

## Advanced Emergency Traumatology Care: A New Trauma Ecosystem

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### Abstract

The emergency department structure and treatment services deal with critical, semi-critical, and urgent care cases. Among these cases are medical and surgical cases. The surgical cases can be divided into trauma and non-trauma-based cases. Trauma cases, therefore, are a sub-specialized field and services provided within the emergency department deal with patients presenting with acute bodily harm. A proper system of traumatology must be in place to recognise patients presenting with major trauma, relay accurate and timely information provide a pre hospital care alert to the emergency staff, conduct a proper Passover of cases to handle information precisely, activate the trauma team and trauma physicians in two tiers so that emergency trauma care does its job before intervention by primary teams of different disciplines unique to the case, investigate the patient with trauma panels and quick trauma protocols, and final disposition of the patient to the operation theatre, wards or discharge after observation and adequate pain control.

**Keywords:** Emergency Medicine; Trauma; Services; Traumatology; Trauma Physician



**Figure 1: The Damage Control Resuscitation Bay in the Emergency Department Hospital Selayang**



**Figure 2: The DCS Suite Label, the Trauma Team Tier 1 Label, the Progress Charting, and Trauma Registry in the DCR Bay**

### Paragraph 1: The Zero Point Survey

#### Pre-Hospital Care Recognition of Major Trauma, Activation of Major Trauma Code, MECC Trauma Activation & Trauma Passover

##### a) Pre-Hospital Care Recognition of Major Trauma

In order to grade the injuries in trauma, there needs to be a subjective and objective measurement system. This will help the team identify major trauma, relay the information accurately, improve communication, and be used in morbidity, mortality, and audit systems to justify the actions of the pre-hospital care personnel in trauma ([Capone-Neto & Rizoli, 2009](#)).

In objective measurement, there are many scores that have been created to be used as scoring and grading systems in trauma. Some are anatomical, some are physiological and some are combined methods. Each method has been shown to have its pros and cons. However, in a trauma setting in the pre-hospital care environment. The decision to stay and play or scoop and run is an important one. Therefore, a quick scoring system as an objective measure with a subjective assessment by the trained eye is an important determinant of the patient's disposition.

The RTS, or revised trauma score is a known tool as an objective measure of the severity of a trauma patient. It is a physiologic system that uses the patient's vital signs as an objective measure of the severity of trauma. The score is based on GCS (Glasgow trauma scale), RR (respiratory rate), and also Systolic Blood Pressure. The total score can be 0–12, and its interpretation is that a patient with an RTS score of 12 is labelled delayed, 11 is urgent, and 3–10 is immediate ([Aydin & Dülger, 2020](#)).

##### b) Pre- Hospital Trauma Notification and Activation of Major Trauma Code

Participants: MECC (Medical Emergency Coordination Centre and DCR Suite)

In low and middle income countries, the chain of survivorship of trauma needs to be enhanced and this can be achieved with good communication ([Wisborg, Montshiwa & Mock, 2011](#)). A relay of information and communication occurs continuously as an ambulance is out for a response. A closed-loop reporting system with interlope communication among the ambulance personnel and MECC needs to be done for all cases including trauma cases responded to by ambulances.

In this scenario, the ambulance personnel will also inform the MECC regarding the revised trauma score (RTS). The MECC will then interpret the RTS Score and decide whether this is a trauma case, a severe case or a non-severe case, a critical case, or a non-critical case.

The MECC once recognises the critical severe trauma case based on the RTS Score, will relay the information to the Red zone/Critical zone in the emergency department. This will be a *Pre- Hospital Trauma Notification*.

The paramedic who receives this information that an ambulance has responded to a severe, critical trauma case and is on the way to the emergency department to the DCR Suite. The paramedic will then make an announcement into the mic and speaker of the emergency department of a trauma alert as activation of the major trauma code. This will allow all Tier 1 trauma team members to clear the DCR bay in red one and prepare the staff, supplies, space, and trauma care system for the arrival of the major trauma patient ([Søreide, 2012](#)).

### **c) Trauma Passover**

Trauma Passover is not a conventional Passover but rather a quick, targeted Passover to identify a few key pieces of information regarding the pre-hospital phase to tailor the management of the intra-hospital phase resuscitation accordingly. Outside the observation line, the prehospital care team will Passover to the trauma team tier 1 leader the following information

A - Age

T- Time of incident

M- Mechanism

I- Injury

S- Severity

T- Treatment given.

### **Paragraph 2: The Trauma Reception**

#### **Two-Tier Trauma Team Activation System and the Damage Control Resuscitation Bay**

The two tier trauma team activation is a new system in which activation of the full trauma team involving multi disciplines involves two steps of activation.

#### **a) Tier 1**

The first tier of trauma team activation involves the Emergency Department personnel working in the red zone and the core primary teams involved in the case. Once a call from the MECC comes to the red zone and the announcement of the trauma team activation is made, the brief history of the case is noted and the relevant medical officer or specialist of the primary team involved in the case is immediately called to come to the emergency department to help in the early phases of the resuscitation.

The emergency department team will be lead by the team leader, which is the emergency physician in charge of the red zone, the airway and breathing personnel will be the medical officer of the red zone, the airway assistant will be the medical assistant, circulation medical officer or nurse who will set up the initial vital signs, and IV access, a circulation assistant who will be the assistant to secure and maintain circulation and a runner who will be the scribe as well as a runner for extra emergency equipment needed during the resuscitation. The primary team who has been on standby for the case will provide additional help in resuscitation and early planning for intervention.

#### **b) Tier 2**

The tier 2 trauma activation referring to the primary team in addition to the core primary team that has been on the case from tier 1 itself. This involves activating the primary teams as primary and secondary surveys are going on and additional injuries are revealed. Activation of other teams like the ICU, radiology for subsequent care, OT preparation, Whole body CT scans are also considered trauma team tier 2 activations in this suggested protocol. ([Rani & Fuzi, 2019](#))

#### **c) The Damage Control Resuscitation Bay**

The damage control resuscitation bay is located at bay 4 in the red zone of the emergency department. This is a dynamic DCR bay in which, due to the current surge capacity in the red zone, this bay will be used as a routine red zone case section, however, when there is a trauma alert, this bay will be cleared and prepared to receive the major trauma patient.

The DCR bay is clearly labelled in highlighted red as DCS, Damage Control Resuscitation Suite, and Emergency Department Hospital Selayang to create a branding and awareness of the existence of the bay and its services within. It has a tier 1 trauma team leadership and team board which is updated daily with the trauma team players in charge of airway and breathing, circulation control of hemorrhage, runners and scribes, and the team leader. It is also equipped with a board of patients primary, secondary, and tertiary surveys to assist all other teams to know the updated status of the patient to prepare for further intervention, for example an Operation Theatre (OT) or whole body CT scan. The OT lighting is added to improve the visibility of wounds and during hemostatic suturing. The side wall panel will also have a QR code that leads to a form of trauma registry. This allows the team leader to scan the code and add the poly trauma patient's records to the trauma registry to survey and study the outcomes of the emergency trauma care initiatives.

To the side of the trauma bay is the '*TRAUMA CAFE*'. The trauma cafe is a cupboard that is fully equipped with all trauma resuscitation equipment, such as a head immobilizer, cervical collar, spinal board, airway adjuncts, bandages, tourniquets, Gamgee, gauze, warm saline, forms for whole body CT, consent forms, an OT checklist, and trauma medications such as tranexamic acid and calcium ampoules.

Just outside of the trauma bay, there will be an observer line. This observer line is to avoid overcrowding in the trauma resuscitation bay and also to have only the tier 1 or tier 2 trauma teams within the bay during acute trauma resuscitation. This is for the safety of the staff, patients and their belongings as well as patient privacy.

### **Paragraph 3: The Tertiary Survey**

#### **a) Whole Body CT Scan Protocol**

To complete the trauma chain of survival, there needs to be proper disposition of the patient. To assess the severities and deciding to go to the OT or to the ward, managing conservatively or operatively needs a objective assessment and the use of WBCT safely is guided by evidence and previous published articles. ([Yussof et al., 2019](#))

*Refer to the references attached.*

#### **b) The Trauma Panel**

The trauma panel is a set of blood ordered by the medical officer on treating a poly trauma patient. This blood has an important value in the management of trauma.

FBC

RP

LFT

VBG

DXT

LACTATE

COAGULATION PROFILE - APTT, INR

FIBRINOGEN

CK

## CARDIAC ENZYMES

**Paragraph 4: The Trauma Flow Chart**

1) Pre hospital care response to a trauma patient
2) Pre hospital care personnel scores the RTS score
3) Relays the information to the MECC
4) MECC rechecks and confirms the RTS score then informs the trauma suite
5) Pre hospital activation done via department announcement
6) Trauma team tier 1 activated
7) ATMIST Passover of trauma patient
8) Primary survey, adjuncts and secondary survey
9) Send Trauma blood panel
10) Trauma team tier 2 is activated
11) Patient is planned for WBCT/OT
12) Close monitoring and reassessment including tertiary survey awaiting disposition

**Conclusion**

In conclusion, an advanced trauma care is an ecosystem, which comprises of components of the trauma chain of survival from the pre hospital care initiatives of recognition of major trauma, relay of information to the clinical treatment area, trauma team activation and proper disposition. This is believed that this protocol would help in bringing the new advanced trauma care services to emergencies worldwide with creation of an infrastructure, system and clinical excellence in the care of trauma.

**Conflict of Interests**

The authors declare that they have no conflict of interests.

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