



MALAYSIAN SOCIETY OF ANAESTHESIOLOGISTS

Yearbook 2021/2022

Trauma

MALAYSIAN SOCIETY OF ANAESTHESIOLOGISTS

YEARBOOK 2021/2022

ISSN 2462-1307



9 772462 130007



MALAYSIAN SOCIETY OF ANAESTHESIOLOGISTS

Yearbook 2021/2022

Published by
Malaysian Society of Anaesthesiologists
Unit 1.6, Level 1, Enterprise 3B
Technology Park Malaysia, Jalan Inovasi 1
Bukit Jalil, 57000 Kuala Lumpur, Wilayah Persekutuan
Tel: (603) 8996 0700, 8996 1700, 8996 2700
Fax: (603) 8996 4700
Email : secretariat@msa.net.my

Copyright © 2022 Malaysian Society of Anaesthesiologists

All rights reserved. No part of this book may be reproduced in any form or by any means without prior permission from the Publisher.

Pusat Kebangsaan ISBN/ISSN Malaysia
ISSN 2462-1307

CONTENTS

- 2 Foreword from the President of the Malaysian Society of Anaesthesiologists
- 3 Preface from the Editors
- 4 Acknowledgements - Reviewers
- 5 Transport for Critically Ill Trauma Patient
Raha Abdul Rahman, Azarinah Izaham
- 10 The Traumatic Parturient
Zawiah Kassim, Afifah Samsudin, Norliza Mohd Nor
- 20 Paediatric Trauma and Anaesthesia
Mohd Lutfi Nijar
- 27 Regional Anaesthesia for Acute Trauma: An Ideal Approach to Improve Outcomes
Ahmad Afifi Mohr Arshad, Shamsul Arif Sulaiman, Muhammad Rehmat Ali Hassan
- 38 Prehospital Assessment of Trauma
Chong Soon Eu, Yeoh Chun Chiat
- 46 Geriatric Trauma and Anaesthesia
Muhammad Maaya
- 51 Trauma Involving Airways and Ventilation Strategies
Low Hsueh Jing, Aliza Mohamad Yusof
- 57 Trauma Care in the Field from a Military Perspective
Mohamad Azlan bin Ariffin
- 65 Management of Trauma in COVID-19 Patients: An Adaptation of Practice
Samuel Tsan Ern Hung
- 74 Transfusions in Trauma
Kevin W S Ng
- 82 Nutrition in Traumatic Brain Injury
Shahmini Ganesh, Noor Airini Ibrahim

Foreword

The MSA Yearbook 2021/2022 provides comprehensive literature on trauma and its effects on Anaesthesia, Intensive Care, and Pain Medicine. Trauma is one of Malaysia's leading causes of mortality and morbidity. Patients involved with trauma can present to anaesthesiologists and intensivists in many situations. Therefore, we must keep abreast with the knowledge of caring for patients with trauma to improve their outcomes.

The MSA encourages our fraternity to write. Thus, I am delighted to see many new authors who have contributed to this publication. We believe our role in improving Anaesthesia and Intensive care in Malaysia has many façades. A wise word from Martin Luther was, "If you want to change the world, pick a pen and write". I congratulate both the editors, Associate Professor Dr Rufinah Teo and Associate Professor Datin Dr Siti Nidzwani Mohamad Mahdi, for the insightful and informative articles on this issue. I would also like to thank all the authors for taking the time to write their articles. Last but not least, sincere gratitude to all the reviewers for sharing their experience in making this book a success.

I hope all our members enjoy reading this year's publication as much as I do and will benefit from all the updates provided.

Professor Dr Ina Ismiarti Shariffuddin

President

Malaysian Society of Anaesthesiologists

Preface

The first Malaysian National Trauma database was launched in 2006 to determine, evaluate and prepare guidelines for trauma care. It is timely that this year's edition is centred around trauma care, a well-established and continually evolving subspecialty in anaesthesia field. Our collective thanks to all authors and reviewers who were enthusiastic, dedicated and wonderful to work with. Thank you to the readers too, we appreciate your continuing interests. Yearbook articles are frequently cited and downloaded, provides a venue for longer, in-depth explorations of developments within our discipline.

There are eleven articles in this Yearbook, covering trauma management in a series of different scenarios, either pre or intra-hospital care; for a variety subset of the population. Readers will have the first experience of a field hospital and strategies when managing critically ill patients, including COVID-19. There are also article updates related to nutrition and blood management. We hope this year's edition will be both useful and bring genuine clinical and academic insights to all our readers to improve its diversity when dealing with trauma care.

Many thanks for this opportunity.

Associate Professor Datin Dr Siti Nidzwani Mohamad Mahdi

Associate Professor Dr Rufinah Teo

Editors

MSA Yearbook 2021/2022

Acknowledgements - Reviewers

This Yearbook would not have been possible without the contributions from the following reviewers:

Dr Azarinah Izaham

Associate Professor and Consultant
Anaesthesiologist
Department of Anaesthesiology and Intensive Care
Faculty of Medicine
Universiti Kebangsaan Malaysia
Kuala Lumpur
Malaysia

Dr Karis bin Masiran

Professor and Senior Consultant Anaesthesiologist
Faculty of Medicine UiTM
Sungai Buloh Campus
Selangor
Malaysia

Dr Felicia Lim Siew Kiaw

Professor and Consultant Paediatric
Anaesthesiologist
Department of Anaesthesiology and Intensive Care
Hospital Canselor Tuanku Muhriz
Universiti Kebangsaan Malaysia
Kuala Lumpur
Malaysia

Dr Liu Chian Yong

Senior Lecturer and Consultant Anaesthesiologist
Department of Anaesthesiology and Intensive Care
Faculty of Medicine
Universiti Kebangsaan Malaysia
Kuala Lumpur
Malaysia

Dr Nor'azim Mohd Yunos

Professor and Intensivist
Department of Anaesthesiology
Faculty of Medicine
Universiti Malaya
Kuala Lumpur
Malaysia

Dr Shahridan Mohd Fathil

Consultant Anaesthesiologist
Gleneagles Hospital Medini
Johor
Malaysia

Dr Thohiroh binti Abdul Razak

Senior Consultant Anaesthesiologist
Department of Anaesthesiology and Intensive Care
Hospital Tunku Azizah
Kuala Lumpur
Malaysia

Management of Trauma in COVID-19 Patients: An Adaptation of Practice

Samuel Tsan Ern Hung

Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Sarawak, Malaysia

INTRODUCTION

Over the past two and a half years, the world has been living in the shadow of the COVID-19 pandemic. Malaysia has been similarly affected, reporting a total of 4,575,809 cases and 35,784 deaths till 5th July 2022.¹ During this time, the medical field has learned to fight this virus and its complications. Public health measures such as mass vaccinations and infection control precautions were implemented to reduce the spread of COVID-19. Despite this, the COVID-19 virus continued to evolve, with no clear end in sight until today. Therefore, healthcare practitioners must remain constantly vigilant in the management of COVID-19 patients, regardless of whether infection rates spike or wane. This review aims to demonstrate the principles of management of COVID-19 patients presenting with trauma.

INITIAL ASSESSMENT AND MANAGEMENT

Triage

Patients presenting with trauma require urgent assessment and management. The triaging process is an important part of this assessment to identify patients with suspected, probable, or confirmed COVID-19 (Table I). The purpose of the triage is to protect staff and to prevent cross-infection with other patients. In addition, the identification of COVID-19 trauma patients will also guide their subsequent management in the hospital, given COVID-19 is a systemic illness which may complicate the patient's hospitalization. During triaging and subsequent management, healthcare providers need to wear appropriate personal protective equipment (PPE) to prevent transmission of infection (Table II).

Initial Management

Initial resuscitation in the emergency department should follow the Advanced Trauma Life Support

protocol with modifications to ensure staff safety is always prioritized. Primary and secondary surveys should be done promptly while maintaining infection control practices to prevent transmission of infection.⁴ The PPE worn by healthcare personnel may be physically limiting and impede the assessment of the patient. Hence, radiological examinations such as X-ray and ultrasonography may be utilized to complement the assessment of patients' conditions.^{5,6}

Airway Management

Trauma patients may require urgent airway management for various reasons, and the difficult airway is common in this population. The complexity of airway management increases exponentially in the presence of COVID-19 illness, with extra considerations for infection control practices, limitations caused by PPE, and potentially compromised respiratory function caused by COVID-19.⁷ Therefore, airway evaluation and planning are vital to ensure its success. The most experienced personnel should be responsible for performing endotracheal intubation, to prevent complications associated with multiple laryngoscopies and the spread of infection to staff. Teamwork and communication within the intubating team are essential. The usage of videolaryngoscopy has been encouraged to increase first-pass intubation success rate. Sufficient neuromuscular blocker to prevent cough reflex, avoidance of bag-valve-mask ventilation and modified rapid sequence induction have been recommended for emergent intubation in this population, to reduce aerosol generation. Readers are encouraged to refer to the consensus guideline for airway management in COVID-19 patients by the Difficult Airway Society, the Association of Anaesthetists, the Intensive Care Society, the Faculty of Intensive Care Medicine and the Royal College of Anaesthetists.⁸

Table I: Case definitions of COVID-19 in Malaysia*

Case	Definition
Suspected case of SARS-CoV-2 infection (A, B or C)	<ol style="list-style-type: none"> 1. A person who meets the clinical AND epidemiological criteria: <ul style="list-style-type: none"> • Clinical Criteria: <ol style="list-style-type: none"> 1. Acute onset of fever AND cough; <p style="text-align: center;">OR</p> <ol style="list-style-type: none"> 2. Acute onset of ANY TWO OR MORE of the following signs or symptoms: fever, cough, general weakness/fatigue, headache, myalgia, sore throat, coryza, dyspnoea, anorexia/nausea/vomiting, diarrhoea, altered mental status. • Epidemiological Criteria: <ol style="list-style-type: none"> 1. Residing or working in a setting with a high risk of transmission of the virus: for example, closed residential settings etc., any time within the 14 days before symptom onset; <p style="text-align: center;">OR</p> <ol style="list-style-type: none"> 2. Residing in or travelling to an area with community transmission anytime within the 14 days before symptom onset; <p style="text-align: center;">OR</p> <ol style="list-style-type: none"> 3. Working in a health setting, including within health facilities and within households, anytime within the 14 days before symptom onset. 2. A patient with severe acute respiratory illness (SARI: acute respiratory infection with history of fever or measured fever of $\geq 38^{\circ}\text{C}$; and cough; with onset within the last 10 days; and who requires hospitalization); 3. An asymptomatic person not meeting epidemiologic criteria with a positive SARS-CoV-2 rapid test kit antigen (RTK-Ag).
Probable case of SARS-CoV-2 infection (A, B, C or D)	<ol style="list-style-type: none"> A. A patient who meets clinical criteria above AND is a contact of a probable or confirmed case or is linked to a COVID-19 cluster. B. A suspected case (described above) with chest imaging showing findings suggestive of COVID-19 disease. C. A person with recent onset of anosmia (loss of smell) or ageusia (loss of taste) in the absence of any other identified cause D. Death, not otherwise explained, in an adult with respiratory distress preceding death AND who was a contact of a probable or confirmed case or linked to a COVID-19 cluster²
Confirmed case of SARS-CoV-2 infection (A, B or C)	<ol style="list-style-type: none"> A. A person with a positive Nucleic Acid Amplification Test (NAAT); RT-PCR, Rapid Molecular, and Gene X-pert. B. A person with a positive SARS-CoV-2 RTK-Ag AND meeting either the probable case definition or suspected criteria C. An asymptomatic person with a positive SARS-CoV-2 RTK-Ag AND who is a contact of a probable or confirmed case

* Obtained from Ministry of Health Malaysia - Guideline (updated 23rd May 2022)²

Table II: Recommended personal protective equipment used when managing suspected/confirmed COVID-19 cases.

Activity	Type of PPE	Note
Activities that do not result in physical contact	<ul style="list-style-type: none"> • N95 mask • Eye protection (face shield/goggles) 	<ul style="list-style-type: none"> • Triaging areas in emergency department may use physical barriers (such as glass or plastic windows or face shield) to reduce exposure.
Activities that result in LOW CONTACT RISK i.e., activities that are unlikely to provide opportunities for the transfer of virus to clothing for example: <ul style="list-style-type: none"> • Recording clinical vital assessment (Blood Pressure/Pulse Rate/Oxygen Saturation/Temperature) • Inserting a peripheral IV cannula • Administering or changing IV fluids 	<ul style="list-style-type: none"> • N95 mask • Eye protection (face shield/goggles) • Disposable plastic apron • Gloves • Fluid resistant isolation gown/ long sleeve plastic apron can be used if anticipating spillage/ difficult line insertion or any activities which increases the frequency of exposure 	<ul style="list-style-type: none"> • HCW should maintain at least 1-meter spatial distance when possible. • HCW should limit the time and frequency of exposure as permissible. • Gowns and gloves should be changed between patients after high-risk contact activities, to minimise the risk of cross-transmission of other pathogens commonly encountered in healthcare settings. • PPE should be exchanged between patients if visibly contaminated.
Activities that result in HIGH CONTACT RISK i.e. activities that involve a higher chance of transfer of virus to the clothing. This includes (but not limited to): <ul style="list-style-type: none"> • Close contact for physical examination • Wound care • ANY activities where splashes/ sprays are anticipated 	<ul style="list-style-type: none"> • N95 mask • Eye protection (face shield/goggles) • Gloves • Isolation gown (fluid-repellent long-sleeved gown/apron) can be used if anticipated spillage/difficult line insertion or any activities which increase the frequency of exposure <p><i>*If the gown is not fluid resistant; it is advised to wear a disposable plastic apron over the gown</i></p> <p><i>*Use of coverall does not offer additional protection and is not recommended</i></p>	<ul style="list-style-type: none"> • PPE should be exchanged between patients if visibly contaminated.
Performing Aerosol Generating Procedures <ul style="list-style-type: none"> • Intubation, extubation and related procedures/CPR • Tracheotomy/tracheostomy procedures • Manual ventilation • Suctioning • Bronchoscopy • Nebulization 	<ul style="list-style-type: none"> • N95 mask/PAPR • Eye protection (face shield/goggles) • Isolation gown (fluid repellent long-sleeved gown) • Gloves <p><i>* Use of coverall does not offer additional protection and not recommended</i></p>	<ul style="list-style-type: none"> • All PPE should be removed after procedure.

Note:

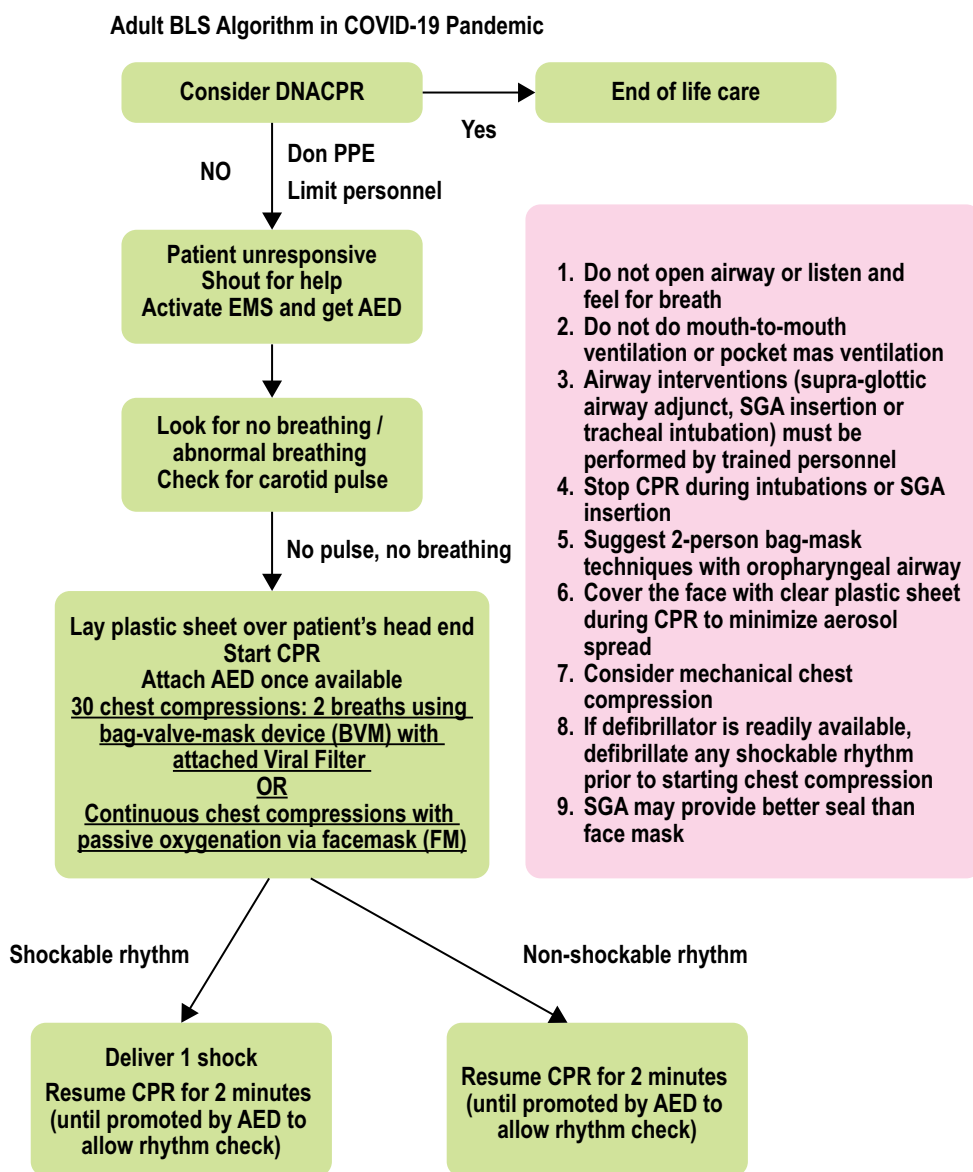
Abbreviations: HCW, healthcare worker; PAPR, powered air-purifying respirator; PPE, personal protective equipment.

*Adapted from Ministry of Health Malaysia guidelines (update 9th March 2022)³

Cardiopulmonary Resuscitation

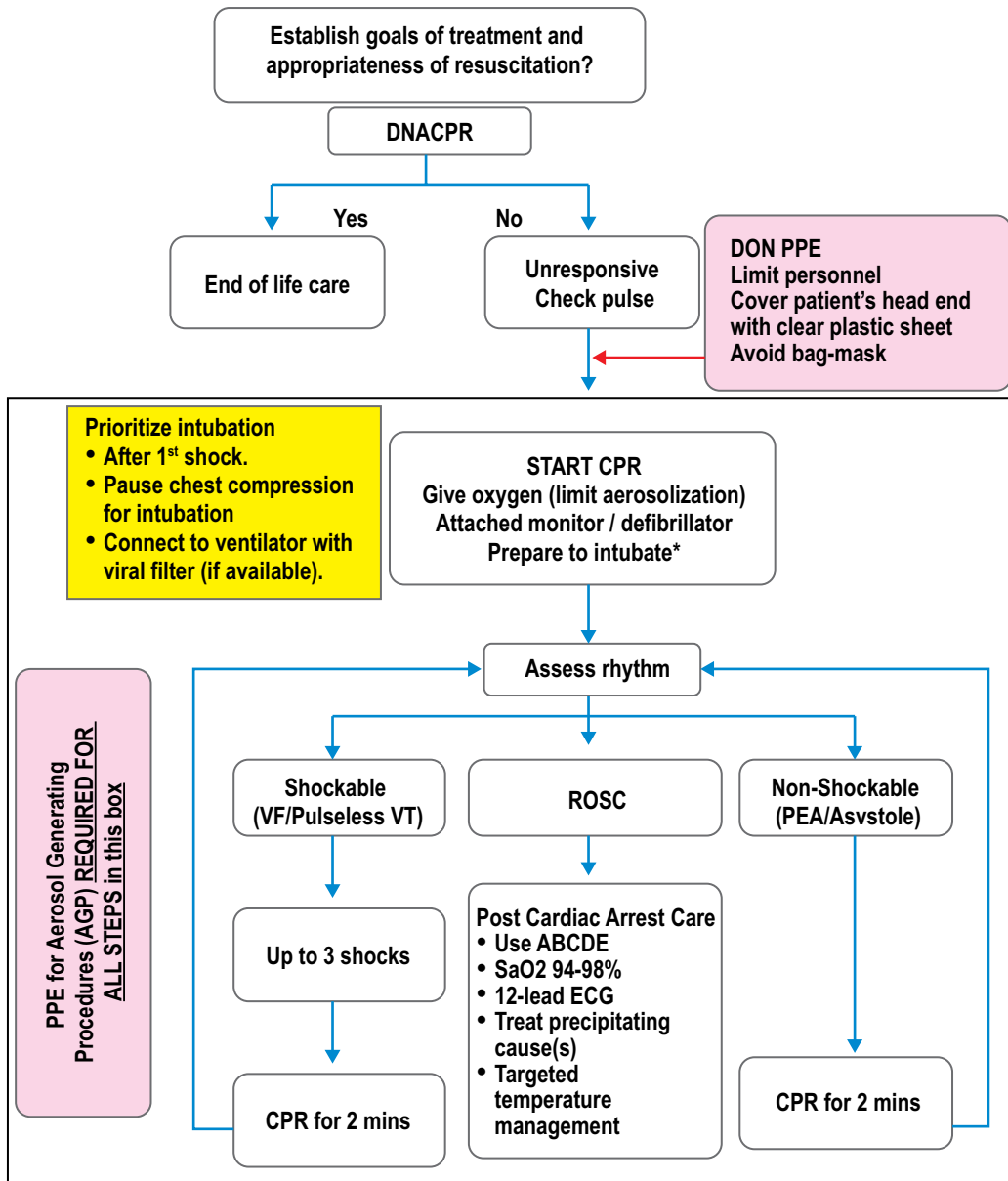
Critically ill trauma patients may require cardiopulmonary resuscitation (CPR) upon presentation to the hospital. During CPR, the risk of transmission of COVID-19 increases drastically, as CPR involves multiple aerosol-generating procedures (chest compression, insertion of advanced airway, and positive pressure ventilation) and numerous medical personnel working at a close distance to the patient. Hence, the Ministry of

Health Malaysia has stressed the mantra of “safety comes first” during CPR to prevent the transmission of infection to medical staff. If staff are not equipped with proper airborne precaution PPE, CPR is not to be performed. Advanced directives should also be discussed early on during the management of critically ill trauma patients with COVID-19.⁹ Recommendations by the Ministry of Health Malaysia for CPR of COVID-19 patients can be found in Figure 1.





Adult BLS Algorithm in COVID-19 Pandemic
 NCORT Consensus statement



DNACPR = do not attempt cardiopulmonary resuscitation, ROSC = return of spontaneous circulation

Figure 1: Adult Basic Life Support and Advanced Cardiac Life Support guidelines from the Ministry of Health Malaysia, with modifications for COVID-19 patients (Updated 17th June 2021)⁹

TRAUMA SURGERY

Many COVID-19 trauma patients presenting to the hospital may require surgery as corrective measures for their injuries sustained during the trauma. In addition, a certain proportion of patients presenting with severe trauma may require damage control surgery to preserve life. The decision for surgery should involve a multidisciplinary team discussion between the surgeon, the anaesthesiologist, and the infectious disease physician, in order to decide on the best course of action for the patient's management.

Equipment, facilities, and staffing

Throughout surgery for trauma patients with suspected or confirmed COVID-19, proper PPE should be always worn (Table II). The surgery should optimally be done in a negative pressure operating theatre (OT), or if not available, in an isolated OT away from the main OT. Signs indicating the COVID-19 exposure area should be well-placed outside the OT to serve as a warning for other staff. Unnecessary devices in the OT should be removed, while necessary items such as anaesthesia machines, drugs and airway trolleys should be covered with disposable plastic sheets. The number of staff allowed into the OT should also be limited to reduce staff exposure to COVID-19. Preferably only senior staff should be in the OT managing the patient. Surgeries should be performed by senior surgeons to reduce operative times and improve outcomes. Teamwork and communication among different teams are important to ensure a successful surgery, considering the physical limitations imposed by PPE making interaction difficult. After surgery, thorough disinfection of the OT should be carried out.^{5-7,10}

Preoperative preparation

Preoperative assessment should optimally be done before the patient arrives in the OT. It is important to note that adequate resuscitation and stabilization before surgery are important to ensure the best patient outcomes. COVID-19 pneumonia patients may present with compromised respiratory function, which may be detected via

an arterial blood gas. If present, appropriate steps need to be taken during induction of anaesthesia, to prevent hypoxaemia. Options include using proper preoxygenation, apnoeic oxygenation with a high-flow nasal cannula, and head-up positioning of patients for intubation. Another important consideration is the risk of coagulation disorders.¹¹ Patients with major haemorrhage from trauma may present with consumptive coagulopathy and disseminated intravascular coagulation. In addition, there is evidence to suggest COVID-19 patients are at high risk of having thrombocytopenia and a hypocoagulable state, which may influence the choice of anaesthesia and preparation for the possibility of intraoperative haemorrhage.¹²

Choice of anaesthesia

Choice of anaesthesia will depend on the patient's condition, type of trauma and planned surgery. If feasible, regional anaesthesia is preferred as it avoids manipulation of the airway, which leads to aerosolization of COVID-19. In addition, the risk of postoperative pulmonary complications can be reduced as patients' respiratory functions are preserved.⁵

Intraoperative phase

Cardiovascular system

For trauma patients with massive haemorrhage without traumatic brain injury (TBI), permissive hypotension whereby systolic blood pressure of 80-90mmHg (mean arterial pressure [MAP] 50-60mmHg) has been recommended until the major bleeding is stopped. Patients with severe TBI (Glasgow Coma Scale ≤ 8) should have their MAP maintained at ≥ 80 mmHg. Additionally, a restrictive fluid replacement strategy to achieve blood pressure targets until bleeding is controlled has been recommended.¹³ It is important to remember that patients with COVID-19 pneumonia are at higher risk of having compromised respiratory functions due to fluid overload. Hence, optimal administration of fluid based on goal-directed fluid therapy is recommended.⁷ Modalities that guide goal-

directed fluid therapy can be the analysis of arterial waveforms (pulse pressure variations) or the usage of non-invasive haemodynamic monitoring. Caution should be practised when giving an allogeneic blood transfusion, due to the risks of transfusion-related lung injury and circulatory overload.¹⁴ During the COVID-19 pandemic, there have been issues with shortage of blood products for various reasons. It is therefore sensible to practice blood conservation strategies to reduce blood transfusion rates.⁷

Respiratory system

Trauma patients with COVID-19 may have pulmonary contusions with concomitant infective changes. This “double-poison effect” will complicate intraoperative ventilatory strategies, resulting in hypoxaemia and organ injuries. Lung-protective ventilation strategies are therefore important to minimize the risk of ventilator-associated lung injury. A low tidal volume (6-8ml/kg of predicted body weight) and optimal positive end-expiratory pressures are recommended, along with intraoperative alveolar recruitment manoeuvres.¹⁵ If endotracheal suctioning is planned, a closed-system should be used to minimize the risk of exposure to staff.

Analgesia

As with all surgeries, multimodal analgesia should be practised. Options include paracetamol, opioids, non-steroidal anti-inflammatory drugs, and regional analgesia techniques. Patients with COVID-19 may not be reviewed as frequently as non-infectious patients in the wards; therefore it is important to ensure that the analgesia given extends well into the postoperative phase. With regards to opioid usage, the risk of respiratory depression and carbon dioxide retention must be considered as these can aggravate lung problems in COVID-19 patients.

Postoperative management

Postoperatively, the decision to discharge a COVID-19 patient to the intensive care unit or ward should be done based on the patient’s condition,

the surgical outcome, and logistic issues (e.g. lack of isolation beds). Extubation is an aerosol-generating procedure, and hence it should be done in the OT itself after surgery. To prevent coughing during extubation, the usage of remifentanyl can be considered.¹⁶ Another method for smooth extubation is the laryngeal mask airway exchange technique (Bailey manoeuvre). This technique allows for minimal stimulation, while at the same time maintaining a patent airway.⁷ After extubation, patients need to be monitored in the OT for about 20 to 30 minutes until they are suitable to be discharged based on appropriate scoring with postanaesthetic recovery score (e.g. Aldrete score).

Trauma patients have a high risk of developing venous thromboembolism (VTE). This risk increases further post-surgery due to Virchow’s triad (blood stasis, endothelial damage, and hypercoagulability). In the presence of COVID-19, the risk of VTE rises even higher, which is attributed to inflammation and the activation of the serum complement system.¹⁷ Taken together, this population of patients will require early VTE prophylaxis. This can be done with mechanical thromboprophylaxis (compression stockings and intermittent pneumatic compression devices), and chemical thromboprophylaxis (low-molecular-weight heparin or unfractionated heparin), which can be started when the risk of bleeding is deemed to be lower.

CHALLENGES

As Malaysia and the rest of the world move into the post-COVID-19 pandemic phase, multiple challenges remain in the management of trauma patients with COVID-19. One of these challenges is the need to increase trauma OT efficiency. Research has shown that during the COVID-19 pandemic, there were significantly increased operative, anaesthetic, change-over, and late-start times. These phenomena have been attributed to the implementation of safety precautions (e.g. PPE, OT cleaning, recovery of patients, etc).¹⁸ The challenge is therefore to improve theatre efficiency without compromising patient safety.

In addition, physician psychological distress and burnout during the pandemic is a worldwide occurrence, potentially compromising the care of COVID-19 patients. In Malaysia up to 55.3% and 67.1% of anaesthesiologists managing COVID-19 patients were burnout and at risk of depression, respectively.¹⁹ The acute management of trauma is by itself mentally taxing, and coupled with COVID-19 management, a recipe for increased burnout and psychological distress is created. Involvement of all stakeholders (doctors, hospital administrators, and politicians) are required to ensure the mental well-being of physicians is taken care of while the COVID-19 pandemic stretches on.

CONCLUSION

The care of trauma patients with COVID-19 is a challenging scenario. Despite that, anaesthesiologists have demonstrated the ability to improvise, adapt and overcome those challenges. Trauma care should not be compromised during the COVID-19 pandemic. At the same time, the safety of staff is paramount, and infection control practices need to be emphasized. Trauma surgery for COVID-19 patients can be done safely. Adaptations to the preoperative, intraoperative, and postoperative phases of care are necessary to achieve the best patient outcomes.

References

1. John Hopkins University. Coronavirus resource center Malaysia: overview, 2022. Available from: <https://coronavirus.jhu.edu/region/malaysia> (assessed 5 July 2022)
2. Ministry of Health Malaysia. Annex 1: case definitions, 2022. Available from: <https://covid-19.moh.gov.my/garis-panduan/garis-panduan-kkm/ANNEX-01-COVID-19-Case-Definition-23052022.pdf> (assessed 5 July 2022)
3. Ministry of Health Malaysia. Annex 8: Guidelines on infection prevention and control measures in managing person under surveillance, suspected, probable or confirmed coronavirus disease (Covid-19), 2022. Available from: <https://covid-19.moh.gov.my/garis-panduan/garis-panduan-kkm/ANNEX-8-IPC-MEASURES-IN-MANAGING-PUS-SUSPECTED-PROBABLE-CONFIRMED-COVID-19-09032022.pdf> (assessed 5 July 2022)
4. Okoye O. Implementing trauma resuscitation protocol in COVID-19 era: our modifications at the National Trauma Centre, Abuja, Nigeria. *Nigerian Journal of Clinical Practice* 2021;**24**:138-141
5. Sawhney C, Singh Y, Jain K, Sawhney R, Trikha A. Trauma care and COVID-19 pandemic. *Journal of Anaesthesiology Clinical Pharmacology* 2020;**36**:S115
6. Li Y, Zeng L, Li Z, Mao Q, Liu D, Zhang L, Zhang H, Xie Y, Liu G, Gan X. Emergency trauma care during the outbreak of corona virus disease 2019 (COVID-19) in China. *World Journal of Emergency Surgery* 2020;**15**:1-10
7. Gong Y, Cao X, Mei W, Wang J, Shen L, Wang S, Lu Z, Yu C, Che L, Xu X. Anesthesia considerations and infection precautions for trauma and acute care cases during the Coronavirus Disease 2019 pandemic: recommendations from a task force of the Chinese Society of Anesthesiology. *Anesthesia and Analgesia* 2020;**131**:326-34
8. Cook T, El-Boghdady K, McGuire B, McNarry A, Patel A, Higgs A. Consensus guidelines for managing the airway in patients with COVID-19: Guidelines from the Difficult Airway Society, the Association of Anaesthetists, the Intensive Care Society, the Faculty of Intensive Care Medicine and the Royal College of Anaesthetists. *Anaesthesia* 2020;**75**:785-99
9. Ministry of Health Malaysia. Annex 40: Guidelines on resuscitation during Covid-19 pandemic version 4/2021, 2020. Available from: https://covid-19.moh.gov.my/garis-panduan/garis-panduan-kkm/ANNEX_40_GUIDELINES_ON_RESUSCITATION_DURING_COVID19_PANDEMIC_17062021.pdf (assessed 5 July 2022)

10. Awad ME, Rumley JCL, Vazquez JA, Devine JG. Perioperative considerations in urgent surgical care of suspected and confirmed COVID-19 orthopaedic patients: operating room protocols and recommendations in the current COVID-19 pandemic. *Journal of the American Academy of Orthopaedic Surgeons* 2020;**28**:451-63
11. Dutton RP, Grissom TE, Herbstreit F. COVID-19 and trauma care: improvise, adapt, and overcome! *Anesthesia and Analgesia* 2020;**131**:323-5
12. Kander T. Coagulation disorder in COVID-19. *The Lancet Haematology* 2020;**7**:e630-e2
13. Spahn DR, Bouillon B, Cerny V, Duranteau J, Filipescu D, Hunt BJ, Komadina R, Maegele M, Nardi G, Riddez L. The European guideline on management of major bleeding and coagulopathy following trauma: fifth edition. *Critical Care* 2019;**23**:1-74
14. Semple JW, Rebetz J, Kapur R. Transfusion-associated circulatory overload and transfusion-related acute lung injury. *Blood* 2019;**133**:1840-53
15. Young CC, Harris EM, Vacchiano C, Bodnar S, Bukowy B, Elliott RRD, Migliarese J, Ragains C, Trethewey B, Woodward A. Lung-protective ventilation for the surgical patient: international expert panel-based consensus recommendations. *British Journal of Anaesthesia* 2019;**123**:898-913
16. Nho J-S, Lee S-Y, Kang J-M, Kim M-C, Choi Y-K, Shin O-Y, Kim D-S, Kwon M-I. Effects of maintaining a remifentanyl infusion on the recovery profiles during emergence from anaesthesia and tracheal extubation. *British Journal of Anaesthesia* 2009;**103**:817-21
17. Schulman S, Hu Y, Konstantinides S. Venous thromboembolism in COVID-19. *Thrombosis and Haemostasis* 2020;**120**:1642-53
18. Khadabadi NA, Logan PC, Handford C, Parekh K, Shah M. Impact of COVID-19 pandemic on trauma theatre efficiency. *Cureus* 2020;**12**:e11637
19. Tsan SEH, Kamalanathan A, Lee CK, Zakaria SA, Wang CY. A survey on burnout and depression risk among anaesthetists during COVID-19: the tip of an iceberg? *Anaesthesia* 2021;**76**:8-10