

Perception of Impact of Frequent Short Training as an Enhancement of Annual Refresher Training

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Abstract

Introduction of facilitated hands-on drills as often as monthly and the use of online modules prior to annual refresher training for emergency response teams were investigated through surveys and group discussions. This research explores how these drills are perceived by emergency response team members, emergency response team coordinators, instructors, and management at the company. Using these tools throughout the year, members of emergency response teams from automobile manufacturing facilities reported an increased ability to maintain their skill sets, build teamwork, and continually refresh and strengthen their ability to protect their fellow workers as well as plant operations and equipment. The results also document examples of how this innovative program that incorporates frequent training has led to workplace improvements.

Keywords

emergency response teams, emergency response, health and safety training, refresher training

Introduction

Emergency response team (ERT) members are typically volunteers who respond to emergencies in their workplaces before public agencies are able to arrive.¹ Duties may include responding to medical emergencies, controlling fires, search and rescue, and containment and clean-up of hazardous materials. This article assesses the perceived value of frequent facilitated hands-on drills and online modules throughout the year to enhance skill acquisition and the quality of annual refresher training for ERT members.

The Occupational Safety and Health Administration (OSHA), the Environmental Protection Agency (EPA), and the Department of Homeland Security (DHS) each address training for team members during emergency responses. In 29CFR1910.120(q)(6), OSHA² requires training for emergency responders to hazardous substances releases must be to achieve competencies consistent with expected tasks: awareness (recognize and report), operations (defensive actions but not to stop the release), technician (stop the release), specialist (for a specific hazard), and incident commander (in charge of the response).

When plant personnel have been trained to respond to a release or other emergency, activities follow

procedures detailed in a plan, the name of which varies according to the applicable regulation. For example, minimum content of an Emergency Response Plan (ERP) for hazardous materials responders covered by 29CFR1910.120(l)(2) are pre-emergency planning; personnel roles, lines of authority, training, and communication; emergency recognition and prevention; safe distances and places of refuge; site security and control; evacuation routes and procedures; specialized decontamination procedures; emergency medical treatment and first aid; emergency alerting and response procedures; critique of response and follow-up; and personal protective equipment and emergency equipment. The training includes the knowledge and skills required for each

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person who will respond. Annually, employers must certify competency of responders for the duties assigned; this often includes refresher training as part of the documentation.

EPA³ requires an emergency response exercise program if a workplace stores or uses highly hazardous chemicals and materials above specified quantities. Exercises must include facility emergency response personnel and/or contractors, as well as coordination with local emergency responders. The DHS⁴ promotes training for responders, asserting that those who administer first aid and cardiopulmonary resuscitation (CPR) or use automated external defibrillator (AEDs) should be properly certified. Employees who use firefighting equipment are to be trained in accordance with OSHA regulations and those who respond to hazardous materials spills should receive specialized training. DHS recommends conducting exercises and drills to validate emergency response training. Depending on the agency, various terms are used to reference organized teams; here we use ERT for simplicity.

The need for practice of skills, such as those required for emergency response, has been evaluated by several investigators. Starr and Burford⁵ indicate that ERTs must practice their skills through drills. These authors cite literature suggesting that distributed learning on multiple occasions leads to better retention of material than single programs. They recommend conducting drills (i) in which manikins are dressed like workers, (ii) at locations in the workplace where emergencies are likely to occur, (iii) from starting points for ERT members that are remote from the manikin, and (iv) with roles predefined before the response. Rieve⁶ contends that well-trained employees can make the difference between life and death for fellow workers and that core emergency response principles must be revisited regularly using refreshers and drills. Taking part in drills enhances the speed and confidence of ERT members during real emergencies. The author recommends both online refreshers and workplace drills. Mohammadfam et al.⁷ argue that the quality of an ERT response depends on the coordination within the team and how well the ERT members understand the roles and responsibilities of everyone on the team. They consider drills to be an important way to develop this coordination and understanding.

The evidence for the effectiveness of drills in maintaining skills is compelling. Data collected by Anderson et al.^{8,9} indicate that first aid and CPR skills among responders deteriorated in the weeks after training, suggesting that regular refreshers and drilling on these skills will improve ERT member performance during emergencies. In addition, responders who participated in repeated training sessions performed better than those who had received only initial training, illustrating the

importance of having multiple opportunities to practice skills. Retention of knowledge and skills among trainees over the long term is enhanced by helping trainees to become active learners and to take control of their own learning.¹⁰ In this framework, drills are a way for learners to effectively master components of tasks, explore new skills, and attempt approaches they have never tried before. Burke et al.¹¹ indicate that moderately and highly engaging training methods, such as drills, are more effective at ensuring worker health and safety and less expensive in the long term even though they may be more expensive than less involved training methods in the short term. Perry and Lindell¹² assert that instructors should hope and expect that problems and conflicts will arise during drills that team members must resolve themselves.

ERT Example

The ERTs studied here were established by an employer at its automobile manufacturing facilities that have operations for assembly, stamping, transmissions, and engines. The ERTs are also at some research and development locations. While the ERT members are typically volunteers from unions, some teams also include management. Across the company, there is formal commitment for managers to support the ERTs. The ERTs respond to medical emergencies, spills for containment and cleanup, fire control, and search and rescue. This requires a robust training program to develop the needed skills.

In order to be an ERT member, each participant must first complete the following: 2-h Incident Command System Awareness; 2-h Blood-Borne Pathogens; 24-h First Aid, CPR, AED; 24-h Incipient Fire Fighting; 4-h Air Monitoring; 24-h Hazmat First Responder, Operations Level; 4-h Self-Contained Breathing Apparatus (SCBA); 24-h Confined Space Rescue, NFPA Operations Level; and 24-h Industrial Emergency Response, Operations Level. An ERT coordinator is assigned for each plant. Company policy and the union contracts describe ERT training to be completed throughout the year. These regular, in-plant drills are selected to meet the needs of the ERT by the coordinator. A drill may include a video to review the technical and operational knowledge related to the hands-on drill. Skill competency is documented using a checklist. The goal is to complete one drill monthly.

In preparation for annual refresher training, ERT members are to complete three online refresher modules: Blood-Borne Pathogens, Hazardous Materials Awareness, and Incident Command. These online modules are completed at the employment site. The 36-h refresher training program is conducted over a week and includes medical topics, confined space rescue, hazardous materials, and

fire safety training. Union contracts include release time for this training program for ERT members.

The training program is carried out by sixty-two instructors working for a contract training group, who themselves receive significant skill training as well as training and observation to ensure the consistency of their delivery and content. This research was undertaken to identify perceived value and barriers of integrating the elements of this robust training—facilitated hands-on drills and online review modules prior to annual refresher training—throughout the year.

Methods

Two survey instruments were developed by the authors to capture data regarding the achievements and attitudes associated with year-round refresher activities. They were pilot-tested with trainers in early 2019 and revised before being finalized. The first instrument was for trainees and captured feedback on acceptance of doing online work and drills during the year, perception of the value of a combination of training modalities (online, drills, classroom) and refresher training generally, response to best learning setting, number of drills and online training sessions completed during the previous year, and an assessment of what if any contribution the ongoing training contributed to conducting work during the year. Information was also collected regarding which online or drill activities had been completed by checking items in a menu. The value of the activities in refresher training was rated and open-ended feedback was requested on usefulness and how to improve usefulness of these activities. This survey was administered in the classroom by instructors during annual 36-h refresher training in 2019, allowing enough time for completion. The contract training group then sent the completed surveys to the authors for analysis.

The second instrument was for trainers to provide feedback on compliance with the prerefrresher online training in blood-borne pathogens; incident command awareness; hazmat awareness and hazard assessment online; and the on-going hands-on drills for SCBA, air monitoring, and knots. Trainers also completed open-ended items, during the spring of 2019, regarding how to improve these aspects of the training program and an assessment of barriers to setting up drills at the work site.

Separate from the survey administration, the primary author had conversations during April 2019 with ERT members (trainees), ERT coordinators, trainers, and members of management to better understand their perspectives on the usefulness of the hands-on drills throughout the year and online modules prior to refresher training. Barriers to implementing these training enhancements and suggestions for improvement were

also discussed. These latter areas enriched the data obtained in the open-ended survey items.

Survey responses and conversations were gathered from convenience samples of trainees and trainers, based on training schedules. No personal identifiers were collected on the surveys or during group conversations. Data analysis of the survey responses involved creating summary data tables of means and percentages when appropriate. The open-ended responses and comments from at least two dozen conversation participants were combined and summarized by themes.

Results

Surveys were administered to fifty-nine trainees in six classes. Forty-five of the trainees answered questions about online refresher modules, indicating that approximately three-quarters had completed the modules. Of the fifty-six trainees assessing the value of these aspects of training throughout the year, fifty-five (more than 98 percent) indicated that the facilitated hands-on drills and online modules helped them in their ERT and related work.

More respondents preferred facilitated hands-on drills to online modules. As shown in Table 1, where some respondents selected more than one response, the highest rating for online work was when combined with face-to-face learning (31 percent). Only 14 percent preferred online work to a traditional learning format, and 10 percent selected “I hate it” as a response. In addition, comments from five participants included “not computer friendly” ($n = 1$), “prefer face-to-face” ($n = 1$), “did not do the training” ($n = 2$), and “not as effective” ($n = 1$). In contrast, the facilitated hands-on drills were preferred to traditional learning by 45 percent of respondents. Nearly, a quarter of respondents indicated the opinion was tempered by the topic of the drill. Compared with the responses regarding the online work, about 50 percent fewer trainees reported the need to combine the drill with face-to-face traditional learning (19 percent) or a preference to concentrated training time (14 percent). Only one trainee noted “hate” of participating in drills.

When asked to complete “a combination of online training, on-site drills, and classroom training” 60 percent ($n = 35$) chose “. . . is the way to go.” Of those who did not participate in drills prior to refresher training ($n = 9$), 1 trainee reported them unnecessary. More than 80 percent of trainees ($n = 47$) considered the drills to be a necessary part of training and none categorized them as a waste of time. Nearly 65 percent ($n = 37$) said they learn the most when they can practice what they are learning. More than 35 percent ($n = 22$) said drills should occur regularly through the year. More than half of the respondents look forward to drills (data not shown).

Table 1. Responses to the Survey Question, “I Like Doing Drills^a Prior to Refresher Training” (N = 58).

	Online		Facilitated drills	
	N	%	N	%
Absolutely, I prefer it to more traditional learning	8	13.8	26	44.8
It depends on the exercise	13	22.4	14	24.1
Only if it's combined with face-to-face traditional learning	18	31.0	11	19.0
It's ok, but I'd rather have concentrated training	16	27.6	8	13.8
I hate it	6	10.3	1	1.7
Other (please specify)	5	8.6	1	1.7
• I am not computer friendly				
• I prefer face to face hands-on with expert journeyman and apprentice				
• Never done it				
• Never done it				
• Not as effective				
No answer	1		1	

^a“Drills” refers to both online and hands-on work.

Table 2. Responses to the Survey Question, “Did the Drills^a You Had Before Training Improve the Quality of Your Refresher Training?” (N = 59).

	No, they were a waste of time		Yes, it allowed me to come to the refresher training with specific questions		Yes, I felt more confident in my knowledge		Yes, it allowed the class to start at a higher level		I did not participate in a preclass drill in this subject		No answer
	N	%	N	%	N	%	N	%	N	%	
Blood-Borne (online)	3	7	1	2	23	52	9	21	9	21	14
Incident Command (online)	0	0	3	7	21	47	8	18	13	29	14
Hazmat (online)	0	0	3	7	16	36	13	29	13	30	14
Air Monitoring	0	0	3	7	19	43	9	21	13	30	15
Confined Space	0	0	5	11	17	39	9	21	13	30	15
Ropes	0	0	6	14	15	34	12	27	11	25	15
SCBA	0	0	7	16	14	32	12	27	11	25	15

Note. SCBA = Self-Contained Breathing Apparatus.

^a“Drills” refers to both online and hands-on work.

Online refresher modules were completed by about 75 percent of participants. For Blood-Borne Pathogens, 52 percent said the online module gave them more confidence when they came to refresher training; 47 percent for Incident Command; and 36 percent for Hazmat Awareness. Only Blood-Borne Pathogens was associated with a rating of “a waste of time” (n = 3 of 36). Nearly, half of the trainees responding (n = 28) had participated in hands-on drills at their facility from eight to twelve times during the prior year. Except for one person who completed none, others participated in drills one to seven times during the year. The most frequent drills were Air Monitoring, Confined Space Rescue, Rope Rescue, and SCBA, each completed by 65 to 75 percent of trainees.

Those reporting participation in specific drills ranged from 25 to 30 percent. As shown in Table 2, of those

completing drills in Air Monitoring, Confined Space Rescue, Ropes, and SCBA, 32 to 43 percent felt it increased their confidence prior to refresher training, and 21 to 27 percent reported that it allowed the class to start at a higher level. No respondent rated these drills a waste of time. Of the fifty-six trainees assessing the value of these aspects of training throughout the year, fifty-five (more than 98 percent) indicated that the facilitated hands-on drills and online modules helped them in their ERT and routine work. Other facilitated hands-on drills reported to be valued included Firefighting, Patient Packaging, and Medical Response.

Rope skills, rope rescue, and rigging were cited most often as being of greatest use. No one provided a specific example of training that was not useful. More than 70 percent reported that the refresher training was

more valuable with hands-on drills prior to refresher training, and the remainder reported that completing drills helped some.

In conversations with trainees, when asked for a specific example of something from the online modules that was particularly useful, several identified learning the dangers of blood exposure. Others focused on incident command. It was noted that that having learned about dangers, one participant realized he did not have the proper personal protective equipment available on-the-job.

Eighteen trainers from three classes completed the survey, describing their perceptions of how online modules and facilitated drills affected refresher training. Because there were differing numbers of trainees and trainers at the training sites, the responses do not reflect a balanced distribution across the course sites. As a result, some of the responding trainers were reporting on the same class of trainees.

According to the eighteen trainers who completed the survey, not all trainees came to refresher training having completed all three required online modules. Of responding trainers, 30 percent showed that some of the participants in their programs had not done any of the assigned online modules prior to the refresher course.

Trainers reported difficulty in arranging both online modules and facilitated hands-on drills with plant personnel and that drills were also difficult to schedule. Trainers reported difficulties with attendance at drills, especially for team members from evening and night shifts.

Of trainers completing the survey, 30 percent reported that trainees in their class completed SCBA Use, Air Monitoring, and Medical; 35 percent had done knots; and a few had done first aid. More than 55 percent of trainers reported that prerefresher drills “make a big difference in improving the refresher training.” This view was supported by one who said in conversation that, “If drills are done, it shows in the team’s performance in a more positive way and helps the class go more smoothly and less explanations, usually.”

Skill retention was perceived to be more limited than expected for some drills. Twenty-five percent of trainers expressed that trainees remembered very little of original training about SCBA use. Twenty percent believed similarly about air monitoring drills. They had more confidence in the retention levels for other topics.

When trainees complete exercises and their knowledge and skills are sharpened, refresher training can be more scenario-based. Based on their experience, trainees identified additional exercises that they needed. Notable requests for exercises included machine rescue, pathfinder (knowing one’s way around a facility and being able to guide emergency responders), and rope rescue. Trainees listed need for live scenarios such as code blue, burn pans, massive bleeding, and trapped manikin.

Workplace improvements resulted from participation in facilitated drills, including changing the location of AEDs and the location of safety equipment.

Having material online allows curricula to be updated regularly. This approach is especially beneficial with the online field training guide on how to do a range of exercises. It also allows for constant evaluation feedback, which in turn leads to continuous improvement in training content and delivery. There is a course comment page on the contract training group’s home page. Comments help in updating the training guide as well as improving course materials.

There were no negative comments to open-ended items on the surveys, but many positive ones that were consistent with the survey results. The following are representative comments of the importance of regular training exercises throughout the year, especially facilitated hands-on drills, that trainees perceived to have enhanced training and their ability to function in actual emergencies:

Training drills are extremely important and the more we train, the more we drill means the more we will be successful at saving lives and performing without putting ourselves and those around us at risk!

Hands-on training is key to my skill set.

Real life drills, full dress-out, and using our equipment assures better team performance.

It is easier to remember and learn from mistakes.

You can’t over train for ERT, the more the better.

From conversations, trainers believed in the importance of frequent training throughout the year but acknowledged that additional steps must be taken to fully implement this fledgling program. How did pre-refresher exercises—both online and hands-on—improve refresher training? Generally, trainers found that they did not need to spend as much time reviewing basic content and could instead spend more time on advanced skills. A few specific examples cited by trainers:

We didn’t have to start from scratch in the classroom.

Skill set shows to be more fluent and allows for better refresher training for the team.

Did not need to spend as much time on blood-borne pathogen training.

Knots were quickly addressed/tested. They were able to focus on other more advanced procedures.

A theme of feedback was the contribution of training in team building. While trainees appreciate learning the best practices from other ERTs, most said, in conversation with the primary author, that they would prefer facilitated hands-on drills with their own ERT teammates using the equipment they have in their facilities. Team communication is critical for a responsive group and when teams train together, individuals report they are more comfortable asking questions. No one is afraid to talk. Trainees consistently expressed the need for more training and more time for training. Other supportive comments from trainees:

- Key to the ERTs is developing teamwork. Frequent facilitated drills that are hands-on with plant equipment and members of one's own ERT are considered critical in building readiness.
- It is important in training that the person chosen to be the Incident Command System commander is not always the "Type A" person on the team. Lots of individuals can rise to the occasion, and it is important to promote leadership among team members. One never knows which team members will be available in an emergency.
- It is important for ERT members to know their facilities well so they can get to emergencies quickly. Pathfinder training, to be able to help emergency response personnel quickly navigate a large facility, is important for ERTs when working with fire departments and other outside emergency responders, but it is important for the team members themselves too.
- In a facilitated drill one can do it, critique it, and repeat until it is done right.

Impacts of this robust training model were recorded during conversations with ERT members, ERT coordinators, and training staff. Participants perceived that increased training throughout the year helped promote the readiness of ERTs, increase capacity to save lives, lessen the severity of incidents, and reduce costs associated with down time. Examples of this include the following.

- In the last year, trained ERT members have administered naloxone and saved at least fifteen lives.
- There have been twenty-one AED saves across the company plants in the last 3½ years from trained ERTs. One plant had two heart attacks in 2018, with the ERT performing AED and CPR until ambulances arrived.
- In 2018, there was a confined space rescue at a facility.
- In 2019, a new ERT member found a worker down after lunch and because of his training was able to provide oxygen before an ambulance arrived.

- Some years ago, there was a dramatic rope rescue at a plant. The victim weighed 400 pounds and was six feet, six inches tall. ERT members, using rope rescue techniques, were able to lower the employee to the ground, a task the fire department was not capable of performing.
- Trained ERTs prevent fires, put out small fires, and help with plant evacuations when necessary.
- As a result of being on ERTs and being trained to respond, many team members promote safety in their regular job—eliminating slip, trip, and fall hazards; inspecting and repairing electrical equipment; and removing faulty safety equipment from service being just a few examples.
- Discussion with a high-level safety official at the company revealed that ERTs, beyond their importance in emergency response, provide a positive return on investment for the company with saves in AED and Narcan administration alone.

This ERT training was reported as leading to improved safety and health outside of work. Representative examples are given as follows.

- Training with local fire departments includes confined space rescue training and joint in-plant training.
- Two weeks after active shooter training, a participant applied skills during an incident at a sporting event. The training contributed to control of the scene, employee protection, and use of the ERT elements to alert proper internal and external authorities.

Trainees share their skills with youth groups such as Boy Scouts, have performed the Heimlich maneuver or CPR to save a life, applied fire extinguisher training to improve safety at home, and contribute to community awareness programs about Christmas tree safety, bee stings, and heat exhaustion.

Discussion

This research largely confirms previous findings^{5–10} regarding the perceived value of more frequent training. In particular, trainees indicated in surveys that online modules and facilitated hands-on drills helped them in their ERT and related work. Conversations with trainees indicated that they believed that they retained information better through more frequent training, leading to better preparation for annual 36-h refresher training. Trainees perceived that conducting drills with fellow ERT members was key to ensuring an effective and coordinated response during real emergencies. Also, completing the modules before refresher training frees up time during the 36-h program to provide more hands-on training related to other topics.

Completing the online modules before refresher training enables trainers to build on basic knowledge during the 36-h program. Increasing participation in this aspect of training is identified by trainers as an important goal. Feedback from participants regarding difficulty in using the system has resulted in development of a new training platform initiated following this data collection. This platform will also facilitate the prompt posting of updates to the drill menu and coordinator guides. Compliance with both drills and online modules is trackable, and this knowledge will assist the trainers in refresher delivery.

Increasing the topics for hands-on drills is supported by trainee comments. The formation of ERTs in this case study is largely motivated by insurance concerns; however, management is committed to the program and reported recognition of value at the plant sites as evidenced by workplace changes including placement of safety equipment. Suggestion of new drill topics by trainees is evidence of their perceived value of the exercises; trainees also underscored the need for live scenarios which can be accomplished through the implementation of these routine drills.

Trainers expressed concern about retention of SCBA and Air Monitoring skills. These trainers represent three of six of the classes in which trainees were surveyed. The findings are not representative of all programs and are not linked to participants; however, the results do indicate areas for improvement.

The new training platform provides tracking of completion and enables documentation of completion. The response that blood-borne pathogen training was perceived as “a waste of time” requires follow up; as this regulation has been available for decades, it is possible that repeated sessions have become less useful. Other trainees reported that it was valued. Notably, no trainee gave a similar rating to any drill, consistent with the very positive feedback on drills as a training method.

There is no program to capture all the uses of training—at work or outside of work. It is recognized that ERT member anecdotal impacts likely are an underreport.

While training topics are primarily based on legal requirements, incidents that have occurred at the facilities are also turned into lessons learned and new topics. For example, a module on responding to opioid incidents was recently added to the 36-h ERT Refresher training because of experiences at several locations.

The facilitated hands-on drills are conducted throughout the year and give participants more opportunities to practice what they learned during refresher training. The drills are composed of scenarios that require participants, for example, to implement an Incident Command System and respond to an incident that could occur at the plant. Drills are also designed to

provide extra time for practicing skills identified as being critical to the success of the response effort, such as wearing an SCBA or donning chemical protective equipment.

The implementation of year-round training activities is a new training approach that has been supported by top management, and increasingly by plant supervisors. Its implementation is still in the process of evolving and being firmly institutionalized across facilities. Adherence to the program of frequent exercises throughout the year is stronger in some facilities than others.

Establishing robust ERTs in every manufacturing facility at the company is challenging. Much progress has been made, but more time is necessary for full implementation. Retention of skills from training exercises requires more consistent and frequent refresher work throughout the year, as mandated by existing company policy. Other barriers to overcome include the continuity of team membership and providing drills for other than day-shift workers.

Conclusions

This industrial case study provides feedback on the perceived usefulness of online refresher modules and facilitated hands-on drills for skill maintenance and as preparation for an annual week-long refresher training program for ERTs. The quality of annual refresher training for ERTs is perceived to be enhanced with this enhanced program of frequent exercises throughout the year. In addition, feedback also documents improvements that have arisen as a result of having both highly trained teams and a strong relationship between the employer and its training contractor. Examples of application of training outside the workplace are shown.

The ERT training described is perceived to be of higher quality because of these innovative training techniques, particularly the implementation of prerefresher online modules and facilitated hands-on drills that occur throughout the year. The perception, as indicated by survey data and conversations with both trainees and trainers, is that exercises throughout the year elevate the level of week-long refresher training, promoting enhanced preparedness and higher functioning teams. The new platform and continued management commitment are supportive of increased use of the online modules and the hands-on drills. The strong comments about drills strengthening the teams were important documentation of value. Participating in hands-on drills with their own ERT members and using their own equipment at their own facility has added to ERT members' confidence and their perception of the quality of their response efforts.

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Scott Tobey is a professor emeritus from Michigan State University (MSU). When Tobey began his career at MSU, he served as the project coordinator for a New Directions grant from OSHA, designed to provide health and safety training to workers in high risk industries in Michigan. After retiring from MSU in 2015, Tobey became president of ERS International, a non-profit educational organization located in Plymouth, Michigan. In his 43 years as a labor educator, he has been responsible for developing and delivering training on health and safety and emergency response to workers across North America.

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