Guideline for Establishing Emergency Medical and Trauma Centers

1st Edition

2020

Emergency Medical Services Division
Department of Medical Services
Ministry of Health

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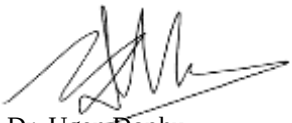
Foreword

Globally, trauma is one of the leading causes of death between 1-44 years. About 5.8 million people die each year as a result of trauma/injuries. In Bhutan, trauma cases are increasing which require prompt and standard care. In addition, medical emergencies are becoming a serious burden for the health system. NCDs like stroke, acute coronary syndrome, respiratory, diabetic complications and alcohol liver diseases are some of the conditions requiring immediate care. The effort to reduce the burden of trauma and medical emergencies is one of the challenges faced by Ministry of Health (MoH). As such, Emergency Medical Services Division is mandated to improve trauma care and emergency services in Bhutan.

Initially, based on the *Health Emergency and Disaster Contingency Plan 2016*, MoH had identified **10** hospitals (Dewathang hospital, Trashigang hospital, Riserboo hospital, Trongsa hospital, Yebilaptsa hospital, Damphu hospital, Wangdue hospital, Phuentsholing hospital, Samtse hospital and Gedu hospital) as **Emergency Medical and Trauma Centers (EMTC)**. However, there was no formal specific guideline for the same. Establishing achievable and affordable standards for trauma care and appropriate utilization of health resources, including human resources with clear job responsibilities in the country is important.

In this guideline, EMTCs are classified into three levels based on services availability criteria. It intends to strengthen referral hospitals as level I, identified hospitals as level II and other districts as level III and it shall provide as a guiding document for the Ministry to upgrade the existing hospitals and establish new ones as **EMTC**. It also aims at making significant improvements at various levels of health facilities in providing trauma, emergency medical services in a coordinated manner. This guideline has been developed in consultation with our various experts involved in care of trauma/injured patients and approved by 2nd High-Level Committee Meeting for Health Sector held on 13th January 2020.



Dr. Ugen Dophu
Secretary

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Abbreviations

ACLS- Advanced Cardiac Life Support
ATLS- Advanced Trauma Life Support
BLS- Basic Life Support
CME- Continue Medical Education
DMS- Department of Medical Services
EmNOC- Emergency Neonatal and Obstetric Care
EMS- Emergency Medical Services
EMR- Emergency Medical Responder
EMRO- Emergency Medical Response Officer
ED/ER- Emergency Department/Room
EMSD- Emergency Medical Services Division
EMTC- Emergency Medical and Trauma Centers
FAST- Focused Abdominal Sonogram for Trauma
HCDD- Health Care and Diagnostic Division
HRD- Human Resource Division
HIDD- Health Infrastructure Development Division
HLC- High Level Committee
ICU- Intensive Care Unit
MoH- Ministry of Health
NCD- Non-Communicable Diseases
PALS- Pediatric Advanced Life Support
PHTLS- Prehospital Trauma Life Support
PPD- Policy and Planning Division

Scope

- This guideline shall apply to MoH, Dzongkhag Health Sectors and health care professionals involved in emergency medical and trauma care services.

Objective

- To serve as a standard guide for the establishment of EMTC including up-gradation of existing hospitals and building new infrastructure.

Definition of EMTC

EMTC is a health facility with resources and capability to provide timely emergency medical and trauma care services on 24x7 to critically injured patients. Although international definition of trauma center is of high standard demanding sophisticated resources requirement, in this guideline the definition is customized for Bhutan's context and resources availability. Accordingly, the EMTC is classified into three levels (level III as lowest and level I as highest) based on the staffing, specialist and services availability.

Levels of EMTC

Level III

- Provide all aspects of immediate care, including some definitive care for non-major trauma patients according to patient needs and available resources
- It will have a general surgical service which also provides most aspects of definitive care to severely injured patients. Its principal function, with respect to major trauma, is to provide initial resuscitation and operative stabilization, prior to appropriate early transfer of major trauma patients to the higher center
- It may be small and isolated hospitals or medical centers, with no immediately available specialist, and minimal radiology or acute care facilities
- Provide 24X7 on-call consultation including pre-hospital services
- Refer patients requiring comprehensive care to Level I & II centers as necessary
- Target- District hospitals with a capacity of 20-40 beds

Level II

- Provide comprehensive clinical care for the severely injured patient.
- The clinical aspects of care for the injured patient should be identical to that of a Level I service without the additional leadership, research and education components
- A Level II service must have a surgeon available
- It provides an appropriate and expeditious transfer of major trauma patients to Level I centers when required
- Provide 24X7 on-call consultation including pre-hospital services
- The center should be equipped with Emergency unit, Surgical, Orthopedic services, EmNOC, OT services, Blood bank, Physiotherapy services, Diagnostic facilities (lab, x-ray, USG), and other supportive services
- Target- Strategic hospitals with a capacity of 60 beds

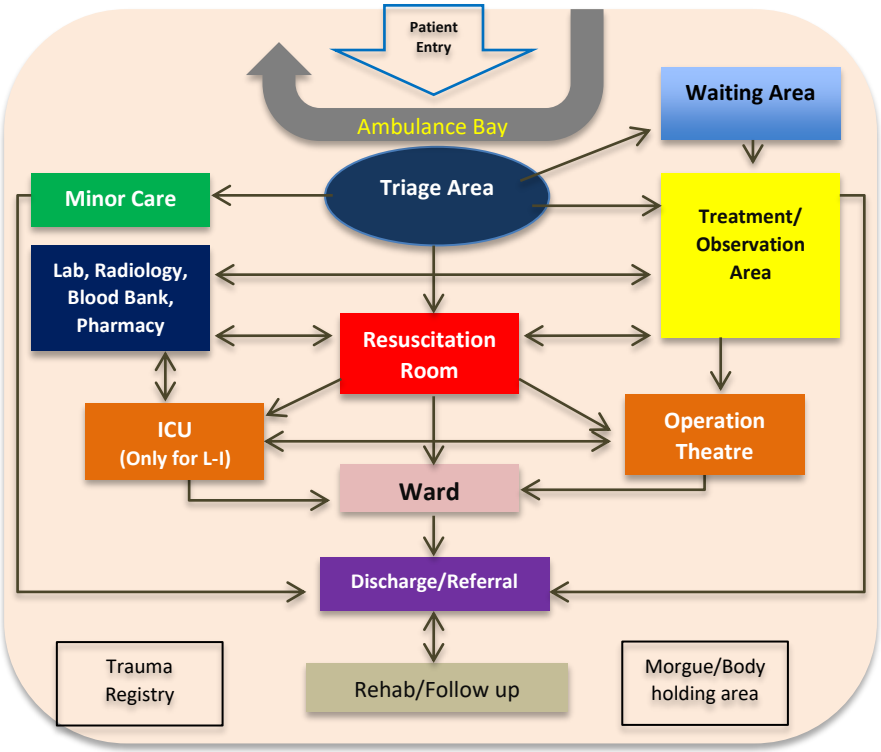
Level I

- Provide highest level of care for emergencies and trauma patients
- Capable of providing the full spectrum of care for the most critically injured patient, from initial reception and resuscitation through to discharge and rehabilitation
- Provide services of all specialties (orthopedic surgery, neurosurgery, anesthesiology, emergency medicine, radiology, internal medicine, reconstructive surgery, oral and maxillofacial, pediatric and critical care) associated with trauma and emergency care
- Provide leadership in injury prevention, surveillance and public education
- Provide CME on trauma care and medical emergency
- Conduct research on trauma care and medical emergency
- Target- Referral hospitals with bed strength of or more than 150 beds

Workflow and Design - Planning consideration for EMTC

The health facility providing EMTC services shall be designed in such a way that patients have easy access to the health care services with good room space, proper ventilation and dust free. There shall be designated patient care areas, diagnostic and clinical services and other facilities depending on the level of centers. These services must have access to each other for transferring patients. It is to be noted that EMTC can be a specialized service strengthened within the existing hospital building or build new infrastructure in an identified area.

Figure 1: *Workflow consideration for EMTC*



Core areas of EMTC:

1. EMS services
2. Patient access and Ambulance entrance
3. Resuscitation room
4. Treatment room
5. Observation room
6. Minor OT/Procedure room
7. Isolation room
8. Triage area
9. Green area/minor care
10. Ambulance bay
11. Intensive Care Unit

12. Operation theatre
13. Burn care room
14. Trauma registry
15. Pharmacy
16. Laboratory
17. Radiology
18. Blood Bank
19. Morgue/Body Holding Area

EMS Services

All the EMTC shall provide basic and advanced pre-hospital care services 24 hours a day. The pre-hospital care team shall be manned by trained professionals such as EMRs, EMROs, Nurses and Doctors depending on the nature of call. These providers are trained in pre-hospital care, scene management, rescue, stabilization and the transport of ill and injured people. In addition, they should be also trained in advanced courses like ACLS, PALS, ATLS and PHTLS. For pre-hospital services and transportation ambulance and helicopter guidelines should be followed.

Entrance Area

The EMTC shall be easily accessible to ambulance and walking patients, including persons with disabilities and wheelchair users. The ambulance transfer area should be one-way entrance. There shall be a direct access from public roads for ambulance and vehicles, with the "entrance" and "driveway" clearly marked with yellow ink on red background. In an existing health facility, the entrances can be common with the current entry and exit providing easy access.

The air-lifted patients are likely to be in a real time critical condition. It is important that the time taken to transfer them between the helicopter and the ED is as short as possible. There are primarily three options for helicopter landing site: at surface (ground) level; at elevated (rooftop) level; or a built structure above the level of the surrounding surface. The best locations for a helicopter landing site are deemed to be on a roof above ED or, where practical, in an open area adjacent to it.

Waiting Area

The waiting area shall provide sufficient space for patients as well as patient escorts. It should be preferably open and nearer to the Triage area.

Seating facilities should be comfortable and adequate. Priority seats should be allowed for persons with disabilities.

Triage Area

Triage may occur before or instantaneously upon patient arrival, within minutes of arrival, at the bed-side or in a designated area. The Triage area may not necessarily need the separate room but shall be located where staff can observe and control access to treatment areas, entrances, and waiting areas. Triage shall be stationed by triage nurse accompanied by other health care staff 24 hours a day. It should be accessible to trolley and wheelchair. There shall be basic equipment such as blood pressure device, pulse oximeter, thermometer, stethoscope, trauma registry form, glucometer, weighing device, extra patient's trolleys, triage tags and alarm system as required for triaging.

Resuscitation Room (Red Area)

The resuscitation area is the specific area where most of the critical and lifesaving interventions are done after reaching hospital. The size and number of the resuscitation area largely depends on the level of centers and the frequency of resuscitation done. Resuscitation area should not be too far from the entrance (Triage area). At a minimum, two nurses per shift shall be there to perform primary assignment for the resuscitation area.

There shall be 360-degree circumferential access to the patient, monitoring equipment and defibrillator, suction, oxygen and wash basin. If more than one resuscitation beds are used, there should be enough work space between the two resuscitation beds. Resuscitation equipment, ventilator, infusion device, cannulation, etc. must be checked and kept ready for all the time. Unnecessary attendant shall not be entertained in resuscitation area.

Treatment Room (Yellow Area)

The treatment room shall provide a private and controlled environment for patient consultations, examinations, treatments and minor procedures. Treatment room is also called acute medical care room. At a minimum, 1:2 beds per nurse ratio per shift shall be there at all times. The number of treatment beds may depend upon the level of centers and frequency of number of emergency and trauma patients. All the beds must be equipped

with monitoring devices and other necessary facilities such as suction, oxygen, infusion device, infection control bins, hand rub, wash basin, screen, etc. Only up to one attendant per patient may be allowed if required in treatment area.

Operating Room

The trauma center shall have at least one adequately staffed operating room immediately available for trauma patients and post-anesthesia recovery (the surgical intensive care unit is acceptable). The operating team shall consist minimally one scrub nurse or technician, one circulating staff nurse, one anesthesiologist immediately available. Ideally, the operating room should be located near or adjacent to the resuscitation area to minimize transportation time for an unstable emergency and trauma patients. There shall be enough space in operating room to accommodate most surgical procedures required in emergency and trauma care with portable operating light, portable imaging equipment and others. Room shall be clean with separate bins for biohazard waste and others as per the standard. The walls and ceiling should be free of fissures, open joints and cracks.

Observation Room (green area)

It is the room for the continued treatment and evaluation process for patients prior to leaving the ER or admitted to the ward. Observation room shall be equipped with all the basic medical and non-medical equipment required in functional mode. The number of observation beds may depend on the level of center and frequency of patients. Each bed shall have enough space (at least 1.5 meters) for the smooth and comfortable working environment for staff.

Isolation Room

EMTC shall have one designated room to keep trauma patients those who are diagnosed with highly contagious disease such as tuberculosis, measles, or chickenpox that need isolation from other patients and staff in the hospital. It should be maintained under negative room pressure technique used in hospitals and medical centers to prevent cross-contaminations from room to room. It includes a ventilation system that generates negative pressure to allow air to flow into the isolation room but not escape from the room, as air will naturally flow from areas with higher pressure to areas with lower pressure, thereby preventing

contaminated air from escaping the room. This technique is used to isolate patients with airborne contagious diseases.

Intensive Care Unit (ICU)

The critically ill trauma patient requires continuous and intensive multidisciplinary assessment and intervention to restore stability, prevent complications, and achieve and maintain optimal outcomes. The EMTC (level I) shall provide ICU care for the patients as long as the patient remains critically ill. A minimum of 1:2 beds per nurses ratio shall be there at all time and may increase above this as dictated by patient acuity. Level II and III EMTC may not have a separate standard ICU but there shall have trauma ward with enough bed capacity for the care of critically ill trauma patients.

Trauma Registry

A system of timely data collection that aids in the evaluation of trauma care for injured patients is called trauma registry. EMTC shall have a trauma registry unit with necessary equipment such as desk top computer with internet connectivity, file rack, table and chairs.

Morgue/Body Holding Area

The Morgue/Body holding area is a facility for the temporary holding / storage of dead bodies prior to transfer to a destination. The area should allow for the following:

- Direct access from the facility for delivery of the body
- It should allow easy and discrete access to deliver and/or remove bodies
- Consider away from public area to ensure that is appropriately screened from visibility

Store

EMTC shall have separate room to store all kind of medical supplies and equipment.

Other Facilities for Patient Relatives

The center should provide enough facilities for the patient families and relatives such as toilets, waiting area with seating facilities and entertainments as required.

Facilities for Staff

EMTC shall have enough facilities for staff including nurse station, changing room, and toilet and administrative office.

Establishment of EMTC

There are two aspects to the establishment of EMTC in this guideline. While one is the establishment of EMTC by strengthening services in existing hospitals, the other is by building new structure. For the former, since the hospitals being identified for up-gradation will already be functional with most of the facilities in place, it is intended to fill the deficiencies and gap identified under this guideline, while for the later it intends to provide as guidance.

Process for up-gradation of Existing hospitals as EMTC

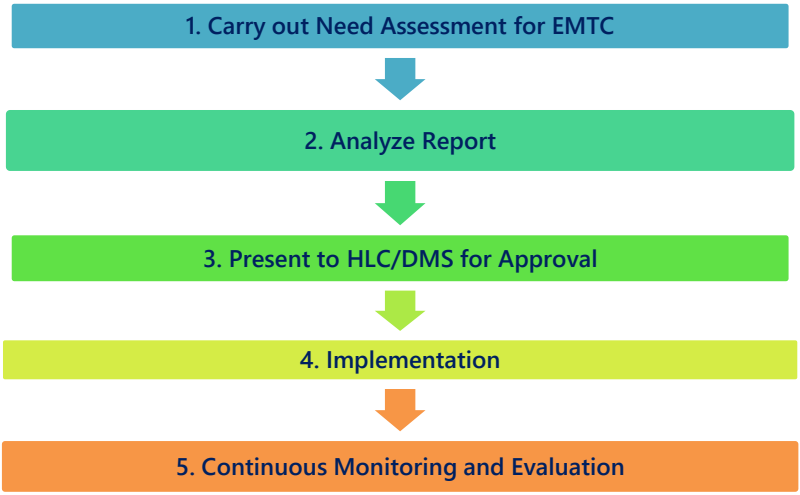
The selection of existing hospitals to be upgraded as EMTC shall be based on the set criteria, preferably in maximum trauma case, regionally balanced area, vulnerability to accidents and difficult access due to hilly terrain, hazard-profile including accident prone areas, highway, industries and mines. The priority shall be accorded to those existing hospitals, where there is high mortality due to trauma and injuries.

MoH will carry out a need assessment of existing hospitals using health facility need assessment tool for EMTC (*annexure 1*). The EMTC will be classified into three levels based on the findings of the assessment, which will be presented to HLC for approval.

After identifying the health facilities, an individual health facility shall be responsible to submit the duly filled requirement form (*annexure 2: checklist for EMTC*). The program shall verify and a detailed field study shall be done by the team for infrastructure, space and size, entrance, equipment, other supplies and costing. The processes are shown in **Figure 2**. The assessment team shall comprise of the following members:

1. Representative, EMSD (Lead)
2. Representative, HCDD
3. Representative, HRD
4. Representative, HIDD
5. Representative, PPD
6. Emergency Specialist/Trauma Focal
7. Others will be based on need.

Figure 2: *Process for up-gradation of Existing hospitals as EMTC*



Building New EMTC

For the construction of new EMTC, the relevant division/department shall refer workflow and design - planning consideration for EMTC of this guideline.

Monitoring and Evaluation

Continuous monitoring and evaluation of overall emergency and trauma management system shall be done by the team lead by EMSD. However, individual health facility's administration shall be responsible for conducting all kind of indenting and requisition of supplies and equipment. They shall also facilitate in building capacity of human resources by training relevant health staff in relevant field. Any issues related to emergency medical and trauma services shall be reported to EMSD and further to MoH. EMSD shall report overall status and improvement of EMTC to High Level Committee annually or during annual review meeting.

ANNEXURE 1: Assessment Tool for Identifying EMTC

Section A: General Information

1. Name of Facility _____ 2. Address _____ 3. E mail_____ 4. Telephone no._____	5. **Type of Facility** ☐ NRH ☐ RRH ☐ District hospital ☐ Military hospital ☐ BHU	6. **Number of Beds** ……

Section B: Infrastructure and Services

Type	**Definition s**	**Yes/No**	**Remarks**
1. Triage area	Designated area where the sorting of patients for prioritization according to clinical acuity is done.		
2. Resuscitation Room (Red)	The specific room where most of the critical and lifesaving interventions are done in ED/ER.		
3. Treatment Room (Yellow)	A room for patient consultations, examinations, treatments and minor procedures in ED/ER. Treatment room is also called acute medical care room.		
4. Observation Room (green)	A room for the continued treatment and evaluation process for patients prior to leaving the ER or admitted to the ward.		
5. Intensive Care Unit	A unit in the hospital where intensive treatment care is provided to patients with severe or life threatening injuries and illnesses, which require constant care and close supervision from life support equipment and medication.		
6. Operating theater with post anesthetic	A room or facility within a hospital where surgical operations are carried out in an aseptic environment.		

recovery zone			
7. Isolation Room	A designated room to keep patients those who are diagnosed with highly contagious disease such as tuberculosis, measles, or chickenpox that need isolation from other patients and staff in the hospital.		
8. Central Sterile Supply Department (CSSD)	Integrated place in hospital that performs sterilization and other actions on medical devices, equipment and consumables.		
9. Ambulance	A vehicle equipped for taking sick or injured people to and from hospital especially in emergencies. Here it denotes only functional ambulances in the hospital.		
10. Waiting area	A space near triage area for patients as well as patient escorts can sit until they receive the services.		
11. Oxygen supply	Readily available number of oxygen cylinders.		
12. Running water	Readily available water supply to the hospital.		
13. Backup Power supply	Backup power supply to the hospital such as generator, solar, etc. that is capable to power surgical machines and life-saving equipment.		
14. An internet connectivity	Hospital that has accessible to high bandwidth internet connection.		
15. Hospital emergency contingency plans in place	Emergency contingency plans available and in place.		

Section C: Strategic location:

Type	**Definitions**	**Number**	**Remarks**

1. Number of Catchment Population	Total number of population that the hospital is currently providing services.		
2. Distance from highway (km)	Total distance in km to the nearest highway from the hospital.		
3. Road network in the catchment area/district	Total length of road in km covering the catchment area of the hospital or district.		
4. Number of Projects, Mines and Industries	Total number of hydropower projects, mining, quarries, industries within the catchment area.		
5. High risk areas (landslides, flood, etc.)	High risk area is defined as the sum of all hazards that have potential threat to population in that catchment area.		
6. Number of referring health centers	Total number of health centers that the hospital is currently serving as referral center for. Only BHU-II and above will be considered to be counted as referring centers.		
7. Distance to higher level of center (km)	Total distance in km from the hospital to the nearest higher referral center.		

Section D: Mortality and Morbidity

Type of cases	Definition	Number	Remarks
1. Caseload	Total number of cases (IPD and OPD) in the past one year.		
2. No. of patients admitted	Total number of patients admitted to the hospital in the past one year.		
3. No. of trauma cases	Total number of trauma cases (drowning and submersion, accidental falls injury, road traffic accidents, work related injuries, burns and other injuries) admitted to the hospital in the past one year.		

Name and Designation of Respondent: _____

Name and Designation of Assessor: _____

Format to Calculate the Final Score (*to be used by Assessor***)**

Name of Hospital……..

CRITERIA	PARAMETER	TOTAL SCORE	SCORE	REMARKS
1. Bed capacity (16 %)				
	> 151 beds	16		
	61-150 beds	14		
	21-60 beds	12		
	<20 beds	10		
2. Infrastructure and Services (30 %)				
2.1. Triage area	Yes	2		
	No	0		
2.2. Resuscitation Room (Red)	Yes	2		
	No	0		
2.3. Treatment room/Acute Medical Care (Yellow)	Yes	2		
	No	0		

2.4. Observation Room (green)	Yes	2		
	No	0		
2.5. Intensive Care Unit	Yes	2		
	No	0		
2.6. Operating theater with post anesthetic recovery zone	Yes	2		
	No	0		
2.7. Isolation Room	Yes	2		
	No	0		
2.8. CSSD	Yes	2		
	No	0		
2.9. Ambulance (functional)	Yes	2		
	No	0		
2.10. Waiting area	Yes	2		
	No	0		
2.11. Oxygen supply	Yes	2		
	No	0		
2.12. Running water	Yes	2		

	No	0		
2.13. An electricity	Yes	2		
	No	0		
2.14. An internet connectivity	Yes	2		
	No	0		
2.15. Disaster contingency and plans in place	Yes	2		
	No	0		
3. Strategic Location (28 %)				
3.1. Number of Catchment Population	>50,000	5		
	20,001-49,999	3		
	<19,999	1		
3.2. Distance from highway (km)	≤1 km	3		
	>1 km	2		
3.3. Road network in the catchment area/district	≥1000	4		
	<999	2		
3.4. Number of Projects, Mines and	> 3	4		

Industries	1-3	2		
	0	0		
3.5. High risk areas (landslides, flood, etc.)	Yes	4		
	No	0		
3.6. Number of referring health center	≥10	5		
	<10	3		
3.7. Distance to higher level of center (km)	≥70 km	3		
	<70 km	1		
4. Type of Cases (26 %)				
4.1. Caseloads	>100,000	8		
	50,001-99,999	6		
	<50,000	4		
4.2. No. of patients admitted	>6000	8		
	3001-5999	6		
	<3000	4		
4.3. No. of trauma cases including burns	>2000	10		
	1001-1999	8		
	<1000	6		

* Region – If there is more number of health facilities from the same region, the Ministry will use its privilege to prioritize the health facilities as EMTC for regional balance and equity.

ANNEXURE 2: Check list for EMTC

	Name of Health Facility: _____						
Sl. No.	**SERVICES**	**Requirement**			**Status**		**Remarks/Justifications**
		Level I (Highest)	**Level II**	**Level III (Lowest)**	**Available (Number)**	**Not Available**	
Infrastructure							
1	Resuscitation room	E	E	E			
2	Treatment room	E	E	E			
3	Observation room	E	E	E			
4	Minor OT/Procedure room	E	E	E			
5	Isolation room	E	E	D			
6	Triage area	E	E	E			
7	Green area/minor care	E	E	E			
8	Ambulance bay	E	E	E			
9	Intensive Care Unit	E	D	-			
10	Operation theatre	E	E	E			
11	Burn care room	E	D	D			
12	Trauma registry	E	E	E			
13	Pharmacy	E	E	E			
14	Laboratory	E	E	E			

Prehospital Care services							
1	Emergency Medical Response Officer	E	E	E			
2	Emergency Medical Responder	E	E	E			
3	Advanced life support ambulance	E	E	D			
4	Basic life support ambulance	E	E	E			
5	Communication system with ED/ER	E	E	E			Radio or mobile phone
6	Emergency Aeromedical Retrieval	E	D	D			
7	Automatic External Defibrillator (AED)	E	E	E			
8	Standard Emergency Medical Kits	E	E	E			Developed by EMSD
Emergency Department							
1	Emergency Physician	E	D	-			
2	Nurses (Emergency, Critical care/Trauma/Triage Nurse)	E	E	E			
3	GDMO/MO with training in ATLS/ACLS	E	E	E			

4	Patient Triage protocols	E	E	E			SOP for training trauma and emergency patients
5	Communication system with prehospital responder	E	E	E			Radio/Phone
6	24hrs Consultant on call	E	E	E			
7	GDMO/MO available 24hrs	E	E	E			
9	Trauma/Emergency alert system	E	E	E			
10	Refrigerator – pharmacy and blood purpose	E	E	E			
11	Full range of splints	E	E	E			
12	ECG 12 lead	E	E	E			
21	Arterial Blood Gas (ABG) Machine	E	E	D			
22	Portable mechanical ventilator	E	E	E			
23	Laryngoscope: Adult, paediatric and neonate	E	E	E			
24	Defibrillator system: biphasic, cardio version, defibrillation, AED, pacing, and monitoring	E	E	E			

25	Emergency crash cart ABS trolley body	E	E	E			
26	Infusion pump	E	E	E			
27	Blood/Fluid warming set	E	E	E			
28	Suction machine	E	E	E			
29	Mayo Table	E	E	E			
30	Operation theatre light	E	E	E			
31	Oxygen cylinder – type A, B and D with accessories	E	E	E			
32	FAST scanning	E	E	E			
33	Chest drainage set	E	E	E			
15	Blood/Fluid warming set	E	E	E			
12	Patient transfer system: Easy move or pat slide; Full body length	E	E	E			
34	Bedside screen, 4 folds	E	E	E			
13	Photocopier & fax, Internet, Email	E	E	E			
Anesthesia/OT Services							
1	Anesthesiologist (General)	E	E	E			
2	Nurse anesthetist	E	E	E			
3	Arterial Blood Gas (ABG)	E	E	E			

	Machine						
4	BiPAP Machine: Portable	E	D	D			
5	Mechanical Ventilator	E	E	E			
6	Anaesthesia machine Vaporiser	E	E	E			
7	Anaesthesia monitor for patient	E	E	E			
8	Laryngoscope, Blade size: Adult, paediatric and neonate	E	E	E			
9	Monitor for post anesthesia care unit	E	E	E			
10	Defibrillator system Facilities: biphasic, cardio version, defibrillation, AED, pacing, and monitoring	E	E	E			
11	Emergency crash cart ABS trolley body	E	E	E			
12	Patient transfer system: Easy move or pat slide; Full body length	E	E	E			
13	Recovery trolley	E	E	E			
14	Infusion pump	E	E	E			

16	Suction machine	E	E	E			
17	Mayo Table, SS	E	E	E			
18	Operation theatre light	E	E	E			
19	Retractor, Collin' (pediatric and adult)	E	E	E			
Orthopedic Services							
1	Orthopedic Surgeon	E	E	E			
2	Ortho Technicians	E	E	E			
3	Pneumatic tourniquet system	E	D	-			
4	Bone drill set	E	E	E			
5	Traction, braces and accessories	E	E	E			
6	General orthopedic instruments set	E	E	E			
7	Traction bed	E	E	D			
Laboratory Services							
1	Lab technologist/technician	E	E	E			
3	Blood gases and pH analyzer	E	E	E			
4	Coagulation studies	E	E	E			
5	Drug and alcohol screening	E	E	E			

6	Microbiology	E	E	E			
7	Serum and urine osmolality	E	E	E			
8	Blood typing, screening, and cross matching	E	E	E			
9	Blood for transfusion	E	E	E			
Hemodialysis Services							
1	Concentrate mixing system Concentrate mixer for preparation of dialysis solution with complete set	E	D	-			
2	Hemodialysis machine	E	D	-			
3	Dialyser reprocessing system	E	D	-			
4	Hemodialysis chair	E	D	-			
5	Reverse osmosis system, portable	E	D	-			
Radio Imaging Services							
1	Radiologist	E	D	-			
2	X-Ray/Ultrasound Technician	E	E	E			
3	CT/MRI Technicians	E	-	-			
4	Computer Tomography (CT) Scanner	E	D	-			

5	X-Ray machine	E	E	E			
6	X-Ray machine, Portable	E	E	D			
7	MRI machine	E*	-	-			* Depending on situation
8	Ultrasound machine	E	E	E			
9	Ultrasound machine, Portable	E	E	D			
Other Specialities and Services							
1	Burns cradle Foldable; Whole body SS	E	E	D			
2	Nebulizer machine with tubings and mask, Adult and child	E	E	E			
3	Stretcher	E	E	E			
4	Weighing scale	E	E	E			
5	Autoclave	E	E	E			
6	Wheel chair (Adult and child)	E	E	E			
7	Endoscopy machine	E	D	-			
8	In-service training for ward nurses on Trauma/Emergency	E	E	E			
9	Trauma registry	E	E	E			

10	Up to date disaster plans for in & out of hospital disasters	E	E	E			
11	Regular tests of the disaster planning – including multidisciplinary involvement	E	E	E			
12	Intensive Care Unit	E	D	-			
13	Neuro Surgeon	E	D	-			
14	General Surgeon	E	E	E			
15	Therapist (Physio and occupational)	E	E	E			
16	Medical Specialist	E	E	D			
17	General Duty Medical Officer (GDMO)	E	E	E			
18	Gynecologist	E	E	D			
19	Pediatrician	E	D	D			
20	ENT/Maxillofacial	E	D	D			
21	Urology	E	D	D			
22	Cardiothoracic	E	D	D			
23	Pharmacist/technician	E	E	E			
24	Emergency Eye Care Services	E	E	E			

25	Electricity back up system	E	E	E			
26	General surgical instrument	E	E	E			
27	Thoracotomy instrument	E	E	-			
28	Spinal surgery instrument	E	D	-			
29	Facio-maxillary instrument	E	D	-			
30	Craniotomy instrument	E	D	-			
31	Physiotherapy equipment	E	E	D			

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