Trauma Service

Hospital Tuanku Ja’afar Seremban

Trauma Surgery
Position Statement & Guidelines

Updated Oct 2025, Version 1.1

CONTENTS

Background

Start of a journey

While it's evident that most regional and national systems have their roots within the hospital setting, gradually branching outwards, a few have evolved in a synchronized fashion. To embark on this journey, implementing a robust In-hospital **Trauma System** is a commendable starting point.

Improved trauma outcomes

Numerous previous studies have unequivocally showcased heightened survival rates and improved overall outcomes for trauma patients when administered care within a well-organized **Trauma System**. This system operates within the confines of a hospital and seamlessly extends its reach into the broader community, addressing not just pre-hospital care but rehabilitation and palliative care.

Trauma System, Center and Service

The Key Elements

Trauma System

The way forward

A **Trauma System** is a coordinated and organized approach to managing patients with severe injuries, aiming to provide timely and appropriate care from the scene of the injury through rehabilitation to re-assimilation of the injured individual back into the community.

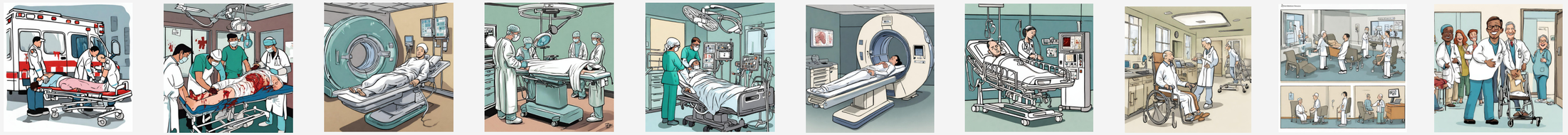
TRAUMA SYSTEM

Trauma System

Key components

- Efficient Pre-Hospital Care
- Designated Trauma Centers
- Effective communication and coordination among healthcare providers
- Ongoing training and education
- Continuous quality improvement
- Rehabilitation services
- Focus on research and innovation

NAVIGATING A MAJOR TRAUMA PATIENT THROUGH A TRAUMA SYSTEM



Initial care: First point of contact with Trauma Service	Definitive Care: Operative or Non-operative and Intensive Care	In-patient and Out-patient care Trauma Rehabilitation	Return to community

Pre-Hospital Care
Emergency & Trauma Department

Trauma Surgery, Neurosurgery, Orthopaedic Surgery and other Surgical-based Departments

Anaesthesia and Intensive Care

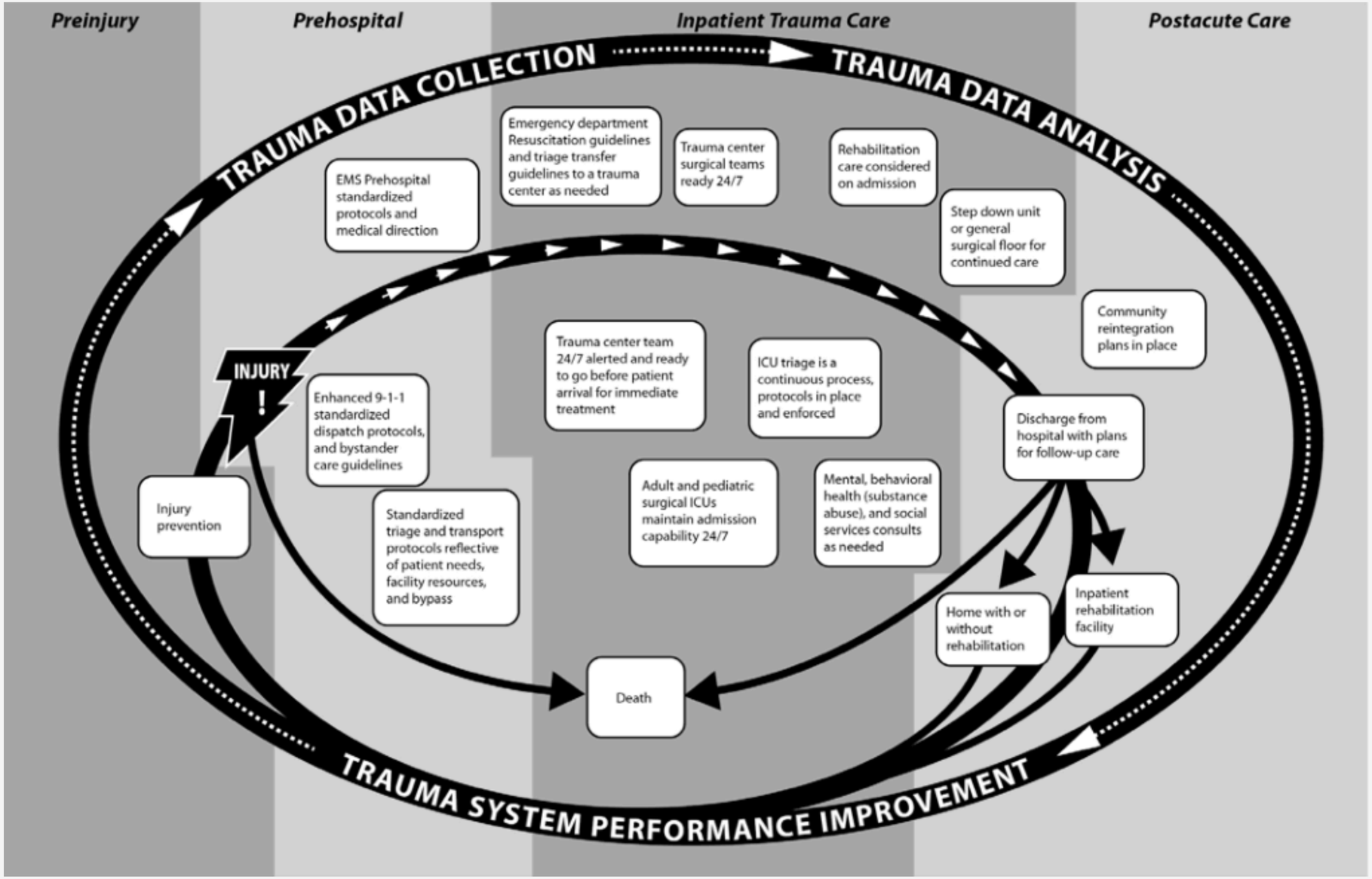
Transfusion Medicine

Trauma Radiology

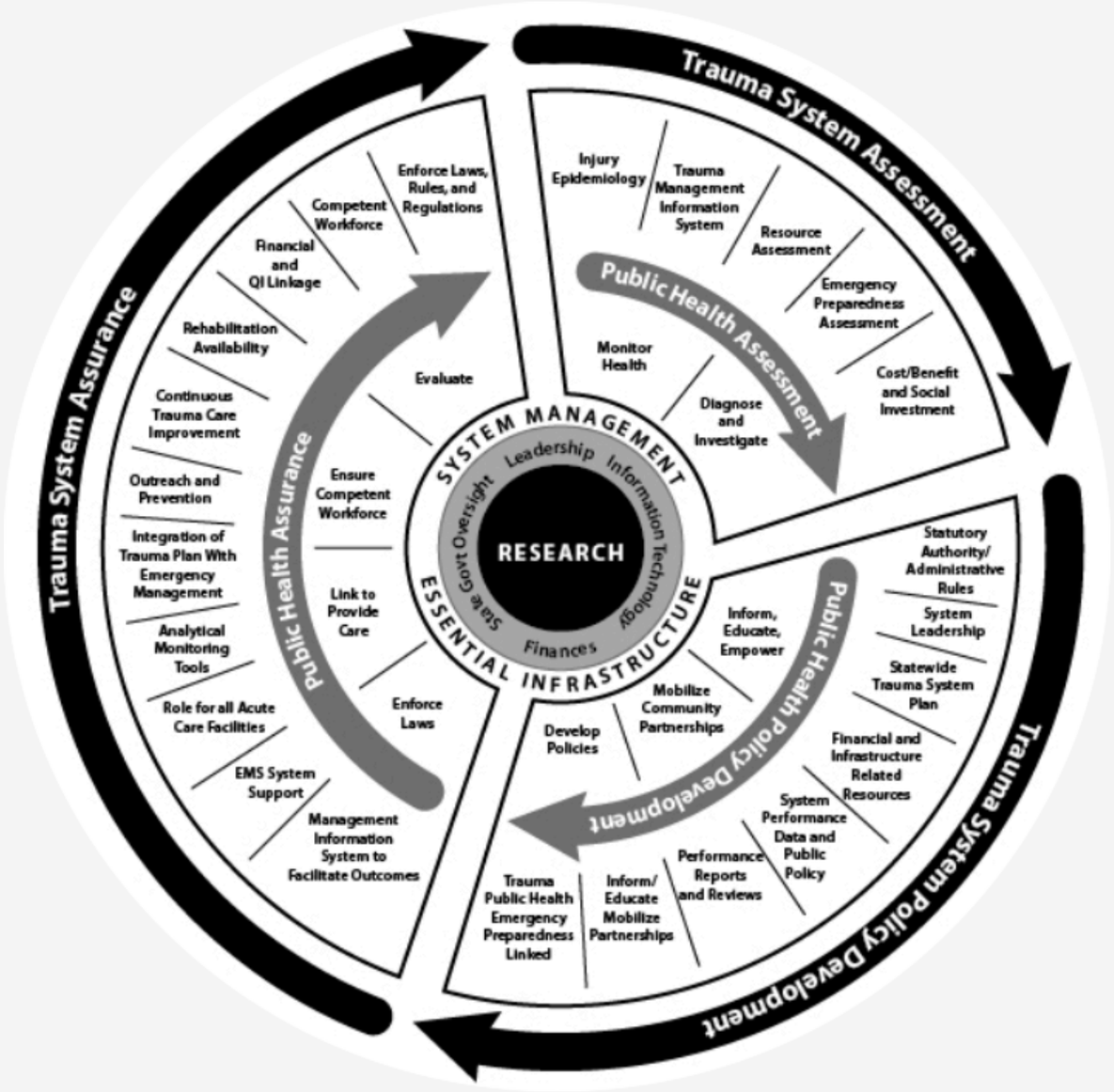
Internal Medicine, Paediatrics, Psychiatry, Pharmacy

Trauma Rehabilitation

Medical Social Works and Child Protection Services



A Preplanned Trauma Care Continuum



The relationship between Public Health Services and the Operations of a Trauma System

“Get the right patient..
to the right hospital..
at the right time..
to the right team..”

Donald Trunkey, 1977

Trauma Center

Care for the injured

A **Trauma Center** is a specialized medical facility, categorized by levels, equipped with advanced resources and a multidisciplinary team to provide comprehensive care for patients with traumatic injuries, with the primary goal of minimizing morbidity and mortality.

TRAUMA CENTER LEVELS & STANDARDS

STANDARDS	LEVEL I	LEVEL II	LEVEL III
Dedicated facilities (Resuscitation Unit, Operating Room & Intensive Care Unit) 24 hours	Yes	Yes	Yes
Trauma Surgeon available in the hospital at all times	Yes		
On-call General Surgeon available within 30 minutes of call	Yes	Yes	Yes
Trauma Surgeon response time	15 minutes		
Emergency Physician in the hospital at all times and dedicated to trauma care	Yes	Yes	
Emergency Physician in the hospital at all times but can leave ED for floor care			Yes

STANDARDS	LEVEL I	LEVEL II	LEVEL III
Anaesthesiologist in the hospital at all times and dedicated to trauma care	Yes		
Anaesthesiologist in the hospital at all times but shared with other services	Yes	Yes	
On-call Anaesthesiologist available within 30 minutes of call			Yes
Anaesthesia response time	15 minutes	15 minutes	30 minutes
Orthopaedic Surgeon in the hospital at all times and dedicated to trauma care	Yes		
General Orthopaedic Surgeon in the hospital at all times	Yes	Yes	

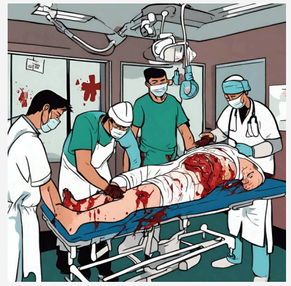
TRAUMA CENTER LEVELS & STANDARDS

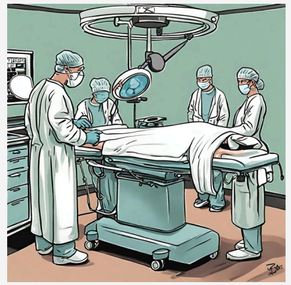
STANDARDS	LEVEL I	LEVEL II	LEVEL III
On-call Orthopaedic Surgeon available within 30 minutes of call			Yes
Orthopaedic response time	15 minutes	15 minutes	30 minutes
Neurosurgeon in the hospital at all times and dedicated to trauma care	Yes		
General Neurosurgeon in the hospital at all times	Yes	Yes	
On-call Neurosurgeon available within 30 minutes of call			Yes
Neurosurgeon response time	15 minutes	15 minutes	Cases can be transferred

STANDARDS	LEVEL I	LEVEL II	LEVEL III
Physician with privileges in critical care on duty in the Intensive Care Unit 24 hrs/day	Yes	Yes	
Critical care physician response time	In-hospital 24 hours	15 minutes	
OT staffed and ready time	15 minutes	15 minutes	30 minutes
In-hospital radiology & CT technicians	Yes	Yes	
Radiologist interpretation time	30 minutes	30 minutes	
Patient-to-nurse ICU ratio	Not exceed 2:1	Not exceed 2:1	Not exceed 2:1

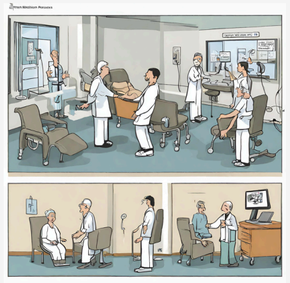
TRAUMA CENTER LEVELS & STANDARDS

STANDARDS	LEVEL I	LEVEL II	LEVEL III
Massive Transfusion Protocol	Yes	Yes	
Rehabilitation services	Yes	Yes	
Comprehensive Trauma Research Program	Yes		
Education - Fellowship Training in Trauma	Yes		
Surgical Residency Program	Yes		
Prevention & Outreach Professional Education	Yes	Yes	








Hospital Tuanku Ja’afar

status as a Trauma Center

Starting point, July 2024

In July 2024, Hospital Tuanku Ja’afar Seremban will commence operations as a **partial Level I Trauma Center**, marking a significant milestone with the introduction of a Trauma Surgeon who will spearhead the Trauma Service.

Future, July 2025 - 2027

By July 2025-2026, our center is committed to achieving the status of a **fully-fledged Level I Trauma Center**. This ambitious goal will be realized through the implementation of designated standards, coupled with the inauguration of the Comprehensive Trauma Research Program and the Trauma Surgery Fellowship Program.

“Any anomaly in your trauma patient is due to trauma, no matter how unlikely it may seem.”

The First Law of Trauma

Trauma Service

Heart of Trauma System

The **Trauma Service** will serve as the central component of a comprehensive care system, acknowledging the vital contributions of various specialties, such as Trauma Surgery, Emergency Services, Anaesthesiology, Orthopaedics, Neurosurgery, Radiology, Physiotherapy, Rehabilitative Services, and other surgical disciplines. It will actively facilitate collaboration among these care providers in managing the injured within the hospital.

TRAUMA CHAIRPERSON
HOSPITAL DIRECTOR

TRAUMA COORDINATOR
TRAUMA SURGEON

TRAUMA CO-COORDINATOR
EMERGENCY PHYSICIAN

TRAUMA COMMITTEE
ANAESTHESIOLOGIST
RADIOLOGIST
NEUROSURGEON
ORTHOPAEDIC SURGEON
TRANSFUSION MEDICINE PHYSICIAN

SURGICAL SPECIALITIES FOR TRAUMA

TRAUMA SURGERY
GENERAL SURGERY
NEUROSURGERY
ORTHOPAEDIC SURGERY
ORAL & MAXILLOFACIAL SURGERY
OTORHINOLARYNGOLOGY
OPHTHALMOLOGY
PAEDIATRIC SURGERY
OBSTETRICS & GYNAECOLOGY

NON-SURGICAL SPECIALITIES FOR TRAUMA

EMERGENCY MEDICINE & TRAUMA
ANAESTHESIA & INTENSIVE CARE
RADIOLOGY
TRANSFUSION MEDICINE
REHABILITATION MEDICINE
MEDICAL SOCIAL WORK
INTERNAL MEDICINE
PSYCHIATRY
PAEDIATRICS

TRAUMA SERVICE

Trauma Service Structure

The **Trauma Coordinator (TC)** plays a crucial role in the efficient management and optimization of the Trauma System. This clinical position involves overseeing the development, configuration, performance, and reporting aspects of the system, ensuring comprehensive care from admission to discharge. Ideally, the TC should be a skilled surgeon, specializing in Trauma, Neurosurgery, or Orthopaedics, capable of providing definitive care and strategic planning.

In collaboration with a Trauma Co-Coordinator, this committee includes representatives from key medical disciplines such as Anaesthesia, Radiology, Orthopaedic Surgery, Neurosurgery, Transfusion Medicine, and Emergency Medicine. The synergy between the Trauma Co-Coordinator and the TC is vital for coordinating services and promoting a multidisciplinary approach to trauma care.

Under the TC's leadership, the committee actively engages in quality improvement activities to enhance the overall effectiveness of the program. The success of the program relies on the seamless teamwork and positive dynamics fostered among these leaders.

TRAUMA SERVICE

Trauma Service

Key components

- Bridging Gaps Among Care Providers
- In-house Trauma Registry
- Staff Training and Enhancement
- Clinical Protocols and Management Algorithms
- Education and Exposure Opportunities
- Future plans

Bridging Gaps Among Care Providers

01

The **Trauma Service** will be the focal point of our comprehensive care system while recognizing the important role of other specialties in managing the care of the injured in the hospital.

02

The Trauma Service will bridge gaps among various care providers, including Emergency Services, Anaesthesiology, Orthopaedics, Neurosurgery, Radiology, Physiotherapy, Rehabilitative Services, and other surgical disciplines in the hospital.

03

This service will ensure seamless and timely care delivery, from admission to post-discharge.

In-house Trauma Registry

01

The Trauma Service will establish and maintain an in-house Trauma Registry, contributing data to the Malaysia National Trauma Registry.

02

Routine audits and system refinements will be guided by valuable insights extracted from our Trauma Registry. This strategic approach emphasizes evaluating outcomes, scrutinizes processes, and pinpoints preventable errors in care delivery.

Staff Training & Enhancement

01

Our medical and ancillary service staff will receive continuous training to enhance their skills.

02

Collaborative monthly data audits, grand rounds, forums, and seminars will involve all departments and units caring for the injured.

Clinical Protocols & Management Algorithms

01

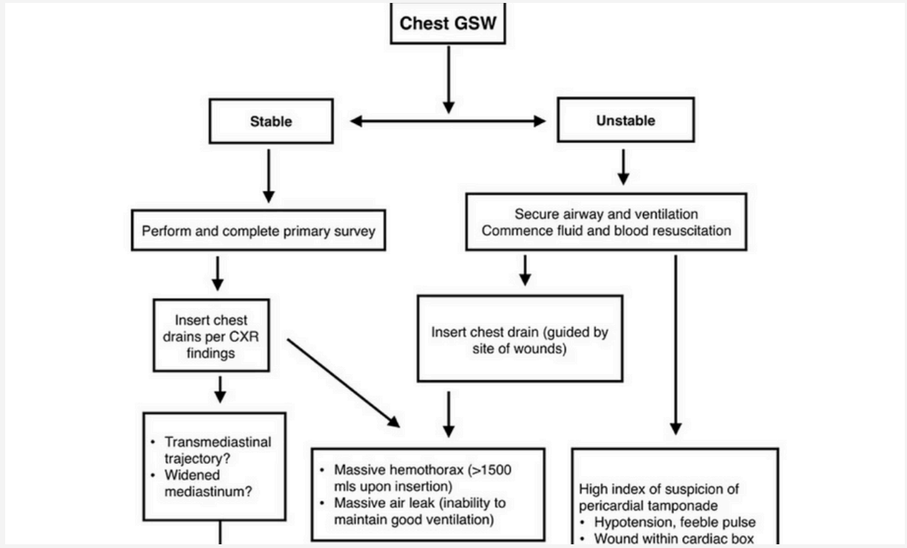
A key emphasis will be placed on developing in-house protocols and clinical management algorithms for various injuries, specifically focusing on major trauma and multiple injured patients.

02

These protocols will be regularly updated based on emerging evidence.

03

The unit will actively engage in research, contributing to local and international publications, aligning with HTJ's designation as a center for subspecialty training.



Education & Exposure Opportunities

01

Junior staff members, including House Officers, Medical Officers, Registrars, and Senior Registrars, will be provided opportunities for short rotations through the service to gain exposure to trauma care.

02

Short attachments by qualified surgeons with an interest in trauma care will be encouraged. Senior members (Fellows) will actively participate in all service activities.

03

The unit will also welcome medical officers pursuing a Master of Emergency Physician and International Fellows, offering them a brief rotation to immerse themselves in trauma surgery.

Future plans

01

Plans will include the structured training and recognition of Trauma Nurse Specialists, with the aspiration for HTJ to become a designated training ground for Trauma Nursing as part of post-basic nursing education.

02

Anticipating the evolution of Regional or National Systems and Networks, the unit envisions the emergence of Trauma Program Managers within the current ranks of Trauma Coordinators.

“Your trauma patient is bleeding to death until you prove otherwise.”

The Second Law of Trauma

TRAUMA SURGERY LEADING THE TRAUMA SERVICE

TRAUMA SURGERY

Staffing & Human Resources

The service will be tailored to the needs and availability of local resources and conditions. It will draw heavily from the General Surgical service as an integral and inseparable part, reflecting its' inherent attribute of being the last vestige of general surgical practice that requires deep understanding and competence in General Surgery.

Members of the Trauma Surgery Unit will comprise of, but not limited to:

1. **Trauma Director (with or without a Co-Director)**
2. **Trauma Fellow/s**
3. **Registrar/Medical Officer (shared resource)**
4. **House surgeon/s (shared resource)**
5. **Trauma Nurse Coordinator/Specialist**
6. **Trauma Registry-Data Manager**
7. **General Administrator (shared resource)**

TRAUMA SURGERY

MEMBERS OF TRAUMA SERVICE	JOB DESCRIPTION
TRAUMA DIRECTOR	• The Director of Trauma Service shall chair and head the service. • Provide leadership for the trauma team in general. • Responsible for the day-to-day running of all aspects of the service. • Sit as a hospital Trauma Committee member (not necessarily the Chair of such a committee). • A Co-Director may or may not be appointed as dictated by the local situation and needs. • Calls will be taken within the General Surgery pool. • The Director shall actively engage in resource planning on a regular basis and the development of Trauma Systems not necessarily limited to in-hospital services.
TRAUMA FELLOW	• The Trauma Fellow position is a rotational post provided for by the Surgical Subspecialty Training Committee of the MOH. • Candidates accepted for training will be involved in all clinical as well as academic activities pertaining to trauma care.

MEMBERS OF TRAUMA SERVICE	JOB DESCRIPTION
	• The Trauma Fellow shall be present at all Trauma Activations during working hours and whenever on the general surgical call roster. • Expected to be exposed to or gain experience in performing a set of recommended surgical operations. (see **Appendix F**) • Also expected to be involved, to a lesser degree, in activities on trauma data and registry as well as general surgical activities (including Endoscopy) when there are no constraints by trauma responsibilities. • Calls shall be within the General Surgery pool. • The posting duration shall be determined by the allotted time as stipulated by the Subspecialty Training Committee.
MEDICAL OFFICER / REGISTRAR	• The MO/Registrar will be involved in the day-to-day clinical management of trauma patients and assist the Fellow in clinical activities. • In the realization that this human resource may be scarce, the post will always be considered a shared resource with the General Surgical service. However, it is prudent to have a particular individual designated on a rotational basis for a determined period.

TRAUMA SURGERY

MEMBERS OF TRAUMA SERVICE	JOB DESCRIPTION
	• Calls will be within the general surgical pool with cover required for general surgical duties during working hours. • The individual/s will be present at all Trauma Activations and, • Most importantly receive handover of trauma patients and referred trauma patients from the preceding (previous day) on-call team.
HOUSE SURGEONS / OFFICER	• The HO is a shared resource within the General Surgery pool, assigned to the service on a rotational basis. The duration of which is determined by the Surgical Department House Officer Coordinator. • The house surgeon will engage in day-to-day clinical work for trauma patients, assisting the Fellows and Registrars. The duties are not unlike other house officers in General Surgery. • They are required to be involved in the collection of data for the internal registry on a daily basis. • Calls are pooled within the General Surgery HO call roster.

MEMBERS OF TRAUMA SERVICE	JOB DESCRIPTION
TRAUMA NURSE COORDINATOR / SPECIALIST	• The Trauma Nurse Coordinator shall “tie in” the individuals within as well as those outside of the Trauma Service. • Shall function as a liaison between all teams treating the patient to provide seamless care throughout the patient’s admission. • Involved either directly or in a supervisory role for wound care nursing. • The Trauma Coordinator will be in charge of the daily collection of data for the in-house Trauma Registry. • Coordinate and arrange discharge to a suitable destination and/or rehabilitation facility • Liaise with NGOs, Social Welfare Departments, or charitable organizations to provide support to individual patients if required out of the hospital environment • Arrange for the transfer and transport of patients between hospitals/centers/regions/countries • Training/supervision (providing input) of nursing staff in the care of the injured patient in the wards • Organize courses and events on trauma education and outreach programs in the community.

TRAUMA SURGERY

MEMBERS OF TRAUMA SERVICE	JOB DESCRIPTION
TRAUMA REGISTRY DATA MANAGER	• Participates in the data collection for the in-house Trauma Registry • To a lesser degree participate in the activities concerning data for the NTRi • Data entry into the in-house Trauma Registry • Processing and retrieval of data from the in-house registry • Participate in the auditing process of the data from the in-house registry • Compiling half-yearly (abbreviated) and annual reports from the in-house database
GENERAL ADMINISTRATIVE ASSISTANT	• This member shall perform daily routine general administrative matters, rosters, and schedules. It is evident that this resource is scarce within the MOH environment, thus necessitating sharing this personnel within the General Surgical service with due thought that the Trauma Service shall not put an undue burden on administrative matters.

Structural & Material Resources

Operating within the framework of the Malaysian Ministry of Health (KKM), this service will leverage the aforementioned resources by tapping into the existing infrastructure within the Ministry of Health, particularly through the General Surgical service and its inventory. The focal point is not a revamp of physical assets but rather a strategic reorganization of current resources. The objective is to establish a novel system and workflow dedicated to optimizing outcomes for injured patients. Any requisitions for hardware, equipment, and therapeutic agents will adhere to established official channels, consistent with the procedures for other services within the MOH. Of paramount importance is the prioritization of setting up an internal trauma registry, based on electronic platforms, superseding all other material requests in significance.

TRAUMA SURGERY

Clinical Work Process

1. All Trauma Activations during working hours are to be attended to by the Trauma Service (for the members of the actual Trauma Team, please refer to **Appendix A** - Trauma Team Activation Guidelines, **Appendix B** - Trauma Team Resuscitation Guidelines).

2. Subsequent management of the above patients (1) shall be managed by the Trauma Service.

3. All Trauma Activations outside of normal work hours shall be taken by the on-call team of the day.

4. All patients taken in by other teams may be handed over the next morning of the next working day, to the Trauma Service if the attending surgeon wishes to do so. In the event that he/she wishes to proceed with providing care for the injured patient, the Trauma Service will assume the role of advisor and provide the necessary input as well as technical assistance, when necessary.

5. However not withstanding the above item (4), all patients kept under teams other than the Trauma Service, shall be made known to the Trauma Service, for the purpose of data entry into the registry. A formal process of handover will be described elsewhere in this document.

6. All Trauma patients admitted to other Departments (i.e. Neurosurgery, Orthopedics, etc) referred to the off-hours on-call team will be handed over to the Trauma Service the next morning of the next working day. The respective Surgeons taking the referrals, however, may elect to continue providing care to these patients and the Trauma Service will provide input and assistance when needed. As is noted in item 5 above, these patients shall be made known to the Trauma Service for data-gathering purposes.

7. Referred trauma cases from other disciplines (i.e. Orthopedics, Neurosurgery, ENT, etc), within working hours, will be seen by the Trauma Service.

TRAUMA SURGERY

Clinical Work Process

8. In the event that patients are transferred out to another Department (i.e. Orthopedics) for care, the Trauma Service shall only discharge the patient after the last clinical team discharges care.

9. The Trauma Service will review, actively participate in the care, and provide input for all trauma cases in the general ICU, except for isolated Orthopedics or isolated head injuries.

10. All discharge documentation and summaries will be done by house surgeons assigned to the Trauma Service. All discharge summaries will be vetted and countersigned by the Trauma Registrar.

11. Discharge of patients kept under the care of other teams/surgeons shall be arranged by the respective teams.

12. Clinical notes of trauma patients under the direct care of the Trauma Service will be tagged separately.

13. Clinic follow-up for all trauma patients will be done by members of the Trauma Service.

14. All wound care to be undertaken in the community shall be arranged by the Trauma Nurse Coordinator. The Trauma Nurse shall at her/his discretion; choose to follow up on the wounds of specific cases as out patient in the clinic (Wound Care Nurse Clinic). Times and places will be arranged as when suitable.

TRAUMA SURGERY

Clinical Handover

Each morning, the Trauma Registrar/Medical Officer will compile a comprehensive list encompassing clinical handovers for all trauma patients admitted to General Surgery. This compilation will also include trauma patients referred to General Surgery through the on-call team from the previous night. This initial list will subsequently be synchronized with the current roster of patients overseen by the Trauma Service.

The cases breakdown comprises two categories:

A. **Patients under direct clinical care of the Trauma Service**. Data from these cases will be meticulously entered into the in-house registry database.

B. **Patients not under the direct clinical care of the Trauma Service**. This subset involves trauma patients either retained under the care of other medical teams or referred to General Surgery by teams outside the Trauma Service. In these instances, the relevant teams have opted to maintain ongoing care for these patients.

Category A

These patients will receive their subsequent clinical care from the Trauma Service. These may include post-operative patients, in which post-operative care will be provided by the Trauma Service, post-damage control operations, in which subsequent surgery will be done by the Trauma Service, or patients on conservative management. Data from these patients will be entered into the registry.

Category B

These are patients whose data will be entered into the registry. Clinical care, however, comes directly under other teams within general surgery. The Trauma Service will assume the role of advisor and assist as necessary.

Both lists will be kept in the master folder which will contain the data collection sheets. This folder will accompany each morning round (both clinical and data rounds). It will be the responsibility of the Trauma Registrar to contact the previous night's Registrar/MO to obtain the details of the previous night’s patients and their location.

“The only place an unstable trauma patient can go is to the OR.”

The Third Law of Trauma

TRAUMA SURGERY

The In-House Trauma Registry

This registry is not designed to replace the Malaysia National Trauma Registry. It has a different minimum dataset that will be more useful as an audit tool to improve in-house service, develop and improve local systems, protocols and management strategies, financial and resource planning as well as audit outcome, performance, and detection errors. (See **Appendix C** for the Dataset for the in-house registry).

Initially, data collection will not include cases admitted to departments other than General Surgery and not referred to General Surgery. Efforts will be made in the future to include patients with isolated Orthopaedics, spine, or head injuries in the in-house registry, in collaboration with the respective departments.

A suitable working arrangement will be formally made to obtain summative clinical information on autopsies done for trauma deaths if the deceased patients fulfill the inclusion criteria listed below.

Inclusion Criteria

- All trauma patients admitted to General Surgery (Category A and B) or Trauma Service.
- All trauma patients admitted to other departments but referred to General Surgery or Trauma Service, in-house.
- All trauma patients transferred by way of referral from other hospitals and later admitted to General Surgery or Trauma Service, for subsequent care of the current injury.
- All trauma patients transferred from other hospitals but admitted to other departments but referred subsequently to General Surgery or Trauma Service, for the current injury.
- Trauma Activation deaths in ED (with signs of life on arrival to ED)

The In-House Trauma Registry

Exclusion Criteria

- Isolated injuries to an organ-system not requiring general surgical care (i.e isolated fractures and other Orthopedics injuries or isolated TBI with no other injury).
- Injuries resulting from known chronic medical conditions (i.e injury resulting from a fall in a known CVA patient)
- Patients who transferred in from another hospital for the treatment of complications arising from trauma (i.e bile duct stricture referred for ERCP following liver trauma)
- Transfers of trauma patients from other hospitals due to failure of initial management (i.e leak from bowel anastomosis or fistula formation)
- Patients seen in ED but subsequently discharged from ED, decline admission or direct transfer to a different hospital (i.e Trauma Activation but subsequently not admitted)
- Patients with injuries resulting from degenerative processes or malignant disease.

The In-House Trauma Registry

Data collection will occur daily during working days, guided by the handover list, and will fall under the purview of the Trauma Nurse Coordinator. The House Officer and the entire team will actively contribute to this process. The responsibility for data entry lies with the evolving position of the Registry Manager. In situations where an electronic database is not available, the in-house registry will be maintained in paper format until a more opportune time for transition arises.

Pre-Hospital Information and Records

- The system will progressively implement a comprehensive record-keeping mechanism in the forthcoming stages, commencing with pre-hospital care. This will manifest through the Ambulance/Paramedical/Rescue run-sheet, a crucial document offering vital insights into the patient's condition at the scene and during transport to the hospital. A sample of this pivotal run-sheet is appended in **Appendix E** for reference.

- Beyond its immediate utility, this run-sheet establishes a tangible "paper trail" that extends beyond the confines of the Emergency Department, enhancing accountability within the pre-hospital service. As part of ongoing initiatives, endeavors will be made to extend the utilization of these forms to other agencies providing ambulance services, beyond MOH ambulances. This collaborative approach aims to ensure these forms are consistently completed and incorporated into the patient's comprehensive medical record.

“Even awake, alert, and stable patients die. And it hurts that much more when they do.”

The Fourth Law of Trauma

TRAUMA SURGERY

Trauma Team Activation (TTA)

Recognizing the paramount significance of maintaining an internal registry for the Trauma Service is crucial, as it serves as the driving force behind the entire system, ensuring its seamless operation. Concurrently, when instituting a registry, it is imperative for every in-hospital trauma system to formulate a well-thought-out Trauma Team Activation Guidelines, as detailed in **Appendix A**. This protocol serves as the primary gateway into the in-hospital system, playing a pivotal role in orchestrating its functionality.

The overarching goal is to establish a Trauma Activation : Major Trauma (ISS>15) ratio of 2:1, translating to a 50% over-triage rate. The protocol, meticulously detailed in **Appendix A**, has been crafted to align with the specific needs and resources available locally. Periodic reviews and modifications are integral to fine-tuning the protocol, ensuring a commendable level of accuracy in identifying true under-triage instances.

“A previously healthy child who is in arrest, or nearly so, is a victim of child abuse until proven otherwise.”

The Fifth Law of Trauma

TRAUMA SURGERY

External Trauma Referral

During regular work hours, external referrals from other hospitals can be initiated through a dedicated phone line. This direct line connects to a member of the Trauma Service capable of promptly making informed decisions. While all Trauma Service members, with the exception of House officers, have the authority to decide whether to accept or divert external referrals, the Medical Officer (MO) receiving the referral is required to consult with the Trauma surgeon/Fellow before deciding on diversion.

For cases originating from district hospitals lacking specialists that necessitate urgent transfer, immediate transfer is facilitated without any unnecessary delays, contingent upon the patient meeting the criteria for urgent transfer (refer to **Appendix D)**.

Regardless of urgency, all trauma transfers are routed through the Emergency Department (ED). Stable patients may undergo triage by the ED team and be assessed by the Trauma Surgeon/Fellow/Registrar/MO.

After normal working hours, referrals and transfers are channeled to the respective on-call team. It is crucial to note that regardless of the timing, all patients in transit must pass through the ED.

TRAUMA SURGERY

External Trauma Referral

WORKING HOURS - To call Trauma Surgeon / Oncall Surgeon / Oncall Surgical MO (ED)

AFTER HOURS - To call Oncall Surgeon / Oncall Surgical MO (ED)

Ideally Surgeon to Surgeon referral.

All trauma transfers **MUST** go through the ED. No ward transfer.

Immediate transfer (unstable patient) from the District Hospital without a specialist as per protocol **(Appendix D).**

“Always look at the image yourself.”

The Sixth Law of Trauma

TRAUMA SURGERY

Trauma Operations

Bearing in mind the heavy burden faced by the hospital's theatres, efforts shall be made to streamline trauma operations to be as efficient and optimal as possible. "Crash operations" in which the patient is in dire condition does not afflict every trauma patient, thus the "blocking" of theatre will only occur during Trauma Team Activations. The threshold for activation has been made slightly higher (less sensitive), in this protocol, as not to burden the system with an excessive number of "stand to" conditions that would ultimately sap the resources of the system, impede operating time, and "desensitize" the teams involved leading to a "blunted response".

"Crash operations" are part of "C" in the ABCs of resuscitation and are performed as immediately as possible without any delay. A massive transfusion protocol will be activated once a "crash operation" is decided. Patients will be transported into the OT complex from the ED by the Trauma Team.

Other emergent trauma operations not requiring "crash" surgery follows existing waiting times and prioritization.

Timeline for Trauma Service Development

The Phases

TRAUMA SERVICE

PHASE 1

JULY - SEPT 2024

- TRAUMA SURGERY UNIT CREATION
- IN-HOUSE TRAUMA REGISTRY
- TRAUMA TEAM ACTIVATION PROTOCOL
- TRAUMA RESUSCITATION PROTOCOL
- MASSIVE TRANSFUSION PROTOCOL

TRAUMA SERVICE

PHASE 2

OCT - DEC 2024

- TRAUMA SERVICE COMMITTEE CREATION
- TRAUMA RADIOLOGY PROTOCOL
- TRAUMA SURGERY GUIDELINES/ALGORITHMS
- INTER-HOSPITAL TRANSFER PROTOCOL
- TRAUMA MORBIDITY & MORTALITY MEETING

TRAUMA SERVICE

PHASE 3

2025 - 2026

- STAFF TRAINING CMEs
- TRAUMA RESEARCH
- TRAUMA ROTATIONS / ATTACHMENTS
- EDUCATION / TRAINING FUNDS
- PUBLIC HEALTH TRAUMA PREVENTION COLLABORATION

“Your patient is at their healthiest as they roll in through the emergency department door.”

The Seventh Law of Trauma

APPENDIX

A	Trauma Team Activation (TTA) Guidelines
B	Trauma Team Resuscitation Guidelines
C	Dataset for Trauma Registry
D	Inter-Hospital Transfer Protocol
E	Pre-Hospital Case Report
F	Massive Transfusion Protocol
G	Vascular Trauma Pathway
H	Trauma Radiology Guidelines
I	Trauma Definitions and Scoring System
J	Recommended Operations and Procedures for Basic Proficiency in Trauma Surgery
K	Trauma Surgery Fellowship

APPENDIX A

Trauma Team Activation (TTA)

TRAUMA TEAM ACTIVATION

ACTIVATION CRITERIA

TRAUMATIC ARREST	
ABC COMPROMISE	• Airway compromise (i.e unable to secure airway, destructive upper airway injury) • SPaO2 < 90% • SBP < 90 mmHg at any time
MECHANISM CRITERIA WITH ABC COMPROMISE	• Fall > 4 meters in height • Vehicle rollover • MVA with the occupant of the same vehicle dead on the scene
ANATOMIC CRITERIA	• Pelvic fracture (with ABC compromise) • Mangle limb (with ABC compromise) • Any penetrating wound to the cardiac box • Any penetrating wound to torso, neck, or extremity (with ABC compromise)
OR	
As requested by the Emergency Physician based on current judgment of situation (i.e mass casualties)	

TRAUMA TEAM ACTIVATION

ACTIVATION A

A

ACTIVATION AUTHORITY:
Emergency Physician

TEAM RESPONSE:
- **Emergency Physician**
- Emergency Registrar/Medical Officer
- 1 x ED Nurse
- **Trauma Surgeon** or **General Surgeon On-call**
- Trauma Fellow/Surgery Registrar
- Surgery Medical Officer
- **Anaesthesiologist**
- Anaesthesia Registrar/Medical Officer
- **Emergency Radiographer**

TEAM NOTIFICATIONS:
- Radiology MO On-call
- Blood Bank Doctor On-call

ACTIVATION B

B

ACTIVATION AUTHORITY:
Emergency Physician

TEAM RESPONSE:
- **Emergency Physician**
- Emergency Registrar/Medical Officer
- 1 x ED Nurse
- **Trauma Surgeon** or **General Surgeon On-call**
- Trauma Fellow/Surgery Registrar
- Surgery Medical Officer
- **Anaesthesiologist**
- Anaesthesia Registrar/Medical Officer
- **Emergency Radiographer**
- **Orthopaedic Surgeon**
- Orthopaedic Registrar/Medical Officer

TEAM NOTIFICATIONS:
- Radiology MO On-call
- Blood Bank Doctor On-call

TRAUMA TEAM ACTIVATION

OPERATOR TO CALL

ACTIVATION A		CHECK
A	**SURGERY** • Trauma Surgeon (8 - 5pm) • General Surgeon Oncall (After 5pm)	
	ANAESTHESIOLOGY • Pakar Peri Oncall	
	RADIOLOGY • Juru X-ray Oncall	
	TO NOTIFY • Radiology MO Oncall • Blood Bank MO Oncall	

ACTIVATION B		CHECK
B	**SURGERY** • Trauma Surgeon (8 - 5pm) • General Surgeon Oncall (After 5pm)	
	ORTHOPAEDIC • Orthopaedic Surgeon Oncall	
	ANAESTHESIOLOGY • Pakar Peri Oncall	
	RADIOLOGY • Juru X-ray Oncall	
	TO NOTIFY • Radiology MO Oncall • Blood Bank MO Oncall	

TRAUMA TEAM ACTIVATION

ACTIVATION SEQUENCE

1	Activating authority (criteria met or upon discretion) calls the hospital information service (switchboard) ----> **“TRAUMA ACTIVATION”** (no details should be given)
2	Switchboard operator ----> individuals within response and notify groups via phone lines such as Speed Dial (SD) ----> **“TRAUMA ACTIVATION L1”** (no details should be given)
3	Each member of the **response team** (that receives the trauma alert) shall **physically present** themselves at ETD immediately. **No communication** by any of the responding team members will be entertained by phone before the arrival in ETD.
4	All members of the **“notified” team** (that receives the trauma notification call) will be called by the respective staff members from the ETD when the need arises to discuss details.
5	For “after working hour” activation, the Consultant Trauma Surgeon can be consulted at any time on selected cases or circumstances if he/she is not part of the team.

ACTIVATION SEQUENCE

6	The Emergency physician team leader briefs the team on the condition of the patient and begins to assign duties.
7	All members of the **response team** shall participate in the process of resuscitation according to the **Trauma Team Resuscitation Protocol**.

STAND DOWN

The Attending Emergency Physician has the sole right to issue a “Stand-Down” from “Alert” status if the situation warrants it. The stand-down order can be issued by paging system as a “Trauma Alert Stand Down” message or verbally if the team has assembled in ETD.

QUALITY INDICATORS

1. Response team of all members: ≤ 15 minutes after receiving the **“Trauma Activation”**
2. Attendance and times of arrival will be recorded on the Trauma Resuscitation form.

TRAUMA TEAM ACTIVATION

QUALITY INDICATORS

TEAM MEMBERS RESPONSE after **“Trauma Activation”** Attendance and arrival times will be recorded on the Trauma Team Activation Form.	**≤15 MINUTES**
CT REQUEST TO SCAN TIME	**≤1 HOUR**
OT BOOKING TO INCISION TIME	**≤1 HOUR**

TRAUMA TEAM ACTIVATION

OVER AND UNDER-TRIAGE ASSESSMENT CALCULATIONS

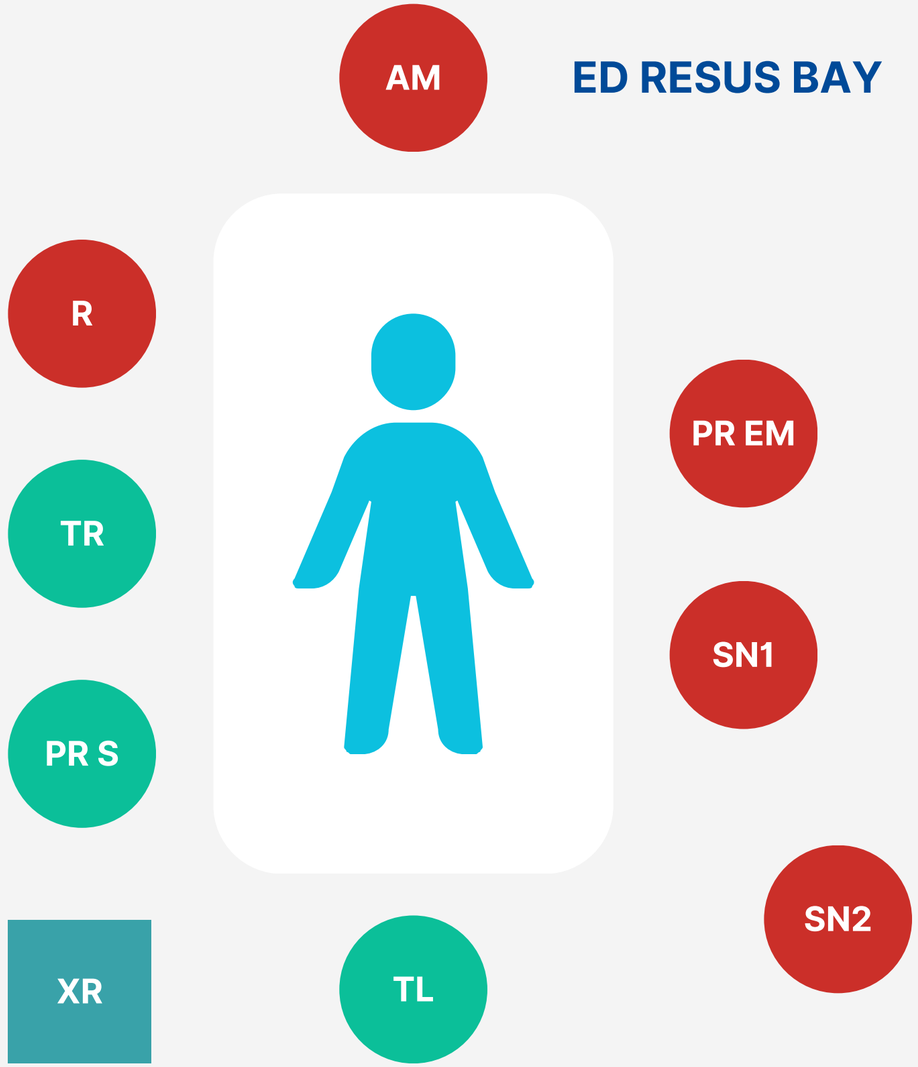
	Not Major Trauma	Major Trauma	Total	Over/Under Triage Monitoring (%)
FULL ACTIVATION	**A**	**B**	**C**	**OVER-TRIAGE** (A/C X 100%)
PARTIAL ACTIVATION	**D**	**E**	**F**	**UNDER-TRIAGE** [(E+H)/(F+I)] X 100%
NO ACTIVATION	**G**	**H**	**I**	

Acceptable rates of **Over-triage** in developed countries range from **25-35%** and **Under-triage** should be **< 5%**.

APPENDIX B

Trauma Team Resuscitation

TRAUMA TEAM RESUSCITATION



INITIAL TRAUMA TEAM CONFIGURATION	
TL	TEAM LEADER (TRAUMA ATTENDING / ED PHYSICIAN)
R	RESUSCITATOR
TR	TRAUMA RESIDENT
AM	AIRWAY MANAGEMENT
PR EM	PROCEDURE EM RESIDENT / MO
PR S	PROCEDURE SURGERY RESIDENT / MO
SN1	NURSE ASSISTANT 1
SN2	RECORDING NURSE
XR	X-RAY TECHNICIAN

TRAUMA TEAM RESUSCITATION

ED RESUS BAY

AM

R

TR

PR S

XR

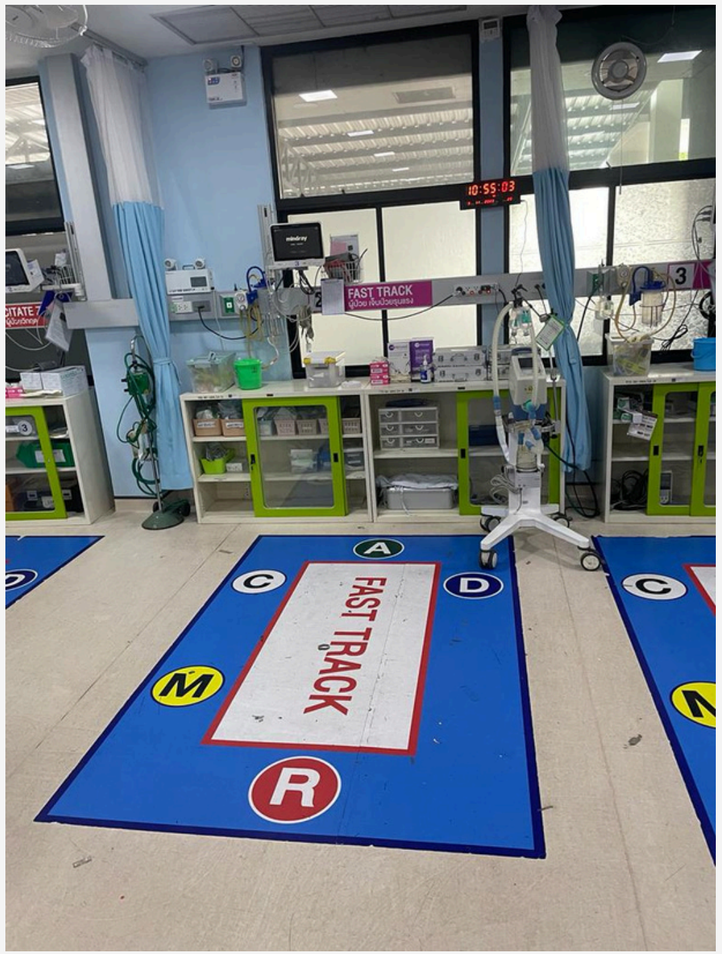
TL

PR EM

SN1

SN2

EXAMPLE OF ED RESUS BAY



TRAUMA TEAM RESUSCITATION

MEDICAL DIRECTION

The Trauma Team Leader will be the Trauma Surgery Attending Physician or, if not immediately available, the Emergency Medicine Attending Physician.

TEAM OPERATION

1	As the patient arrives in the Resuscitation Room, the transport litter will be brought to the Resuscitator's side of the gurney and the Trauma Team and paramedics will transfer the patient to the gurney on the Resuscitator's count of three.
2	While removing the patient's clothing and obtaining vital signs, the Resuscitator, under the direction of the Team Leader, begins the primary survey, directing the Airway Manager and the Procedure Resident as necessary to establish an airway and adequate IV access and to place chest tubes if indicated. The Trauma Surgery Resident confirms the primary survey and proceeds with the secondary survey either after the above are completed, or, in unstable patients while those resuscitative measures are underway,

PROGRESSION

1	The Trauma Surgery Resident will confer with the Team Leader and the Resuscitator in developing a definitive evaluation plan. Dlagnostic peritoneal aspirate, cricothyroidotomy, and resuscitative thoracotomy should be performed by the Trauma Surgeon. Central lines, chest tubes, and endotracheal intubation will be performed by the Emergency Medicine Resident under the Team Leader direction.
2	If the patient does not need admission to the Trauma Surgery Service, he may be cleared by Trauma Surgery, and appropriate disposition arranged by the EM staff. If the patient does warrant Trauma Surgery Service admission but also warrants additional consultation by other specialists, such consultation may be carried out in the EM department or Trauma ward as agreed by the Team Leader, Trauma Resident and EM Attending or Resident.
3	In the event that multiple critically injured patients arrive in the EM department simultaneously, the Team Leader will request additional resources, according to mass casualty protocol.

TRAUMA TEAM RESUSCITATION

MEMBERS OF TRAUMA TEAM	TEAM ASSIGNMENTS
TRAUMA TEAM LEADER (TL)	Trauma team leaders (TL) represent individuals with specific training, skills, and interests in major trauma resuscitation. They represent a selected group of individuals from various disciplines, from the surgical specialties, the emergency department, anesthesia, and critical care backgrounds. Everyone has a distinct style, but an excellent TL has the following qualities: • is a strong leader – everyone in the room should sense that you are in charge • has excellent communication skills • has excellent clinical skills and judgment • has comprehensive knowledge of traumatology and trauma resuscitation • knows how to maintain a sense of urgency • knows when to call for help • can manage both the patient and the trauma team • these things are not easy – the good TLs make it look easy The TL is the captain of the team and as such, represents the most responsible physician once involved in the care of the trauma patient. All decisions and communications MUST go through the TL. The TL is initially positioned at the foot of the gurney, has ultimate responsibility, and authority for all management.

MEMBERS OF TRAUMA TEAM	TEAM ASSIGNMENTS

	The role of the TL is to:
	• Determine the eligibility, safety, and acceptance of all trauma transfers.
	• Be on-site within **15 minutes** after a trauma activation.
	• Identify and prioritize the patient's injuries.
	• Ideally allows senior residents to initiate resuscitation, evaluation, and intervention but redirects or overrides any orders as necessary.
	• Directly supervises and assists in major emergency interventions, e.g., ED thoracotomy, cricothyroidotomy, peritoneal aspirate
	• Maintain open communication with all members of the team on these priorities.
	• Remember sometimes you have to manage both the patient and the team.
	• Maintain crowd control.
	• Review all the radiology images and complete the documentation.
	• Communicate with the appropriate services about identified injuries.
	• The TL is the most responsible physician until the patient is officially accepted by another service.
	• When the TL is a non-surgeon: the trauma surgeon should be notified of the following:
	  ◦ Unstable blunt trauma patient
	  ◦ Penetrating torso injuries from the neck to the groin.

TRAUMA TEAM RESUSCITATION

MEMBERS OF TRAUMA TEAM	TEAM ASSIGNMENTS
TRAUMA TEAM LEADER (TL)	The Trauma Team Leader will direct the course of the Primary Survey and resuscitation and expect a response to his or her questions; all questions or information should be directed to this person. There should be no other extraneous conversation. If the Team Leader is required to leave the bedside, the responsibility should be transferred to another qualified senior team member (Specialist). The individual roles of the team members are subject to change based on the needs of the patient and the resources available during the resuscitation. The TL may modify the duties of any team member if in the best interest of the patient.
RESUSCITATOR (R)	Initially positioned on the patient's right side near the head of the gurney, under the supervision of the Team Leader, performs an initial assessment Primary Survey (A-E) and based on that assessment: • Direct the management of the airway • Ensure C-spine precautions if indicated • Order and determine what investigations are required, including laboratory tests and diagnostic imaging. • Participate in the management and disposition of the patient. • Notify the OR/ICU/Angio/Interventional radiology for any potential patient.

MEMBERS OF TRAUMA TEAM	TEAM ASSIGNMENTS
TRAUMA RESIDENT (TR)	Initially positioned on the patient's right side, confirms the Primary Survey and performs the Secondary Survey as soon as resuscitative procedures are underway. He/She will call out the findings loudly so that the Recording Nurse (SN2) and Team Leader (TL) can hear the results. In consultation with the Team Leader, determine the need for immediate surgical intervention or immediate transfer to the Operating Room. If the patient is stabilizing in conjunction with the Resuscitator, will develop a plan for further evaluation, consultation, and disposition. After the examination is completed, he/she should document the examination findings on the Trauma Evaluation sheets. The TR is expected to participate in the following interventions: Intubation, CT, surgical/wound exploration, ED thoracotomy, cricothyroidotomy, peritoneal aspirate, and immobilization of fractured limbs.

TRAUMA TEAM RESUSCITATION

MEMBERS OF TRAUMA TEAM	TEAM ASSIGNMENTS
AIRWAY MANAGER (AM)	Initially positioned at the head of the gurney, follow the Resuscitator's directions regarding necessary airway management. If directed, perform endotracheal intubation with or without rapid sequence paralysis as indicated. Confirms tube placement and ventilates patient until relieved by a mechanical ventilator.
PROCEDURE RESIDENT EM (PR EM)	Initially positioned on the patient's left side, follow directions regarding the placement of peripheral/central venous lines and/or chest tubes.
PROCEDURE RESIDENT SURGERY (PR S)	Initially positioned on the patient's right side, follow directions for additional or simultaneous procedures; subsequently assist the Trauma Resident (TR) in the patient's evaluation.
PRIMARY NURSE (SN1)	Initially positioned on the patient's left side, assist in undressing the patient, obtain vital signs, assess the status of IVs started in the field, and report above to the Recording Nurse (SN2). Obtain or assist in obtaining blood samples and placing them in proper collection tubes. As directed, place or assist in placing nasogastric tubes and urinary catheters. Connect and monitor the chest tube system. Other functions as directed.

MEMBERS OF TRAUMA TEAM	TEAM ASSIGNMENTS
RECORDING NURSE (SN2)	Initially positioned at the C-Booth counter, calls for an X-ray Technician, and records all vital signs, procedures, medications, etc. on appropriate sheets. Prepare, label, and send laboratory specimens; spin hematocrits and perform other bedside diagnostic tests as directed. Notes time of arrival of Trauma Team members and other surgical consultations.
X-RAY TECHNICIAN (XR)	Initially positioned back from the Trauma Team, stands by with a portable X-ray machine until directed by the Resuscitator, Trauma Resident, or Team Leader to obtain films; routinely brings cassettes for chest and pelvis films.
ATTENDING COORDINATOR NURSE OR CLINICAL COORDINATOR (CC)	A CC is an indispensable part of the trauma team. The initial responsibility of the CC is to positively identify the patient and to make contact with the patient's family. They act as the primary first contact of the family and will relay basic information to family members before they arrive in the hospital. Other roles are: • Ensure all team members are wearing appropriate personal protective equipment (see below).

TRAUMA TEAM RESUSCITATION

MEMBERS OF TRAUMA TEAM	TEAM ASSIGNMENTS
ATTENDING COORDINATOR NURSE OR CLINICAL COORDINATOR (CC)	• Monitor activities of the trauma team. • Control traffic in the trauma room; be attentive to patients' privacy, e.g., keep curtains closed, and keep other patients and family members away from traffic areas. • Communicate with family and collaborate with family support staff members. • Escort family members to the trauma room and attend to them when appropriate. • For pediatric resuscitations, accompany parents into the trauma room; attend to them continuously. • If the patient is transferred, ensure that family members have transportation and directions to the receiving facility. • In the case of a patient's death, assist in contacting the funeral service.
EMERGENCY PHARMACIST	Emergency Pharmacist assists in preparing medications and records all the drugs used. He or she also plays an important role in any adverse drug reactions (ADR) if it happens.

GUIDING PRINCIPLES

- Personal Protective Equipment (PPE) or protective gear should be worn by all personnel who work directly with the patient.
- Discuss the patient's condition only behind closed doors and after ensuring a private environment.
- Vigilantly maintain the patient's privacy.
- All procedures should be consented either verbally or written. In case of a life-saving procedure and the patient is unable to give consent, consent can be taken from the next of kin. If the next of kin is not available, consents from the surgeon and physician are required.
- Ensure that the patient is informed of procedures before they are performed. Continuously ascertain the patient's comfort level (e.g., pain, temperature).
- Verbally acknowledge orders; inform the source when the request has been completed; when giving orders, ensure their receipt.
- Every procedure and treatment should always follow the standard ATLS protocol and clinical practice guidelines.
- Vacate the room when X-rays are being taken unless fitted with a lead apron.
- Place the patient's clothing and belongings into labeled bags as soon as possible and declare to ensure safety and legality.

TTA Visual summary

Trauma call timeline

This suggested Trauma Team timeline is based on a combination of guidance from expert opinion and experience. It aims to help clinicians familiarise themselves with the basic principles of organising and responding as Trauma Team and the central role of the Trauma Team Leader.

T-15

15 minutes before arrival of patient

Team assembles

Ensure all team members present → Introductions → Allocation of roles

Declare code red?

Inform transfusion laboratory if a 'shock pack' is required

Team brief

Team leader briefs the team with information from the pre-hospital alert. Team discusses what they expect to happen

Make ready

- Equipment
- Drugs

Time T

Patient arrives

Initial assessment

Prior to receiving a sterile handover confirm:

- **1** Patent airway
- **2** Central pulse
- **3** No visible active haemorrhage

Patient handover

Prehospital handover is received with trauma team silence using "AT-MIST"

A	T	M	I	S	T
Age	Time of injury	Mechanism of injury	Injuries sustained	Signs and symptoms	Treatment given so far

T+0

Immediate actions

Horizontal assessment

Components of the <C>ABCD paradigm and initial investigations (such as chest and pelvic X-Ray, and blood tests) are carried out by several people at the same time, coordinated by the trauma team leader. This allows the team to have the required clinical information quickly

<C>	A	B	C	D
Control of catastrophic haemorrhage	Airway	Breathing	Circulation	Disability

Initial treatment

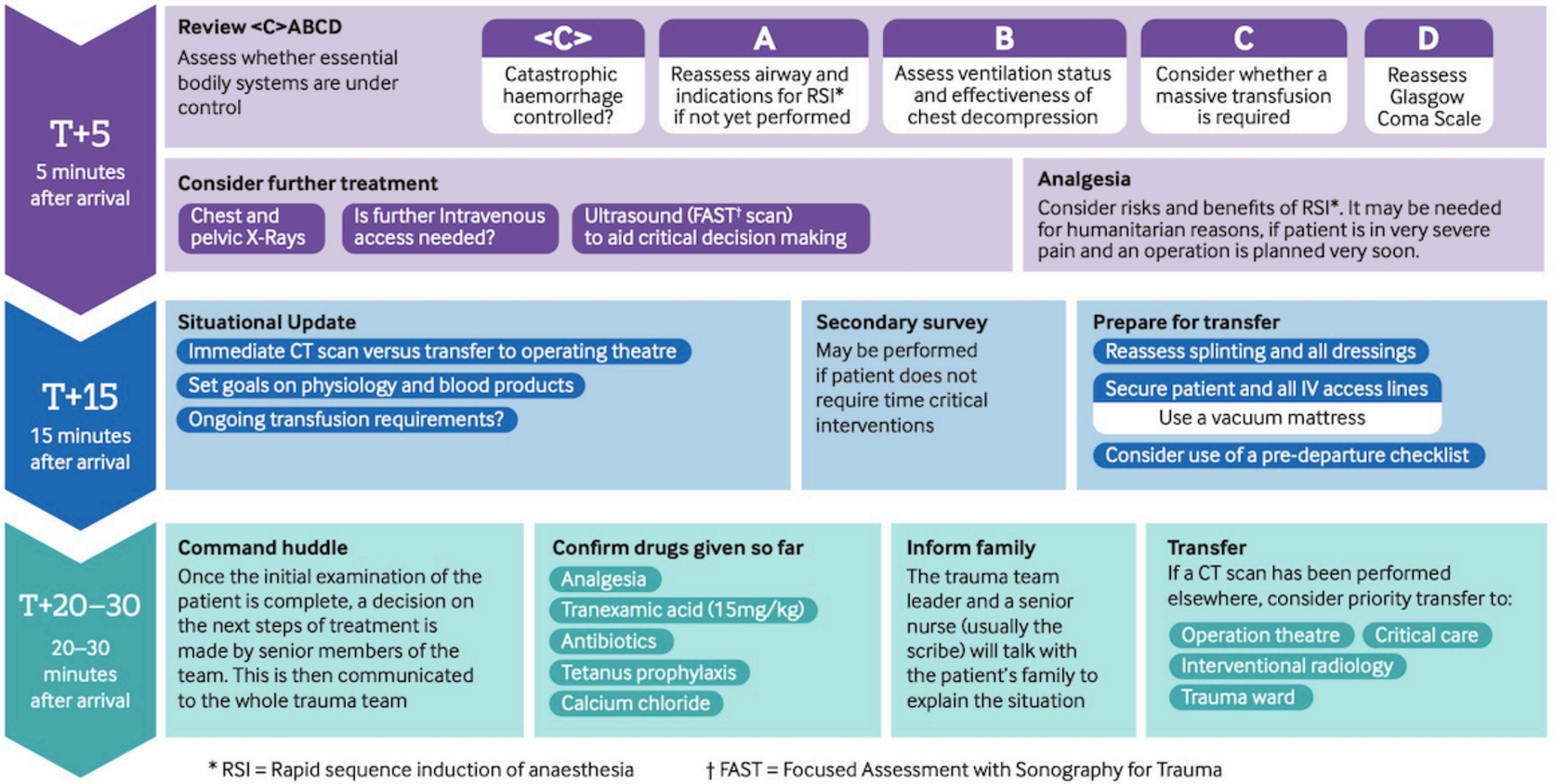
- Oxygen — 15L via non re-breather mask
- Secure large bore venous or intraosseous access
  To allow rapid administration of blood and blood products

Blood tests

- Full blood count
- Venous blood gas
- Blood group and save
- Urea & Electrolytes
- Thromboelastometry — Such as RoTEM
- Point of care INR testing — If patient is on Warfarin

Example of <C>ABCD Systematic Approach

<C>	Amputated limb: Apply tourniquet and compression bandage with or without topical haemostatic agents
A	Actual or impending airway compromise: RSI* with Cervical Spine control
B	Ventilatory failure: RSI* and consider need for chest decompression: needle versus thoracostomy versus chest drain insertion
C	Pelvic fracture suspected: Apply pelvic binder Long bone fractures: Splint and assess peripheral pulses
D	Unconsciousness (GCS 8 or less), unmanageable, combative or severely agitated patient with a head injury: RSI*


T+5
5 minutes after arrival
Review <C>ABCD
Assess whether essential bodily systems are under control
<C>
Catastrophic haemorrhage controlled?
A
Reassess airway and indications for RSI* if not yet performed
B
Assess ventilation status and effectiveness of chest decompression
C
Consider whether a massive transfusion is required
D
Reassess Glasgow Coma Scale
Consider further treatment
Chest and pelvic X-Rays
Is further Intravenous access needed?
Ultrasound (FAST† scan) to aid critical decision making
Analgesia
Consider risks and benefits of RSI*. It may be needed for humanitarian reasons, if patient is in very severe pain and an operation is planned very soon.
T+15
15 minutes after arrival
Situational Update
Immediate CT scan versus transfer to operating theatre
Set goals on physiology and blood products
Ongoing transfusion requirements?
Secondary survey
May be performed if patient does not require time critical interventions
Prepare for transfer
Reassess splinting and all dressings
Secure patient and all IV access lines
Use a vacuum mattress
Consider use of a pre-departure checklist
T+20–30
20–30 minutes after arrival
Command huddle
Once the initial examination of the patient is complete, a decision on the next steps of treatment is made by senior members of the team. This is then communicated to the whole trauma team
Confirm drugs given so far
Analgesia
Tranexamic acid (15mg/kg)
Antibiotics
Tetanus prophylaxis
Calcium chloride
Inform family
The trauma team leader and a senior nurse (usually the scribe) will talk with the patient's family to explain the situation
Transfer
If a CT scan has been performed elsewhere, consider priority transfer to:
Operation theatre
Critical care
Interventional radiology
Trauma ward
* RSI = Rapid sequence induction of anaesthesia
† FAST = Focused Assessment with Sonography for Trauma

APPENDIX C

Dataset for Trauma Registry

DATASET FOR TRAUMA REGISTRY

MINIMUM DATASET FOR IN-HOUSE REGISTRY

- Patient identification
  - Name (free text)
  - NRIC no. (standard format)
  - Age (standard format)
  - Gender (standard format)
  - Ethnicity (fixed field)
  - Address (free text)
  - Occupation (fixed field)
- Date and time of injury (standard format)
- A short history of events during injury (free text)
- Usage of restrain devices where applicable (fixed field)
- Place of injury (fixed field)
- Type of activity engaged in during injury (fixed field)
- Mechanism (fixed field) – blunt/penetrating/blast
- Pre-hospital information
  - Transport to ED (fixed field)
  - Vehicle entrapment (fixed field)
  - Length of time of entrapment (standard format, fixed field)
  - Inter-hospital transfer (fixed field)
  - Scene vital signs recordings
  - SBP (standard format)
  - RR (standard format)
  - HR (standard format)
  - GCS (standard format, fixed field)
  - Pre-hospital notification (fixed field)

MINIMUM DATASET FOR IN-HOUSE REGISTRY

- Early Hospital Care
  - Date of arrival to ED (standard format)
  - Time of arrival to ED (standard format)
  - Trauma team activation (fixed field)
  - Date of transfer out of ED (standard format)
  - Time of transfer out of ED (standard format)
  - Post ED destination (fixed field)
  - ED Vital signs recordings
  - SBP (standard format)
  - RR (standard format)
  - HR (standard format)
  - GCS (standard format, fixed field)
  - Intubation (fixed field)
- ICU care
  - Days of stay (standard format)
  - ICU death (fixed field)
- Operations/surgery
  - Dates (standard format)
  - Times (standard format)
  - Operative procedure (free text)
  - Positive or significant negative findings (free text)
- Injury diagnoses and description (AIS codes to follow on data entry)
  - Head and neck (free text)
  - C- spine and spine (free text)
  - Chest (free text)
  - Abdominal and pelvis (free text)
  - Extremities (free text)
  - Soft tissues/ocular etc (free text)
- ISS (standard format)
- TRISS (standard format)
- Functional assessment at discharge (format as per functional score scale chosen)

MINIMUM DATASET FOR IN-HOUSE REGISTRY

- Complications (entire duration of hospitalization)
  - Neurological (free text)
  - Pulmonary (free text)
  - Cardiovascular (free text)
  - Renal (free text)
  - Hematologic (free text)
  - Gastrointestinal (free text)
  - Infectious (free text)
  - Wound (free text)
  - Nutrition (free text)
  - Musculoskeletal (free text)
- Discharge information
  - Date of discharge (standard format)
  - Discharge destination (fixed field)
- Hospital follow-up care
  - Trauma clinic appointment (fixed field)
  - Other disciplines
  - Orthopaedics/Spine (fixed field)
  - Neurosurgery (fixed field)
  - Urology (fixed field)
  - Cardiothoracic surgery (fixed field)
  - Ophthalmology (fixed field)
  - ENT (fixed field)
  - Plastic surgery (fixed field)
  - Dental and maxillofacial surgery (fixed field)
  - Others (free text)
- Death
  - Date (standard format)
  - Time (standard format)
  - Location (fixed field)
    - Emergency department
    - OT
    - ICU/HDU/CICU/NHDU
    - Open ward
  - Interventional radiology
  - Cause of death (fixed field)
    - CNS
    - MOF
    - Uncontrolled bleeding/coagulopathy
    - Infectious
    - Others (free text)

DATASET FOR TRAUMA REGISTRY

TRAUMA SURGERY REGISTRY DATASHEET SUMMARY

CODE:

GENERAL INFO

Name:

DOA: / /
DOD: / /

NRIC/Passport:

RN:

Status on discharge: ☐ Alive ☐ Dead

Sex: ☐ Male ☐ Female

Age:

Occupation:

Phone no:

TCA:

Wards:

Nationality:

Ethnicity: ☐ Malay ☐ Chinese ☐ Indian ☐ Bumi Sab/Srwk ☐ Orang Asli ☐ Warga Asing

PRE-HOSPITAL / SCENE HISTORY / WALK-INS

Injury Date: / /
Injury Time: ____ : ____ am/pm

Mechanism of injury: ☐ Blunt ☐ Blast ☐ Penetrating ☐ Others :

Location: ☐ Home ☐ Road ☐ Workplace ☐ Industrial ☐ Farm ☐ Public place ☐ Recreational ☐ School

Intention: ☐ Un-intentional ☐ Self-harm ☐ Unknown ☐ Assault ☐ Criminal ☐ Others :

Blunt Injury : ☐ RTA ☐ Fall ☐ Industrial injury ☐ Assaulted ☐ Others :

Person in RTA: ☐ MB rider ☐ Pillion ☐ Pedestrian ☐ Driver ☐ Passenger ☐ Bicycle

Fall: ☐ < 2 meters ☐ > 2 meters

Vehicle: ☐ Car ☐ Lorry ☐ Bus ☐ Motorbike ☐ Bicycle ☐ Heavy vehicle ☐ Boat ☐ Van

Height of fall: ____ m

Restraint used: ☐ None ☐ Helmet ☐ Seat belt ☐ Child carseat

Airbags deployed? ☐ Yes ☐ No

Penetrating injury: ☐ Knife ☐ Agriculture tool ☐ Gun shot wound ☐ Industrial tool ☐ Others :

Blast injury: ☐ Yes ☐ No

Other type of injury:

1st Field VS: BP ____/____ HR ____ RR ____ O2 SAT ____ %

1st Field GCS: E ____ V ____ M ____ Total ____

Field intubation? ☐ Yes ☐ No

Pre-hospital Cardiac Arrest? ☐ Yes ☐ No

Transport to ED: ☐ Ambulance ☐ Public Transport ☐ Private vehicle ☐ Others :

Inter-hospital transfer: ☐ Yes ☐ No Primary Hosp :

EMERGENCY DEPARTMENT

ED Arrival Date: / /
ED Arrival Time: ____ : ____ am/pm

Trauma Activation(TA): ☐ Yes ☐ No Time: __ : __ am/pm

MTP Activation: ☐ Yes ☐ No Time: __ : __ am/pm

1st ED VS: BP ____/____ HR ____ RR ____ O2 SAT ____ % Temp: ____ C On O2 ☐ Yes ☐ No

1st ED GCS: E ____ V ____ Total ____ M ____ Intubated ☐ Yes ☐ No

Procedures in ED: ☐ Intubation ☐ Chest tube ☐ Toilet & suturing ☐ CVL ☐ DPL ☐ CPR ☐ Others :

Death in ED: ☐ DOA (No resuscitation) ☐ <15min resuscitation ☐ Other death

Next phase after ED: ☐ <24hr ☐ OT ☐ ICU ☐ Ward ☐ Interventional Radiology

Timing of CT decision (If TA): ____ : ____ am/pm

CT start time (If TA): ____ : ____ am/pm

Date & time of booking for OT Crash Laparotomy / Thoracotomy from ED: / / ____ : ____ am/pm

Date & time of arrival to OT from ED: / / ____ : ____ am/pm

ICU/NHDU/CICU

ICU Admission: ☐ Yes ☐ No

ICU Admission Date	ICU Discharge Date	Length of ICU stay (days)
/ /	/ /	
/ /	/ /	
/ /	/ /	

OPERATIONS / PROCEDURES

ENTER ALL THAT APPLY DURING HOSPITAL STAY

MTP Activation: ☐ Yes ☐ No

Timing of 1st Safe O transfusion: ____ : ____ am/pm

Blood products:	PRBCs	Plasma(FFP)	Platelets	Cryoprecipitate
Within 1st 4 hours	____ mls / bag	____ mls / bag	____ mls / bag	____ mls / bag
Within 1st 24 hours	____ mls / bag	____ mls / bag	____ mls / bag	____ mls / bag
Total	**____ mls / bag**	**____ mls / bag**	**____ mls / bag**	**____ mls / bag**

Operative Care:

No	Date	Time Start	Operation/s
	/ /	____ : ____ am/pm	
	/ /	____ : ____ am/pm	
	/ /	____ : ____ am/pm	
	/ /	____ : ____ am/pm	
	/ /	____ : ____ am/pm	

Procedures:

☐ Chest tube ☐ Wound debridment ☐ T&S ☐ Percutaneous Drainage
☐ OGDS ☐ Colonoscopy ☐ ECRP ☐ Bronchoscopy
☐ PEG insertion ☐ Intubation ☐ CVL ☐ IVC Filter
☐ Others

CO-MORBIDITY

Patient's co-morbidity:

☐ Hypertension ☐ ESRF/CKD
☐ Diabetes ☐ Cancer
☐ COAD ☐ Immunocompromised
☐ Asthma ☐ Others:
☐ Cardiac

ISSUES/COMPLICATIONS

Issues / Complications:

☐ Acute Kidney Injury (AKI)
☐ Acute Respiratory Distress Syndrome (ARDS)
☐ Alcohol withdrawal syndrome
☐ Cardiac arrest with CPR
☐ Catheter-associated urinary tract infection (CAUTI)
☐ Central line-associated bloodstream infection (CLABSI)
☐ Surgical Site Infection (SSI)
☐ Deep Vein Thrombosis (DVT)
☐ Pulmonary Embolism (PE)
☐ Extremity Compartment Syndrome
☐ Myocardial Infarction (MI)
☐ Pressure Ulcer
☐ Severe sepsis
☐ Stroke/CVA
☐ Ventilator-associated Pneumonia (VAP)
☐ Hospital-associated Pneumonia (HAP)

DISCHARGE

Discharge Date: / /

Discharge Info:

☐ Home ☐ Rehab ☐ Mortuary ☐ Absconded
☐ Nursing Home ☐ Other hospital ☐ AOR

Location of dead patient:

☐ ED ☐ ICU / NHDU ☐ Others :
☐ OT ☐ Ward

Cause of death:

☐ CNS ☐ Multi-organ failure (MOF) ☐ Medical
☐ Bleeding ☐ Sepsis ☐ Others :

INJURIES / SCORING

INJURIES:

Region	Injury Description	Grade	AIS
Head and Neck (including Cervical Spine)			
Face and facial bone			
Chest (including Thoracic spine and Diaphragm)			
Abdomen (including Lumbar spine)			
Extremities & Pelvis			
External Soft tissues			

TRAUMA SCORING:

NISS ____ Revised Trauma Score (RTS) ____

ISS ____ TRISS ____

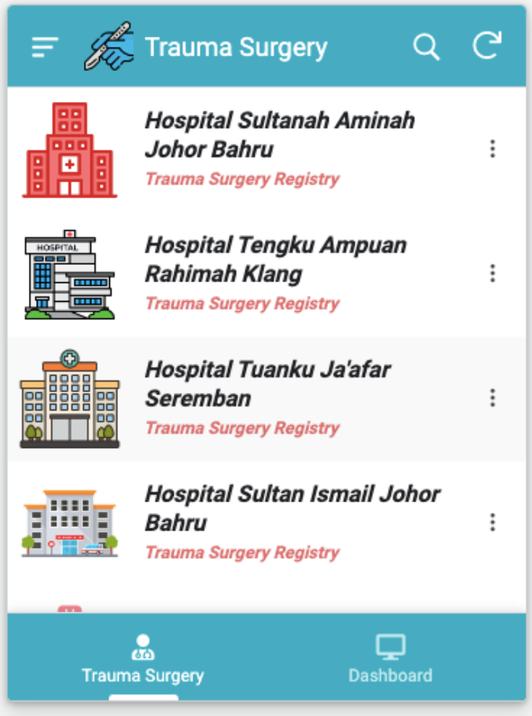
https://www.thecalculator.co/health/Trauma-Injury-Severity-Score-(TRISS)-Calculator-1022.html

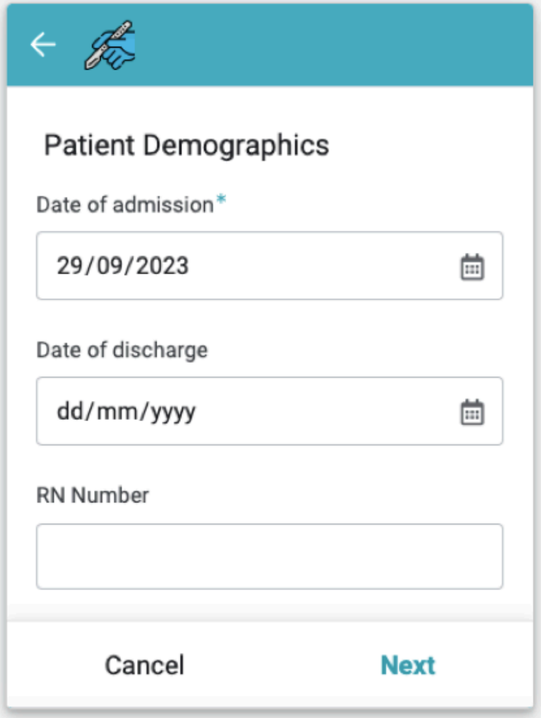
KPI:

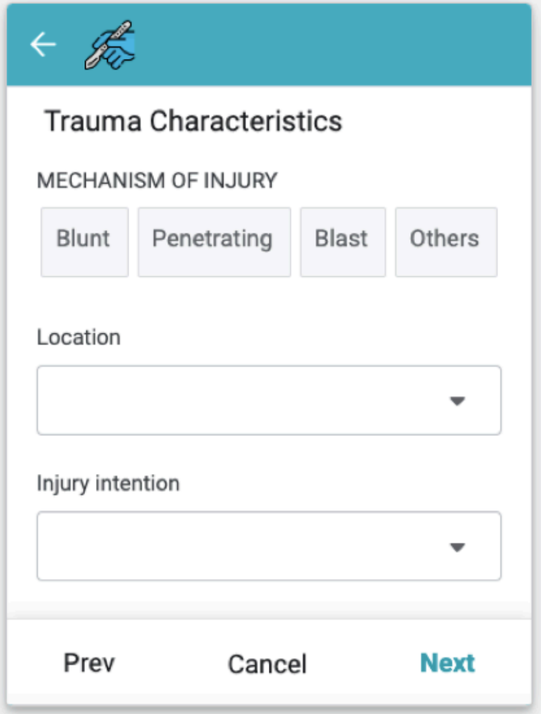
No mortality for patient with ISS ≤15 ☐ Yes ☐ No
Crash laparotomy within 60 minutes after OT booking ☐ Yes ☐ No
Laparotomy without complication ☐ Yes ☐ No

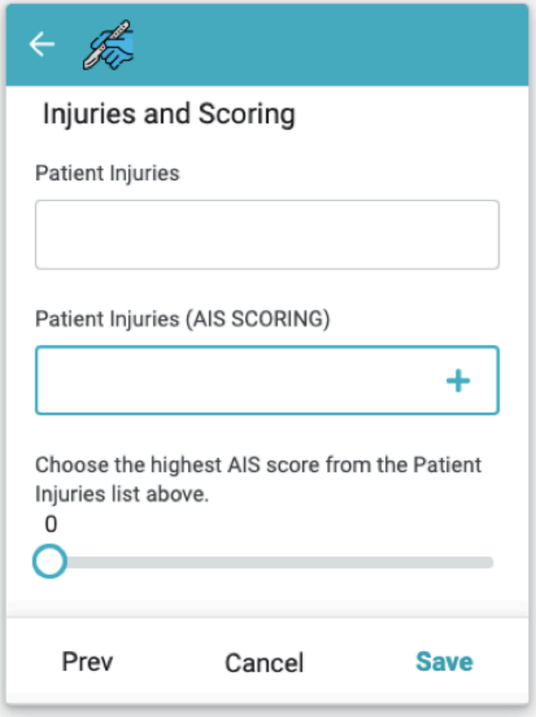
DATASET FOR TRAUMA REGISTRY

TRAUMA SURGERY REGISTRY APPS









APPENDIX D

Inter-Hospital Transfer Protocol

INTER-HOSPITAL TRANSFER PROTOCOL

TRANSFER PROTOCOL

This is the transfer protocol between Hospital Tuanku Ja'afar, Seremban, and a non-specialist district hospital. Ex. Hosp Jelebu

TERMS OF REFERENCE

1	This transfer protocol is between Hospital X (Level IV) and the Department of Surgery Hospital Tuanku Ja'afar, Seremban.
2	The duration of use of this protocol is from the date of issue (as stated in the covering letter) until further review.
3	This protocol pertains to only trauma patients who fulfill the immediate transfer criteria.

IMMEDIATE TRANSFER CRITERIA

The criteria listed below will be used to determine immediate transfer from X (Level IV) Hospital ED to Hospital Tuanku Ja'afar, Seremban

Criteria apply only to **TRAUMA** patients :

1. **SBP of 90 mmHg or less at any time**
2. **HR of >120/min after 1L of crystalloids rapid infusion for adult patients**
3. **Peritonitis**
4. **Positive FAST**
5. **Any penetrating wound to the torso (abdomen/chest) or neck (gunshot wounds, stab wounds, impalement injuries)**
6. **Unstable polytrauma patient and requires intubation**
7. **Obvious signs of vascular injury (i.e massive external haemorrhage)**

The criteria listed stand independent of each other (i.e. do not require correlation with another existing entity).

All other patients not satisfying the criteria above are to be referred through the usual existing channels of communication.

INTER-HOSPITAL TRANSFER PROTOCOL

PRE-TRANSFER WORKUP

LABORATORY

1	**NO** haematological/biochemistry tests need to be done.
2	**Group-specific blood** (whole blood or PRC) should be typed and available for use during transport of the patient (any amount available), group specific implies **emergency typing** only and NOT a complete cross-match. If blood is not available at all, this should NOT delay transfer.

RADIOLOGY

1	**NO** radiologic investigations are required unless they are readily available. The basic trauma series **(AP supine chest x-ray and supine AP pelvic x-ray)** may be obtained provided these do not delay rapid transfer of the patient.
2	**NO** other imaging is required other than CXR and Pelvic X-ray if the patient is haemodynamically unstable.
3	**DO NOT** perform Skull and Cervical X-ray for a patient with low GCS and suspected to have Traumatic Brain Injury as a CT scan is mandatory for this patient.

TRANSFER REQUIREMENTS

1	Secure airway. Patients will require endotracheal intubation if the upper airway is not secured or in imminent threat of control being lost en route or where consciousness is impaired sufficiently to endanger the airway. **DO NOT** transfer the patient unless airway control is ensured.
2	Supplemental oxygen will be administered to all patients (the modality to be decided by the attending doctor based on the clinical condition of the patient).
3	A hard collar and spinal board should be used for all patients to be transferred.

INTER-HOSPITAL TRANSFER PROTOCOL

4	Ensure adequate breathing during transport (i.e. bag or portable ventilation during transfer, if required).
5	Tension pneumothorax is a **CLINICAL** diagnosis, a chest drain should be inserted before transfer in the presence of a combination of; unilateral decreased air entry of a hemithorax, distended neck veins, and hypotension. A confirmatory CXR is **NOT** required if a transfer is imminent, however, the receiving team should be informed that a confirmatory CXR has not been done.
6	Chest tubes should **NOT** be clamped at any time during transfer.
7	All patients shall have 2 large bores (16G or 18G) IV lines in situ at any convenient site.
8	One liter of crystalloid should be infused in ED and en route. Subsequently, blood should be transfused. **DO NOT** give more than one liter of crystalloid.
9	Control all external haemorrhage with dressings and apply pressure/compression where and when necessary.
10	The patient's BP need **NOT** be normal for transfer and this should NOT delay transfer (i.e. do not wait for the BP to be "stable"), resuscitation should continue during the journey. Aim of a SBP of 80-90mmhg and MAP of 50-60mmhg before transfer provided there is no Head Injury. Fluids and infusions should NOT be stopped en route.
11	An indwelling urinary catheter and a nasogastric tube should be in place before transfer.
12	Patients shall have an accompanying doctor who is competent to secure the airway (ie. able to perform endotracheal intubation) if the need arises en route or if the tube dislodges.
13	The Trauma Team (*refer to contact list) shall be informed prior to transfer (once initially and once more just as the patient leaves Hospital X (Level IV) ED) during working hours of the weekdays and the On Call Surgical MO or On Call Surgeon of the day during after hours and weekends.
14	The **receiving team's (Trauma/General Surgery)** medical officer will notify the ED red zone of the impending transfer or vice versa if the ED is notified, the ED team will notify the Trauma Team of the impending arrival of the patient. One party (either Trauma/General Surgery or ED red zone team) notification is sufficient (i.e. the transferring hospital need not make multiple phone calls to multiple units.

INTER-HOSPITAL TRANSFER PROTOCOL

15

If the patient has other concurrent injuries that may involve other disciplines, the appropriate referrals will be made by the Trauma Team in HTJ. The referring hospital need not refer separately.

TRANSFER DESTINATION

All patients shall be admitted via **HTJ Emergency and Trauma Department**. No ward transfers are allowed. Upon arrival, the Surgical MO/Trauma MO will attend to the patient in ETD.

CONTACT LIST

1. Trauma Surgery Unit HTJ (via HTJ switchboard)
2. General Surgery - Medical Officer on call (ward), via HTJ switchboard
3. General Surgeon - Fellow/Trauma Surgeon or Gen Surgeon on-call via HTJ switchboard.
4. Emergency RED ZONE, medical officer/specialist, via HTJ switchboard.

Sequence of contact in descending order (one phone call only to any personnel below in the order listed):

During normal work hours on weekdays:

1. Trauma Surgery Medical officer, if unavailable-
2. ED RED ZONE Medical officer-in-charge, if unavailable-
3. Trauma Surgery Fellow/Surgeon in the Trauma Surgery Unit, if unavailable-
4. ED RED ZONE Specialist in charge, if unavailable
5. On-call Medical Officer, General Surgery, if unavailable-
6. On-call Surgeon of the day, if unavailable -
7. Director of Trauma Surgery / Consultant Trauma Surgeon if unavailable
8. ED Head of Department

During off hours, weekends, and public holidays

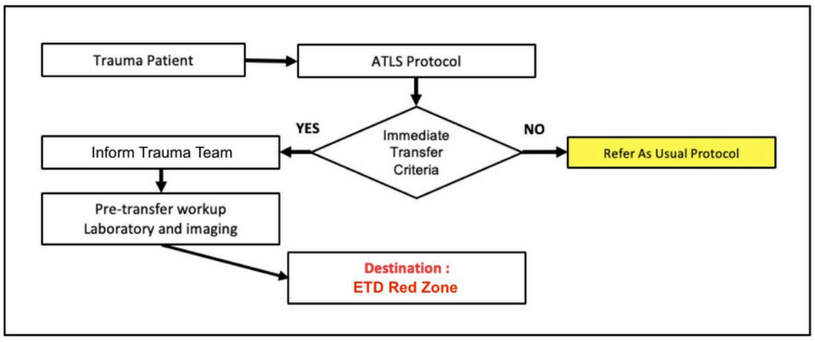
1. On-call Medical Officer, General Surgery, if unavailable-
2. ED RED ZONE Medical officer-in-charge, if unavailable-
3. On-call Surgeon of the day, if unavailable -
4. Trauma Fellow/Trauma Surgeon

QUALITY INDICATORS

1. Time lapsed between the decision of criteria met and transfer decided by the attending doctor in Hospital X (Level IV) Hospital and the ambulance leaving Hospital X (Level IV) Hospital ED with the patient on board shall not be more than 90 minutes.
2. Fulfills all necessary transfer requirements.
3. No unnecessary investigations were done by the attending team in Hospital X (Level IV) Hospital or requested by the receiving team in HTJ.

INTER-HOSPITAL TRANSFER PROTOCOL

INTERHOSPITAL TRANSFER PROTOCOL FOR TRAUMA CASES



IMMEDIATE TRANSFER CRITERIA

- SBP ≤ 90 mmHg
- HR of > 120 bpm after 1L of crystalloids
- Peritonitis
- Any penetrating wound to torso or neck, impalement injuries
- Obvious signs of vascular injuries
- Positive FAST
- Low GCS with polytrauma

(The listed criteria stand independent of each other)

AIRWAY

- Secure the airway
- Provide supplemental oxygen
- Apply cervical collar/spinal board

BREATHING

- Ensure adequate breathing and ventilation
- Chest tube : DO NOT CLAMP Chest tube during transfer
- Confirmatory CXR post CT insertion is not required if transfer is imminent

CIRCULATION

- Secure external active bleeding
- 2 large bore IV access with concurrent infusion of 500mls of IVF
- SBP 80-90 mmhg/MAP 50-60 mmhg is acceptable
- SBP need not be normal prior to transfer
- SBP > 110 mmhg for patient with TBI
- Resuscitation need to be continued en-route

DISABILITY

- Secure the airway if GCS < 11

EXPOSURE

- Quick secondary survey and secure any external bleeding
- Apply splint accordingly

PRE-TRANSFER WORKUP

LABORATORY

- Haematological / biochemistry test are not required
- Group Specific Blood should be done and available for use (provided it does not delay transfer)

RADIOLOGY

- CXR and Pelvic X-ray may be obtained provided it does not delay transfer
- Omit Cervical and Skull x-ray if CT Brain is indicated
- X-ray of other extremities are not required for unstable patient.

TRANSFER REQUIREMENT

- CBD and RT should be in place
- All intubated patient must be accompanied by a trained medical officer.

INFORMATIONS NEEDED BY TRAUMA TEAM

M : Mechanism of injury
I : Injuries observed
S : Vital Signs
T : Treatment given

INFORM TRAUMA TEAM
(IT IS SUFFICIENT TO CALL ONLY ONE PERSONAL BELOW IN ORDER AS LISTED):

OFFICE HOURS:

1. Trauma Surgery MO
2. ED Red Zone MO/Specialist
3. Trauma Surgeon
4. On call MO or Surgeon
5. Consultant Trauma Surgeon
6. Consultant EP

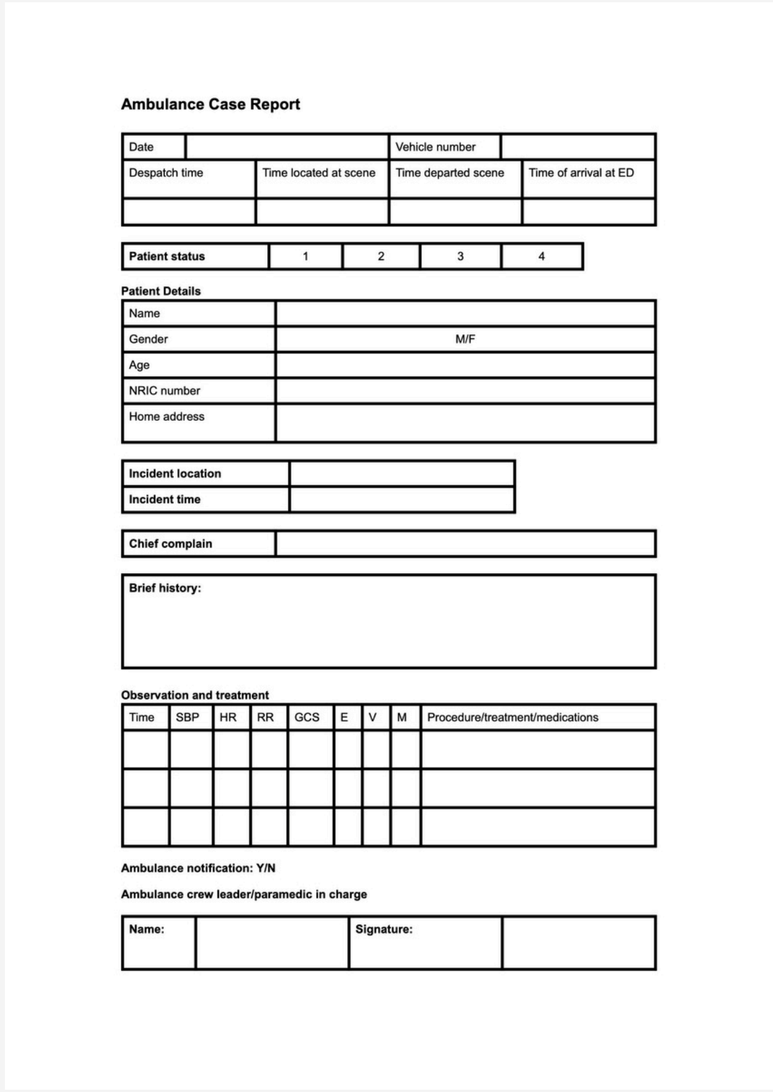
OFF HOURS / WEEKEND / PUBLIC HOLIDAYS

1. On Call Surgical MO
2. ED Red Zone MO/Specialist
3. On call Surgeon

APPENDIX E

Pre-Hospital Case Report

PRE-HOSPITAL CASE REPORT



Ambulance Case Report

Date		Vehicle number	
Despatch time	Time located at scene	Time departed scene	Time of arrival at ED

Patient status	1	2	3	4

Patient Details

Name	
Gender	M/F
Age	
NRIC number	
Home address	

Incident location	
Incident time	

Chief complain	

Brief history:

Observation and treatment

Time	SBP	HR	RR	GCS	E	V	M	Procedure/treatment/medications

Ambulance notification: Y/N

Ambulance crew leader/paramedic in charge

Name:		Signature:	

Despatch time: Time ambulance given orders (assigned) to locate patient, this is not the time logged by the call center

Patient status: Denotes subjective assessment of the paramedic in-charge on the overall condition of the patient. Status are as of below:

STATUS	CONDITION	TRIAGE
1	Critical, immediate threat to life	Red
2	Serious, potential threat to life	Yellow
3	Moderate problem, unlikely to threaten life	Green
4	Minor problem, no threat to life	Green

Patient details: Self explanatory

Incident location: General location of incident, self explanatory

Chief complain: In the context of trauma, this will be in general terms (i.e. MVA, assaulted, stabbed, gun shot wound, fall)

Brief history: In the context of trauma, should include description of mechanism (i.e. driver of car, head on collision, high speed > 40 km/h etc.)

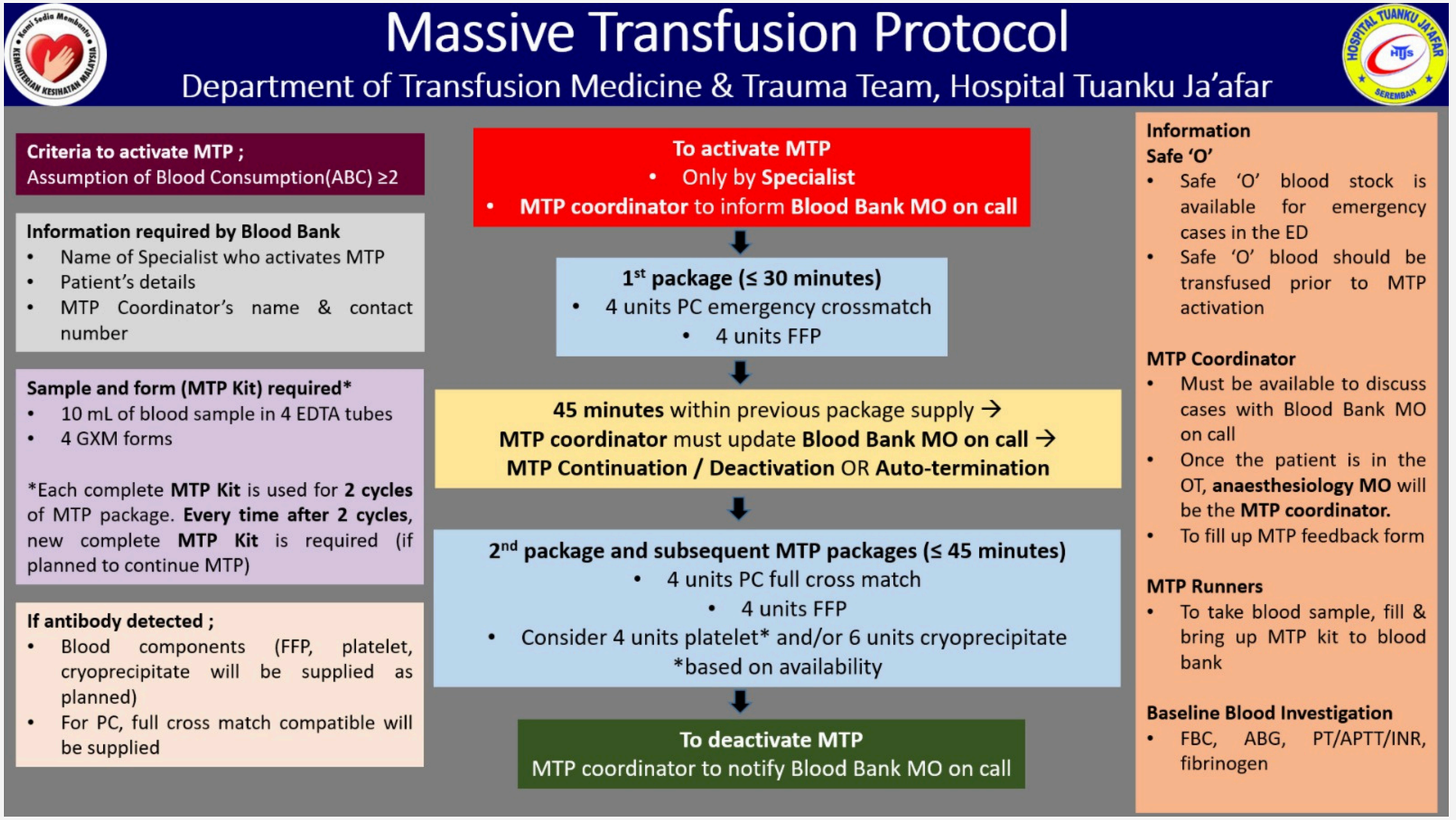
Observation and treatment: Self explanatory

Ambulance notification: Notification given by the ambulance crew to the ED physician to warn of an impending arrival of a status 1 or 2 patient, that has strong probability of a Trauma Team Activation. The ED physician at his/her discretion may activate the Trauma Team after receiving notification, prior to the patient arriving in the ED. This notification is via UHF/VHF wireless or by cell telephone system as per dictated by local resources.

APPENDIX F

Massive Transfusion Protocol

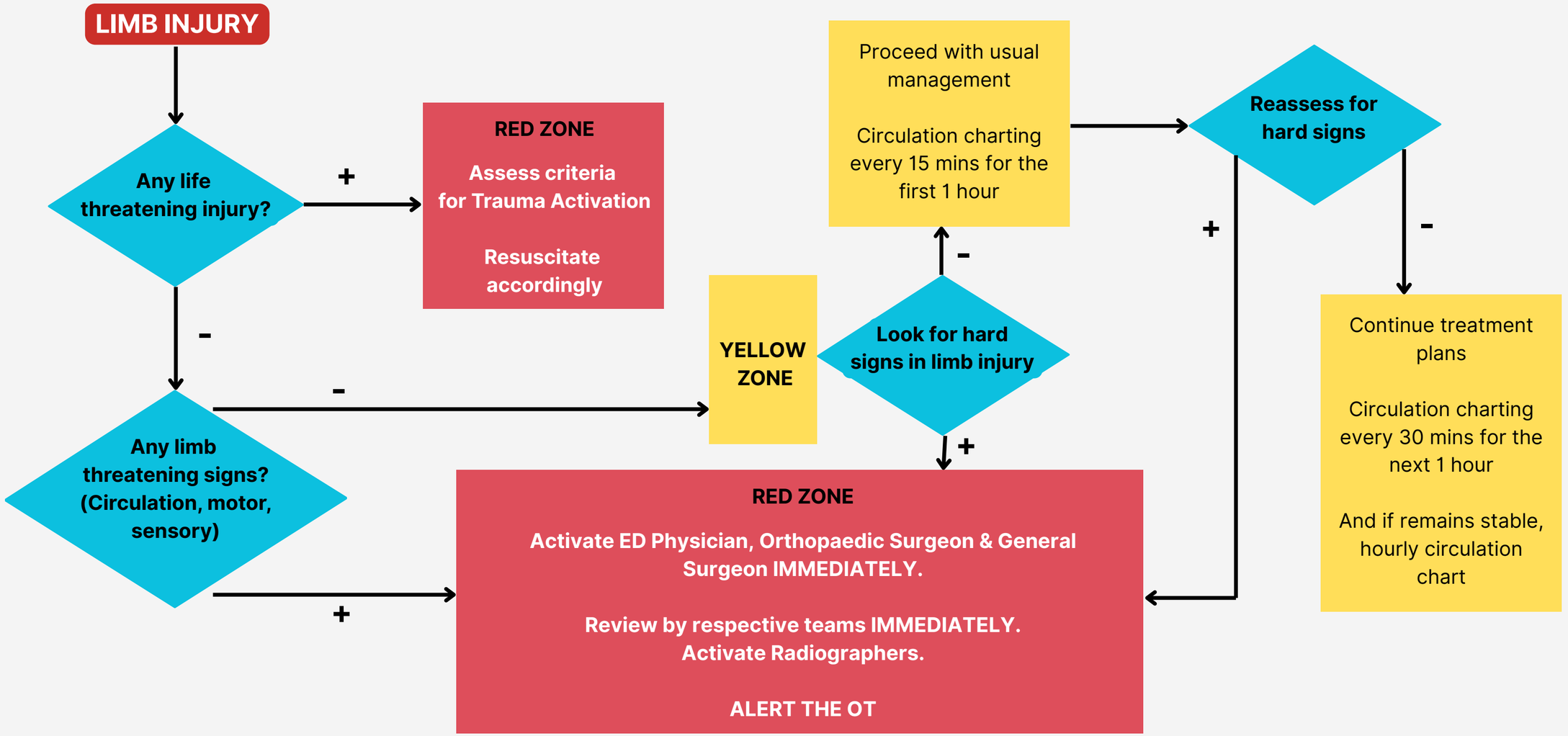
MASSIVE TRANSFUSION PROTOCOL



APPENDIX G

Vascular Trauma Pathway

VASCULAR TRAUMA PATHWAY



VASCULAR TRAUMA PATHWAY

Hard signs in Limb Threatening Injury

- Active bleeding
- Expanding/pulsatile hematoma
- Bruit/thrill over wounds
- Absent distal pulses
- Distal ischaemic signs: pain, pallor, paralysis, parasthesia, cool to touch

Designated Primary Team according to area of Vascular Injury

- Wrist and hand: Orthopaedic
- Other parts of upper limb and whole of lower limb: Surgery
- Impending compartment syndorme with preserved pulses: Orthopaedic
- Compartment syndrome with loss of pulses: Surgery

Request for Imaging

- X-ray request forms must be countersigned by the managing specialist or Emergency Physician to ensure initial images requested are appropriate.
- Selected cases might require CTA without X-ray prior to operative management.

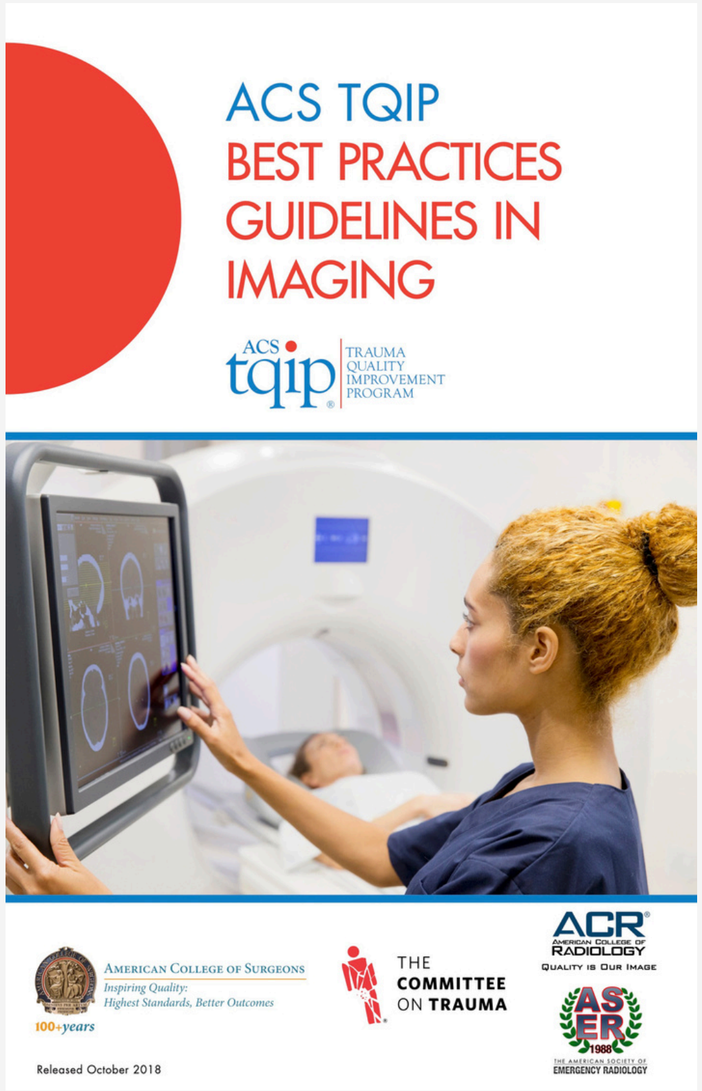
APPENDIX H

Trauma Radiology Guidelines

TRAUMA RADIOLOGY GUIDELINES

TO BE DISCUSSED WITH RADIOLOGY TEAM

Example:
American College of Surgeon (ACS) Best Practices Guidelines in Imaging



APPENDIX I

Trauma Definitions and Scoring System

TRAUMA DEFINITIONS AND SCORING SYSTEM

MAJOR TRAUMA	The only globally accepted definition of “Major Trauma” is injuries with an **ISS of more than 15**. Subsequent additional criteria vary by institution and region.
ABBREVIATED INJURY SCORE (AIS)	The AIS is a score weighted on the injury severity of a given anatomic organ. It is graded 1 to 6 in ascending severity, 6 being unsurvivable. The AIS for solid organs is coded according to AAST (American Association for the Surgery for Trauma) guidelines, 1990. All other AIS scores are clinician-subjective. For this registry, the AIS scores were decided and assigned to an injury by cross-referencing at least two or preferentially three sources of information: radiological data (X-rays and scans), operative notes, and communication with the operating team surgeon/s.
INJURY SEVERITY SCORE (ISS) & NEW INJURY SEVERITY SCORE (NISS)	ISS is an anatomical score used to quantitatively assign the severity of multiple injuries. Each injury is assigned an Abbreviated Injury Score (AIS) and only the highest AIS within a certain body region is included in the final calculation. There are five body region divisions and the top 3 scoring injuries are identified. Each of these 3 AIS scores is squared and the total constitutes the ISS (Baker et. al., 1974). In this report, where “ISS” is stated, it was calculated with the NISS principle (Osler, 1997).
REVISED TRAUMA SCORE (RTS)	The RTS is a physiologic severity score that can be a useful triage tool and is an accurate predictor for the probability of survival. This score assigns coded values for 3 parameters, namely the first recordings of the Glasgow Coma Scale, systolic blood pressure, and respiratory rate. Values range from 0.00 to 7.84. The higher the RTS value, the higher the probability of survival is expected. The values used for calculation are those obtained from the first recorded values in the emergency department.
TRAUMA AND INJURY SEVERITY SCORE (TRISS)	The TRISS combines physiologic data from the RTS, anatomic data from the ISS, age (less than or 55 years and older), and mechanism of injury to give a probability of survival or TRISS score. TRISS>0.5 = Expected observed survivors; TRISS<0.5 = Expected observed death.

APPENDIX J

Recommended Operations and Procedures for Basic Proficiency in Trauma Surgery

TRAUMA SURGERY OPERATIONS & PROCEDURES

	ESSENTIAL	DESIRABLE
AIRWAY		
Tracheostomy, open	Yes	
Tracheostomy, percutaneous		Yes
Cricothyroidotomy		Yes
Oral endotracheal intubation including rapid sequence intubation	Yes	
HEAD/FACE		
ICP Monitor		Yes
Ventriculostomy		Yes
Lateral canthotomy		Yes
Burr-hole/craniotomy and evacuation of EDH		Yes
NECK		
Exposure & definitive management of vascular and aero digestive injuries (neck exploration)	Yes	
Thyroidectomy		Yes

	ESSENTIAL	DESIRABLE
CHEST		
Exposure & definitive management of cardiac injury, pericardial tamponade	Yes	
Exposure & definitive management of thoracic vascular injury		Yes
Repair blunt thoracic aortic injury: open or endovascular		Yes
Pulmonary non-anatomical resections		Yes
Exposure & definitive management of tracheo-bronchial & lung injuries	Yes	
Diaphragm injury, repair	Yes	
Definitive management of empyema: decortication (open)	Yes	
Video-assisted thoracic surgery (VATS) for management of retained hemothorax and empyema		Yes
Bronchoscopy: diagnostic	Yes	
Damage control thoracotomy	Yes	

TRAUMA SURGERY OPERATIONS & PROCEDURES

	ESSENTIAL	DESIRABLE
Exposure & definitive management of esophageal injuries & perforations	Yes	
ABDOMEN & PELVIS		
Exposure & definitve management of gastric, small intestine and colon injuries	Yes	
Gastrostomy (open and percutaneous) and jejunostomy	Yes	
Exposure & definitive management of duodenal injury	Yes	
Management of rectal injury	Yes	
Management of all grades of liver injury	Yes	
Hepatic resectional debridement		Yes
Management of splenic injury, infection, inflammation or diseases	Yes	
Management of pancreatic injury, infection and inflammation	Yes	
Pancreatic resection & debridement	Yes	

	ESSENTIAL	DESIRABLE
Management of renal, ureteral and bladder injury	Yes	
Management of injuries to the female reproductive tract		Yes
Management of acute operative conditions in the pregnant patient		Yes
Management of abdominal compartment syndrome	Yes	
Damage control techniques	Yes	
Abdominal wall reconstruction following resectional debridement for infection, ischemia	Yes	
Diagnostic laparoscopy for penetrating abdominal wounds	Yes	
Exposure & definitive management of major abdominal and pelvic vascular injury	Yes	
EXTREMITIES		
Exposure and management of upper extremity vascular injuries	Yes	

TRAUMA SURGERY OPERATIONS & PROCEDURES

	ESSENTIAL	DESIRABLE
Exposure and management of lower extremity vascular injuries	Yes	
Damage control techniques in the management of extremity vascular injuries, including temporary shunts	Yes	
Acute thrombo-embolectomy	Yes	
Fasciotomy, upper extremity		Yes
Fasciotomy, lower extremity	Yes	
Amputations, lower extremity (AKA, BKA)	Yes	
Reducing dislocations		Yes
Applying femoral/tibial traction		Yes
OTHER PROCEDURES		
Split thickness, full-thickness skin grafting	Yes	
Operative management of burn injuries		Yes
Upper GI endoscopy		Yes

	ESSENTIAL	DESIRABLE
Colonoscopy		Yes
FAST	Yes	

APPENDIX K

Trauma Surgery Fellowship

TRAUMA SURGERY FELLOWSHIP

Trauma Surgery Fellowship: A Comprehensive Three-Year Training Program

The Malaysia Ministry of Health (MOH) has approved a comprehensive training program for the Trauma Surgery Fellowship that spans three years. Only two positions are offered annually for Malaysian surgeons who have completed at least two years of General Surgery post-gazettement.

During the program, Trauma Surgery Fellows will develop in-depth clinical knowledge and technical skills necessary for caring for trauma patients. Areas of focus include pre-hospital and initial phase of care, trauma systems, management of specific traumas, trauma critical care, and special conditions in Trauma Surgery, late phase management in trauma, trauma care in austere conditions, modern warfare injuries, retrieval systems, fixed and rotary winged evacuation/transport of trauma patients. In addition, fellows will participate in nine months of operative experiences in thoracic, vascular, and hepatobiliary regional centers in Malaysia.

The last year of training involves a posting to trauma centers outside of Malaysia. Our fellows have trained in trauma centers in Canada, Hong Kong, New Zealand, Singapore, the United Kingdom, and the United States of America. Our goal is to train surgeons to be leaders in trauma care and eventually assume clinical and administrative roles in advanced trauma care systems. Ultimately, our aim is to establish a system that provides comprehensive and high-quality care for trauma patients in Malaysia.

For more information, please refer to the **Trauma Surgery Fellowship Manual** available at this link: https://drive.google.com/file/d/1g8W_UbGz4AICY0SOb-zfFvpmY8NC5EI7/view

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TRAUMA SURGERY SERVICE

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