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SETTING UP THE WORLD HEALTH ORGANIZATION (WHO) - SINGAPORE EMERGENCY MEDICAL TEAM (SGEMT) FOR A TYPE 1 FIXED FACILITY DEPLOYMENT

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List of Abbreviations

ACLS	: Advanced Cardiac Life Support
APLS	: Advanced Paediatric Life Support
ARCH	: ASEAN Regional Capacity on Disaster Health Management
ASEAN	: Association of Southeast Asian Nations
ATLS	: Advanced Trauma Life Support
BCLS	: Basic Cardiac Life Support
CCTS	: Clinical Care Technical Standards
EMT	: Emergency Medical Team
EMTCC	: Emergency Medical Team Coordination Cell
HMLS	: HAZMAT Medical Life Support
LSCN	: Life Support Course for Nurses
MFA	: Ministry of Foreign Affairs
MHA	: Ministry of Home Affairs
MINDEF	: Ministry of Defence
MOH	: Ministry of Health
NHG	: National Healthcare Group
NUHS	: National University Health System
PAHO	: Pan American Health Organization
SGEMT	: Singapore Emergency Medical Team
SINGHEALTH	: Singapore Health Services

STES	: Singapore Technologies Engineering Synthesis
UN	: United Nations
WASH	: Water, Sanitation and Hygiene
WHO	: World Health Organization

ABSTRACT

Introduction: The World Health Organisation (WHO) Emergency Medical Team (EMT) initiative was formed in 2010 and is part of the United Nations' (UN) international disaster management and response ecosystem. To date, WHO has verified more than 35 EMTs internationally. The Association of Southeast Asian Nations (ASEAN) Regional Capacity on Disaster Health Management (ARCH) project was established in 2016 and is the collaboration mechanism for comprehensive capacity strengthening on disaster health management within ASEAN. In 2018, ASEAN member states accepted WHO's call for accredited EMTs and adoption of WHO standards. Within ASEAN, Thailand was the first to set up a WHO-EMT in 2019. In partnership with Singapore's Ministry of Health (MOH), Singapore Health Services (SingHealth), the largest public healthcare cluster, was tasked to help set up Singapore's in inaugural overseas emergency medical team under the WHO framework – the Singapore Emergency Medical Team (SGEMT) in 2023. **Objective:** This paper documents and shares key milestones during the creation of SGEMT. **Methods:** This is a qualitative study based on open-ended interviews with eight core members of the SGEMT planning committee and review of the relevant documents and processes pertaining to the overall disaster health response of the WHO EMT system and how SGEMT was developed by MOH and its public healthcare sector. A deductive approach to thematic analysis of the materials was performed. **Results:** Several themes were identified in the process of SGEMT formation. In chronological order, they were the whole-of-government approach, selecting the most suitable EMT typology, creating the EMT organizational structure, division of labour through creation of different working groups for different core technical standards and choosing the commercial tendering process for WASH and logistics. This process was augmented by guidance from WHO and regional partners through a mentorship programme. **Conclusion:** The process of creating SGEMT required strong political and organizational will. It was thematically sequenced into several crucial steps and required effective project management at various levels of labour division and invaluable input from WHO mentors. More academic papers should be written on the set-up of the WHO EMT, comparing experiences to obtain best practices and encouraging more teams to get accredited. This will greatly boost the international disaster response capabilities.

Keywords: WHO Emergency Medical Team; Singapore Emergency Medical Team; Capacity-Building

INTRODUCTION

The World Health Organization (WHO) Emergency Medical Team (EMT) initiative was formed in 2010, following the suboptimal international medical response in Haiti in 2010 and the recommendations from the WHO-Pan American Health Organization's (PAHO) guidelines on Foreign Field Hospitals in the Aftermath of Sudden-Impact Disaster (1–2). The WHO EMT Global Classification is an external peer review evaluation mechanism that assesses EMT compliance against internationally agreed guiding principles, and core and technical standards (1). Once an EMT is accredited by WHO, it enters the WHO registry of internationally deployable teams and is part of the United Nations' (UN) international disaster management and response ecosystem (3). Upon activation, WHO EMTs will report to EMT Coordination Cell (EMTCC) within the affected country before being deployed to its designated operational site. Since 2013, the WHO EMT system has been utilized in several disasters, including the 2015 Nepal earthquake and the 2020 Beirut Harbour explosion (4–8).

As part of the Association of Southeast Asian Nations (ASEAN), Singapore participates in the ASEAN Regional Capacity on Disaster Health Management (ARCH) project, which was established in 2016 (9). The ARCH project is the collaboration mechanism for comprehensive capacity strengthening on disaster health management at national and regional levels within ASEAN. ASEAN Member States (AMS) have been committed to provide effective mechanisms to achieve substantial reduction of disaster losses and to jointly respond to disaster emergencies through concerted efforts and strengthened collaboration (10–12). In 2018, AMS accepted WHO's call for accredited EMTs and adoption of WHO standards. Within ASEAN, Thailand was the first to set up a WHO EMT in 2019 (13).

Singapore is an island-state with a land area of 735.2 km^2 and a population of 5,917,600 (14–15). Its healthcare system consists of both public and private services. The hospital sector is dominated by public healthcare service, which provides for 83.8% of hospital beds and 77.8% of hospital admissions, and operates under three healthcare clusters, namely Singapore Health Services (SingHealth), National Healthcare Group (NHG) and National University Health System (NUHS) (16). Every cluster has its own network of primary care clinics, specialist centres, referral hospitals, and step-down care facilities.

Following the ASEAN commitment to WHO EMT standards in 2018, Singapore embarked on its journey to achieve WHO EMT accreditation in 2019. As the intent was to take

a whole-of-government approach, this required multiple and repeated discussions with various key stakeholders within Ministry of Health (MOH), Ministry of Defence (MINDEF), Ministry of Home Affairs (MHA) and Ministry of Foreign Affairs (MFA). The process was further delayed by the COVID-19 pandemic from 2020 to 2023. In 2023, Singapore resumed its journey toward developing a Singapore Emergency Medical Team (SGEMT), and successfully underwent the WHO EMT verification process in September 2024. This paper documents and shares key milestones during this journey.

METHODS

This paper is exempted from institutional review board approval. This is a qualitative study based on interviews and document review. Relevant documents pertaining to the overall disaster response of the WHO EMT system and SGEMT planning committee meeting minutes were reviewed. In June 2024, open-ended interviews were carried out face-to-face with all eight core members of the SGEMT planning committee. The core group consists of one director and three managers from MOH as well as two doctors, one nurse and one clinical operations administrator from SingHealth. A deductive approach to thematic analysis was performed by the authors. Informed consent was taken from interviewees and the owners of the meeting minutes. Confidentiality was waived by the interviewees as it presented no more than minimal risk of harm and the process was to elicit facts.

RESULTS

Based on the document review and open-ended interviews, several themes were identified. In chronological order, they were the whole-of-government approach, selection of EMT typology, the SGEMT organizational structure, the two core technical standards, development of the SGEMT clinical care technical standards (CCTS), outsourcing of the water, sanitation, hygiene (WASH) and logistics requirements. Throughout the process, SGEMT also received invaluable guidance from WHO and regional partners.

Whole-of-Government Approach

WHO EMTs come from a myriad of backgrounds. EMTs can be from government, non-governmental organizations, military, or international humanitarian networks such as the International Red Cross and Red Crescent Movement (1). The ideology behind Singapore's push to achieve WHO EMT accreditation is the government's commitment to ASEAN's ARCH project (9). Based on this; the approach was to form a government-backed, public healthcare

entity for WHO EMT verification. This also ties in with Singapore's local disaster response system, which utilizes a whole-of-government integrated risk management policy and deploys field medical teams from various public healthcare hospitals to the disaster site for on-site medical management of casualties (17).

For the formation of SGEMT for WHO accreditation, expertise from the following ministries were involved – MOH, MINDEF, MHA and MFA.Members from these ministries take on advisory roles in the establishment and accreditation of SGEMT. Depending on the nature of the deployment, members from MINDEF's Singapore Armed Forces or MHA's Singapore Civil Defence Force may also be invited to deploy as SGEMT partners. To ensure maximal efficiency, a conscious decision was made to appoint one of the three healthcare clusters to lead this effort. Members of the same healthcare cluster are more familiar with each other's capabilities and the availability of expertise. Administrative matters, such as requesting for time off and training venues, can also be settled promptly by one management level, assisted by one secretariat.

In partnership with MOH, SingHealth, being the largest of the three healthcare clusters, was tasked to set up Singapore's inaugural SGEMT for WHO EMT accreditation. The long-term plan is to rotate standby periods between the three healthcare clusters at steady state. Hence, to ensure continuity, pre-identified healthcare leaders from the other two clusters were invited to be advisors and observers to the developmental process.

Selection of EMT Typology

There are different types of EMT under the WHO framework, based on the mobility and level of care that can be provided (1). These are described in Table 1. Singapore has been involved in regional humanitarian efforts before, including deployment to Indonesia after the 2004 Indian Ocean earthquake and tsunami, and to Nepal after the 2015 earthquake (18–19). Prior to considering WHO EMT accreditation, standby rosters for overseas deployment of field medical teams, from the public healthcare sector, were already present. Singapore's current overseas field medical team's efforts are centred around primary healthcare but are also equipped to provide resuscitation and minor procedures. The prior deployments have mostly been in a fixed location, with occasional deployment of a small splinter medical team to more remote areas (19). This existing resource was a fit for the EMT Type 1, defined by WHO as "primary care facilities that can provide acute emergency care to the community" (1). With

these considerations, Singapore decided on a Type 1 fixed facility accreditation process, to fully utilize currently available resources and experience.

Table 1. WHO EMT Typology

Type of Teams	Description	Operational from arrival to affected area by at least:	Field operational for at least
Type 1 Mobile	Provide daylight hours care for stabilization of acute trauma and non-trauma presentations, referrals for further investigation or inpatient care and community-based primary care with the ability to work in multiple locations over the period of a deployment.	24 hours	2 weeks
Type 1 Fixed	Provides daylight hours care for acute trauma and non-traua presentations, referrals and for ongoing investigation or care and community-based primary care in an outpatient fixed facility.	24 hours	2 weeks
Type 2 Inpatient Surgical Emergency Care	Provides Type 1 services plus general and obstetric surgery for trauma and other major conditions as well as inpatient acute care.	24-36 hours	3 weeks
Type 3 Inpatient Referral Care	Provides Type 2 services plus complex referral and intensive care capacity.	36-48 hours	4 weeks
Specialized Care Teams	Additional specialized care teams that can be embedded in local health-care facilities or Type 2 or Type 3 unless specified otherwise, which can provide the following services: outbreak, surgical, rehabilitation, mental health, reproductive and newborn care, interdisciplinary, interhospital and technical support.	Variable	Variable

Source: Quah et al., 2025

The SGEMT Organizational Structure

The expected patient load for a EMT Type 1 fixed facility is 100 per day, operating largely during daylight hours for a minimum of two weeks (1). The clinical management is expected to centre around treatment of trauma and non-trauma emergencies, stabilization and referral of

patients requiring inpatient services, primary healthcare for basic communicable and non-communicable diseases, and basic reproductive health services. The final number of members in each WHO EMT is self-determined, taking into consideration that the team must be self-sufficient for the duration of deployment. Based on these parameters, the decision was made to form an 18-member medical team, with five doctors, ten nurses, one rehabilitative physiotherapist, one clinical psychologist and one clinical support staff. This number is above the recommended 12-member medical team as stated in the WHO published guidelines for classification and minimum standards for emergency medical teams (1). The medical members are all from Singhealth. In addition to this 18-member medical component, there is an additional 5-member administrative team from MOH and a 10-member logistic team from a designated logistics partner, to form a 33-member SGEMT contingent. Figure 1 shows the organization structure of SGEMT.

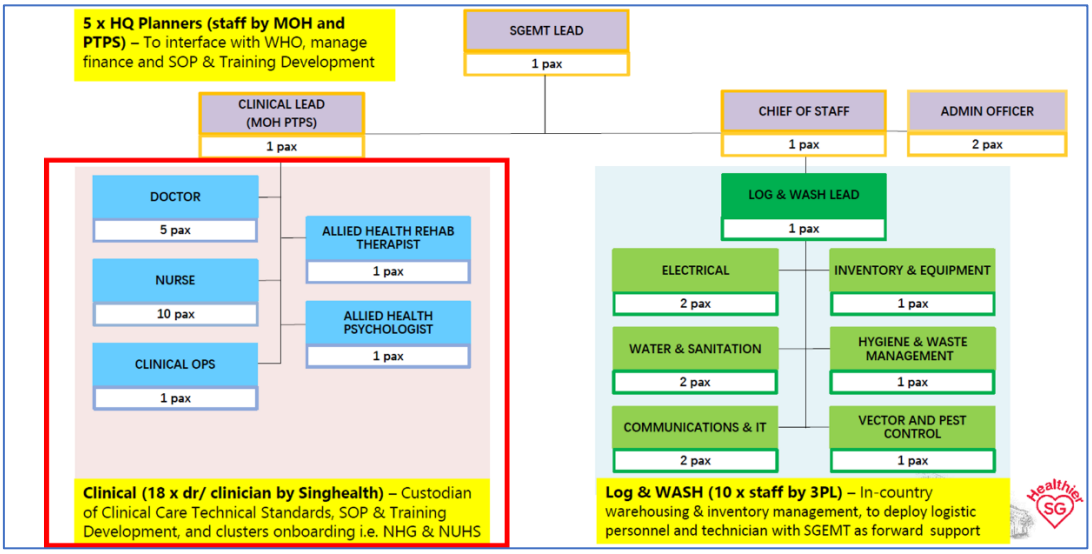

Figure 1. SGEMT Organizational Structure

Source: Quah et al., 2025

The make-up of the 18-member medical component is crucial to achieve operational competence for a Type 1 fixed facility. The team needs to have expertise in emergency medicine, family medicine, paediatric medicine, midwifery, rehabilitation, wound care and clinical psychology. As a basic requirement, all medical members must be certified in Basic Cardiac Life Support (BCLS). Within the team, there would be at least one member certified in Advanced Cardiac Life Support (ACLS), Advanced Paediatric Life Support (APLS), Advanced Trauma Life Support (ATLS), HAZMAT Medical Life Support (HMLS), Life Support Course

for Nurses (LSCN), Advanced Nursing Diploma in Emergency Medicine, Advanced Nursing Diploma in Midwifery and Psychological First Aid.

Table 2 shows the SGEMT clinical team make-up – each role's specialization, grade, and qualification required and its accompanying job description. Open calls for volunteers are regularly made and volunteers are recruited based on their specialization, grade and qualifications. It is mandatory for each member to go through a three-component SGEMT hybrid training programme comprising of e-learning modules, face-to-face workshop with a tabletop exercise and a ground deployment simulation exercise. A pool of 72 volunteers will be trained and placed on the standby roster. Upon activation, 18 personnel will be selected based on availability and needs

Table 2. SGEMT 18-member medical team, role description and qualifications required

Role	Specialization	Qualifications	Role Description
Doctor 1 (Medical Lead)	Emergency Medicine Specialist (Consultant and above)	Specialisation: Emergency Medicine Grade: Consultant and above Certification(s): BCLS, ACLS, APLS, ATLS, HMLS Confident in using POCUS in day-to-day work.	Provide expert opinion on all clinical decisions related to adult emergency and critical care and assumes primary responsibility for all such decision-making. Functions as trauma leader during management of a major trauma patient. Assists SGEMT Clinical Lead on administrative matters when called upon. Maintain watchfulness for psychological welfare of personnel in medical branch and administer psychological first aid appropriately.
Doctor 2	Family Medicine Specialist (Consultant and above)	Specialisation: Family Medicine Grade: Consultant and above Certification(s): BCLS, ACLS/APLS	Provide expert opinion on all clinical decisions relating to family medicine and continuing care. Assumes primary responsibility for all such decision-making.
Doctor 3	Paediatric Emergency Medicine Specialist (Senior Resident and above)	Specialisation: Paediatric Emergency Medicine Grade: Senior Resident and above Certification(s): BCLS, APLS, ATLS, HMLS	Provide expert opinion on all clinical decisions relating to paediatric emergency medicine and critical care. Assumes primary responsibility for all such decision-making.

Role	Specialization	Qualifications	Role Description
Doctor 4	Medical Officer / Junior Resident and above (MO Post-graduate year (PGY) 3 and above)	Specialisation: None required Grade: MO PGY3 and above Certification(s): BCLS, ACLS, APLS Experience: At least 6 months' experience in ED or polyclinic setting within the last 2 years	Participate in seeing patients and have cases cleared with an appointed senior.
Doctor 5	Medical Officer / Junior Resident and above (MO PGY3 and above)	Specialisation: None required Grade: MO PGY3 and above Certification(s): BCLS, ACLS, APLS Experience: At least 6 months' experience in ED or polyclinic setting within the last 2 years	Participate in seeing patients and have cases cleared with an appointed senior.
Nurse 1	Emergency Medicine (Nurse Manager/Clinician)	Specialisation: Emergency Medicine Grade: Nurse Manager / Nurse Clinician Certification(s): BCLS, Advanced Diploma (EM) and ACLS/LSCN/ATLS Experience: Minimum of 3 years of management experience	Lead and evaluate patient care activities and to ensure that care delivery is in accordance with the established policies, procedures and guidelines at the clinical areas. Monitor, evaluate and take corrective action on care rendered by the team of nurses to maintain the highest standard at clinical areas. Coordinate and collaborate with patients, other healthcare team members and patient's family on patient care and discharge needs. Take ownership of complex cases and facilitate smooth transfer to step down care. Provide direct patient care during surge capacity and in trying situations e.g., a complex or acutely ill patient. Monitor, evaluate and take corrective action on care rendered by the

Role	Specialization	Qualifications	Role Description
			team of nurses to maintain the highest standard of care.
Nurse 2	Emergency Medicine (Nurse Manager/Clinician)	As above	As above
Nurse 3	Emergency Medicine (Senior Staff Nurse)	Specialisation: Emergency Medicine Grade: Senior Staff Nurse Mandatory Certification(s): BCLS, Advanced Diploma (EM) Encouraged Certification(s): LSCN/ACLS/LSCN/PALS Experience: Trained in PAC-scale triage	Perform triage assessment and prioritize case based on severity of patient's illness and SGEMT policies. Assist with initial consultation, assessment, and management of patients with various acute medical or surgical complaints. Assist in performing basic procedures such as intravenous cannulation, urinary catheter insertion, toilet and suture of simple lacerations and back-slab application independently. Assist in performing advanced procedures such as airway management including use of non-invasive ventilation and endotracheal intubation, setting of chest drains and manipulation and reduction of displaced fractures under supervision. Documenting nursing management and progress on the patient case records provided. Coordinating care of patients requiring transfers and conveyances to other healthcare facilities.
Nurse 4	Paediatric Emergency Medicine (Nurse Manager / Nurse Clinician / Senior Staff Nurse)	Specialisation: Paediatric Emergency Medicine Grade: Nurse Manager / Nurse Clinician / Senior Staff Nurse Certification(s): BCLS, APLS, Advanced Diploma (EM)	As above, with reference to paediatric patients.

Role	Specialization	Qualifications	Role Description
Nurse 5	Paediatric Emergency Medicine (Senior Staff Nurse)	Specialisation: Paediatric Emergency Medicine Grade: Senior Staff Nurse Certification(s): BCLS, APLS	As above.
Nurse 6	Midwifery (Midwife)	Specialisation: Midwifery Grade: Midwife Certification(s): BCLS, Advanced Diploma in Midwifery	Provide quality nursing care to pregnant patients throughout the antepartum, intrapartum, and post-partum periods, including the care of newborn babies. Assists and guides patients on the different pain relief measures. Conducts normal vaginal deliveries for patients. Perform / assist in procedures such as prostin insertion, insertion of epidural catheter, removal of epidural catheter, insertion of fetal scalp electrode, artificial rupture of membranes and episiotomy repair. Initiates and supports breastfeeding. Document informative, accurate and concise statements on delivery data and nursing care in the patient case records provided.
Nurse 7	Midwifery (Midwife)	Specialisation: Midwifery Grade: Midwife Certification(s): BCLS, Advanced Diploma in Midwifery	As above
Nurse 8	Community / Polyclinic (Senior Staff Nurse / Senior Registered Nurse)	Specialisation: Community / Polyclinic Grade: Senior Staff Nurse / Senior Registered Nurse Certification(s): BCLS, LSCN	Coordinate and manage care for patients. Implement and evaluate nursing care activities for patients. Perform a variety of simple invasive and non-invasive procedures related to care plans, within the scope of duties. Assist doctors during clinical procedures, examination, and clinical assessment of patients as appropriate. Assess patient and develop discharge plan based on patient / family needs.

Role	Specialization	Qualifications	Role Description
			Implement discharge plan and interventions and communicate the plan with the multi-disciplinary team members like doctors and allied health professionals.
Nurse 9	Community / Polyclinic (Senior Staff Nurse / Staff Nurse / Registered Nurse)	Specialisation: Community / Polyclinic Grade: Senior Staff Nurse / Staff Nurse / Registered Nurse Certification(s): BCLS, LSCN	As above
Nurse 10	Medical / Surgical / Orthopaedics (Senior Staff Nurse)	Specialisation: Medical / Surgical / Orthopaedics Grade: Senior Staff Nurse Certification(s): BCLS Experience: Minimum of 3 years of experience in specialized wound care management	As above. Provide expertise and tend to patients requiring special or continual wound care.
Allied Health Therapist	Rehabilitation Therapist	Specialisation: Physiotherapy Grade: Physiotherapist Certification(s): BCLS, CPR/AED Optional certification(s): Sports First Aid (with concussion training) Experience: Completed all rotations	Assessment and treatment of patients including but not limited to – fractures, spinal cord injuries, amputation, peripheral nerve injury, burns, traumatic brain injury. Appropriate referral of patients for follow-up rehabilitation at appropriate local provider or Type 2 or 3 EMT facilities. Assist with discharge planning, provide appropriate walking aids and assistive device to aid with discharge. Accurate documentation of patient records. Support Clinical Ops as needed.
Allied Health Psychologist	Clinical Psychologist	Specialisation: Clinical Psychology Grade: Senior Psychologist Certification(s): BCLS, PFA	Providing psychological support to the SGEMT. Performing Psychological First Aid and brief interventions for SGEMT and patients in distress when needed. Coordinating care of patients requiring

Role	Specialization	Qualifications	Role Description
		Experience: Familiar and proficient with the provision of trauma care and stabilization-focused interventions and preferably has experience providing psychosocial support post-disaster/large scale crisis	continued psychological support to other local mental health resources / network.
Clinical Operations	Crisis Planning and Operations / Emergency Planning (Assistant Manager and above, or involved in WHO-SGEMT accreditation process)	Specialisation: Crisis Planning and Operations / Emergency Planning Grade: Assistant Manager and above, or involved in WHO-SGEMT accreditation process Certification(s): BCLS Experience: Coordinating major events, exercises and a broad range of hospital-level operational activities, and hands-on experience in managing emergency response operations	Daily operations management to oversee communications and flow of information within clinical team and between clinical team and admin team and LOGS-WASH lead respectively. Daily operations management to oversee clinical structure and space usage and supplies and equipment management. Assist in registration of patients. Coordination of patient transfers and conveyances to other healthcare facilities. Coordination and disposal of waste materials (waste management). Coordination of lodging and transportation for medical team (to link up with vendor). Manage clinical operations in terms of communications and cleanliness within the clinical area of SGEMT.

Source: Quah et al., 2025

The Two Core Technical Standards

In accordance with the WHO EMT guidelines for classification and minimum standards for emergency medical teams, there are two core technical standards – the clinical care technical standards (CCTS) and the operations support technical standards (1). The CCTS aims to standardize and provide a consistent level of care across different countries and organizations. It consists of 27 clinical standards, which vary between EMT typologies. The operations support technical standards concern two main areas – WASH and logistics. The WASH standards govern the infection prevention and control methods of the EMT, in seven different

areas, such as healthcare waste management, environmental cleaning and sanitation. The logistics standards govern the operational functionality and self-sufficiency of EMTs, in 13 different areas, such as mobilization, food, communications.

Developing the SGEMT CCTS

A multi-disciplinary clinical working committee from Singhealth was set up to develop the SGEMT CCTS. This involved doctors, nurses, allied health professionals, such as pharmacists, physiotherapists, clinical psychologists, and clinical operations specialists. Out of 27 clinical standards listed in the WHO EMT guidelines, 24 are applicable to a type 1 fixed facility. The working group used these 24 clinical standards to craft 24 chapters in the CCTS. Each chapter had a relevant content expert creator, such as a paediatrician for the chapter on child health and an emergency physician for the chapter on assessment, resuscitation, and stabilization. Local and international clinical guidelines and standards were used as references. These include Advanced Trauma Life Support manual developed by the American College of Surgeons, resuscitation algorithms from the Singapore National Resuscitation Council, Singapore's national emergency department triage system known as the Patient Acuity Category (PAC) Scale and reference textbooks (20–28).

Table 3 gives further information on these 24 chapters and a description of what was included in the SGEMT CCTS manual. The clinical working committee started work on the SGEMT CCTS in April 2023 and completed the first draft in July 2023. Further revisions and iterations were made following several close and detailed discussions with our SGEMT mentors from WHO. The development of the SGEMT CCTS manual also helped SGEMT members to better understand their roles and responsibilities during deployment and to engage in a mental exercise of resources required to care for community as a Type 1 Fixed EMT. In addition, several SGEMT members attended regional disaster response exercises and courses in 2023, to gain a clearer understanding of the WHO EMT concept of operations. These include the ASEAN Regional Drill Exercise in Indonesia, the Regional Collaboration Drill in Malaysia and the Asia Pacific Earthquake Emergency Response Exercise in Brisbane (11, 29–30)

Table 3. SGEMT Clinical Care Technical Standards Manual.

	SGEMT CCTS Chapters	Description
1	Initial Assessment & Triage	Screening will be performed to pick up potential infectious disease cases. Singapore Emergency Department triage protocol will be utilized (25-26). Triage Sieve will be used for mass casualty incident scenarios.
2	Assessment, Resuscitation & Stabilization	Resuscitation algorithms will be according to the Singapore National Resuscitation Guidelines (21-23). ATLS will be used for trauma patients (24).
3	Referral & Transfer	SGEMT will have established protocols to liaise with EMTCC, to facilitate safe transfer of patient and complete handover of clinical details.
4	Observational Care	SGEMT will provide for prolonged observation if required, during operational hours of SGEMT. Regular reviews will be conducted.
5	Sedation and Analgesia	SGEMT has trained, certified and experienced physicians licensed to administer analgesics, sedatives, and local or regional anaesthesia for various conditions or procedures.
6	Minor procedures with local or regional anaesthesia	SGEMT will be able to provide joint and fracture reductions, incision and drainage of abscesses, toilet and suture of lacerations and wound debridement. Other procedures include setting of intravenous lines and nebulization of medications.
7	Laboratory Services	SGEMT will be trained to operate the point-of-care tests available. These include I-stat analyzer for blood gas, electrolytes and haemoglobin sampling, glucometer, urine HCG, 12-lead electrocardiogram, rapid diagnostic kit for malaria, ART kits for COVID-19 and portable ultrasound.
8	Clinical Pharmacy and Consumables	Pre-deployment, SGEMT works closely with pharmacists to curate the quantity and type of drugs required to perform its function, provide oversight on the layout and set-up of the pharmacy within SGEMT base of operations, implement a system to monitor stock. Only physicians with prescribing rights in Singapore are allowed to prescribe within SGEMT.
9	Sterilization	SGEMT will mostly be utilizing disposable sets. For non-disposables, there will be a basic steam autoclave machine with protocols in place to ensure sterility or the use of 3-wipe chemical sterilization.

	SGEMT CCTS Chapters	Description
10	Infection, Prevention and Control	SGEMT will appoint a responsible IPC member within the team who oversees the team's adherence to protocols. The protocols are there to prevent transmission of pathogens, communicable diseases and any multi-resistant organisms that have higher incidence of occurrence within a healthcare setting. These include proper environment hygiene practices and transmission-based precautions for staff.
11	Health Promotion & Community	SGEMT will integrate information, education, and communication materials into daily operations. Communication will be based on host country's or WHO's available publications online. It will centre around injury prevention, basic wound management, food safety, water safety, personal hygiene, communicable diseases and managing acute psychological stress.
12	Chemical, biological, radiological and nuclear (CBRN), Toxicology and Toxinology	SGEMT will have the capacity to recognize victims of CBRN exposure and to protect themselves with basic personal protective equipment when there is any suspicion for potential contamination of staff.
13	Wound Care	SGEMT will have an established system for wound assessment, management, and treatment. There is suggested recommendations for wounds requiring transfer. There will be a designated wound care nurse.
14	Burns	SGEMT will only manage up to superficial burns of ≤ 5% TBSA. Patients with more severe burns will be stabilized for transfer, complete with adequate pain relief and burns dressing.
15	Fracture & Limb Injuries	SGEMT will not have an x-ray machine. The diagnosis of a fracture will be made clinically, if possible. Plaster casts are available for limb immobilization. Appropriate follow-up and transfers will be made for patients required imaging and advanced care.
16	Spinal Cord Injuries	SGEMT will ensure appropriate examination to assess concomitant trauma, diagnose possible spinal cord injuries, immobilize, and transfer with care, to avoid further damage.
17	Communicable Disease Care	SGEMT has isolation areas, with separate sanitation facilities, donning and doffing areas for staff and established infectious wastewater treatment. Emphasized informing EMTCC early.
18	Non-Communicable Disease Care	SGEMT will treat patients with non-communicable diseases, temporarily re-establish their medication supply and ensure referral back to their community services.

	SGEMT CCTS Chapters	Description
19	Reproductive, Maternal & Newborn	SGEMT will provide emergency care for any uncomplicated normal delivery, if delivery is imminent. There will be a dedicated obstetric area. Complicated maternal cases will be transferred. There are guidelines for cases of gender-based violence.
20	Child Health	SGEMT will provide basic emergency and trauma stabilization, essential newborn care, outpatient paediatric care, screening and isolation of communication diseases and basic management of non-communicable diseases.
21	Malnutrition	SGEMT will conduct screening for malnutrition for children aged 6 to 59 months, using the mid-upper arm circumference (MUAC) measurement. SGEMT will provide initial treatment with therapeutic food and ensure follow-up with relevant organizations.
22	Palliative Care	SGEMT recognizes and will respect local cultures and values in making shared medical decisions. Palliation will be provided for suitable patients, aiming to provide symptom relief and dignity at end-of-life.
23	Physiotherapy & Rehabilitation	SGEMT will teach usage of ambulatory aids, such as crutches and basic physiotherapy exercises. If prolonged rehabilitative care is required, appropriate referral will be made before SGEMT exits.
24	Mental Health & Psychosocial	All SGEMT staff will undergo basic psychological first aid training pre-deployment. There will also be a dedicated clinical psychologist, who will attend to patients with chronic mental health issues. Continuation of care referrals will be made before SGEMT exits. There will be no dispensing of psychotropic medications.

Source: Quah et al., 2025

Outsourcing of the WASH & Logistics Standards

The operations support technical standards consist of WASH and logistics. WASH and logistics require a logistical company and a specialized crew who can provide and maintain facility structure, water sources, power supply, cleanliness, safety, warehousing, and transport of materials. The planning parameters were taken to be a total of 100 patients a day, for a minimum of 14-day deployment period. Out of 100 patients a day, 60 percent were estimated to be adults and 40 percent to be children under the age of 16 years old. In terms of disease

acuity, we estimate 20 percent attendance to be priority 1 (severely ill) cases, 30 percent attendance to be priority 2 (moderately ill) cases and the remaining 50 percent to be priority 3 (mildly ill) cases. Contingencies were also planned for, should the EMT see more than 100 patients a day or are requested to stay beyond 14 days, with an additional 50 percent logistical load.

The tendering process was chosen to right-site resources. For SGEMT, MOH is meant to function at a strategic level while the public healthcare cluster functions at an operations level. It would be unwise to task one public healthcare cluster to perform warehousing and crew supply as all three clusters will take turns to be on standby and to be deployed. It would also be a waste of resources for all three clusters to prepare their own warehouses, materials, and crew. Collaborating with other ministries, such as MINDEF and MHA, was also explored. Ultimately, outsourcing via the tendering process was the most efficient, in terms of economics and personnel management. This approach ensures that the operational and logistical needs of SGEMT are met with the highest level of expertise.

A detailed list of requirements, including personnel, logistics, transportation, warehouse maintenance, was drawn up and MOH called for and subsequently awarded the tender to a vendor on the open market. Several vendors with relevant experiences responded to the tender. The logistics belong to MOH, but the vendor is reimbursed for their services to source, purchase, store and maintain the validity of these logistics as well as to provide round-the-clock roster of deployable personnel. Additional fees are incurred by MOH during deployment, to cover costs relating to freight, personnel flights, insurance, and overseas allowances. The SGEMT Logistics Technical Standards manual mirrors the 13 chapters listed in the WHO EMT guidelines, and the SGEMT WASH Technical Standards manual covers the listed seven chapters.

Guidance from WHO and Regional Partners

The WHO EMT verification process comes with allocation of mentors from WHO, as well as members of recently accredited EMT teams (14). The WHO mentorship programme is invaluable, as they share their experiences from previous deployments and give advice on matters arising. SGEMT had three mentors, each with different focus areas. The first was a WHO personnel who assisted with administrative queries, the second was a doctor from a recently accredited EMT who assisted with clinical core standards while the third was a fire and emergency officer who assisted with operations support. Their broad base of knowledge covered all aspects of developing an EMT.

DISCUSSION

There are several valuable lessons to be learnt during the SGEMT accreditation process. Firstly, developing an EMT is an ambitious and laborious project. At the heart of the matter is the ideal of human compassion across and despite borders in times of extreme needs. To achieve that ideal, a strong organizational or political will is the first requirement. This was first displayed by WHO in establishing the EMT initiative in 2013. Subsequently, ASEAN member states supported this initiative collectively. In Singapore, her government answered the call and appointed MOH to lead this project with the support of an existing whole-of-government mechanism.

It was also vital for MOH to form the development team with appropriate stakeholders. The strategic move taken was to engage one public healthcare cluster for the initial development instead of all three at the same time, while keeping the other two apprised of the process. This allowed maximal efficiency, in terms of mutual understanding, communications and secretariat support. However, the challenge in the future is the handover process from one cluster to another. MOH needs to place safeguards to ensure that knowledge and skill transference is complete. This may include having to set up a quality assurance committee made up of members from all three clusters, overseeing pre-deployment training, content updates and post-deployment debriefs and follow-up actions. The same quality assurance committee may then be tasked to participate in future re-accreditation process.

Division of labour was an important aspect of SGEMT development. From the start, different working groups were set up to meet the needs. For example, clinicians were tasked to develop the CCTS manual, while the WASH manual was developed by personnel within MOH and other members of relevant ministries, such as MINDEF. This allowed the people with the best expertise to focus on the different needs of SGEMT. The challenge with such an approach is when domains overlap between working groups, for example, the management of medical waste are both important chapters in CCTS and WASH manuals. The solution was having an MOH personnel in attendance at each working group meeting. If one working group had a query which crosses over to another domain, it can be quickly resolved by the MOH personnel.

This approach also allowed them, as project manager, to have an oversight of all parallel developments. Even within each working group, there is further division of labour, where a member may be allocated to several chapters, as content expert or be advised to seek expertise within the cluster for content verification. The working group head is again kept apprised of all parallel developments and steps in to resolve technical difficulties.

It is uncommon for EMTs to outsource their WASH and logistics personnel and processes, via a commercial tendering process. Most will buy or rent their own warehouses and hire personnel to maintain the validity of the logistics. The SGEMT approach is a step away from convention. This approach may help to reduce the daunting aspect of operations support for organizations and countries who may wish to consider EMT accreditation in the future. The challenge associated with this approach may be in the overall cost and the quality of logisticians provided for deployment.

In a bid to drive costs down, the tendering process was made public to invite competition between suppliers. Several suppliers responded to the tender. As part of the tender agreement and to ensure quality of the personnel, logistical personnel provided need to fulfil certain requirements relating to experience, age, general fitness, and had to complete the pre-deployment course prior.

Lastly, the WHO mentorship program was invaluable to the development process of SGEMT. They participated in regular meetings, whether virtually or in person. They were also reachable via electronic mail for consultation. Their experience allowed more realistic planning. For example, while Type 1 Fixed facilities are expected to treat 100 patients a day, their experience seems to suggest that it is usually more than 100, rather than less. This resulted in the decision to plan for an additional 50 percent logistics. They were also open to hearing new ideas and providing advice on whether these may or may not work.

To date, there is only one journal publication documenting the set-up of a WHO EMT, by Thailand (14). There were similar themes, such as a requirement for strong organizational will with realistic funding and manpower support, a whole-of-government engagement, the need for a strong project management approach, creation of a working group with designated functional team leaders, the conduct of training using workshops and simulation and invaluable support from the WHO mentors. The main difference was in WASH and logistics where Singapore chose to outsource via a commercial tendering process instead.

A limitation of this study includes its generalizability, as a single country's experience may not be applicable to other organizations or countries. More publications can be encouraged in this area, to compare the experiences from different WHO EMTs and share best practices. This will provide more information for those who may be considering this endeavour.

CONCLUSION

SGEMT was successfully accredited in September 2024. The SGEMT process was sequenced into making it a whole-of-government effort, selecting the most suitable EMT

typology, choosing relevant stakeholders, creating the EMT organizational structure, division of labour through creation of different working groups for different core technical standards and choosing the tendering process for WASH and logistics. This requires strong political and organizational will, effective project management at various levels of labour division and invaluable input from WHO mentors allocated to SGEMT. More academic papers should be written on the set-up of the WHO EMT, comparing experiences to obtain best practices and encouraging more teams to get accredited. This will greatly boost the international disaster response capabilities.

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AUTHORS' CONTRIBUTION

Kee Chong Ng conceptualised and wrote the initial manuscript. Joy Quah took the lead in completing the manuscript. All the remaining authors contributed to the critical edits of the final manuscript. All the authors were involved in the development of SGEMT.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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