

Emergency with Resiliency Equals Efficiency – Challenges of an EMT-3 in Nepal

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Abbreviations:

EMT: Emergency Medical Team
FDST: Forward Disaster Scout Team
ICU: intensive care unit
IDF: Israel Defense Forces
IEMT: Israeli Emergency Medical Team
SOD: sudden onset disaster
WHO: World Health Organization

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Specific Event Identifiers:

Event Type: Earthquake.

Event Onset Date: April 25, 2015.

Location of Event: Ghorka District, Nepal.

Geographic Coordinates: lat = 28.147; lon = 84.708; elevation = 1000 m.

Time of Observation Reported: 11:56:26 AM NST (Nepal Standard Time).

Response Type: Medical Relief.

Abstract

The 7.8 M_W (moment magnitude scale) earthquake that hit Nepal on April 25, 2015 caused significant casualties and serious damage to infrastructure.

The Israeli Emergency Medical Team (IEMT; later verified as EMT-3) was deployed 80 hours after the earthquake. A Forward Disaster Scout Team (FDST) that was dispatched to the disaster area a few hours after the disaster relayed pre-deployment information.

The EMT staff was comprised of 42 physicians. A total of 1,668 patients were treated. The number of non-trauma cases increased as the days went by. The hospitalization rate was 31%. Wound debridement procedures were the most common operations performed.

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Introduction

On April 25, 2015, an earthquake of 7.8 M_W (moment magnitude scale) hit Nepal from an epicenter located in the Ghorka district, about 80 kilometers west of the capital Kathmandu. Estimated casualties exceeded 9,000 people killed, 23,000 people injured, and two million people displaced from their homes.^{1,2} Collapsed buildings with residents inside and severe infrastructure damage were common (Figure 1).

The Israel Defense Force (IDF; Jerusalem, Israel) dispatched its Forward Disaster Scout Team (FDST) to the disaster area. The team's missions included gathering and relaying relevant information about the scale of the disaster, the injury types and load inflicted, the status of the local hospitals, and a preliminary assessment of the medical and/or other humanitarian needs required. The information was relayed to the commanding personnel of the Emergency Medical Team (EMT) in Israel in order to help gear-up accordingly.³

A Type 3 EMT was assembled 80 hours after the earthquake in Kathmandu. According to World Health Organization (WHO; Geneva, Switzerland) classification, a Type 3 EMT is defined as an "Inpatient Referral Care Complex" which, among other services, provides in-patient referral surgical care as well as intensive care services (Table 1).

As requested by the Nepalese army, the Israeli EMT (IEMT) was deployed within the Birendra Military Hospital Compound (Kathmandu, Nepal) where it served both as a primary care center as well as an in-patient referral center for hospitals and for other lower level EMTs.

The authors were part of the commanding personnel of the EMT whose mission objective was to provide medical and humanitarian aid to anyone who needed it.

The purpose of this manuscript is to summarize the IEMT's experience in Nepal and to emphasize the specific challenges that a Type 3 EMT might expect to encounter.



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Figure 1. Collapse of Buildings with Residents Inside and Ruins of Houses and Buildings.

EMT TYPE	DEFINITION	SERVICES	OPENING HOURS
1- Outpatient Emergency Care	Out-patient initial emergency care of injuries and other significant health care needs.	<ul style="list-style-type: none"> • Triage, assessment, first aid. • Stabilization + referral of severe trauma and non-trauma emergencies. • Definitive care for minor trauma and non-trauma emergencies. 	Day-Time Services
2- Inpatient Surgical Emergency Care	In-patient acute care, general and obstetric surgery for trauma and other major conditions.	<ul style="list-style-type: none"> • Surgical triage, assessment, and Advanced Life Support. • Definitive wound and basic fracture management. • Damage control surgery. • Emergency general and obstetric surgery. • In-patient care for non-trauma emergencies. • Basic anesthesia, X-ray, blood transfusion, lab, and rehab services. • Acceptance and referral services. 	Day and Night Services
3- Inpatient Referral Care	Complex in-patient referral surgical care, including intensive care capacity.	<ul style="list-style-type: none"> • Capacity to provide Type 2 services. • Complex reconstructive wound and orthopedic care. • Enhanced X-ray, blood transfusion, lab, and rehab services. • High-level pediatric and adult anesthesia. • Intensive care beds with 24-hour monitoring and ability to ventilate. • Acceptance and referral services. 	Day and Night Services
4- Additional Specialized Care EMT	Additional specialized care cells within Type 2, 3, or an EMT.	<ul style="list-style-type: none"> • Context-specific specialist care supplementary to Type 2 + 3 FMT services or local EMT. • Specialized services may include: burn care, dialysis and care for crush syndrome, maxillo-facial surgery, orthoplastic surgery, intensive rehabilitation, maternal health,^a neonatal and pediatric transport and retrieval.^a 	On Request

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Table 1. Classification and Minimum Standards for EMTs in SODs

Note: Adopted from Norton, et al; 2013.⁵

Abbreviations: EMT, Emergency Medical Team; FMT, Foreign Medical Team; SOD, sudden onset disaster.

^aUnits that may be self-contained not embedded.

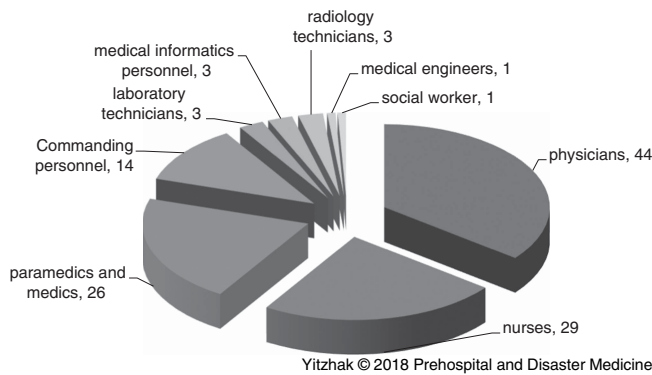


Figure 2. Composition of the Israeli Emergency Medical Team Personnel in Nepal.

Source

Hospital and patient data were collected in the form of mandatory action reports which were registered into the IDF Medical Corps computerized data registry. Patient data were collected using an International Classification of Diseases, Ninth Revision diagnosis code of 800 to 959.9. The cumulative patient records were entered into a Microsoft Excel spreadsheet Version 1802 (Microsoft Corporation; Redmond, Washington USA) and analyzed.

Observations

Contingency deployment protocols that include impetuous FDST dispatch, commanding personnel recruitment, and appropriate equipment preparation were launched. Equipping the team per protocol is based upon previous experiences from similar missions.³ As soon as information from the FDST arrives, the necessary team and equipment adaptations and fine-tuning are made accordingly.

Four treatment wards and four sections for medical logistic services were prepared. The treatment wards included three admission wards (pediatric, adult, and gynecology/obstetrics) and one intensive care unit (ICU) ward. The adult admission ward oversaw all the adolescent and adult patients (above 16 years old) from all the required disciplines: medical, surgical, orthopedic, maxillofacial, ophthalmology, and ear, nose, and throat/ENT.

The four sections of the medical logistics included radiology, field laboratory, medical informatics, and command sections.

Forty-four beds were available to the EMT for admission, including eight ICU beds (with ability to expand to 12 beds) and two operating tables.

The staff comprised of 124 medical and paramedical personnel, divided into commanding and non-commanding posts (Figure 2). The commanding personnel were picked per experience from previous humanitarian missions abroad, whereas the non-commanding and purely professional staff included personnel that have been previously deployed at least once to a disaster zone (20 physicians), as well as personnel to whom this was their first mission (22 physicians).

A total of 1,668 patients presented to the EMT, out of which 785 (47%) were male. Five-hundred and eleven patients were hospitalized (hospitalization rate = 31%). Most patients (1,015; 61%) were within the adult (19–55) age group (Table 2).

As expected, less trauma cases presented to the EMT as time passed by. Figure 3 depicts the distribution of trauma and non-trauma cases by day. The types of operations performed by the EMT are depicted in Table 3. Most of the surgeries were

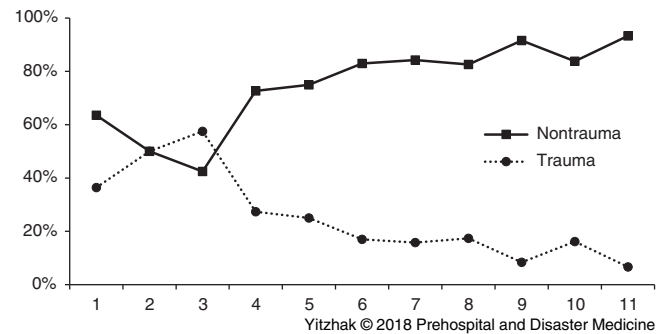


Figure 3. Distribution of Trauma and Non-Trauma Cases - Nepal 2015.

orthopedic and performed for wound debridement as the major diagnosis.

Analysis

The IDF dispatched its FDST to Nepal as soon as news of the disaster was made public.^{3–6} Under the guidance of the FDST, the IEMT deployed 80 hours after the earthquake.^{7–13}

Among 98 different international teams that responded to the Nepal earthquake, the IEMT was the only one to be later recognized as Level 3 EMT by WHO.^{2,14,15}

The WHO classification of EMT types for sudden onset disasters (SODs) is based upon the presence of certain capabilities (Table 1). For example, a Type 3 EMT should be able to provide large, 40–100 bed facilities and to support or replace tertiary hospitals.⁴

Emergency Medical Team refinements are made based on the specific disaster scenario and challenges that it is supposed to face. The authors classify the expected challenges into two major categories.¹⁶ Category A: EMT-tailored mainly for disasters that damaged the country's infrastructure and medical treatment facilities. In such scenarios, the challenge primarily involves severe and untreated trauma cases related to the disaster. Such challenges were experienced by the IEMT in the aftermath of the earthquake in Haiti in January 2010.⁷ Category B: EMT-tailored mainly for disasters that left the country's infrastructure intact or partially functioning, thus enabling treatment of the major trauma cases by the local health facilities. In such scenarios, the challenge primarily involves treatment of indigenous diseases, and serving as a referral center for the local hospitals and/or other EMTs, owing to the burden on the local medical facilities. Such challenges were experienced by the IEMT in the aftermath of the Typhoon Yolanda in the Philippines in November 2013.¹⁷

The IEMT deployed in the aftermath of the Nepal earthquake suited the Category B mentioned above.

The demographics of the patients that presented to the EMT show a majority of young males, unlike the typical gender epidemiology of earthquakes described by Neumayer and Plümper in 2008.^{18,19} These data may verify that the IEMT served as a local Category B, largely non-trauma, care-giving facility.

Recommendations

The authors identify the following challenges and suggested recommendations for a Type 3 EMT:

1. **Challenge:** Lack of advanced diagnostic instruments like computerized tomography/CT scans and magnetic

AGE GROUP	MALE (% of total)	FEMALE (% of total)	TOTAL
0-2	49 (3%)	38 (2.2%)	87
3-18	210 (12.6%)	153 (9%)	363
19-55	433 (26%)	582 (35%)	1015
56+	93 (5.6%)	110 (6.6%)	203
TOTAL	785 (47%)	883 (53%)	1668

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Table 2. Demography of Patients Presented to the IDF Field Hospital in Kathmandu
Abbreviation: IDF, Israel Defense Force.

Group	N
Orthopedic	117 (43.3%)
Plastic Surgery	51 (19%)
Radiology	33 (12.2%)
Ob/GYN	26 (9.63%)
Maxillofacial	10 (3.7%)
General Surgery	3 (1.1%)
Ophthalmologic	2 (0.7%)
Other	28 (10.37%)
Total	270

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Table 3. Case-Mix of Patients that Underwent Surgery in the IDF Field EMT in Kathmandu
Abbreviations: EMT, Emergency Medical Team; IDF, Israel Defense Force.

resonance imaging/MRI.

Recommendation: A strong leadership comprised of experienced department chairs from Israel's leading civilian hospitals is important for the mission's success. Such a leadership enabled reliance on clinical decisions of department heads whose educated "gut-feelings" could compensate for the lack of experience.

- Challenge:** Diminution of resources (manpower, space, medical equipment, and supplies).

Recommendation: Versatility (ie, team/space) and pooling of resources. The EMT's largest in-patient ward – the "adult admission ward" – was required to incorporate patients from various disciplines. Such a diverse patient load demands capable multi-disciplinary care, including an adaptive and versatile nursing team.

- Challenge:** Badly needed ICU beds.

Recommendation: Triage decisions were made in order to make this resource available to patients who would benefit from it the most.¹⁷ A fully equipped, large ICU and balanced triage decisions are among the set of challenges encountered by an EMT-3 team.



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Figure 4. Pre-Deployment Planning Enabled Deployment Near a Helicopter Landing Area within the Birendra Military Hospital Compound.

- Challenge:** Declared higher level of care required from a referral center.

Recommendation: The EMT should be able to offer a higher level of care, both in specialty personnel and equipment. Complicated patients receiving primary treatment in less advanced facilities may be referred to the EMT at any time. A 24/7 laboratory and imaging service, as well as a well-equipped ICU service, were the most utilized EMT resources used for referral.

Additionally, careful pre-deployment planning enabled deployment near a helicopter landing area (Figure 4), a decision that proved useful for referral purposes since landslides that blocked the highways made wheeled medical evacuations difficult.

- Challenge:** Team accommodation – various foreign medical personnel in disaster areas seek to join larger teams. Lending the EMT's auspices to foreign medical personnel who work with good intentions, but whose credentials, immunization status, and/or medical abilities could not be easily verified is another challenge.¹⁵ Moral and medicolegal responsibilities need to be considered and dealt with. The moral responsibility refers to making sure that the person/EMT seeking to join the higher level EMT has the required medical skills; the medicolegal responsibility refers to ensuring that all accommodated teams abide by the same rules and regulations.²⁰

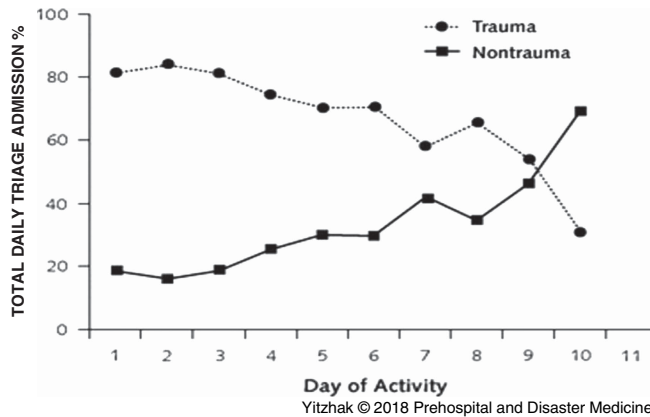


Figure 5. Distribution of Trauma and Non-Trauma Cases - Haiti 2010.⁷

Recommendation: In general, the IEMT policy is to incorporate every foreign volunteer under its umbrella, but at the same time, enable provision of care only under direct supervision by the commanding and/or professional personnel.

6. **Challenge:** As expected, with time (Figure 3 and Figure 5), more non-trauma cases were referred. With the understanding that the local facilities will be overwhelmed for several weeks after the first few days of the disaster and might not have sufficient vacancy required for accommodating routine cases, there is an advantage in EMTs staying around and assisting in the routine patient load that would have burdened the local health facilities.

Recommendation: As dictated by such a requirement, the EMT's clinicians are required to be updated about the local disease epidemiology, as well as the appropriate expertise to deal with it. Such an additional expertise enables the team exercise an "open-door" policy and treat everyone coming through its doors.

Limitations

It is to be noted that this might be the first and only manuscript in the English literature that discusses the challenges faced by a Type 3 EMT. However, the main limitation of the report presented in the manuscript lies in the very fact that there are no other similar data to compare the challenges and recommendations with.

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