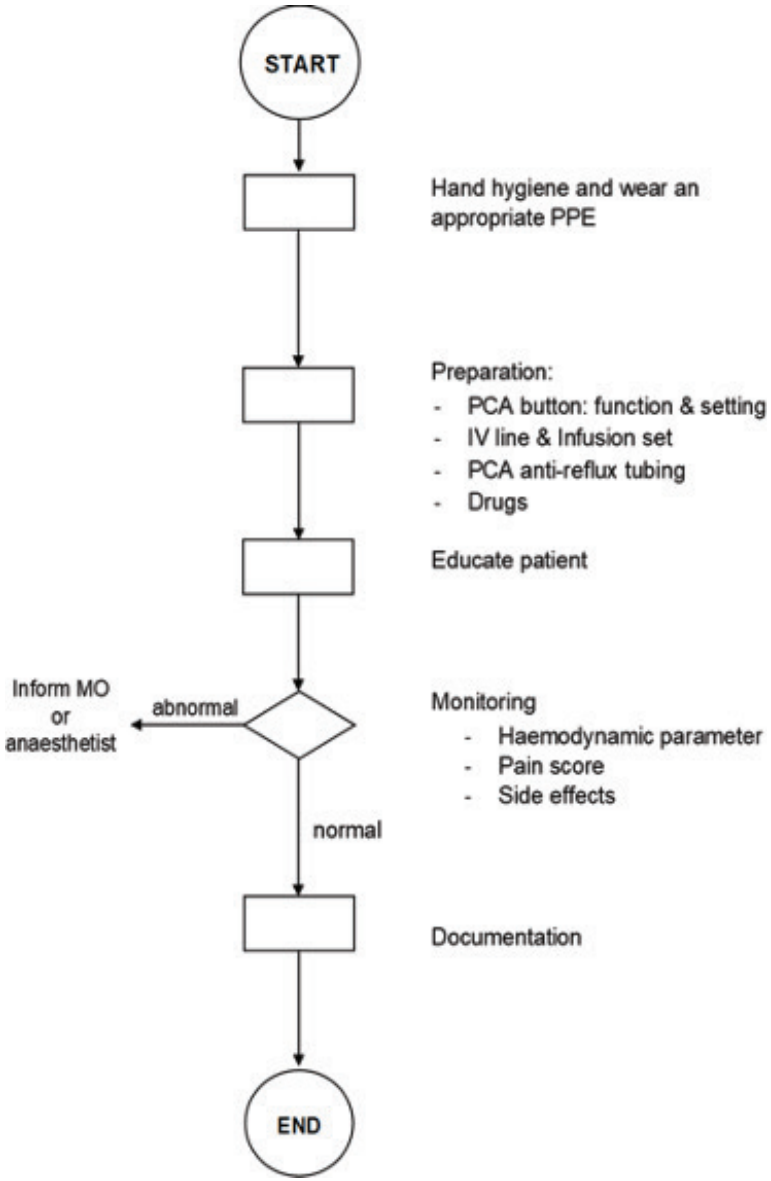
B.16. PATIENT CONTROLLED ANALGESIA IN RECOVERY ROOMM

Scope	Assistant Medical Officers are responsible in managing PCA in Recovery Room.
Purpose	To ensure patient receives adequate analgesia.
Materials / Equipment	1. PPE. 2. PCA pump. 3. PCA Anti-reflux tubing. 4. IV infusion set. 5. Drugs - as per ordered. 6. SSSL form. 7. GA form. 8. APS form.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Preparation: i. check the performance of PCA pump. ii. setting of PCA pump - as per ordered: - drugs. - dosage. - lock-out interval. iii. dedicated IV line: - functioning well. - connect with anti-reflux tubing. 4. Educate patient on: i. the usage of PCA button. ii. time to press PCA button. 5. Monitoring: i. pain score. ii. haemodynamic monitoring. iii. side effect. 6. Documentation.

References	Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. Grable, B. &. (2015). Patient Monitoring. In P. K. Sikka, *Basic Clinical Anaesthesia* (pp. 70 - 74). New York: Springer. doi:10.1007/978-1-4939-1737-2 Lee, C. Y. (2006). *Manual of anaesthesia.* Singapore: McGraw Hill Education. Unit, S. &. (2013). *Pain Management Handbook.* Malaysia Ministry of Health (MOH).
Appendix	Refer to Appendix B.16.
Revision History	Not applicable

Appendix B.16.

FLOW CHART PATIENT CONTROLLED ANALGESIA (PCA)
RECOVERY ROOM



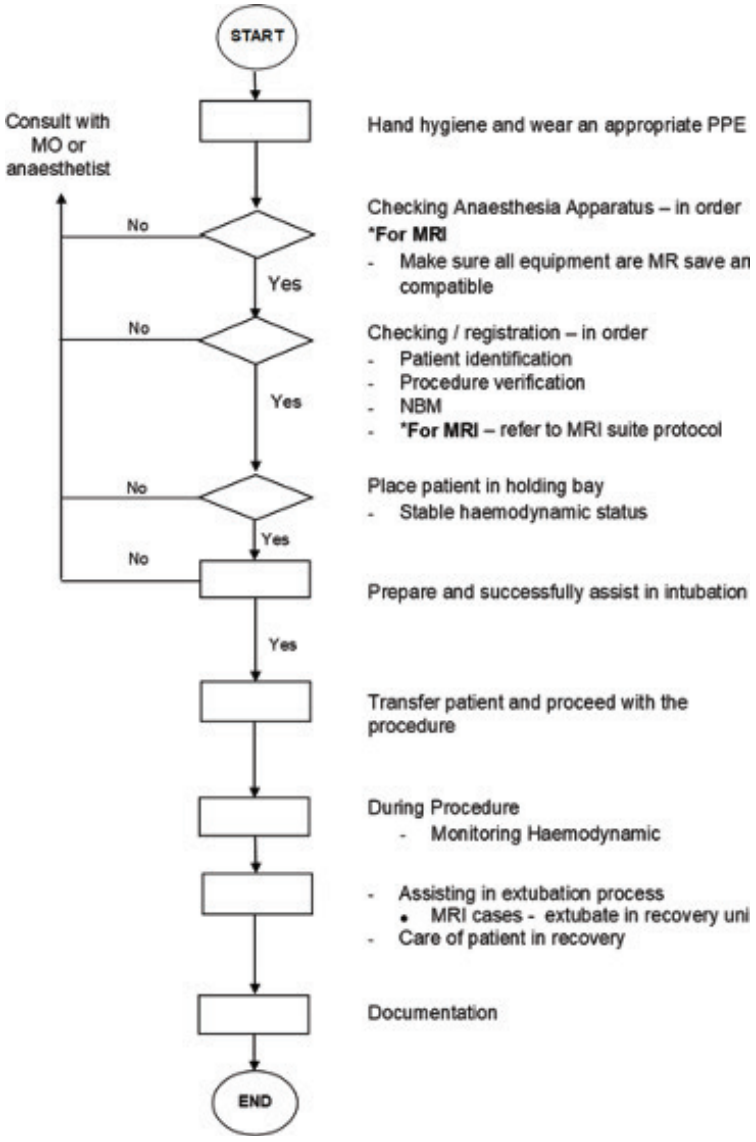
B.17. MANAGEMENT OF PATIENT IN NON-OPERATING ROOM ANAESTHESIA

Scope	Assistant Medical Officers are responsible in assessing, preparing and assisting anaesthetist in NORA.
Purpose	To administration of sedation or anaesthesia outside the operating room to patient undergoing painful or uncomfortable procedure.
Materials / Equipment	1. PPE. 2. Anaesthesia consent. 3. Surgical consent (for procedure in NORA). 4. Intubation trolley. 5. Suction devices. 6. IV cannulation set. 7. Physiological monitoring device. 8. GA machine. 9. Emergency trolley. 10. Fluid management system (syringe, volumetric pump). * For MRI suite: equipment must be MRI safe and compatible
Work Process	1. Preparation personnel: i. hand hygiene ii. wear an appropriate PPE iii. ensure personnel is free from metal - preparation equipment for MRI procedure - anaesthetic assistant to check anaesthetic equipment before conduct of anaesthesia for MRI 2. Preparation patient: i. refer to relevant checklist according to primary team. 3. Intubation – for intubated patient - pilot balloon is covered with micropore: i. Holding bay of MR Complex: non-intubated. ii. ICU or OT – (intubated). iii. CT Scan - sedation or intubation. iv. ERCP – sedation or intubation. v. ECT – non-intubated (hold mask). vi. ICL – sedation or intubation.

Work Process	4. Continue monitoring patient haemodynamic status. 5. Ensure IV access is functioning. 6. Assisting in extubation process (in MRI cases – extubation in recovery unit). 7. Post recovery care (refer to post recovery care guideline). 8. Documentation all relevant information. 9. Discharge to primary unit.
References	Baheti, K. B. & Laheri, V. V. (2015). *Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach.* New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). *Morgan & Mikhail's Clinical Anaesthesiology* (6th ed.). New York: McGraw Hill Education. Lee, C. Y. (2006). *Manual of anaesthesia.* Singapore: McGraw Hill Education. Patel, S. & Reddy, U. (2016). Anaesthesia for interventional neuroradiology. *British Journal Anaesthesia Education, 16*(5), 147-152. doi:https://doi.org/10.1093/bjaed/mkv032 Patient Safety Unit & Safe Surgery Saves Life Steering Committee. (2018). Guidelines on Safe Surgery Saves Lives Programme (2nd ed.). Kuala Lumpur: Ministry of Health Malaysia. Retrieved February 22, 2022, from https://patientsafety.moh.gov.my/v2/?page_id=867 Fernandez-Roblesa C, Oprea AD. Nonoperating room anaesthesia in different parts of the world. Curr Opin Anesthesiol. 2020;33:520-6.
Appendix	Refer to Appendix B.17.
Revision History	Not applicable

Appendix B.17.

FLOW CHART OF MANAGEMENT OF PATIENT IN NON-OPERATING ROOM ANAESTHESIA



STANDARD PRACTICE GUIDELINES FOR AMO IN INTENSIVE CARE SERVICES

INTENSIVE CARE TECHNOLOGISTS (ICT)

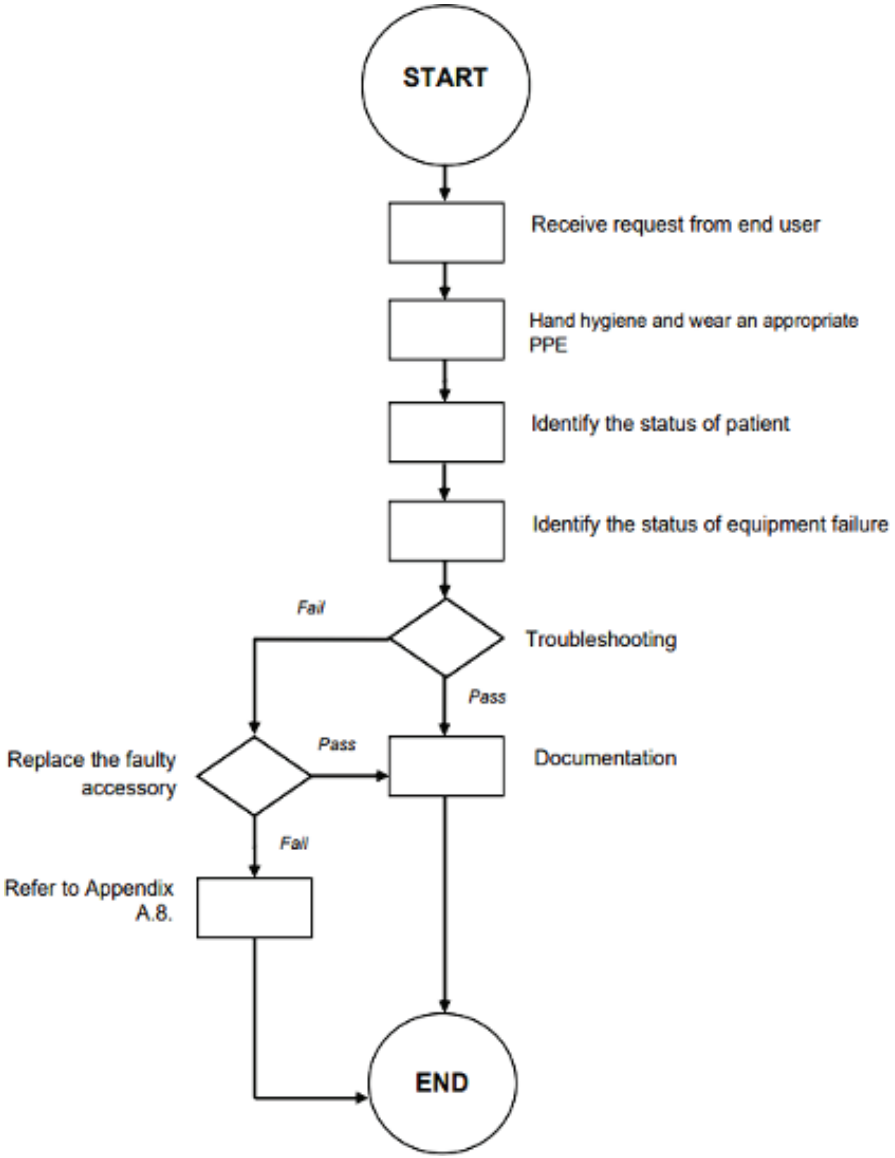
C.1. IDENTIFYING ERRORS AND TROUBLESHOOTING CRITICAL CARE DEVICES

Scope	Assistant Medical Officers are responsible to inspect, identify and troubleshoot critical care devices and inform HSS when equipment is malfunction.
Purpose	To ensure all the critical care devices are functioning well and safe to be used on patients.
Materials / Equipment	1. PPE. 2. Critical care devices. 3. Consumables or accessories. 4. User manual (according to manufacturer).
Work Process	1. Receive request from end user. 2. Hand hygiene. 3. Wear an appropriate PPE. 4. Identify the status of patient: i. vital signs. ii. hemodynamic stability. iii. biohazard or normal. 5. Identify the status of equipment failure: i. consumables or accessories faulty. ii. connection faulty (leak, loose, crack, sedimentation). iii. display faulty (jammed, reboot faulty, no power supply). 6. Identifying and rectifying the error by troubleshooting according to manufacturer user manual. 7. Replace the faulty accessory, if available. 8. If accessories are not available and problem persist, refer to Appendix A.8. 9. Documentation.

References	Ademe BW, Tebeje B, Molla A. (2016). Availability and utilization of medical devices in Jimma zone hospitals, Southwest Ethiopia: A case study. BMC Health Serv Res. 16(1):1– 10. Alsohime, F., Temsah, M. H., Al-Eyadhy, A., Ghulman, S., Mosleh, H., & Alsohime, O. (2021). Technical Aspects of Intensive Care Unit Management: A Single-Centre Experience at a Tertiary Academic Hospital. Journal of multidisciplinary healthcare, 14,869–875. https://doi.org/10.2147/JMDH.S294905. Bourgain, J. L., Coisel, Y., Kern, D., Nouette-Gaulain, K., Panczer, M., & ventilator group of the French Society of Anaesthesia, Intensive Care (2014). What are the main "machine dysfunctions" to know? Annales francaises d'anesthesie et de reanimation, 33(7-8), 466–471. https://doi.org/10.1016/j.annfar.2014.07.744 Cairo, J.M. (2016). Chapter 18: Troubleshooting and problem solving. In Pilbeam's mechanical ventilation: Physiological and clinical applications (6th ed., pp. 341- 363). St. Louis: Elsevier. Zippel, C., Börgers, A., Weitzel, A., & Bohnet-Joschko, S. (2014). Many critical incidents could be avoided by pre- anaesthesia equipment checks: lessons for high reliability organizations. European journal of anaesthesiology, 31(5), 289–291. https://doi.org/10.1097/EJA.0000000000000054
Flow Chart	Refer to Appendix C.1.
Revision History	Not applicable

Appendix C.1.

FLOW CHART IDENTIFYING ERRORS AND TROUBLESHOOT CRITICAL CARE DEVICES



C.2. IDENTIFYING ERRORS AND TROUBLESHOOTING VENTILATORS

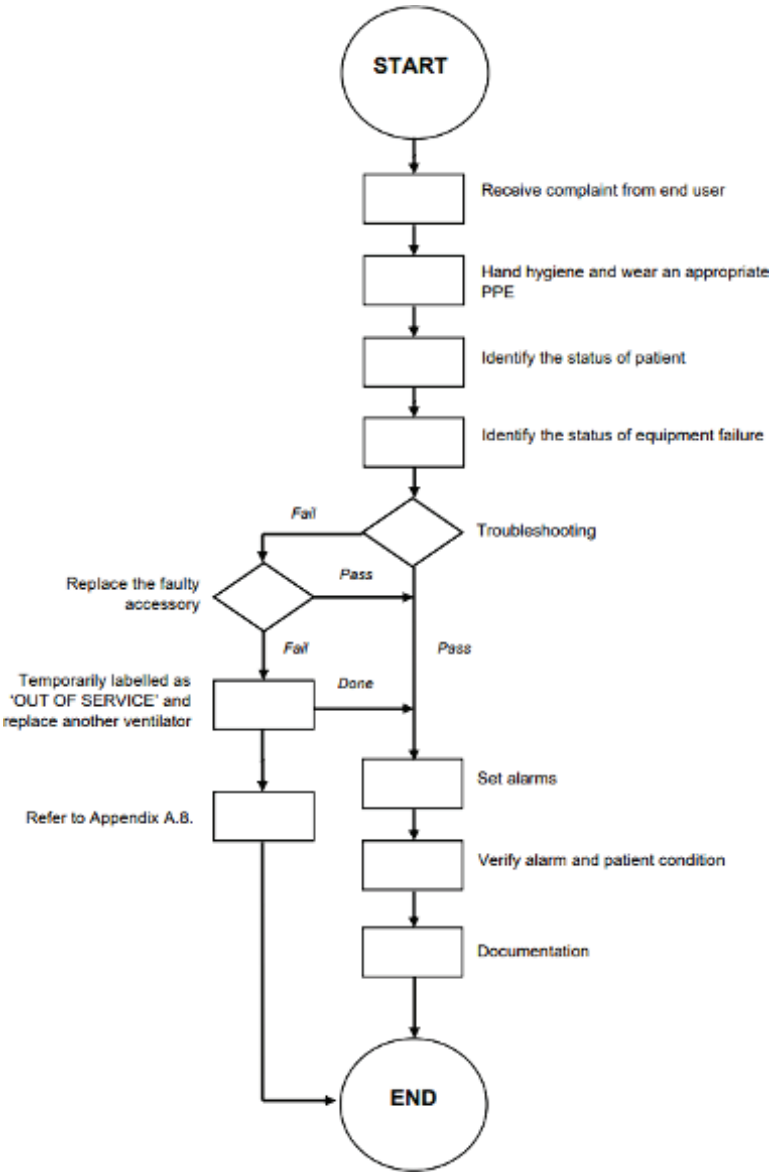
Scope	Assistant Medical Officers are responsible to inspect, identify and troubleshoot ventilators and inform HSS when it's malfunction.
Purpose	To ensure ventilators are functioning well and safe to be used on patients.
Materials / Equipment	1. PPE. 2. Test lung. 3. Consumables or accessories. 4. User manual (according to manufacturer).
Work Process	1. Receive complaint from end user. 2. Hand hygiene. 3. Wear an appropriate PPE. 4. Identify the status of patient: i. vital signs. ii. hemodynamic stability. iii. biohazard / normal. 5. Identify the status of equipment failure: i. if the cause of an alarm cannot be identified and fixed quickly, remove the ventilator breathing circuits from the patient and begin manual ventilation with a BVM. ii. some essential alarms on the ventilator include ventilator inoperative, power failure, no gas delivery to the patient, low peak inspiratory pressure, low tidal volume, low or high minute volume, low positive end-expiratory pressure and continuous positive airway pressure, apnoea, inspiratory: expiratory ratio, high pressure limit, high respiratory rate, and low or high FiO2. iii. consumables faulty. iv. connection faulty (leak, loose, crack, sedimentation) v. display faulty (jammed, reboot faulty, no power supply).

Work Process	6. Turn the ventilator off and restart it. 7. Follow the troubleshooting instructions on the ventilator, if available. 8. If the ventilator fails to operate properly, temporarily label it “OUT OF SERVICE” for a maintenance check and replace it with another ventilator. 9. Ensure that the alarms are set appropriately. 10. Verify the alarm has been corrected and the patient is in stable condition. 11. Rectify the fault by troubleshooting according to the manufacturer user manual. 12. Replace the faulty accessory, if available. 13. If problem persist, refer to Appendix A.8. 14. Documentation.
References	Ademe BW, Tebeje B, Molla A. (2016). Availability and utilization of medical devices in Jimma zone hospitals, Southwest Ethiopia: A case study. BMC Health Serv Res. 16(1):1–10. Alsohime, F., Temsah, M. H., Al-Eyadhy, A., Ghulman, S., Mosleh, H., & Alsohime, O. (2021). Technical Aspects of Intensive Care Unit Management: A Single-Centre Experience at a Tertiary Academic Hospital. Journal of multidisciplinary healthcare, 14,869–875. https://doi.org/10.2147/JMDH.S294905. Bourgain, J. L., Coisel, Y., Kern, D., Nouette-Gaulain, K., Panczer, M., & ventilator group of the French Society of Anaesthesia, Intensive Care (2014). What are the main "machine dysfunctions" to know? Annales francaises d'anesthesie et de reanimation, 33(7-8), 466–471. https://doi.org/10.1016/j.annfar.2014.07.744.

References	Cairo, J.M. (2016). Chapter 7: Final considerations in ventilator setup. In Pilbeam's mechanical ventilation: Physiological and clinical applications (6th ed., pp. 98- 117). St. Louis: Elsevier. Cairo, J.M. (2016). Chapter 18: Troubleshooting and problem solving. In Pilbeam's mechanical ventilation: Physiological and clinical applications (6th ed., pp. 341- 363). St. Louis: Elsevier. Covert, T., Niu, N.T. (2015). Differential diagnosis of high peak airway pressures. DCCN: Dimensions of Critical Care Nursing, 34(1), 19-23. doi:10.1097/DCC.0000000000000093. Spiegel, R., Mallemat, H. (2016). Emergency department treatment of the mechanically ventilated patient. Emergency Medicine Clinics of North America, 34(1), 63-75. Zippel, C., Börgers, A., Weitzel, A., & Bohnet-Joschko, S. (2014). Many critical incidents could be avoided by preanaesthesia equipment checks: lessons for high reliability organizations. European journal of anaesthesiology, 31(5), 289–291. https://doi.org/10.1097/EJA.0000000000000054
Flow Chart	Refer to Appendix C.2.
Revision History	Not applicable

Appendix C.2.

FLOW CHART IDENTIFYING ERRORS AND TROUBLESHOOTING VENTILATORS



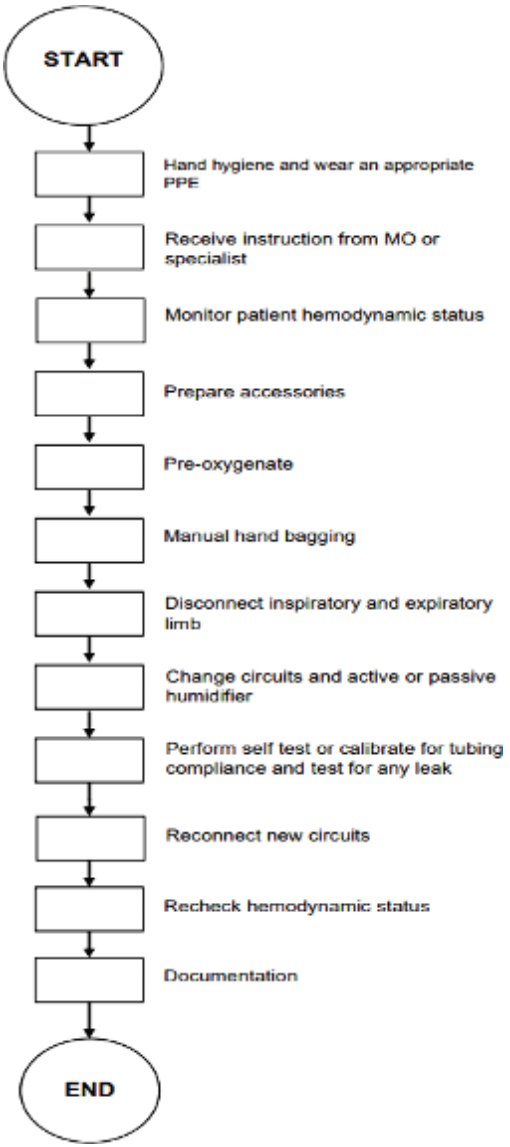
C.3. CHANGING OF DIRTY OR SOILED VENTILATOR CIRCUITS

Scope	Assistant Medical Officers are responsible to ensure ventilator circuits are discarded or changed when soiled OR upon request by MO or specialist to change type of humidification from passive humidification to active humidification or vice versa.
Purpose	To prevent any microorganism growth and to facilitate change process on patient's humidification.
Materials / Equipment	1. PPE. 2. Breathing circuit. 3. Test lung. 4. HME. 5. BVM.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Receive instruction from MO or specialist on changing patient humidification from passive to active or via versa OR change circuits if soiled. 4. Monitor patient haemodynamic status. 5. Prepare accessories. (heated water bath, HME & circuits). 6. Pre-oxygenate patient 100%. 7. Manual hand bagging with BVM . 8. Disconnect inspiratory and expiratory circuit limbs. 9. Change circuit : i. discard soil circuit and change to clean circuits OR ii. discard HME and apply active humidification system OR iii. disconnect active humidification system and connect with HME. 10. Perform self-test or calibrate for circuit compliance and test for any leaks. 11. Reconnect new circuit to patient. 12. Recheck patient haemodynamic status. 13. Documentation.

References	American Association for Respiratory Care, Restrepo RD, Walsh BK. Humidification during invasive and non-invasive mechanical ventilation: 2012. Respir Care 2012; 57:782. Han JN, Liu YP, Ma S, et al. Effects of decreasing the frequency of ventilator circuit changes to every 7 days on the rate of ventilator-associated pneumonia in a Beijing hospital. Respir Care 2001; 46:891. Hess DR, Kallstrom TJ, Mottram CD, et al. Care of the ventilator circuit and its relation to ventilator-associated pneumonia. Respir Care 2003; 48:869. Lorente L, Lecuona M, Jiménez A, et al. Ventilator-associated pneumonia using a heated humidifier or a heat and moisture exchanger: a randomized controlled trial [ISRCTN88724583]. Crit Care 2006; 10: R116. Wiles S, Mireles-Cabodevila E, Neuhofs S, et al. Endotracheal Tube Obstruction Among Patients Mechanically Ventilated for ARDS Due to COVID-19: A Case Series. J Intensive Care Med 2021; 36:604.
Flow Chart	Refer to Appendix C.3.
Revision History	Not applicable

Appendix C.3.

FLOW CHART CHANGING OF DIRTY OR SOILED VENTILATOR CIRCUITS



C.4. REPROCESSING OF VENTILATORY EQUIPMENT

Scope	Assistant Medical Officers are responsible in reprocessing of ventilatory equipment according to the manufacturer protocols and hospital infection control guidelines.
Purpose	To allow safe use of ventilators which includes cleaning, disinfection, sterilization as well as testing and calibration.
Materials / Equipment	1. PPE. 2. Ventilators – invasive and non-invasive. 3. Test lung. 4. Disinfectant wipes or spray. 5. Dressing trolley. 6. Sterile sheet (for reusable circuit). 7. Ventilator circuits (reusable). 8. Reusable inspiratory and expiratory filter.
Work Process	1. Reprocessing: i. hand hygiene. ii. wear an appropriate PPE. iii. remove all accessories from ventilator. iv. keep aside all reusable patient circuits, inspiratory filter, expiratory filter, flow sensor, transducer cassette etc for thermal disinfection or cold sterilisation. v. remove and discard all disposable items. vi. wash and rinse all soiled items with distilled sterile water. vii. thermal disinfection for heat-resistant equipment that can withstand high temperature (e.g., 80°C); using a washer disinfector machine. viii. cold sterilization is performed if a washer disinfector is not available and for equipment that may not tolerate 80 °C or may be damage in physical appearance by high temperature. ix. once thermal or cold sterilization complete, rinse and dry it in drying cabinet. x. wipe ventilator surface with non-alcohol base disinfectant wipes. xi. allow ventilator surface to dry.

Work Process	2. Performance test: i. fix the ventilator circuits and humidifier (if needed) to the ventilator. ii. connect flow sensor and do calibration for flow and oxygen sensor (if applicable). iii. run test and calibration on ventilator (as recommended by manufacturer guideline). iv. set the ventilator in normal range value. (normal range value refers to manufacturer operator manual). v. test run the ventilator with test lung within 15 - 30 minutes. vi. troubleshoot if any alarms and refer to Appendix A.8. if problem persist. vii. switch off ventilator once test ended. viii. storage. 3. Documentation.
References	Alraddadi, B. M., Qushmaq, I., Al-Hameed, F. M., Mandourah, Y., Almekhlafi, G. A., Jose, J., Al-Omari, A., Kharaba, A., Almotairi, A., Al Khatib, K., Shalhoub, S., Abdulmomen, A., Mady, A., Solaiman, O., Al-Aithan, A. M., Al-Raddadi, R., Ragab, A., Balkhy, H. H., Al Harthy, A., Sadat, M., … Saudi Critical Care Trials Group (2019). Non-invasive ventilation in critically ill patients with the Middle East respiratory syndrome. Influenza and other respiratory viruses, 13(4), 382–390. https://doi.org/10.1111/irv.12635. Cammarota G, Simonte R and De Robertis E (2022) Comfort During Non-invasive Ventilation. Front. Med. 9:874250.doi: 10.3389/fmed.2022.874250.

References

Cvach, M. M., Stokes, J. E., Manzoor, S. H., Brooks, P. O., Burger, T. S., Gottschalk, A., & Pustavoitau, A. (2020). Ventilator Alarms in Intensive Care Units: Frequency, Duration, Priority, and Relationship to Ventilator Parameters. Anaesthesia and analgesia, 130(1), e9– e13. https://doi.org/10.1213/ANE.0000000000003801.

Chacko, B., Thomas, L., Sharma, R., Yadav, B., Jeyaseelan, L., Arul, A. O., Victor, P., Chandiraseharan, V. K., Lenin, A., Carey, R., Jayakaran, J., Krishnaswami, R. K., & Peter,

J. V. (2022). Non-invasive Ventilation in the Management of Respiratory Failure Due to COVID-19 Infection: Experience from a Resource-Limited Setting. Mayo Clinic proceedings, 97(1), 31–45. https://doi.org/10.1016/j.mayocp.2021.10.002.

Guidelines on Infection Control in Anaesthesia, College of Anaesthesiologist, Academy of Medicine of Malaysia in collaboration with Malaysian Society of Anaesthesiologists, May 2014.

Morita P, Weinstein P, Flewwelling C, Bañez CA, Chiu T, Iannuzzi M, et al. (2016). The usability of ventilators: a comparative evaluation of use safety and user experience. Crit Care 20, 263. Available at https://doi.org/10.1186/s13054-016-1431-1.

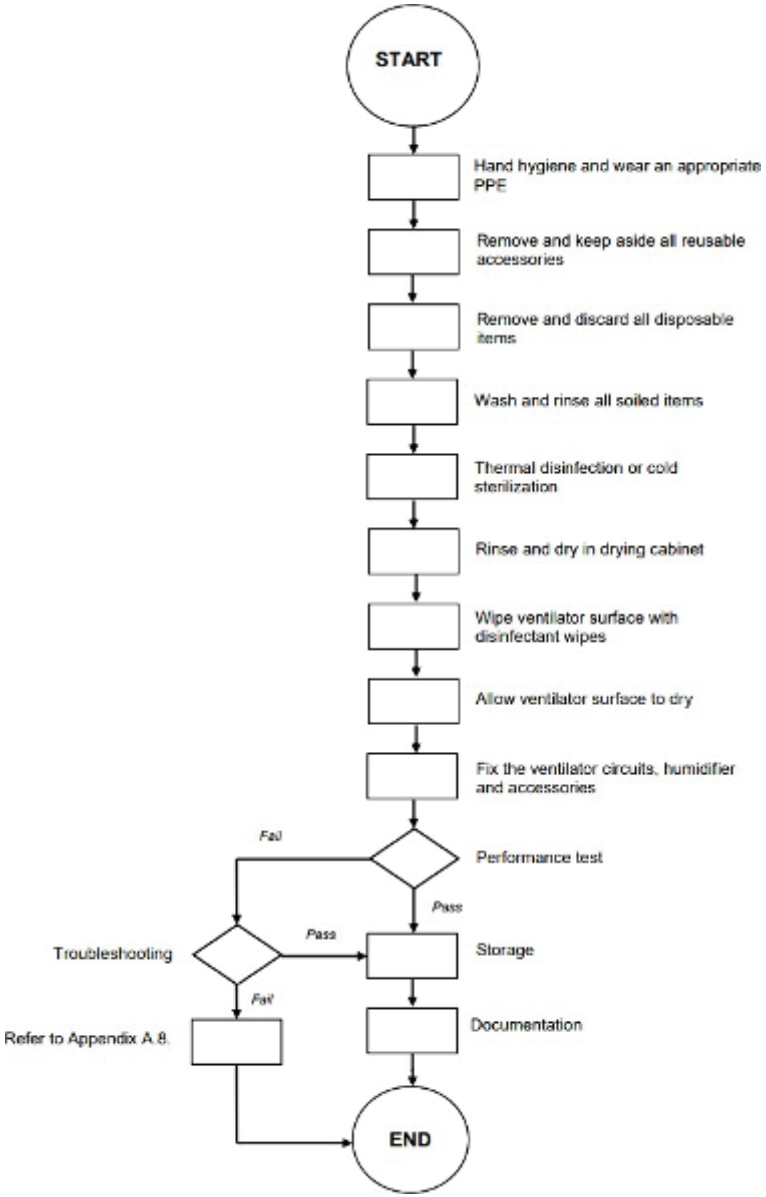
Pierson, D. J. (2011). "Patient-Ventilator Interaction." Respiratory Care 56(2): 214-228.

Rebelo, T., Neutel, E., Alves, E. C., Barros, F., Oliveira, H., Machado, H., Mendonça, J., Araújo, J. F., Luís, J., Pêgo,

	J. M., Silva, J., Oliveira, M., Sousa, N., Figueiredo, P., Barata, P., Magalhães, R. S., Magalhães, R. M., & Gomes, S. H. (2021). ATENA-A Novel Rapidly Manufactured Medical Invasive Ventilator Designed as a Response to the COVID-19 Pandemic: Testing Protocol, Safety, and Performance Validation. Frontiers in medicine, 8, 614580. https://doi.org/10.3389/fmed.2021.614580. Rochwerg, B., Brochard, L., Elliott, M. W., Hess, D., Hill, N. S., Nava, S., Navalesi, P., Members Of The Steering Committee, Antonelli, M., Brozek, J., Conti, G., Ferrer, M., Guntupalli, K., Jaber, S., Keenan, S., Mancebo, J., Mehta, S., & Raoof, S., Members Of The Task Force (2017). Official ERS/ATS clinical practice guidelines: non-invasive ventilation for acute respiratory failure. The European respiratory journal, 50(2), 1602426. https://doi.org/10.1183/13993003.02426-2016. Sanchez D, Smith G, Piper A and Rolls K (2014) Non–invasive Ventilation Guidelines for Adult patients with Acute Respiratory Failure: a clinical practice guideline. Agency for Clinical Innovation NSW government Version 1, Chatswood NSW, ISBN 978-1-74187-954-4. Singer, B. D., & Corbridge, T. C. (2009). Basic invasive mechanical ventilation. Southern medical journal, 102(12), 1238–1245. https://doi.org/10.1097/SMJ.0b013e3181bfac4f.
Flow Chart	Refer to Appendix C.4.
Revision History	Not applicable

Appendix C.4.

FLOW CHART REPROCESSING OF VENTILATORY EQUIPMENT



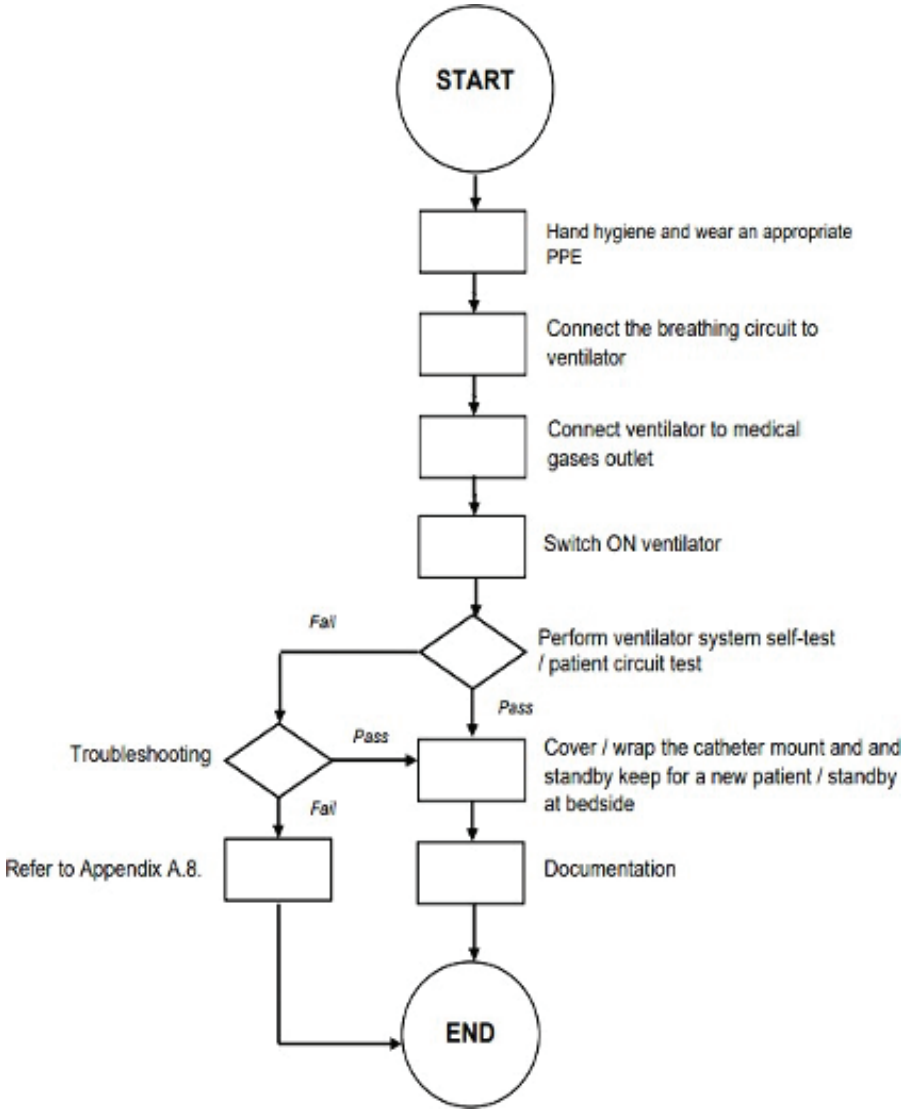
C.5. PREPARATION AND SETTING UP VENTILATOR BEFORE USE ON PATIENT

Scope	Assistant Medical Officers are responsible in preparation of disposable or reusable circuits, testing, calibration and performance test on ventilator before use on patient.
Purpose	To help increase the shelf life, performance, accuracy and efficiency of ventilator to prevent any errors and adverse effects and patient safety which are associated with ventilator.
Materials / Equipment	1. PPE. 2. Ventilator. 3. Test lung. 4. Dressing trolley. 5. Sterile sheet (for reusable circuit). 6. Ventilator circuits (Disposable / Reusable). 7. BVF (inspiratory and expiratory limbs) – if applicable. 8. Catheter mount.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Connect the breathing circuit to ventilator (reusable/ disposable), BVF & swivel catheter mount. 4. Connect the ventilator to: i. oxygen outlet. ii. medical compressed air outlet. 5. Switch ON ventilator. 6. Perform ventilator system self-test or patient circuit test (if required). 7. Follow manufacturer instructions for self-test as prompted. 8. If self-test passed, cover or wrap the catheter mount and keep for a new patient or standby at bedside. 9. If self-test fail, perform troubleshoot and if equipment still malfunction, refer to Appendix A.8. 10. Documentation.

References	Cvach MM, Stokes JE, Manzoor SH, Brooks PO, Burger TS, Gottschalk A, Pustavoitau A (2020). Ventilator Alarms in Intensive Care Units: Frequency, Duration, Priority, and Relationship to Ventilator Parameters. Anesth Analg., 130(1):9-13. Magill SS, Klompas M, Balk R, et al (2013). Developing a new, national approach to surveillance for ventilator associated events. Crit Care Med, 41(11):2467-2475. Medicines and Healthcare products Regulatory Agency, Gov. UK (2020), Specification for ventilators to be used in UK hospitals during the coronavirus (COVID-19) outbreak – Retrieved from https://www.gov.uk/government/publications/specification. U.S. Food and Drug Administration (2020), Ventilators and Ventilator Accessories for COVID 19 Appendix A. Criteria for Safety, Performance and Labelling. Retrieved from https://www.fda.gov/media/136437/download. Williams LM, Sharma S. (2022), Ventilator Safety. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing.
Flow Chart	Refer to Appendix C.5.
Revision History	Not applicable

Appendix C.5.

FLOW CHART PREPARATION AND SETTING UP VENTILATOR FOR A NEW PATIENT



C.6. PREPARATION AND ASSISTING IN PULSE INDEX CONTOUR CARDIAC OUTPUT MONITORING (PiCCO)

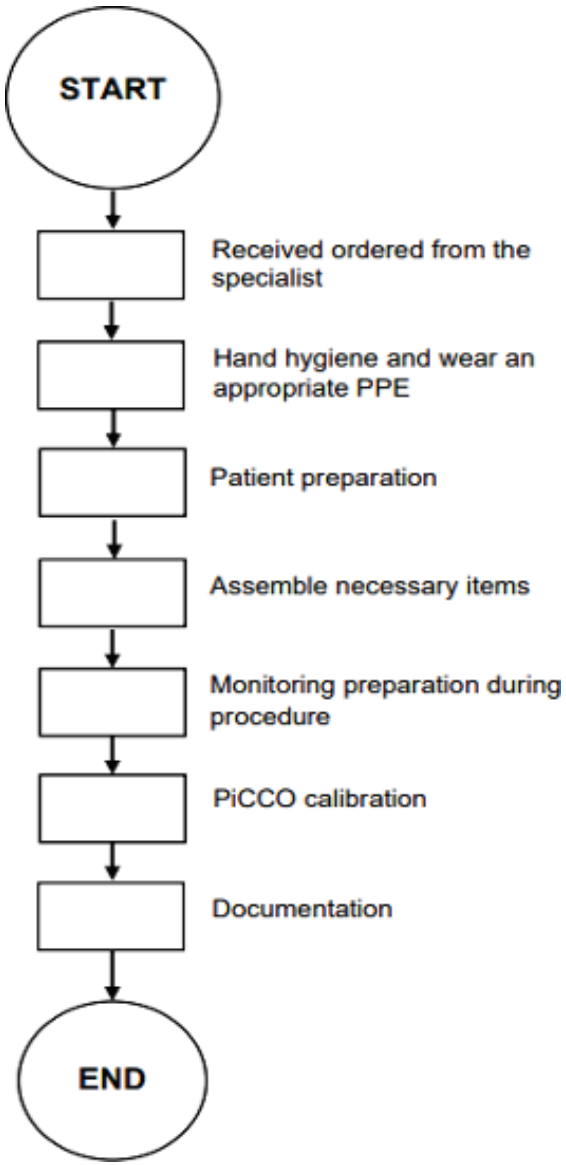
Scope	Assistant Medical Officers are responsible to facilitate and assist intensivist or specialist for accurate quantification of CO or at least precise detection of the change in the CO in critically ill patient.
Purpose	To assess and monitor cardiovascular status and to evaluate patient response to various therapies, including fluid management interventions, vasoactive and inotropic medication administration, and mechanical assist devices.
Materials / Equipment	1. PPE. 2. PiCCO monitor with module. 3. PiCCO monitor interface cable . 4. Injectable temperature sensor cable. 5. PiCCO catheter- 5Fr x 20 / 25cm. 6. PiCCO monitoring kit. 7. 3-way stopcock. 8. Non-compliance tubing 200cm-red. 9. Non-compliance tubing 200cm-blue (if applicable). 10. IV pole and transducer holder. 11. Pressure bag. 12. CO module and cable for interface with the monitor. 13. Pressure module and cable for interface with the monitor. 14. N/Saline 0.9%. 15. Levelling device (low-intensity laser or carpenter level). 16. Sterile and non-sterile gloves. 17. Syringes – 10ml and 20ml. 18. Dressing sets.
Work Process	1. Received order from the intensivist or specialist. 2. Hand hygiene and wear an appropriate PPE. 3. Patient preparation: i. patient verification. ii. assist the patient to the supine position.

Work Process	4. Assemble: i. attach module, cable to monitor, drip set and cold saline. 5. During procedure : once PiCCO catheter inserted: i. attach pressure transducer (ABP). ii. once reading is acceptable, attach the temperature cable. iii. attach CVP monitoring. iv. attach injectate temperature sensor with housing cable. v. check patient temperature reading: - enter patient data-name, gender, height or weight for body surface area. - levelling and zeroing ABP. - levelling and zeroing CVP. 6. PiCCO calibration: i. key in CO mode. ii. press start on “CCO or CO” module. iii. once “message ready for measurement” appear - inject. iv. 20cc cold saline (<8ºC) when reading show “stable baseline, inject now”. v. perform rapid and smooth injection. vi. perform minimal 3 reading of measurement to get the average. vii. press save and calibrate CCO to store average values. viii. press calculates haemodynamic. ix. press vital sample and perform calculation. x. calibration done and print result. xi. make sure all parameters for CCO are functioning (CO, CI, SV, SVI, GEDV, GEDI, ITVB, ITVI, SVV, SVRi, SVR, CFI, EVLW, ELWI). 7. Documentation.

References	Chew MS, Aneman A. Haemodynamic monitoring using arterial waveform analysis. Current Opinion in Critical Care. June 2013; 19:234-41. Hewitt NA & Braaf SC. The Clinical application of pulse contour cardiac output and intrathoracic volume measurements in critically ill patients. Australian Critical Care. August 2006; 19:86-94. King D and Price A. Measuring cardiac output using the PiCCO system. British Journal of Cardiac Nursing. Nov 2008; 3:11. 2. www.intensive care.hsnet.nsw.gov.au/./ pulse_contour_ cardiac_output_PICCO_HM_nepean> pdf. Litton E and Morgan M. The PiCCO monitor: a review. Anaesthesia and Intensive Care. May 2012; 40:393- 409 . Morgan MPG 2012, 'The PiCCO monitor: a review. Anaesthesia and Intensive Care', vol.40, no.3. http://www.researchgate.net/ publication/224947194_T he_PiCCO_monitor_a_review. [15 September 2015]. Tusher VS and Wyncoll DL. Volumetric haemodynamic monitoring and continuous pulse contour analysis – an untapped resource for coronary and high dependency care units. Critical Care Medicine. September 2002; 9:20-26.
Flow Chart	Refer to Appendix C.6.
Revision History	Not applicable

Appendix C.6.

FLOW CHART OF PREPARATION AND ASSISTING IN PULSE INDEX CONTOUR CARDIAC OUTPUT MONITORING (PiCCO)



C.7. PREPARATION AND ASSISTING IN ENDOTRACHEAL INTUBATION

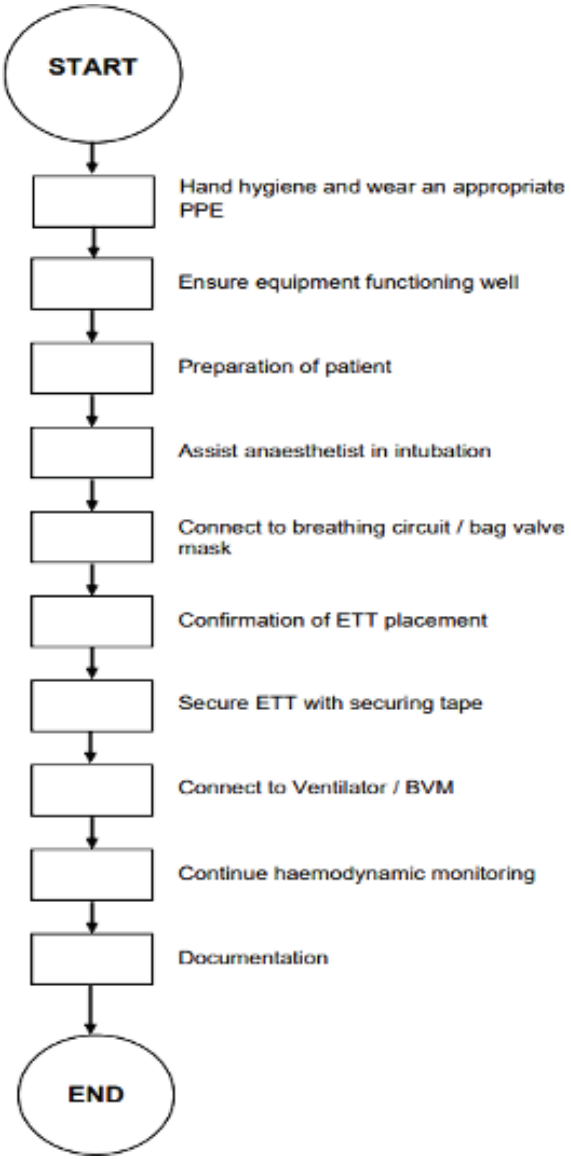
Scope	Assistant Medical Officers are responsible to prepare, assist and ensure equipment are available and functionable for endotracheal intubation.
Purpose	To facilitate and assist MO or anaesthetist or intensivist in maintain a patent airway, overcome respiratory failure and reduce work of breathing of patients.
Materials / Equipment	1. PPE. 2. Intubation – MALES;- i. M: - mask (BVM, masks etc). - magill forcep. - mouth gag. ii. A: - airway adjuncts oropharyngeal, nasopharyngeal). iii. L: - laryngoscope (assorted size of blade & type, assorted handle) – functioning. - lubricant gel. iv. E: - ETT – size according to patient. - etCO2 – confirmation of ETT placement. - emergency trolley. v. S: - SGA. - stylet. - stethoscope. - suction apparatus. • suction catheter: ½ size of ETT X 3. • yankuer – appropriate size. - syringe: 10 ml or 20 ml. - securing tape – anchoring ETT. - scissor. - spatula.

Materials / Equipment	3. Medication: i. analgesic. ii. induction or sedative agent. iii. neuromuscular blocking agent. 4. Ventilator. 5. Physiological monitoring system.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Ensure all apparatus functioning well. 4. Preparation of patient; i. patient identification. ii. procedure verification - consent. iii. ensure IV line is patent and functioning. iv. monitor haemodynamic parameters continuously. v. assist in intubation process. vi. apply BURP (backward, upward, rightward pressure) manoeuvre to facilitate intubation – when needed. vii. inflate ETT cuff (until hissing sound is disappeared during auscultation) or 5ml to 10ml (where applicable). viii. remove stylet. ix. level of ETT – measures at incisor teeth; - female: 18 – 20 cm. - male: 20 – 22 cm. 5. Connect the ETT to breathing circuit and attach with ventilator or BVM. 6. Confirmation of ETT placement: i. visible chest rises. ii. water vapor in ETT. iii. capnograph – normal EtCO2. iv. 5 points auscultations. v. X-ray – where applicable. vi. evaluation of oxygenation via skin signs. 7. Secure ETT with securing tape. 8. Continue haemodynamic monitoring. 9. Documentation

References	Baheti, K. B. & Laheri, V. V. (2015). Understanding Anaesthetic Equipment & Procedure Approach: A Practical Approach. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. Butterworth, J. F., Mackey, D. C. & Wasnick, J. D. (2018). Morgan & Mikhail's Clinical Anaesthesiology (6th ed.). New York: McGraw Hill Education. Grable, B. &. (2015). Patient Monitoring. In P. K. Sikka, Basic Clinical Anaesthesia (pp. 70 - 74). New York: Springer. doi:10.1007/978-1-4939-1737-2. Lee, C. Y. (2006). Manual of anaesthesia. Singapore: McGraw Hill Education. Williamson, D., & Nolan, J. (2015). Airway assessment. In A. B. Burtenshaw (Ed.), Emergency Airway Management (2nd ed., Vol. 41). London: Cambridge University Press.
Flow Chart	Refer to Appendix C.7.
Revision History	Not applicable

Appendix C.7.

FLOW CHART PREPARATION AND ASSISTING IN ENDOTRACHEAL INTUBATION



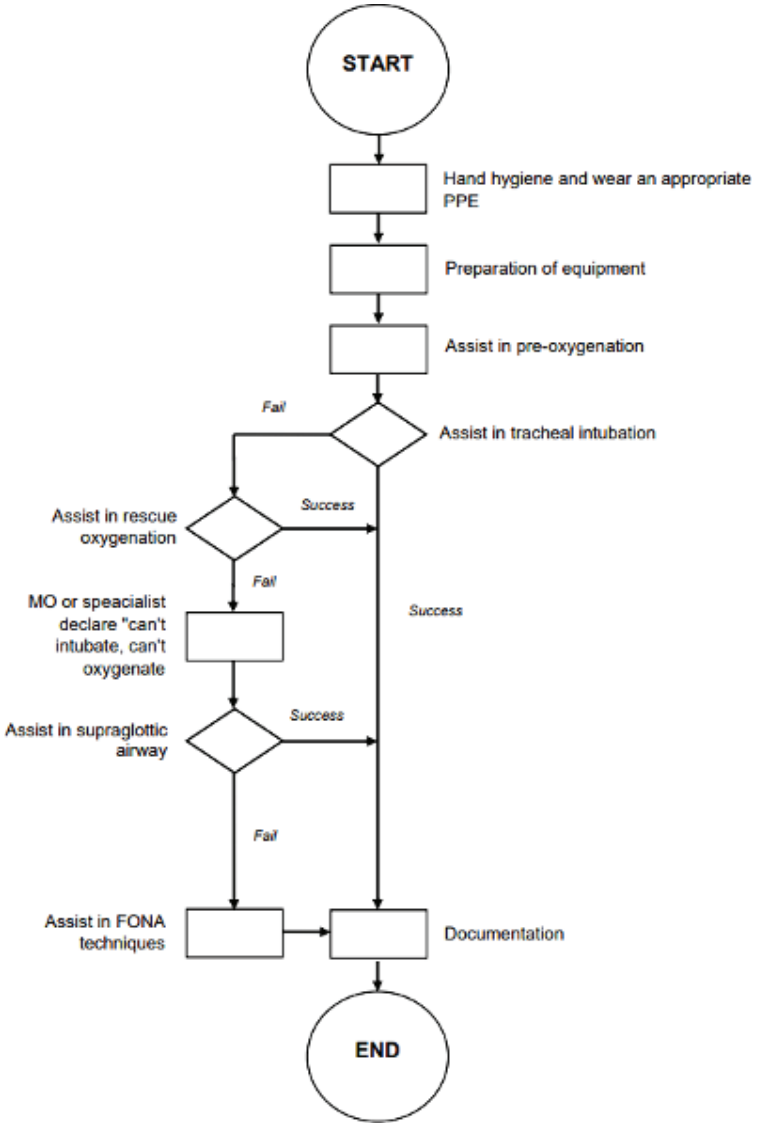
C.8. PREPARATION AND ASSISTING IN ANTICIPATED DIFFICULT INTUBATION

Scope	Assistant Medical Officers are responsible to ensure all essential equipment to use in anticipated difficult endotracheal intubation are available and functioning well.
Purpose	To facilitate and assist anaesthetist or intensivist in providing a comprehensive strategy to optimize oxygenation, airway management and tracheal intubation in anticipated difficult intubation of critically ill patients.
Materials / Equipment	1. PPE. 2. BVM. 3. Guedel airways (various sizes). 4. Stylet or bougie. 5. ETT (various sizes). 6. Laryngoscope set with McCoy blade. 7. Magill forceps. 8. SGA. 9. Stethoscope. 10. Securing tape. 11. Scissors. 12. Lubricating gel. 13. Syringe 20ml. 14. Video assisted laryngoscope. 15. Flexible bronchoscope. 16. End tidal CO2 monitor. 17. Ventilator. 18. Suction device with apparatus.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Preparation of equipment. 4. Assist in pre-oxygenate: i. position: head up if possible. ii. oxygenation by face mask or CPAP or NIV or nasal O2. iii. share plan for failure (DASS guideline).

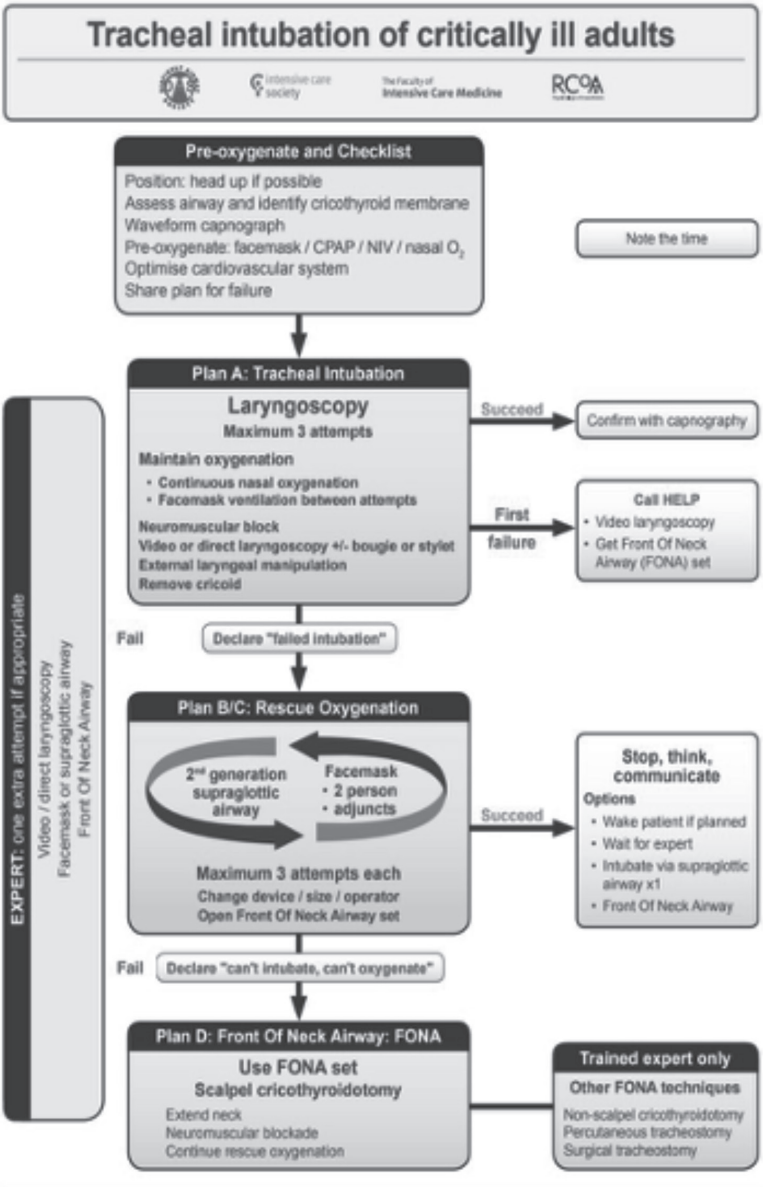
Work Process	5. Assist in tracheal intubation: i. maintain oxygenation. ii. continuous nasal oxygenation. iii. face mask ventilation between attempts. iv. prepare and assist with video or direct laryngoscopy with bougie or stylet. 6. If failed tracheal intubation, prepare and assist in: i. rescue oxygenation; - SGA. - face mask and airway adjunct. ii. once declared by MO or specialist "can't intubate, can't oxygenate, assist in preparation and procedure; - front of Neck Airway: FONA (Scalpel cricothyroidotomy). 7. Documentation.
References	Ahmed. A (2018) Difficult tracheal intubation in critically ill. Journal of Intensive Care. BMC. Heidegger T. Management of the Difficult Airway. N Engl J Med. (2021) May 13;384(19):1836-1847. [PubMed] . Janssens, M.; Hartstein, G (2001). Management of Difficult Intubation, European Journal of Anaesthesiology: January 2001 - Volume 18 - Issue- page 3-12 https://das.uk.com/guidelines/icu_guidelines2017. Traylor B.A, McCutchan A (2021), Unanticipated Difficult Intubation in An Adult Patient.
Flow Chart	Refer to Appendix C.8a. & C.8b.
Revision History	Not applicable

Appendix C.8a.

FLOW CHART PREPARATION AND ASSISTING IN ANTICIPATED DIFFICULT ENDOTRACHEAL INTUBATION



Appendix C.8b.



This flowchart forms part of the DAS, ICS, FICM, RCoA Guideline for tracheal intubation in critically ill adults and should be used in conjunction with the text.

C.9. PREPARATION AND ASSISTING IN FLEXIBLE BRONCHOSCOPY PROCEDURE

Scope	Assistant Medical Officers are responsible to prepare, assist and reprocessing of flexible bronchoscope according to hospital infection control guidelines.
Purpose	To obtain tissue specimen, assessment, diagnostic and therapeutic purpose, BAL, remove secretion and blood from patient with respiratory disease.
Materials / Equipment	1. PPE. 2. Flexible bronchoscope. 3. Light source. 4. Sterile dressing towel. 5. Disposable suction set. 6. Suction connector tubing. 7. Syringe: 10ml. 8. Sterile distilled water in 10ml. 9. Sterile mucous extractor 10ml bottle. 10. Lubricant jelly. 11. Swivel connector with bronchoscopic port or endoscopic mask (optional).
Work Process	1. Pre-procedure: i. hand hygiene. ii. wear an appropriate PPE. iii. check equipment and apparatus. iv. prepare trolley for procedure. v. drape the trolley with sterile dressing towel. vi. do pre-sampling specimen by flushing the bronchoscope with sterile distilled water into the sampling container. vii. upper shelf; - flexible bronchoscope flushed with sterile distilled water. - cover the procedure area with sterile dressing towel. - fill sterile distilled water in a gallipot of disposable suction set.

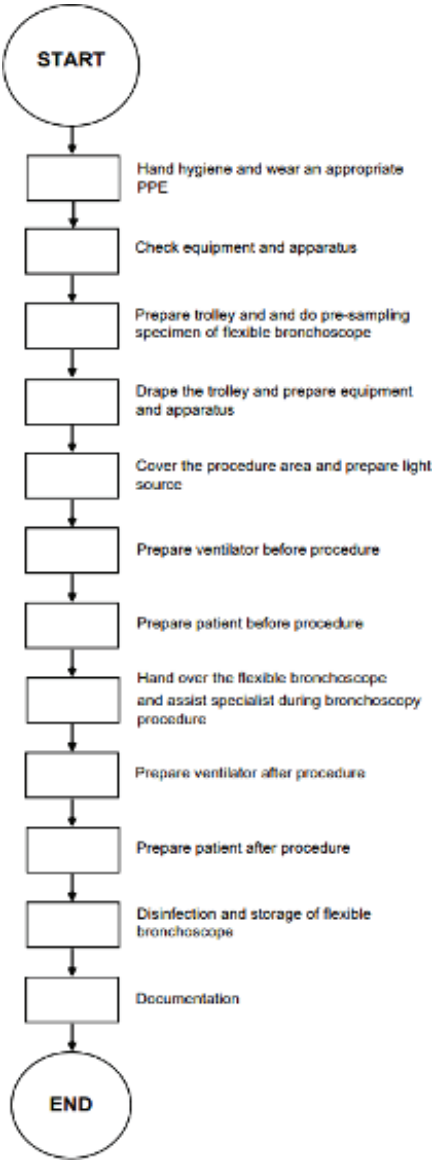
Work Process	- connect suction tubing to the suction connector of the fibreoptic bronchoscope. - lubricate the fibreoptic bronchoscope with lubricant jelly. - draw 10ml of sterile distilled water by using syringe 10ml (standby for flushing purpose). viii. lower shelf; - sterile distilled water in 10ml. - sterile mucous extractor 10ml bottle for BAL specimen. - lubricant gel. ix. switch on light source of bronchoscope. 2. Intra procedure:- i. ventilator: - set ventilator setting and adjust parameter as per order by specialist. - pre-oxygenation with 100% of oxygen. - connect the swivel connector to 'Y' connector of the ventilator circuit. Lubricate orifice of the swivel connector (if needed). ii. patient: - flat the bed and patient in supine position. iii. flexible bronchoscope: - flush device with syringe 10ml with 70% alcohol before flushing it with N/Saline irrigation. - hand over the fibreoptic bronchoscope to specialist. - closely monitor any changes of patient vital sign. - perform chest percussion or vibration if needed. - connect the sterile mucous extractor to the suction port of the bronchoscope and get ready to flush with sterile distilled water to get the BAL specimen (if needed).

Work Process	3. Post procedure: i. ventilator: - set ventilator back to patient previous ventilator setting. - disconnect the swivel connector and connect back to ventilator circuit. ii. patient: - closely monitor vital signs. - position patient with head up 30 degrees. iii. flexible bronchoscope: - flush through the bronchoscope suction port with sterile water and wipe bronchoscope body with disinfectant wipes to remove patient secretion. - please handle the system with care and do not bend it. - soak in HLD solution (according to manufacturer recommendations). - rinse with clean water about 15 – 30 minutes. - hang in the drying cabinet about 30 – 45 minutes. - once dried, store in brief case or dedicated cabinet. 4. Documentation.
References	Guidelines on Infection Control in Anaesthesia, College of Anaesthesiologist , Academy of Medicine of Malaysia in collaboration with Malaysian Society of Anaesthesiologists, May 2014. Karimi, R., Tornling, G., Grunewald, J., Eklund, A., & Sköld, C. M. (2012). Cell recovery in bronchoalveolar lavage fluid in smokers is dependent on cumulative smoking history. PloS one, 7(3), e34232. https://doi.org/10.1371/journal.pone.0034232.

	Kneidinger, N., Warszawska, J., Schenk, P., Fuhrmann, V., Bojic, A., Hirschl, A., Herkner, H., Madl, C., & Makristathis, A. (2013). Storage of bronchoalveolar lavage fluid and accuracy of micro-biologic diagnostics in the ICU: a prospective observational study. Critical care (London, England), 17(4), R135. https://doi.org/10.1186/cc12814 Mohan, A., Madan, K., Hadda, V., Tiwari, P., Mittal, S., Guleria, R., Khilnani, G. C., Luhadia, S. K., Solanki, R. N., Gupta, K. B., Swarnakar, R., Gaur, S. N., Singhal, P., Ayub, I. I., Bansal, S., Bista, P. R., Biswal, S. K., Dhungana, A., Doddamani, S., Dubey, D., … Rajagopal, T. P. (2019). Guidelines for diagnostic flexible bronchoscopy in adults: Joint Indian Chest Society/National College of chest physicians (I)/ Indian association for bronchology recommendations. Lung India: official organ of Indian Chest Society, 36(Supplement), S37–S89. https://doi.org/10.4103/lungindia.lungindia_108_19. Radhakrishna, N., Farmer, M., Steinfort, D. P., & King, P. (2015). A Comparison of Techniques for Optimal Performance of Bronchoalveolar Lavage. Journal of bronchology & interventional pulmonology, 22(4), 300–305. https://doi.org/10.1097/LBR.0000000000000201. Seijo L, M, Flandes J, Somiedo M, V, Naya A, Manjón J, Álvarez S, Fernández-Navamuel I: (2016). "A Prospective Randomized Study Comparing Manual and Wall Suction in the Performance of Bronchoalveolar Lavage." Respiration 91(6): 480-485.
Flow Chart	Refer to Appendix C.9.
Revision History	Not applicable

Appendix C.9.

FLOW CHART PREPARATION AND ASSISTING IN FLEXIBLE BRONCHOSCOPY PROCEDURE



C.10. PREPARATION & ASSISTING IN PERCUTANEOUS TRACHEOSTOMY

Scope	Assistant Medical Officers are responsible to assist specialist in performing percutaneous tracheostomy as in bedside procedure.
Purpose	To provide a long-term secure in airway to facilitate rehabilitation and discharge of critically ill patients.
Materials / Equipment	1. PPE. 2. N/Saline 0.9% in 10ml. 3. Chlorhexidine 2% in 70% alcohol. 4. Tracheostomy set. 5. Sterile lubricant gel. 6. Syringe; 5ml & 10ml. 7. Needle; 21G & 23G 8. Bupivacaine with adrenaline 0.5% in 10ml. 9. Branula; 14G 10. Flexible bronchoscope (optional). 11. Medications for sedation and paralysis. 12. EtCO2 monitor. 13. Intubation kit. 14. Percutaneous tracheostomy kit: i. surgical scalpel blade. ii. an introducer needle. iii. a guide wire. iv. a tracheal dilator. v. a protective sheath. vi. a single-stage progressive tracheal dilator. vii. a tracheal loading trocar. viii. small slip-tip syringe.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Check upper shelf equipment and equip with: i. tracheostomy set. ii. sterile gown. iii. sterile glove. iv. dressing towel

Work Process	4. Check lower shelf equipment and equip with: i. N/Saline 0.9% in 10ml. ii. alcohol 70% solution or Chlorhexidine 2% solution. iii. tracheostomy kit. iv. lubricant gel. v. syringe 5ml and 10ml. vi. needle 21G and 23G. vii. branula14G. viii. bupivacaine with adrenaline 0.5% in 10ml. 5. Ventilator set up: i. set up ventilator with proper setting as per order by specialist. ii. connect swivel connector to 'Y; connector from ventilator (optional if using bronchoscope). iii. connect to EtCO2 monitoring. 6. Preparation of patient: i. aseptic technique. ii. ensure the right patient. iii. flat the bed and put patient in supine position. Put a shoulder roll beneath the patient scapulae to extend the neck and improve exposure of the anterior neck. iv. monitoring patient vital sign closely. 7. Flexible bronchoscope guidance (optional): i. disconnect the ETT from the ventilator circuit. ii. connect swivel connector to 'Y; connector from ventilator. iii. reconnect the circuit and resume ventilation. iv. attach a bronchoscope adaptor to the tube. 8. Assist specialist during procedure. 9. Confirm the tracheostomy tube placement with EtCO2. 10. Perform suction to remove the secretion. 11. Connect the circuit to the tracheostomy tube and resume ventilation. 12. Secure the tracheostomy tube with a tracheostomy collar. 13. Remove ETT, once tracheostomy tube is secured. 14. Remove shoulder roll and positioning the patient. 15. Documentation.

References

Andriolo, B. N., Andriolo, R. B., Saconato, H., Atallah, Á. N., & Valente, O. (2015). Early versus late tracheostomy for critically ill patients. The Cochrane database of systematic reviews, 1(1), CD007271. https://doi.org/10.1002/14651858.CD007271.pub3

Chiesa-Estomba, C. M., Lechien, J. R., Calvo-Henríquez, C., Fakhry, N., Karkos, P. D., Peer, S., Sistiaga-Suarez, J. A., Gónzalez-García, J. A., Cammaroto, G., Mayo- Yánez, M., Parente-Arias, P., Saussez, S., & Ayad, T. (2020). Systematic review of international guidelines for tracheostomy in COVID-19 patients. Oral oncology, 108, 104844. https://doi.org/10.1016/j.oraloncology.2020.104844.

Giri, P. C., Bellinghausen Stewart, A., Dinh, V. A., Chrissian, A. A., & Nguyen, H. B. (2015). Developing a percutaneous dilatational tracheostomy service by medical intensivists: experience at one academic institution. Journal of critical care, 30(2), 321–326. https://doi.org/10.1016/j.jcrc.2014.10.018.

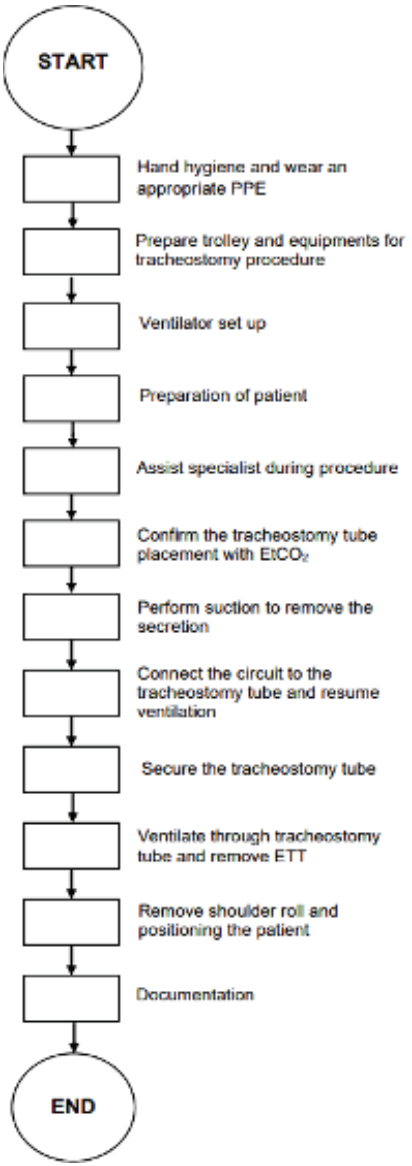
Majid, A., Cheng, G. Z., Kent, M. S., Gangadharan, S. P., Whyte, R., & Folch, E. (2014). Evaluation of rigid bronchoscopy-guided percutaneous dilational tracheostomy. A pilot studies. Annals of the American Thoracic Society, 11(5), 789–794. https://doi.org/10.1513/AnnalsATS.201310-343BC.

Pattnaik, S. K., Ray, B., & Sinha, S. (2014). Griggs percutaneous tracheostomy without bronchoscopic guidance is a safe method: A case series of 300 patients in a tertiary care Intensive Care Unit. Indian journal of critical care medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine, 18(12), 778–782. https://doi.org/10.4103/0972-5229.146303.

References	Trouillet, J. L., Collange, O., Belafia, F., Blot, F., Capellier, G., Cesareo, E., Constantin, J. M., Demoule, A., Diehl, J. L., Guinot, P. G., Jegoux, F., L'Her, E., Luyt, C. E., Mahjoub, Y., Mayaux, J., Quintard, H., Ravat, F., Vergez, S., Amour, J., & Guillot, M. (2018). Tracheotomy in the intensive care unit: guidelines from a French expert panel. Annals of intensive care, 8(1), 37. https://doi.org/10.1186/s13613-018-0381-y.
Flow Chart	Refer to Appendix C.10.
Revision History	Not applicable

Appendix C.10.

FLOW CHART PREPARATION & ASSISTING PERCUTANEOUS TRACHEOSTOMY



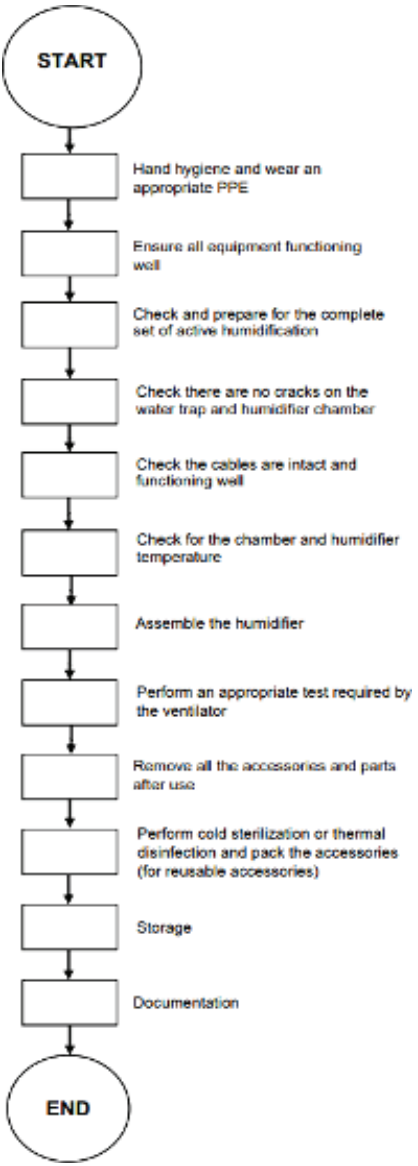
C.11. PREPARATION AND MANAGEMENT IN ACTIVE HUMIDIFICATION OF VENTILATOR CIRCUITS

Scope	Assistant Medical Officers are responsible in preparation and management of active humidification of inhaled gases as a standard of care of mechanical ventilation patients in intensive care.
Purpose	To ensure the active humidification are functioning well and placed in the inspiratory limb of the ventilator circuit.
Materials / Equipment	1. PPE. 2. Respiratory humidifier. 3. Humidifier chamber. 4. Water trap bottle. 5. Temperature probe. 6. Heated wire. 7. Absorbent paper. 8. Distilled sterile water. 9. Ventilator circuit.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Preparation: i. ensure all equipment are functioning well. ii. check and prepare for the complete set of active humidification. iii. check there are no cracks on the water trap and humidifier chamber. iv. check the cables are intact and functioning well. v. check for the chamber and humidifier temperature. 4. Performance: i. assemble the humidifier with a clean technique. ii. perform an appropriate test required by the ventilator in order to compensate and identify any leakage. iii. if problem occurs, immediately change to another unit of humidifier device. 5. Cleaning: i. remove all the accessories and parts after use. ii. disinfect all accessories according to hospital infection control guidelines.

Work Process	iii. perform cold sterilization or thermal disinfection. iv. pack the accessories (for reusable accessories). 6. Storage. 7. Documentation.
References	American Association for Respiratory Care, Restrepo, R. D., & Walsh, B. K. (2012). Humidification during invasive and non-invasive mechanical ventilation: 2012. Respiratory care, 57(5), 782–788. https://doi.org/10.4187/respcare.01766. Branson, R. D., Gomaa, D., & Rodriquez, D., Jr (2014). Management of the artificial airway. Respiratory care, 59(6), 974–990. https://doi.org/10.4187/respcare.03246. Fink, J., Aru, A. (2021). Chapter 39: Humidity and bland aerosol therapy. In R.M. Kacmarek, J.K. Stroller, A.J. Heuer (Eds.), *Egan's fundamentals of respiratory care* (12th ed., pp. 817-8431). St. Louis: Elsevier. Lellouche, F., Qader, S., Taillé, S., Lyazidi, A., & Brochard, L. (2014). Influence of ambient temperature and minute ventilation on passive and active heat and moisture exchangers. Respiratory care, 59(5), 637–643. https://doi.org/10.4187/respcare.02523. Guidelines on Infection Control in Anaesthesia, College of Anaesthesiologist , Academy of Medicine of Malaysia in collaboration with Malaysian Society of Anaesthesiologists , May 2014. Restrepo, R.D., Walsh, B.K. (2012). AARC Clinical practice guideline: Humidification during invasive and non- invasive mechanical ventilation: 2012. Respiratory Care, 57(5), 782-788. doi:10.4187/respcare.01766 (classic reference)* (Level VII).
Flow Chart	Refer to Appendix C.11.
Revision History	Not applicable

Appendix C.11.

FLOW CHART PREPARATION AND MANAGEMENT IN ACTIVE HUMIDIFICATION OF VENTILATOR CIRCUITS



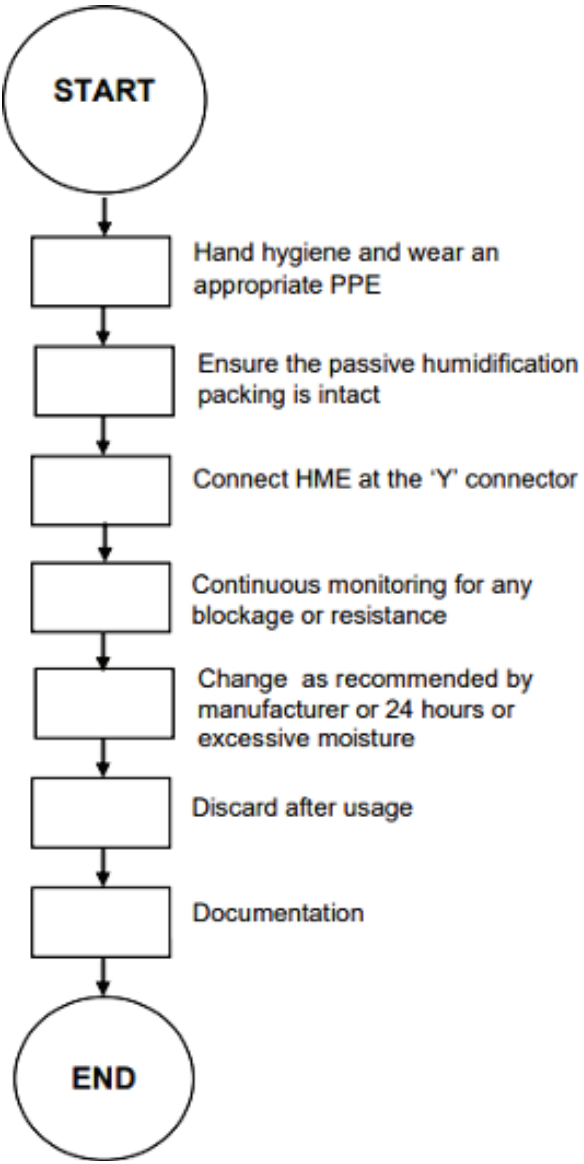
C.12. PREPARATION AND MANAGEMENT IN PASSIVE HUMIDIFICATION OF VENTILATOR CIRCUITS

Scope	Assistant Medical Officers are responsible to ensure passive humidification are applied correctly and replaced accordingly to mechanically ventilated patient.
Purpose	To ensure HMEs are changed every 24 hours, if soiled or blocked with secretions in order to prevent any complications.
Materials / Equipment	1. PPE. 2. HME. 3. Ventilator circuit.
Work Process	1. Preparation: i. hand hygiene. ii. wear an appropriate PPE. iii. ensure the passive humidification packing is intact before usage. iv. connect HME at 'Y' connector. v. continuous monitoring on passive humidification device for any blockage or resistance and change, when needed. 2. Perform: i. passive humidification is single use. ii. change HME as recommended by manufacturer every 24 hours, excessive moisture or as indicated. 3. Cleaning: i. Discard after usage in clinical waste. 4. Documentation.
References	Al Ashry, H. S., & Modrykamien, A. M. (2014). Humidification during mechanical ventilation in the adult patient. BioMed research international, 2014, 715434. https://doi.org/10.1155/2014/715434.

References	Cerpa, F., Cáceres, D., Romero-Dapueto, C., Giugliano- Jaramillo, C., Pérez, R., Budini, H., Hidalgo, V., Gutiérrez, T., Molina, J., & Keymer, J. (2015). Humidification on Ventilated Patients: Heated Humidification or Heat and Moisture Exchangers? The open respiratory medicine journal, 9, 104–111. https://doi.org/10.2174/1874306401509010104Retamal J, Castillo J. Chikata, Y., Oto, J., Onodera, M., & Nishimura, M. (2013). Humidification performance of humidifying devices for tracheostomized patients with spontaneous breathing: a bench study. Respiratory care, 58(9), 1442–1448. https://doi.org/10.4187/respcare.02093. Lellouche F, Taillé S, Lefrançois F, Deye N, Maggiore SM, Jouv et P, et al; Groupe de travail sur les Respirateurs de l'AP-HP. Humidification performance of 48 passive airway humidifiers: comparison with manufacturer data. Chest 2009;135(2):276–286. Vargas, M., Chiumello, D., Sutherasan, Y., Ball, L., Esquinas, A. M., Pelosi, P., & Servillo, G. (2017). Heat and moisture exchangers (HMEs) and heated humidifiers (HHs) in adult critically ill patients: a systematic review, meta- analysis and meta-regression of randomized controlled trials. Critical care (London, England), 21(1), 123. https://doi.org/10.1186/s13054-017-1710-5.
Flow Chart	Refer to Appendix C.12.
Revision History	Not applicable

Appendix C.12.

FLOW CHART PREPARATION AND MANAGEMENT IN PASSIVE HUMIDIFICATION OF VENTILATOR CIRCUITS



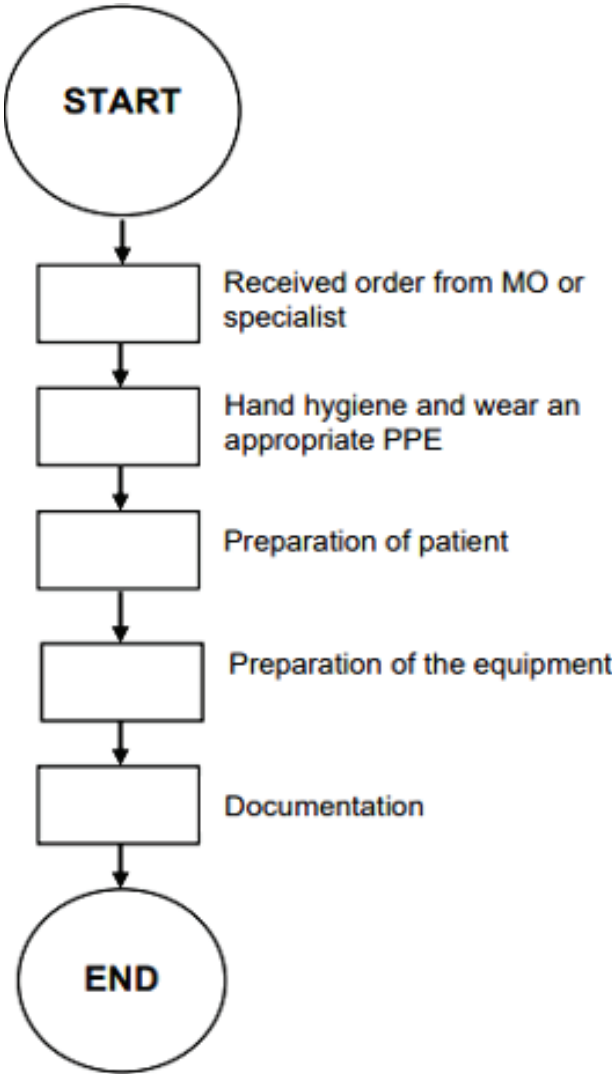
C.13. PREPARATION AND ASSISTING IN METERED DOSE INHALER (MDI)

Scope	Assistant Medical Officers are responsible to provide therapy for the aerosolization of pharmacological agent via MDI to maintain airway patency and provide clearance of retained secretions.
Purpose	To standardize the delivery of aerosolized medication to the lungs using a MDI with the appropriate spacing device.
Materials / Equipment	1. PPE. 2. MDI. 3. Bronchodilators. 4. MDI adapter. 5. Gloves (Non-Sterile). 6. Physiological monitoring system.
Work Process	1. Received order from the MO or specialist. 2. Hand hygiene. 3. Wear an appropriate PPE. 4. Preparation of patient: i. assist the patient to the semi-fowler sitting position. ii. receive order from the MO or specialist: - dosage to be delivered in mcg or puffs. - frequency. - durations. - mode of administrations. 5. Preparation of the equipment: i. shake canister vigorously prior to use. ii. connect MDI cannister to appropriate adapter. iii. administer during inspiration phase. iv. auscultate the patient's lungs. 6. Documentation.

References	Agusti, A., et al. (2018). "Inhaled corticosteroids in COPD: friend or foe?" European Respiratory Journal 52(6): 1801219. Dolovich, M. B., Ahrens, R. C., Hess, D. R., Anderson, P., Dhand, R., Rau, J. L., Smaldone, G. C., Guyatt, G., American College of Chest Physicians, & American College of Asthma, Allergy, and Immunology (2005). Device selection and outcomes of aerosol therapy: Evidence-based guidelines: American College of Chest Physicians/American College of Asthma, Allergy, and Immunology. Chest, 127(1), 335–371. https://doi.org/10.1378/chest.127.1.335. Newman S. P. (2005). Principles of metered-dose inhaler design. Respiratory care, 50(9), 1177–1190. Rogliani, P., Calzetta, L., Coppola, A., Cavalli, F., Ora, J., Puxeddu, E., Matera, M. G., & Cazzola, M. (2017). Optimizing drug delivery in COPD: The role of inhaler devices. Respiratory medicine, 124, 6–14. https://doi.org/10.1016/j.rmed.2017.01.006 Sorino, C., Negri, S., Spanevello, A., Visca, D., & Scichilone, N. (2020). Inhalation therapy devices for the treatment of obstructive lung diseases: the history of inhalers towards the ideal inhaler. European journal of internal medicine, 75, 15–18. https://doi.org/10.1016/j.ejim.2020.02.023
Flow Chart	Refer to Appendix C.13.
Revision History	Not applicable

Appendix C.13.

FLOW CHART PREPARATION AND ASSISTING IN METERED DOSE INHALER



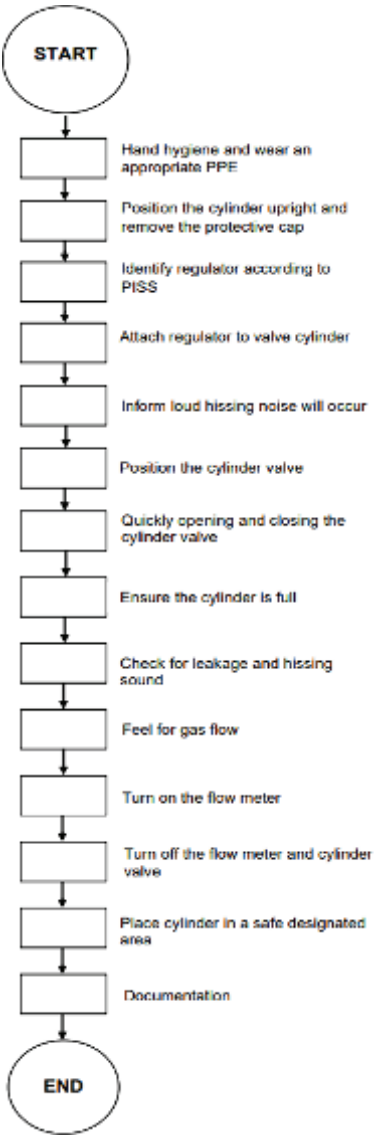
C.14. PREPARATION AND MANAGEMENT OF PORTABLE MEDICAL OXYGEN GAS CYLINDER

Scope	Assistant Medical Officers are responsible in managing, checking and storage of portable medical oxygen gas cylinders.
Purpose	To ensure portable medical oxygen gas cylinders are always sufficient and safe to be used for both patient or HCW during intra or inter facilities transportation and disaster.
Materials / Equipment	1. PPE – leather glove & safety boots. 2. Oxygen cylinder. 3. Cylinder wrench. 4. Pin index or bull nose oxygen regulator. 5. Oxygen trolley.
Work Process	1. Hand hygiene. 2. Wear an appropriate PPE. 3. Position the cylinder upright in a cylinder trolley. 4. Remove the protective cap or shrink wrap plastic tape protecting the cylinder valve. 5. Identify the proper regulator according to pin index safety system. 6. Pin index regulator to pin index valve cylinder or bull nose regulator to bull nose valve cylinder. 7. Inform to personnel or patients in the area that a loud hissing noise will occur (if applicable). 8. Position the cylinder such that the cylinder valve opening is pointing away from any people in the room. 9. Check the cylinder by quickly opening and closing the cylinder valve by using a cylinder wrench. 10. Check the pressure gauge to ensure the cylinder is full (2,000 psi) or not below 1/3 third of full capacity. 11. Check for leakage at the connection between the cylinder and regulator. 12. Listen for a hissing sound to detect any leakage.

Work Process	13. Feel for gas flow with your hands around the connection to detect any leakage. 14. Turn on the flow meter and feel for the flow of gas. 15. Turn off the flow meter after all system functioning well. 16. Turn off the cylinder valve if cylinder is not in use. 17. Place cylinder in a safe designated area. 18. Documentation.
References	Department of Health Estates and Facilities Directorate (2006). Medical gases. Health Technical Memorandum 02-01: Medical Gas Pipeline Systems. Part A: Design, installation, validation and verification. London: The Stationery Office. Available from: https://www.england.nhs.uk/wp- content/uploads/2021/05/HTM_02-01_Part_A.pdf. O'Driscoll, B. R., Howard, L. S., Earis, J., & Mak, V. (2017). British Thoracic Society Guideline for oxygen use in adults in healthcare and emergency settings. BMJ open respiratoryresearch, 4(1), e000170. https://doi.org/10.1136/bmjresp-2016-000170. World Health, O. and F. United Nations Children's (2019). WHO-UNICEF technical specifications and guidance for oxygen therapy devices. Geneva, World Health Organization.
Flow Chart	Refer to Appendix C.14.
Revision History	Not applicable

Appendix C.14.

FLOW CHART PREPARATION AND MANAGEMENT OF PORTABLE MEDICAL OXYGEN GAS CYLINDER



GLOSSARY

ITEM	EXPLANATION/ DEFINITION
Anaesthetic machine	A medical device used to generate and mix a fresh gas flow of medical gases and inhalational anaesthetic agents for the purpose of inducing and maintaining anaesthesia.
Anaesthesia	General anaesthesia: controlled unconsciousness during which you feel nothing. In local anaesthesia, only an area of your body is numbed and you can remain awake.
Anaesthetist	A doctor trained to give anaesthetic.
Arterial Blood Gas	Measures the amounts of arterial gases, such as oxygen and carbon dioxide. An ABG test requires that a small volume of blood be drawn from the radial artery with a syringe and a thin needle, but sometimes the femoral artery in the groin or another site is used.
Arterial line	A cannula put into an artery (often at your wrist). This measures your blood pressure continuously. Your anaesthetist can also take blood samples from it to measure your oxygen levels.
Aseptic Technique	Is a standard healthcare practice that helps prevent the transfer of germs to or from an open wound and other susceptible are on patient's body.
Awake Flexible Bronchoscope Intubation	Awake tracheal intubation involves placing a tracheal tube in an awake, spontaneously breathing patient, most commonly with flexible bronchoscope.
Berman Airway	Side channels enable use of suction catheters without obstructing the airway, allowing for additional air flow.
Bispectral Index	Used to monitor depth of anaesthesia.
Breathing circuit	To deliver oxygen and anaesthetic gases and eliminate carbon dioxide.

ITEM	EXPLANATION/ DEFINITION
Bromage Score	An accepted tool for the measurement of motor block. This scale assesses the intensity of motor block by the patient's ability to move their lower extremities.
BURP Manoeuvre	Applying backward, upward, rightward, and posterior pressure on the larynx (i.e., displacement of the larynx in the backward and upward directions with rightward pressure on the thyroid cartilage) for visualization of the vocal cord.
Capnography	The monitoring of the concentration or partial pressure of carbon dioxide in the respiratory gases. Its main development has been as a monitoring tool for use during anaesthesia and intensive care.
Catheter	A hollow flexible tube for insertion into a body cavity, duct, or vessel to allow the passage of fluids or distend a passageway. One use includes the drainage of urine from the bladder through the urethra.
Cricoid Pressure	Also known as the Sellick manoeuvre, is a technique used in endotracheal intubation to minimise risk of regurgitation.
Critical care	Critical care is the multidisciplinary healthcare specialty that cares for patients with acute, life-threatening illness or injury.
Central Venous Pressure Line	A soft tube that your anaesthetist puts into a vein (often in your neck) that ends up in the large vein taking blood to your heart. It is used to measure pressure in these veins and to give you medicines, fluids or food.
Deep Vein thrombosis	A blood clot that forms in a deep vein in your leg or abdomen.

ITEM	EXPLANATION/ DEFINITION
Defibrillator	A machine that uses an electric current to stop any irregular and dangerous activity of your heart.
Diameter Index Safety System	A set of engineering standards preventing users of compressed gases from linking pressurised gas holding tanks to the wrong hoses or tubing. The standards designate specific-sized connectors for each different medical gas.
Guedal airway	A curved plastic device put into your mouth when you are unconscious. This keeps the tongue from blocking your airway so allows you to breathe more easily.
Heat and Moisture Exchanger	A device that intended to replace the normal warming and humidifying functions of upper airways when these structures are bypassed during endotracheal intubation.
High Flow Nasal Cannula	Is a device that delivered 100% warmed and humid air on at a flow rate of up to 80 litres per minute through nose.
Hypothermia	Defined as a body core temperature below 35.0 °C (95.0 °F) in humans.
Intensive Care Unit	A specialized section of a hospital containing the equipment, medical and nursing staff, and monitoring devices necessary to provide intensive care.
Intensivist	A critical care physician whose medical practice is focused entirely on the care of critically ill and injured patients.
Laryngeal Mask Airway	A piece of anaesthetic equipment. This lets oxygen and anaesthetic gas pass easily to your lungs without needing to put an endotracheal tube into your trachea.
Laryngoscope	Equipment with a light for examining your larynx (voice box) so your anaesthetist can see where to put an endotracheal tube.

ITEM	EXPLANATION/ DEFINITION
Luer lock	Luer-lock connectors (female) are joined by means of a tabbed hub on the female fitting those screws into threads in a sleeve on the male fitting and attaches securely. Male luer lock connectors are available with integral lock rings or with rotatable features to allow you to position the tubing before assembly. This locking mechanism is used for applications that require a secure connection and also making leak-free connection.
Magill Forceps	Magill forceps are angled forceps used to guide a tracheal tube into the larynx or a nasogastric tube into the oesophagus under direct vision.
Malignant Hyperthermia	It is a genetic hypermetabolic muscle disease, the characteristic phenotypical signs and symptoms of which most commonly appear with exposure to inhaled general anaesthetics or succinylcholine (triggering agents).
Minimum Alveolar Concentration	The concentration of a vapour in the alveoli of the lungs that is needed to prevent movement (motor response) in 50% of subjects in response to surgical (pain) stimulus. MAC is used to compare the strengths, or potency, of anaesthetic vapours.
Mucosal Atomizer Device	Intranasal or intraoral mucosal atomization device delivers a mist of atomized medication that offers rapid absorption across mucosal membranes to the blood stream.
Nasopharyngeal Airway	A type of airway adjunct, a tube that is designed to be inserted into the nasal passageway to secure an open airway.
Neuromuscular blocking agent	A chemical agent that paralyses skeletal muscles by blocking the movement of neurotransmitter at the neuromuscular junction.
Pathogens	A bacterium, virus, or other microorganism that can cause disease.

ITEM	EXPLANATION/ DEFINITION
Pharmacokinetic	The study of time course of drug absorption, distribution, metabolism and excretion.
Pin Index	Safety system designed to ensure the correct gas is filled into the correct cylinder and that the cylinder will only connect to correct equipment.
Scavenging system	A system that actively removes anaesthetic gases mixture from operating theatre.
Target Controlled Infusion	Automates the dosing of intravenous drugs during surgery.
Total Intravenous Anaesthesia	Intravenous administration of anaesthetic agents to induce a temporary loss of sensation or awareness.
Tracheostomy	A tracheostomy is a stoma/ opening created on the anterior tracheal wall.
Ventilator	The ventilator can do all the breathing for the patient or it can assist the patient's own breathing. A machine that delivers oxygen to a patient's lungs to assist with the breathing process.

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