

EXAMINING WHAT FEATURES OF EMERGO EXERCISES IMPROVE EMERGENCY PREPAREDNESS

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BACKGROUND

In the UK, the term ‘major incident’ refers to any occurrence that “*presents serious threat to the health of the community or causes such numbers or types of casualties, as to require special arrangements to be implemented*” (NHS England, 2018; p. 7). This includes natural and manmade disasters, terrorist incidents, pandemics, or other events resulting in large numbers of casualties, many of whom will require immediate lifesaving interventions. Although rare, the number and scale of such incidents is predicted to increase as a result of environmental change and global warming (Homer-Dixon, 2007).

Recent events such as Hurricane Katrina and the Manchester Arena bombing highlight the vital role the medical community plays in major incident response and the importance of emergency preparedness (Allen, Karanasios, & Norman, 2014; Kerslake, 2018; Klima et al., 2012; Waring et al., 2018). Indeed, Category 1 responders, including health services, are legally required to conduct regular emergency preparedness exercises to test their response (UK Civil Contingencies Act 2004). Accordingly, Public Health England (PHE) provides various opportunities for hospitals, Ambulance and other emergency services to participate in exercises designed to test individual and organisational response.

One form of exercising method used by PHE, and over 34 other countries worldwide, is the Emergo Train System[®] (ETS) (www.emergotrain.com). This simulation-based system seeks to replicate the psychological rather than physical demands of an incident, using symbols and whiteboards to represent casualties, resources and locations (Lennquist & Montán, 2012). Amongst other features, ETS contains a large bank of over 800 casualty profiles with a range of injuries that can be used to create various scenarios across different settings. During an ETS exercise, responders from various roles within NHS, Ambulance, Fire and Rescue, Police and associated agencies are confronted with an incident that requires large numbers of casualties with varying degrees of injury to be triaged, transported and treated. This tests planning, policy, procedure, and aspects of Joint Emergency Services Interoperability Principles, including communication, coordination, joint understanding of risk and situation awareness (www.jesip.org.uk/five-principles). Participating in ETS exercises may also improve practitioner learning with regard to emergency preparedness. However, limited empirical focus has been directed to examining these mechanisms to date.



Figure 1. Examples of practitioners engaging in ETS exercises

Dr. Elena Skryabinaⁱⁱ from the Emergency Response Department (ERD) Behavioural Science Team at PHE contacted Dr. Sara Waring at the University of Liverpool in September 2017 to request a partnership in evaluating the effectiveness of ETS exercises for promoting learning in medical staff. Accordingly, the following report focuses on presenting evidence that highlights i) what aspects of emergency preparedness

are improved by taking part in ETS exercises, ii) the exercise components that facilitate learning, and iii) how. Such evidence is important for informing future exercise delivery to enhance learning outcomes.

The summary of findings presented below is based on data collected from four large ETS exercises that took place between February and December 2018, Exercises Tartar, Golden Eagle, Blue Peter and Kestrel. Each of the four exercises simulated a Marauding Terrorist Attack that involved between 124 and 409 responders. Data consists of 83 pre- and post-incident questionnaires and 10 interviews completed by medical staff from four Major Trauma Networks in England. In addition, interviews were also conducted with 10 exercise facilitators with between 10 months and 45 years of facilitation experience ($M = 12.49$ years, $SD = 16.59$), six of whom had emergency planning, resilience and response [EPRR] roles in hospitals, two were members of the PHE ERD training team, one had an EPRR role within an Ambulance Service, and one was a clinical pathologist.

KEY FINDINGS

1. Participation in ETS exercises significantly reduces responders' levels of anxiety, whilst boosting confidence in themselves, their team and organisation to respond to major incidents.
2. ETS exercises are valuable for providing opportunities to gain experience, practice intra- and inter-agency cooperation, and evaluate and adjust actions in line with timely feedback.
3. Learning is significantly improved by responders investing effort into preparing in advance, along with features of exercise design, including realism, format and having all key players involved.
4. Responders highlight the importance of exercising frequently and allowing more practitioners to participate for ensuring that all are ready to respond to a major incident.

SUMMARY OF QUANTITATIVE FINDINGS

Both prior to and post ETS exercises, responders indicated on a scale of one to six (1 = low, 6 = high) how well prepared they felt to respond to major incidents against a number of criteria. As shown in Table 1, responders felt less anxious and more confident in their ability to deal with a major incident after taking part in an ETS exercise. They also understood their emergency roles better once they had practiced adopting them and were more confident in their team's abilities, the appropriateness of departmental resources, and in the ability of agencies to work together. Finally, responders felt more confident in and familiar with their organisation's incident plans after participating in an ETS exercise. In summary, findings indicate that participation in ETS exercises is beneficial for reducing anxiety, whilst improving confidence in ability to respond to major incidents and awareness of emergency roles and plans.

Table 1. Pre- and Post-exercise Comparisons

Variable	Mean (SD)		t-test
	Pre-	Post-	
Level of anxiety in dealing with a major incident	3.79 (1.40)	3.48 (1.34)	$t(82) = -2.201, p < .05$
Confidence in dealing with a major incident	4.47 (0.93)	4.90 (0.74)	$t(82) = 5.144, p < .001$
Training and preparedness	4.29 (0.94)	4.87 (0.75)	$t(82) = 7.705, p < .001$
Competency-based knowledge and skills	4.63 (0.82)	5.01 (0.66)	$t(81) = 5.509, p < .001$
Emergency plans	4.50 (0.74)	4.63 (0.80)	$t(81) = 1.777, p < .05$
Organisational preparedness	4.45 (0.83)	4.66 (0.81)	$t(80) = 2.890, p < .005$
Appropriateness of resources	4.16 (0.95)	4.38 (0.96)	$t(75) = 2.293, p < .005$
Teamwork	4.72 (0.80)	5.04 (0.67)	$t(81) = 4.093, p < .001$
Multi-agency response	4.50 (1.04)	4.67 (0.72)	$t(78) = 1.964, p < .05$

In order to test what features of ETS exercises predicted practitioner learning about emergency response, multiple regression analysis was conducted. The strongest predictors of improved learning were i) level of preparation responders invested prior to the exercise ($\beta = .20, p = .019$), ii) having all of key players participating who would be involved in a real major incident ($\beta = .20, p = .039$), iii) the realism and time pressure of the scenario ($\beta = .23, p = .016$), and iv) exercise format ($\beta = .34, p = .002$), $F(4,80) = 19.02, p < .001, \Delta R^2 = .47$. In-depth interviews were also conducted post-exercise to provide a better understand of why these factors are important to promoting learning and findings are discussed below.

SUMMARY OF QUALITATIVE FINDINGS

Interviews conducted with both responders and facilitators were transcribed and analysed using Thematic Analysis to identify key similarities and differences across interviews (Braun & Clarke, 2006). Overall, analysis highlighted three key themes of importance for understanding the value of ETS exercises for promoting learning about emergency preparedness: i) Experience; ii) Cooperation; and iii) Evaluation and Adjustment. In parallel with quantitative findings above, analysis also provides clarification regarding what features promote the effectiveness of ETS exercises for maximising learning and why in the following three themes: iv) Preparation; v) Realism; and vi) Regular Practice.

Promoting learning about emergency preparedness

i) Experience: Responders felt that taking part in ETS exercises was valuable for providing the opportunity to gain first-hand experience of undertaking roles and making key decisions in response to major incident scenarios. This allowed them to better understand their duties and responsibilities, and identify potential obstacles that needed adjustment to improve performance. Responders also felt that it gave them experience of utilising their hospital's emergency plans and resources in response to a complex and dynamic situation, which increased their knowledge of how to access equipment and implement their organisation's major incident plans. Responders commented that gaining this experience made them feel less anxious about responding to a major incident and more confident in doing so.

"I think experiencing and practicing that role during the exercise made me realise the complexities of the role itself, not my day to day role, but the role as a major incident, at a major incident. Yes, I would change how I would do things, completely"

"It's just sort of knowing where everything is and where to go and who's got what equipment and that, so it's definitely good to familiarise myself with that."

"I think in terms of those of us who were at the training day would feel better prepared after it than we would have done before."

ii) Cooperation: Responder comments indicated that participating in an ETS exercise was beneficial for facilitating mutual understanding, teamwork, and collaboration within and between agencies. People from different organisations had the opportunity to communicate and witness each other working on the types of challenges that could arise in a real major incident. This helped to build trust across agencies, along with better understanding of one another's roles and capabilities. As a result, responders felt they would be better able to share necessary information to inform understanding and decisions, and allocate resources in future incidents, which is important for achieving common goals.

"It's where all departments joined up using the JESIP principles, how we adapted them, the intelligence, and then there was the communication between each department as to what we were going to do. I found it very helpful."

"I think it was very useful. You work together as a team and see what our individual strengths and weakness might be. It enabled us to do a run through and see where things would have worked and maybe needed improvement"

iii) Evaluation and adjustment: Responders also commented on the value of participating in ETS exercises for being able to evaluate their organisation's preparedness by testing emergency plans, resources and arrangements. The exercises allowed them to identify the strengths and risks of plans (evacuation procedure, time response from people on call, roles present, etc.) and resources available (number of beds, staff available, specialist equipment, etc.), along with receiving timely feedback on this. Consequently, they felt better able to take necessary actions to overcome shortcomings identified during the exercises in order to mitigate problems in future scenarios.

"I do think I've learnt, you know, in terms of having to revise a new emergency plan for this hospital and the action cards, and sort of, what we would do, general organisation of what we would do in

this area, how we would facilitate getting emergency patients through, expediting them in a timely and efficient manner, whilst also still keeping the x-ray department running for other patients.”

“I sound like a manager, but being able to deep-dive into our plans and being able to walk them through with departments to see where we would come unstuck, where we might have problems and where things would work well.”

Facilitators also agreed on the importance of exercises for allowing responders to evaluate and adjust. They highlighted the important role that debriefs played in this process for encouraging reflection and learning. Facilitators noted that during debriefs, they could best promote learning by taking an impartial ‘responder focused’ approach that involved listening to responder views but without biasing them toward what they believed should have occurred within the exercise. Facilitators noted that as responders had experienced the exercise directly, they had important insights to give on the successes, problems and recommendations for future practice. Facilitators also noted that they could assist with promoting evaluations to enhance learning during debriefs by managing discussions so that all responders had an opportunity to contribute rather than just the most outspoken, and that discussions remained focused.

“I’ve done many exercises, and so I’ve, you’ve got that knowledge already, and so you’ve already had some preconceptions of what you think should have been done or what should have been better but actually listening to what they’re telling you and taking on board what they’re saying, without imposing your own experience and thoughts on that, will give you much more sort of candid feedback from them. But then also teasing out the recommendations from them. So as well as getting them identifying potentially what went wrong or what went well, getting them to make recommendations of what we should do in future, rather than again, you doing that because they’re ideally placed; they’ve been in that situation; they’re in the best place to make those recommendations.”

“hot debrief, yes, again that is a skill and they have got to have the confidence and experience to manage large groups of people and to get the best from them, and also to keep them time framed, because there will always be individuals that want to stand on an orange box and to state their opinions, which is great and they should do that, but the skill of the facilitator is to be time bound as well, is to get the best from the group in the time available.”

Promoting effectiveness of exercises

iv) Preparation: Participants commented that the level of knowledge and learning they were able to gain from participating in an ETS exercise was influenced by how much effort they invested in preparing in advance. This corresponds with the multiple regression findings above, which showed preparation to be a significant predictor of learning. Responders noted that preparation allowed them to better understand how the exercise would run and why, which parties were participating, the purpose, what they would gain from participating, knowledge gaps they may want to address, and exercise objectives. Such knowledge was important for setting goals and improving motivation to engage. Responders suggested that exercise delivery teams could better help them to prepare by ensuring that reading materials were provided several days in advance, along with a quiz to test their knowledge and clarify the objectives being tested. Some responders also commented that it would be beneficial if their organisation provided incentives for reviewing their emergency plans, including allocating time for this activity. Responders also commented that they could be helped to prepare for the exercise by having an introductory lecture prior to the exercise to set the context, along with ensuring there was sufficient time to ask questions about exercise delivery. This may help to reduce misunderstandings regarding the role of a facilitator (see ‘Realism’ theme below).

“It would have helped if I’d been able to look through those prior to the event because during the event I was having to go through them. Flip through them and see what different the departments thought they would be doing in the response.”

“So, there was an online training session with the Emergo, so just to kind of make you aware of the sort of sequence that was going to happen and how it was going to, the whole thing was going to run

and what the, you know, what Emergo, how they, they were obviously patients, so it kind of gave you an insight into the Emergo systems.”

v) Realism: In line with quantitative findings that showed exercise realism to be a significant predictor of learning, responder comments highlighted that realism was important for enabling them and their organisations to evaluate and revise their performance in a simulation that closely resembled a real-world scenario. Exercise participation was the closest they were likely to come to receiving training for a real major incident. The more closely responders felt the scenario reflected the complexity and challenges of a real major incident, the more confident they were that it allowed them to robustly test their abilities, organisational plans and resources to identify what worked well and why, and where alterations were required. In particular, responders felt that realism was achieved by including all relevant roles and agencies that would respond to a real incident, choosing scenarios and objectives relevant for them and their agency, ensuring that data and information feeds were accurate and realistic, providing tangible consequences for decisions made, and realistic time and resource pressures.

“I think the, just having a constant flow of patients, I think we dealt with over 200 patients, so that constant flow and pressure, although it obviously doesn’t completely simulate a real major incident it did simulate the pressure and the intensity of what a major incident would be like in terms of the numbers, which was good.”

“I think there was a bit of preparation in terms of getting everyone together beforehand in terms of who was going to attend so we had all the right people there.”

Exercise facilitators also felt that realism was essential to promoting responder learning. For facilitators, this realism was achieved by adopting a ‘distance’ approach to allow responders to play out the exercise and take decisions and actions as independently as possible. They highlighted that this was because, in reality, responders would have to act independently without the presence of a facilitator or emergency planner. Facilitators commented that in order to preserve realism, they would allow participants to make mistakes and take actions they did not necessarily agree with so that they could learn from this, and would only intervene if responders were failing to complete tasks, follow plans and procedures, or were taking actions that fell outside of the exercise scope (e.g. telephoning non-players). Rather than giving answers or solutions, they would provide prompts or clarifications.

“So I tried as much as possible to let them get on with it, because obviously, you know, in the event of a real incident they wouldn’t have a facilitator there and it would be up to them to use the information and resources they had and make their decisions.”

“You know, in a real life incident there’s not going to be a facilitator. You’re just going to have to get on with it. So as much as you want to tell them, well I would do this or I would do that, you almost have to kind of feed them and suggest and, you know, help them and support them, but not give too much away, which is quite hard because you look at something and you think “why are you doing that?” but you can’t say anything. You can get them to think along different lines but it’s very hard, you know. You want them to plan for real life incidents but you want them to think for themselves.”

However, facilitators noted that trying to maintain this level of exercise realism sometimes led to misunderstandings with responders. Some responders expected facilitators to adopt a more leading role, providing instructions, whilst others expected a teacher or tactical advisor who would provide answers and solutions. Although responders felt that exercise realism was important for promoting their learning, some did not understand that facilitators were aiming to support this through adopting a distance approach. As noted above, consistently providing lectures or briefings prior to the start of exercises to clarify how they will run and why make help to minimise these misunderstandings that can sometimes arise during exercises when facilitators take a ‘distanced’ approach to allow responders to think through problems rather than being given answers.

“I think that the players, the participants, seem to think that the facilitator is going to tell them exactly what to do and say, “now you need to do this, now you need to do that”. Whereas, in my view, a facilitator is just to oversee, step in where necessary, to make sure that the exercise can continue to run. But other than that, it’s up to the players, the participants to play it as real or as real as possible.”

“I think, as a facilitator, they see you as, if you get stuck you can tell us the answer, do you know what I mean? It’s just, you know, it gives them the confidence to have you there... You kind of say to them you are on your own, and they kind of, I think that frightens them, you know. So they, I think they rely on you heavily and think that, actually, you know, forget that they’ve got to kind of, and they almost look for you, they almost look to you for a solution.”

vi) Regular Practice: Responders felt they learned a lot about organisational plans, policies and resources, and how to implement these during a major incident by taking part in an ETS exercise. However, it was acknowledged that managing major incidents is complex and requires different skills, resources, polices and procedures than may be used on a regular basis in their day-to-day roles. Accordingly, responders felt that it was important to run ETS exercises on a regular basis to improve performance and ensure that lessons learned were remembered, implemented and continually tested. They also commented that running exercises on a regular basis would allow more people to take part, which would ensure that everyone had an opportunity to gain experience in a safe learning environment. This would mean that, regardless of who was on duty in the event of a major incident, all staff would be equipped with the knowledge, skills and experience needed to fulfil their roles and coordinate activities and information across agencies.

“My recommendations are that we need more of these exercises [...] Practice makes perfect and in these sorts of scenarios, you make a mistake you’re not going to kill anybody and you learn from your mistakes.”

“I would make sure now that every single new member of staff in the team could be a part of something like that”

CONCLUSION AND RECOMMENDATIONS

Whilst major incidents are thankfully rare, these dynamic, risky and uncertain events usually occur without warning. Their scale and complexity requires the implementation of special arrangements that fall outside of the day-to-day roles of medical staff, which limits familiarity. Accordingly, emergency preparedness activities are vital to the effectiveness of major incident response. Prior research focuses on the importance of emergency preparedness exercises for allowing agencies to test their response. However, less focus has been directed toward testing the value of emergency preparedness exercises for promoting learning regarding major incident response, including those delivered using Emergo Train System.

Drawing on quantitative and qualitative data collected from four ETS exercises, findings presented within this report show that participation in ETS exercises improves how well prepared medical staff feel to respond to major incidents. In particular, participation in ETS exercises improved understanding of roles and responsibilities, and reduced anxiety. It also allowed medical staff to gain knowledge and experience of using emergency plans and resources, and identifying their shortcomings, along with enhancing multiagency teamwork, and increasing confidence in responding to major incidents. Findings also highlighted factors of importance for enhancing learning outcomes, including responders investing time in preparing in advance, inclusion of key exercise components to increase realism, and running exercises frequently. In addition, findings highlight the important role that facilitators play in promoting learning through personal reflection, evaluation, and encouraging responders to be independent in their response to incidents, allowing them to learn from their decisions and actions. Based on these findings, the following recommendations are provided to enhance the use of ETS exercises for promoting learning:

- **Provide exercise materials and quizzes to all responders several days in advance** in order to enhance understanding of the purpose and value of the exercise and promote motivation to engage. It is important to note that ability for exercise planners to do so is dependent on hospitals and other

participating agencies identifying and providing the details of which members of staff will be participating in advance. Preparation would also be facilitated by organisations providing incentives such as allocating time for staff to engage in preparation activities.

- **Ensure exercise briefings are consistently provided for all responders prior to the start of each exercise** covering details such as the purpose, how the exercise will run and why (including the role of a facilitator), and the learning objectives. This will minimise confusion and manage expectations, including misunderstandings that can sometimes arise during exercises when facilitators take a 'distanced' approach to allow responders to think through problems rather than being given answers.
- **Ensure that exercise scenarios are as realistic as possible** to enable responders to evaluate and revise their performance in line with timely feedback. This includes ensuring all relevant agencies and roles are involved, using realistic scenarios, objectives, time pressures, tangible consequences, and accurate input and output data.
- **Ensure that evaluation and reflection processes are promoted in the design and delivery of exercises, including debriefs.** Facilitators play a vital role in promoting evaluation and reflection through encouraging responders to be independent and by adopting responder centred approaches to debriefs rather than providing all of the answers.
- **Run emergency preparedness exercises frequently** and with as many people as possible to ensure that lessons learned are remembered, implemented and continually tested, and that all personnel have opportunities to practice responding to major incidents in safe learning environments. Organisations may benefit from nominating 'deputies' to shadow exercise responders in order to provide additional learning opportunities, and to step in to attend exercises if responders become unable to do so at short notice.

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