

CSMIA Mock Drill and Juhu Aerodrome Emergency Exercise, Mumbai 2023: A Case Study

Renaldo Pavrey 

Centre for Accident & Emergency Medicine, Nanavati Max Super Specialty Hospital, Mumbai, India
Email: renaldo.pavrey@gmail.com

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Abstract

Background: As a step towards building disaster resilience in the face of mass casualty events, the Mumbai International Airport Limited (MIAL) and Airports Authority of India (AAI) conducted two mock exercises in November and December 2023 respectively. The exercises were conducted to check disaster preparedness of different departments and agencies responsible for disaster management, which included the receiving tertiary care hospital of Nanavati Max Super Specialty Hospital (NMSSH), Mumbai. **Objective:** The aim of our study was to prepare disaster management stakeholders in the Emergency Department (ED) at NMSSH to adequately receive casualties during a mass casualty event occurring at the Chhatrapati Shivaji Maharaj International Airport (CSMIA) and Juhu Aerodrome. Our objectives were: 1) to check preparedness, adequacy and efficacy of the ground-level staff in the ED for response to mass casualty events in the CSMIA and Juhu Aerodrome, and 2) to enhance the skills of ED stakeholders through the practice of coordinated actions. **Materials and Methods:** The approach used was retrospective, observational and qualitative. Data collection was done via primary sources, *i.e.*, appointed scribes and observers present during the exercises. **Results:** The participation of all agencies in the entire process was encouraging. Though the workflow processes during the Mock Exercise were well-maintained, with minimal to no access blocks, a few shortcomings were noted. It was noted that other medical departments were not adequately cognizant of the Disaster Management Plan prepared by the ED. A plan for surge capacity in the Emergency Department was found to be suboptimum, with evident gaps noted in the Standard Operating Procedure (SOP) for unidentified victims. **Conclusions:** Tabletop exercises and mock drills are an integral part of education and training in dealing with external disaster situations for a hospital. The emergency exercises conducted by the AAI in collaboration with NMSSH were a

competent addition to the yearly Code Yellow mock drills conducted by the hospital.

Keywords

Disaster Medicine, Emergency Preparedness, Emergency Medical Service, Mass Casualty Incident, Disaster Planning

1. Introduction

Preparedness for disasters is a dynamic process. In addition to having a well-documented disaster management plan (DMP) in place, it is prudent to have regular drills to test the hospital's DMP [1]-[3]. The drills may be hospital disaster drills, computer simulations tabletop or other 3 - 5 exercises. In India, hospitals rarely conduct disaster drills or publish reports of such drills. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) actually requires hospitals to test their emergency plan twice a year, including at least one community-wide drill [3].

The Chhatrapati Shivaji Maharaj International Airport (CSMIA) serving Mumbai is the second busiest airport in India and the ninth busiest airport in Asia in the fiscal year 2023-2024. The airport is operated by Mumbai International Airport Limited (MIAL), a joint venture with the Airports Authority of India (AAI), the latter of which also operates the Juhu Aerodrome. The aerodrome is located in the Juhu suburb of Mumbai and is not only a hub for the Pawan Hans transport service, but also caters to the Bombay Flying Club. The CSMIA has been handling commercial operations for the past 75 years.

Located under a 5-km radius of both airports, the Nanavati Max (NMSSH) Super Specialty Hospital (formerly Balabhai Nanavati Charitable Hospital) has always had a close relationship with the MIAL. Medical emergencies occurring at both airports are routinely routed to the Emergency Department (ED) at NMSSH. As a step towards building disaster resilience in the face of mass casualty events, the MIAL and AAI conducted two mock exercises in November and December 2023 respectively. The exercises were conducted to check disaster preparedness of different departments and agencies responsible for disaster management, which included the receiving tertiary care hospital of NMSSH.

2. Case Study

2.1. Aim

To prepare disaster management stakeholders in the Emergency Department at NMSSH to adequately receive casualties during a mass casualty event occurring at the CSMIA and Juhu Aerodrome.

2.2. Objectives

- To check preparedness, adequacy and efficacy of the ground-level staff in the

ED for response to mass casualty events in the CSMIA and Juhu Aerodrome.

- To enhance the skills of ED stakeholders through the practice of coordinated actions.

2.3. Scope

The exercises were conducted between various departments at the CSMIA and Juhu Aerodrome in collaboration with the Emergency Department at NMSSH, which is situated in Vile Parle, a western suburb of Mumbai, Maharashtra, India.

2.4. Schedule of Programs

A) CSMIA Mock Exercise: November 22, 2023 (12:00-15:00).

B) Juhu Aerodrome Table Top Exercise: December 7, 2023 (16:00-18:00).

2.5. Conduct of Exercise

➤ CSMIA Mock Exercise

Mock Exercise was conducted on November 22, 2023 between CSMIA and NMSSH between 12:00 and 15:00 (**Figure 1**). The primary interactions gauged were between various paramedical agencies in collaboration with the MIAL, and the ED personnel at NMSSH. **Table 1** shows a summary of the cascade of events and timelines, as well as the actions that were carried out during the course of the exercise.



Figure 1. CSMIA mock emergency drill.

Table 1. CSMIA drill cascade of events with timelines and actions.

Time	Action
09:30	Sequence of events and administrative arrangements finalized by the MIAL and Department of Medical Administration at NMSSH.
11:00	Scenario was formulated after due deliberations by lead operations at MIAL, and the exercise was planned for execution as per scenario in a sequential manner.
12:18	Call received by the Operations team of the hospital from CSMIA inquiring about bed capacity and preparedness: 10 beds were kept ready to receive casualties (5 ICU + 5 ward).
12:56	Victims brought by outside cardiac ambulances from CSMIA (First Wave: 5 victims)—simulated accidental airplane crash.
12:56-13:25	S.T.A.R.T disaster triage implemented—RED (1), YELLOW (1), GREEN (2), BLACK (1)
13:25	End of first wave.
13:36	Second Wave—1 victim brought unannounced (BLACK: shifted to Mortuary)
13:38	End of second wave.
13:45	Call received about potential transfer of additional 4 victims; however, unconfirmed. Informed that call will come in case patients are getting transferred. Plan to escalate to Code Yellow for ED if more patients expected.
13:50	All victims shifted to respective disposition areas.
14:16	Drill terminated by CSMIA officials.

Roles and Responsibilities:

- Operations—identification and rapid registration of all victims, along with initiating transfer of victims to respective areas of disposition.
- Admissions—handled all the admission formalities.
- Security—handling of personal items of the victims with appropriate documentation, and medico-legal aspects.
- Housekeeping/Orderlies—four personnel for shifting victims in sequential fashion as per priority (Red first, then Yellow, and then Green).

Emergency Department Doctors

- *Team 1*, 1 Senior Consultant and 1 Senior Resident at Triage Area (ED Lobby)—Disaster Triage (S.T.A.R.T) implemented, with tagging of victims with color tags and ushering victims into the ED.
- *Team 2*, 1 Consultant, 5 Residents—bed allocation in the ED, initiating life-saving treatment including resuscitation, documentation, medico-legal formalities and transfer to areas of disposition.

Emergency Department Nurses

- 1 Nursing Coordinator, 1 Nurse in-Charge: handling coordination between nurses.
- 1 Nurse Team Leader supervising management of RED victims, 3 nurses allocated to manage remaining victims.

Continuum of Care in the Emergency Department

- For the current drill, five beds in the Observation Area (enclosed area) of the ED were cordoned off in order to continue treatment of actual patients,

whereas three beds in the Acute Care Unit and two additional stretchers in the Procedure Room were used to manage the Mock Drill victims.

➤ **Juhu Aerodrome Table Top Exercise**

Table Top Exercise (TTE) was conducted on December 7, 2023 between Juhu Aerodrome and NMSSH at the Pawan Hans airfield (**Figure 2**) between 16:00 and 18:00. The following actions were carried out in the exercise:

- The Department of Emergency Medicine presented their Disaster Management Plan (Code Yellow for External Disaster) and informed their actions for preparedness and mitigation.
- The Department of Medical Administration was apprised about their preparations in the event of a mass casualty event at the Pawan Hans airfield.
- A scenario of a helicopter crash was painted and simulated injects were put at the Pawan Hans airfield; various faculties like police, fire, etc., responded to those injects.
- NMSSH responded by sending an Advanced Cardiac (ALS) ambulance to the scene of the crash. The following were involved: 1 Emergency Medicine Resident/1 Emergency Nurse/2 Ancillary Staff.
- NMSSH team worked in collaboration with miscellaneous departments at the site to evacuate and stabilize victims at the scene.
- Summarization was done by the Aerodrome coordinator at the airfield.



Figure 2. Juhu aerodrome tabletop exercise.

2.6. Observations

➤ Positives

- a) Disaster Management Plan has been prepared and exercised by the NMSSH ED to deal with any disaster situation.
- b) Participation of all agencies in the entire process was encouraging.
- c) Workflow processes during the Mock Exercise were well-maintained; minimal to no access blocks were noted.
- d) Good turnout for the Table Top Exercise.

➤ Shortcomings

- a) It had been noted that other medical departments were not adequately cognizant of the Disaster Management Plan prepared by the ED.
- b) Plan for surge capacity in the Emergency Department was suboptimum.
- c) Communication needed sharpening.
- d) Gaps were noted in the Standard Operating Procedures (SOP) for unidentified victims.

3. Conclusion

Mock emergency exercises for mass casualty events are vital in providing insight into the shortcomings and gaps in existing institutional policies, which can then be adequately addressed and remedied, as was done in this case. It is a known fact that health systems in India lack comprehensive disaster preparedness plans and training [4]. Continuous and regular training with drills of health professionals are important measures when it comes to an effective disaster response [5]. Emergency drill is a usual practice in the army, which maintains competency levels of their personnel. Similar training and drills in emergency protocols for health systems for mass casualty management and communication would prove very useful in effective disaster management to save lives and restore health [6].

Lessons Learnt and Recommendations

There is an important lesson to be learned by a privatized health system: to have disaster preparedness plans in readiness with materials and designated first responders.

Proper command and coordination structure between all faculties within the hospital and the Emergency Department is critical. Standard protocols for mass casualty management can be tailored to each specification and ergonomic plan of a hospital, and these should be frequently exercised and executed [7]. We recommend a bare minimum of once-a-year mock exercises and emergency drills.

These drills ensure that a checklist is adequately maintained for essential medicines, supplies, equipment, and command and communication systems in the event of a mass casualty event. We recommend the presence of a disaster cupboard /kit in every Emergency Department. This kit may also house the various documentation forms, including disaster triage tags and other essentials that may be required when a Code for external disaster is activated.

Disaster management is a multidisciplinary activity [5]; it was noted that most of the other departments in the hospital were not adequately cognizant of the disaster plan of the ED/hospital. It is imperative that this is remedied in the form of at least once a year disaster mock exercises for the hospital, which include a briefing with all the respective heads of departments prior to the drill, followed by a debriefing session at the culmination of the exercise.

A health system's readiness plays an important role in prompt and effective mass casualty management [2]. There is a need to strengthen health systems with a focus on health services, health facility networks, and capacity building [8]. In our study, we noted that due to ergonomic constraints, we faced a huge issue with surge capacity. In the advent of multiple privatized hospitals springing up in limited spaces in crowded Tier I cities, it's important to consider readiness in terms of infrastructure, and ergonomic Emergency Medical Centres are the need of the hour.

Training is an integral part of capacity building [8]. Mock exercises and drills hold the key to the successful activation and implementation of any disaster management plan.

Conflicts of Interest

None declared.

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