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Improving mass casualty planning in low resource settings: Médecins Sans Frontières and International Committee of the Red Cross perspective

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Summary

Mass casualty events occur on a regular although unpredictable basis within the contexts of both Médecins Sans Frontières (MSF) and the International Committee of the Red Cross (ICRC) activities. The frequency of both natural disasters and other mass casualty incidents is increasing with urbanisation and industrialisation, compounded by climate change and conflict. Both organisations have recognised that the historical training focus on full-scale mass casualty simulations has not always been followed through to the resolution of action points and dissemination of learning. Staff training for mass casualty management has been variable. This led MSF and ICRC to develop a multimodal approach to assist development of mass casualty plans and preparedness. Capitalising on our presence in these contexts we are incorporating our experience of quality improvement and change management to complement simulation to 'stress and test' systems. We examine the challenges and share our efforts to improve training of staff in field projects across both MSF and ICRC and discussing future innovations.

MSF Médecins Sans Frontières; ICRC International Committee of the Red Cross; MCI Mass casualty incident; MCP Mass casualty plan

Keywords: humanitarian field; International Committee of the Red Cross; major incident management; mass casualty incident; mass casualty planning; mass casualty training; Médecins Sans Frontières

In the past two decades there were 7348 major recorded disaster events worldwide claiming 1.23 million lives, affecting 4.2 billion people, many on more than one occasion, resulting in approximately US\$2.97 trillion in global economic losses.¹ With increased urbanisation, population movements, and climate change mass casualty incidents (MCIs) worldwide are becoming increasingly frequent, a trend that we can expect to continue and likely accelerate.² Although conflict, terrorist attacks, mass shootings, and natural disasters tend to attract the most attention, a study of MCIs in the USA found motor vehicle traffic crash to represent the most common cause of injury.³ The burden of road traffic deaths is disproportionately high among low-income countries (LICs) with 1% of the world's motor vehicles in LICs resulting in 13% of global road traffic deaths.⁴ The risk of death in a road traffic accident in LICs is 27.5 deaths per 100 000 population, three times higher than that of high-income countries.⁴ Unfortunately, systematic data collection on these events in low resource settings is much more difficult to obtain, although initiatives such as the Emergency Event Database (EM-DAT) geo-referenced natural disaster database are being developed.⁵

Both Médecins Sans Frontières (MSF) and the International Committee of the Red Cross (ICRC) work in some of the most critically under-served and high-risk settings around the world. Although MSF's reputation for being able to rapidly intervene in humanitarian emergencies is well deserved, perhaps even more salient for mass casualty planning is MSF's long-term commitment in settings of protracted conflicts, epidemics, and natural disasters. In 2019 MSF worked in more than 70 countries, of which 130 projects were in an armed conflict or post-conflict setting.⁶ In these settings, MSF is present in clinics and hospitals where mass casualty planning and training can take place before incidents occur. The ICRC is an independent neutral organisation ensuring humanitarian protection and assistance of victims of armed conflict and other situations of violence working in more than 100 countries worldwide. ICRC supports population health across the continuum of care. Within pre-hospital, hospital, and

community facilities, a core element is mass casualty planning, preparation, and operational delivery. Both MSF and ICRC collect and analyse health data, which places the organisations in a unique position to contribute to our understanding of these events in low-resource settings and how to best conduct mass casualty planning in these contexts.

Historic approach

Historically, a variety of approaches have been taken to mass casualty training ranging from lecture presentations to full-scale simulations. Similarly, some training is targeted towards certain job profiles whereas others are provided to projects. Regardless of these variations, there is recognition of the importance of mass casualty planning particularly within the contexts in which both organisations operate. The expectation across each organisation is that a mass casualty plan (MCP) should be in place for any hospital project at risk of receiving a rapid influx of patients. In practice, this applies to all but a small handful of facilities. The MCP should be reviewed at least annually and ideally more frequently incorporating the learning from both simulation and other training and post-MCI analysis. In the field, within MSF, the responsibility for writing and reviewing the MCP lies primarily with the medical management in a project, with input from logistics and administration. Frontline clinical staff are expected to be familiar with their project's MCP. Reviewing and validating the project plan is the responsibility of the country medical coordinator for the mission, the senior medical person in the country headquarters. The ICRC frequently works in partnership with local actors to support healthcare facilities and facilitates the review of existing plans and development of new plans in collaboration with these partners. In practice, the MCP is often reviewed during changes of managerial staff at the project level or as a result of debriefings after an MCI or simulation exercise.

Although internal training targeted towards senior medical leadership exists, preparation of other staff for mass casualty management is generally expected based on their previous

work history. In the case of medical staff without specific field experience, mass casualty management skills are often assumed based on their specialty (e.g. anaesthesia, surgery, or emergency medicine) rather than a formal requirement or training during recruitment. Courses such as Hospital Major Incident Medical Management and Support (HMIMMS) and the corresponding MIMMS for pre-hospital providers do exist. However, training in mass casualty planning and management is not systematically taught to healthcare professionals as part of their postgraduate training.⁷ Although Advanced Trauma Life Support (ATLS) training is required in many countries including the UK as part of anaesthesia, emergency medicine, and surgical curriculum, mass casualty training is not compulsory. In the 10th edition of ATLS, mass casualty management merely appears as an annex.⁸ Major incident knowledge appears under special interest area in the proposed 2021 Royal College of Anaesthetists Anaesthesia Curriculum training syllabus, making it non-compulsory.⁹

It is also important to acknowledge that although the principle of mass casualty management is similar to that in high-income countries, there are distinct differences in the humanitarian setting in terms of patient population, injury patterns, and resources including personnel. In the LIC setting the paediatric population is over-represented, and burns-related injuries are more common. Both paediatric and burns patients require additional expertise to manage and should be included in mass casualty training. The WHO Technical Working Group on Mass Casualty Burns recently published guidance on mass casualty burns planning and preparation.¹⁰ There is an increasing threat of MCI involving chemical accidents or attacks and staff training on personal protective equipment (PPE) is vital. Limited resources will undoubtedly affect survival rates, and palliative care may play a bigger role in mass casualty management despite being infrequently formally taught.

Mass casualty training for frontline staff largely consists of full-scale simulations in project sites. Specific skills training for clinicians focuses on mass casualty triage and primary and secondary survey for clinicians. However, such training often depends on the initiative of staff with a particular interest in mass casualty management. This clinical focus misses out the organisational, managerial, and support services role in MCI. There has not been a standardised curriculum or minimum competencies requirement across either organisation. Face-to-face training from technical advisors or trainers from headquarters can be arranged in the field upon request, but the large numbers of field projects and staff turnover means that this approach cannot respond to all the training needs in the field.

Full-scale simulation has long been viewed as the gold standard for project training and the indication that a project is 'prepared' to manage an MCI. This approach is resource intensive, time consuming, and challenging to schedule. Removing staff from patient care or interrupting patient flow to run a simulation in the healthcare facility is often impractical or even impossible. Likewise, security measures may not allow a simulation to take place outside the facility. As a result, many projects struggle to run full-scale simulations on a regular basis. High staff turnover, including both local but especially short-term internationally recruited staff, results in

many personnel not having participated in this type of training.

Data on mass casualty incidence and activation of a project's MCP are not currently systematically collected. Patient data are collected in all MSF and ICRC projects, but often these data are collected in aggregate. Mass casualty events may be recorded in project reports, but again this is not done systematically. As a result, there is no easily accessible quantitative data on MCIs in terms of frequency, causes, or number of casualties. This scarcity of data is a significant hindrance to systems-level learning. Furthermore, failure to recognise non-conflict-related causes of MCIs such as traffic accidents leads to delays in activation and underreporting of events.

Current efforts

MSF's Emergency Medicine, Anaesthesia, and Critical Care Working Group, in close collaboration with counterparts at the ICRC, has taken on the task of harmonising the MSF approach to mass casualty management with specific attention to simulation. We recognise that throughout their career many staff move between sections, and even amongst organisations. A consistent framework, terminology, and training materials should help reinforce learning and enhance MCP preparation and delivery. Together we are increasing the variety of training options that projects can adapt to their particular needs and constraints.

Full-scale simulations in MSF and ICRC settings tend to focus on the individual facility. However, there are clear benefits of integrating disaster response into existing healthcare settings.^{11,12} Whenever possible mass casualty planning and mass casualty training exercises in the field should include other actors, particularly local hospital staff and the Ministry of Health and pre-hospital and other rescue services. Involving Ministry of Health staff in MSF-run mass casualty simulation can help foster long-term cooperation and sustainability. In ICRC projects, hospital-led mass casualty planning, preparation, and exercises have encouraged wider involvement of pre-hospital services and other providers.

Because exercises are conducted over a few hours, the focus invariably falls on the reception and triage of patients and their distribution to treatment zones. Such exercises bolster the incorrect notion that mass casualty management is a clinical activity that only involves the emergency department. The challenge of gathering information, referring, or safely discharging patients, hospital command and control, and the critical roles of non-clinical staff are often glossed over. By the time the event is complete, there is little time left to focus on debriefing and no time to re-run the simulation to stress and test potential improvements.

Despite the limitations, these simulations are generally well received by staff, and they do offer unique benefits. They test teamwork and recreate the chaos that is typical of real MCIs. However, if staff lack the skills that they are expected to perform, it is unlikely that this environment will promote their acquisition. The approach of Roussin and Weinstock¹³ structures simulation exercises based on learning new skills, developing proficiency, and acquiring shared understanding. This more granular approach suggests that training skills such

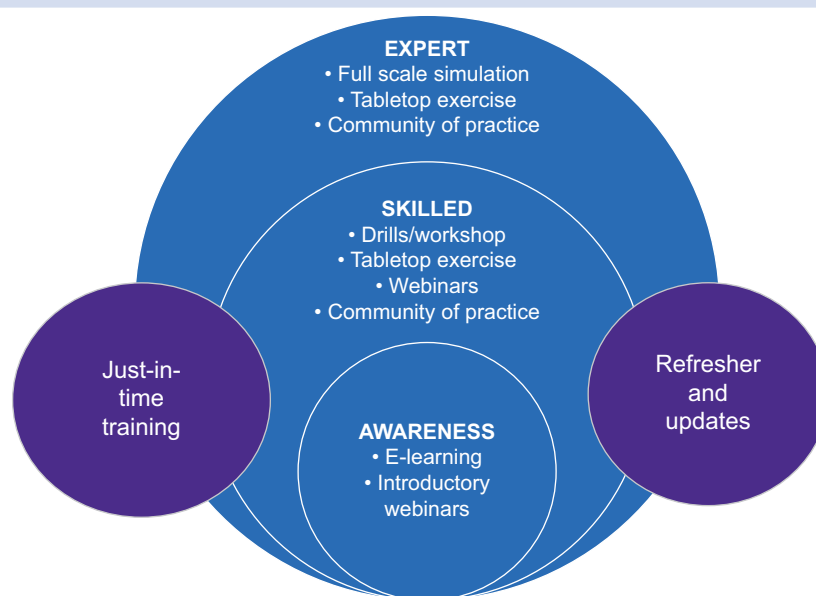


Fig 1. Multimodal blended approach to mass casualty training.

as mass casualty triage or debriefing, require a different training approach compared with developing teamwork and troubleshooting existing plans. Similarly, the WHO Simulation Exercise Manual, distinguishes between discussion-based and operations-based exercises.¹⁴

With these insights in mind, both MSF and ICRC are focusing on a blended approach to training incorporating just-in-time training, refreshers, and updates where appropriate (Fig. 1). Case-based simulation drills focus on teaching specific skills such as mass casualty triage. Tabletop exercises allow for more flexible timelines that can engage incident coordinators more fully by simulating an incident from alert to activation and finally deactivation and beyond. ICRC has partnered with the EMERGO train system, which uses a tabletop style simulation for education and training in emergency and disaster management.¹⁵ As we begin piloting tabletop exercises in our projects, we are finding that they can be quicker to organise and less disruptive to ongoing clinical care. This allows more time for debriefing. We expect this will permit more frequent tabletop exercises than full-scale simulations, better matching the turnover of staff. We expect projects to continue performing full-scale simulations, but with clearer objectives, more detailed guidance, and enhanced debriefing. A broader institutional initiative to integrate simulation as a training modality is through developing more materials for training trainers, particularly in debriefing.

Beyond simulation, we are developing training materials including self-paced e-Learning modules, downloadable checklists, and MCP templates. Drills to test and maintain critical elements of mass casualty response such as alerting staff of an MCI and periodically walking through the patient

circuit in the MCP are simple and quick exercises. These can identify critical bottlenecks, such as doors that are locked after hours or renovations that block a critical path in the patient circuit. In addition to customisable tools, technical advisors will continue to help projects identify which tool is best suited to the improvements they seek to make.

We recognise that improving the quality of debriefings is essential to effective integration of lessons learned. Hence, it is important to invest in teaching debriefing skills to key personnel. Debriefing should follow a structured approach at the project level and be captured more systematically at headquarters. Well-structured debriefings are a relatively inexpensive and effective way to enhance team performance and promote institutional improvement in practice; for example use of the 'Stop for 5' hot debriefing tool and after action reports.^{16–18}

Future prospects

The travel restrictions at the start of the COVID-19 pandemic forced both MSF and ICRC to dramatically ramp up utilisation of videoconferencing. Broadening the toolkit of mass casualty planning resources has already allowed us to begin piloting remote support of simulation activities showing feasibility. More extensive implementation is needed to further assess feasibility and impact.

Virtual reality technology promises fully immersive training opportunities allowing much higher fidelity simulation of MCIs.^{19,20} However, early experiences in MSF have proved it difficult to scale up. More importantly, there is still much to be gained from maximising the benefits of less expensive and more widely available technologies.

Furthermore, shifts in the use of educational modalities must avoid the expansion of a digital divide. Nonetheless, an increase in activities taking place online will ideally encourage communities of practice. Remote support lowers the barriers to integrating clinical staff in training activities between assignments. This could also address some of the gaps in mass casualty training, familiarising staff with our training tools before they arrive in a project. How we recognise the skills of staff through micro-credentials and keep track of their progress are challenges that lie ahead alongside collecting meaningful data on utility and practicality of the new training tools.

Gamification of activities such as training or reporting could increase their appeal and adoption, improving availability of data. Increasing our understanding of the size and types of MCIs, perhaps through international registries, is vital to improving our understanding of MCIs.

Conclusions

The presence of MSF and ICRC in a broad range of low resource settings likely to experience MCIs provides an opportunity to develop approaches to mass casualty training and management accessible to a broad range of clinical and geographic settings. A more granular understanding of simulation as a teaching modality is expanding our tools for mass casualty training. As remote training brings us into more frequent contact with larger numbers of field projects, we hope to achieve more consistent reporting of MCIs and systematic sharing of lessons learned.

Authors' contributions

Proposed the editorial: NL.

All authors contributed to the writing and approved the submitted draft.

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Declarations of interest

All authors declare that they have no conflicts of interest.

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