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A FORMATIVE EVALUATION OF THE LOCAL HEROES PREPAREDNESS TRAINING PROGRAM

BY

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An abstract of
A Thesis submitted to the Faculty of the
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Abstract

A FORMATIVE EVALUATION OF THE LOCAL HEROES PREPAREDNESS TRAINING PROGRAM

BY
Yusuf Abdur Rahman

The DeKalb County, Georgia Board of Health developed and implemented the Local Heroes training program to address emergency preparedness training gaps within the public health workforce. This work evaluated the first implementation of the Local Heroes program at the DeKalb County Board of Health and was intended to provide analyses, conclusions, and recommendations that can be used to guide improvement efforts.

Participants' pre and post-test performance was analyzed with significant improvement in post-test results demonstrated in most areas. Analysis of participants' opinions of the training also indicated significant learner satisfaction with the program. Though some areas for improvement in the learning environment and evaluation instruments were noted, the overall results of the evaluation were encouraging.

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Introduction

Introduction and Rationale

The terrorist attacks of September 2001 caused a sea change in the various missions of public health departments. The responsibility of fulfilling these changes was unexpectedly placed upon public health department employees. Suddenly, public health workers found themselves forced to the forefront as first responders. Consequently, they were required to embrace new roles and responsibilities, often without the necessary competencies to do so (Gebbie & Merrill, 2002; Walsh, Subbarao, & Gebbie, et al., 2012).

Due to this change in the expectations of public health workers and the results of an internal training needs assessment, the DeKalb County, Georgia, Board of Health (DCBOH) developed and implemented the Local Heroes training program to address the need for additional emergency preparedness training. However, as of March 2008 DCBOH has not performed an evaluation of this training program. This project is a formative evaluation of the Local Heroes program intended to guide improvement efforts and next steps.

Problem Statement

One result of the events of September 11, 2001, and the subsequent anthrax attacks is public health departments and their employees have been required to undergo a dramatic change in culture. They have been forced to change from a 9-to-5, Monday through Friday, organizational model to one centered on the very real need for a 24/7, 365-days-a-year emergency response capability. This major shift in job roles and organizational cultures also implies new and enhanced expectations of a public health workforce unaccustomed to thinking of themselves as first responders (Lichtveld, Cioffi, Henderson, Sage, & Steele, 2003).

As it relates to the public health workforce, the expanded public health organizational model brought on by the events of September 11th, demands the willingness and ability to report for duty in an emergency, new knowledge and skills (i.e., competencies) needed to handle emergencies, as well as the ability to quickly and effectively respond to a wide variety of threats to the public's health (DiMaggio, Markenson, Loo, & Redlener, 2005; Qureshi, Gershon, Gebbie, Straub, & Morse, 2005; Subbarao & Lyznicki, 2008).

Unfortunately, due to a wide variety of factors, the public health workforce has often not been sufficiently educated with respect to their emergency response roles, nor adequately motivated to report for duty in an emergency (IOM, 2002; Shadel et al., 2004; Walsh, Subbarao, & Gebbie, et al., 2012). As a result, there is a serious need to improve upon the knowledge, willingness, and ability of public health workers to recognize and respond to emergent threats to the public's health.

These barriers to public health workforce emergency preparedness highlight the need for a comprehensive workforce development tool to address existing gaps in employee knowledge.

However, in addition to training, such a tool would also need to assess and address the willingness of public health workers to actually report for potentially hazardous duty, often outside normal business hours or locations.

Theoretical Framework

The Local Heroes training and social marketing campaign developed by the Advanced Practice Center (APC) of the DeKalb County, Georgia, Board of Health (DCBOH) addresses these barriers to preparedness in several ways. In addition to a traditional didactic training component, the program also provides a handbook that serves as an ongoing reference tool. Local Heroes also includes a marketing campaign to heighten awareness of the other components of the program as well as the importance of the everyday duties of public health workers.

As outlined in the guidance document provided with the Local Heroes training materials, the primary goals of the Local Heroes program are to make public health preparedness a routine part of public health practice and to help public health workers understand their specific role during an emergency.

Purpose Statement

As with any training and workforce development program, Local Heroes needs an evaluation to measure and demonstrate its results and value, and to inform needed improvements to program implementation. As of March 2008 no such evaluation of the program has been undertaken. Therefore, the purpose of this work is to assess the effectiveness of Local Heroes in addressing specific knowledge deficits and competency requirements as outlined in the DCBOH training needs assessment (DCBOH, 2005).

Some of these competencies include awareness of their individual response role, public health's role in disaster response, recognizing unusual events that might indicate an emergency and the chain of command (Incident Command System) that will be used in the event of an emergency.

Additional goals for this evaluation are to determine the extent to which the training sessions and content meet the needs of the participants as well as informing possible changes to improve learning, participant satisfaction, and ultimately the overall level of employee preparedness. The overarching evaluation question for this project is as follows: Is the Local Heroes Program an effective training tool to address the knowledge deficits and competency requirements outlined in the DCBOH training needs assessment?

Evaluation Questions

1. What is the level of learner satisfaction with the training?
2. Has knowledge of key preparedness concepts increased as a result of the training?

3. Has the program improved learner's self-perceptions of their competence to respond to an emergency?

Significance Statement

This formative evaluation of the Local Heroes program will provide valuable analysis that will serve to illuminate current program strengths and weaknesses. It will also provide useful recommendations to inform future improvements or changes to the program.

The results of the evaluation will address the needs and requirements of the primary stakeholders in the program. Therefore, the DCBOH will receive information that will help it be accountable to the National Association of County and City Health Officials (NACCHO) and the Centers for Disease Control and Prevention (CDC), which funded the Advanced Practice Center (APC) program at DCBOH that developed Local Heroes. The program's trainers will be provided with feedback regarding the degree to which the training methods, materials, and environment are meeting the needs of participants. Finally, and perhaps most importantly, the DCBOH will be informed of the degree to which the emergency preparedness competencies of its employees are being improved as a result of the resources expended on the Local Heroes program.

Definition of Terms

For the purposes of this project the following terms are defined below:

Ability refers to being physically able to report for duty in an emergency

Active learning refers to small group exercises, question-and-answer sessions, and other participative techniques designed to enhance learning by actively involving the learner.

Adult learning theory is a theory pioneered by Malcolm Knowles that posits that adults have certain unique needs and requirements as learners.

Competencies refers to a set of skills, knowledge, and attitudes necessary for emergency response.

First responders refers to those people immediately responsible for the protection and preservation of life, property, and environment in the early stages of an emergency.

Incident Command System (ICS) is a standardized, all-hazard incident management concept originally designed for use by emergency management agencies. It is now required at all levels of government.

Instructor-led training refers to classroom training delivered by a knowledgeable instructor/facilitator to explain concepts, answer questions, and facilitate learning.

Strategic National Stockpile (SNS) is a national cache of antibiotics, vaccines, chemical antidotes, and other critical medical equipment and supplies that can be quickly deployed to respond to an emergency.

Willingness refers to the personal decision to report for duty in an emergency.

Summary

Public health employees have been tasked with new duties and responsibilities in part as a result of the events of September 2001. However, they lack many of the basic skills and competencies required for them to effectively carry out these added responsibilities. The Local Heroes program is designed to address these issues to enhance the preparedness of the public health workforce. This project will evaluate the initial implementation of Local Heroes at the DCBOH to highlight strengths and weaknesses of the program and to inform future program improvements.

Chapter II

Literature Review

Introduction

This chapter reviews the literature on public health's role in emergency preparedness, core competencies for preparedness, barriers to employee availability, and the need for training at the DCBOH. The chapter concludes with a description of the program structure and the sequence of expected program events via the use of a logic model followed by a discussion of Kirkpatrick's training evaluation framework upon which the evaluation process for this project was based.

Public Health Roles in Emergency Preparedness

Institutionalizing the expanded emergency preparedness and first response roles within the public health workforce has proven to be a significant challenge for public health departments around the country. The reasons for this vary from funding and staffing shortages to inadequate training levels and bureaucratic impediments. (RAND Center for Domestic and International Health Security, 2006). Moreover, some staffers may resent the allocation of scarce resources to prepare for events they perceive to be highly unlikely to occur while at the same time they struggle to keep up with their traditional public health job roles. (Katz, Staiti, & McKenzie, 2006). Thus, health departments and their staff face inherent challenges in balancing

the competing priorities of traditional public health missions with new preparedness responsibilities. (RAND Center for Domestic and International Health Security, 2006).

Core Competencies for Public Health Preparedness

The very concept of public health preparedness remains at best only vaguely defined (Nelson, Lurie, Wasserman, & Zakowski, 2007). Even so, the value of education and training in core competencies needed for all public health workers are recurring themes in scholarly work discussing the subject. Some examples of scholarly work discussing competency based training include Parker, Barnett, Fews, & Blodgett (2005), Subbarao, & Lyznicki, (2008), and Walsh, Subbarao, & Gebbie, et al., (2012).

However, true public health workforce preparedness goes beyond simply being knowledgeable about job responsibilities and response roles. Public health workers must also have functional skills that they can actually apply in the event of an emergency (Walsh et al, 2012).

According to Gebbie & Merril (2002), this need was first recognized in the aftermath of the Institute of Medicine (IOM) report, *The Future of Public Health* (1988). The recognition of the need for practical, results-based skills prompted a shift away from training focused solely on content toward the idea of basic competencies needed for public health practice.

Barriers to Employee Availability

In addition to being functionally competent, public health workers must also be available for duty so that any knowledge and skills they have acquired are of value to the response to an incident. Unfortunately, public health workers are very likely to be either unwilling or unable to report for duty in the event of an emergency. This is particularly true of incidents where the risks to personal or family safety are perceived to be high. (Adams & Berry, 2012; Gershon et al., 2010; Grimes & Mendias, 2010).

Balicer, Omer, Barnett, and Everly (2006) also identified barriers to reporting for duty in the event of an emergency. Barriers cited included perceived risk, lack of knowledge and ambiguity regarding one's tasks. However, as with Qureshi et al. (2005), Balicer et al. (2006) also found that these barriers could be addressed by interventions to reduce perceived risk and increase knowledge and confidence. Specific interventions cited included training, risk perception, and increasing workers' awareness of their importance to the response effort. Similar improvements in intention to respond were also observed after training interventions by Gershon, et al, (2010). Therefore, basic competency-based emergency preparedness training can have the dual benefit of enhancing workers' competency to respond to an emergency as well as their willingness to do so.

Training Needs Assessment

In spite of the value of preparedness training for the public health workforce, it has frequently been cited as an area in need of improvement. According to the National Center for Health Workforce Analysis (2005), public health departments reported that bioterrorism and disaster preparedness were their most pressing training need, with 75% of respondents saying they felt there were inadequate training opportunities in these subjects. Additionally, 33% of respondents also cited core public health principles as a significant training need.

The DeKalb County, Georgia, Board of Health (DCBOH) faced similar challenges with regard to workforce training. Therefore, in an effort to identify and address barriers to public health staff preparedness and assess key staff competencies, the Advanced Practice Center at DCBOH administered a training needs assessment survey (DeKalb County Board of Health, 2005). This needs assessment was performed to enumerate and prioritize agency training needs and to inform the development of a comprehensive training and workforce development plan to address them (DeKalb County Board of Health, 2005). The training needs assessment survey was administered online in March 2005 to all DCBOH staff members (n = 500) with 79% of respondents (n = 395) completing it.

The survey asked DCBOH staff to rate the importance of various competencies to their job descriptions and then to assess their level of ability with regard to these competencies. The difference between the two was then calculated and used to determine which competencies were perceived to be both the most important and most in need of training.

Four particular areas were given high ratings by respondents for importance (i.e., "somewhat important"). These four areas were: uses appropriate equipment for

communication," "acts within limits of own knowledge during an emergency," "describes the role of government agencies and programs in providing health services," and "applies public health sciences to prevention and reduction of morbidity and mortality."

Of particular relevance to this project, some of the highest specific knowledge deficits cited by staff were related to emergency preparedness. These included "recognizing signs and symptoms of exposure to chemical, nuclear, and biologic agents" and "describing public health's roles and responsibilities in emergency response." Therefore, the training needs assessment clearly highlighted the need for technical as well as policy and procedure-related emergency preparedness training among DCBOH staff.

In addition to assessing staff competency and prioritizing training needs, motivators, barriers, and the learning formats staff members preferred for training sessions were also evaluated. According to the information collected, DCBOH staff stated a preference for instructor-led training, interactive training methods, and information to help them develop a better understanding of an area of importance to their jobs.

Local Heroes Program Design

As a direct result of the training needs assessment, the Local Heroes social marketing and training tool was devised as part of an overall training and workforce development plan. Local Heroes is composed of three primary components: a didactic training curriculum, an employee handbook, and marketing materials. The training curriculum centers on teaching core competencies for public health workers (Gebbie & Merril, 2002). Additionally, because of the needs of the target audience, the curriculum also adheres to adult learning principles.

The Local Heroes employee handbook is a volume of over 200 pages that contains information on recognizing and responding to public health threats, customizable incident command system roles and responsibilities, individual/family preparedness as well as numerous other tools and resources. It is intended to serve as an ongoing information resource to which employees can refer after completion of the didactic training.

Local Heroes also includes a marketing component comprised of materials designed to build enthusiasm and enhance awareness of the training as well as the wide variety and critical nature of public health work.

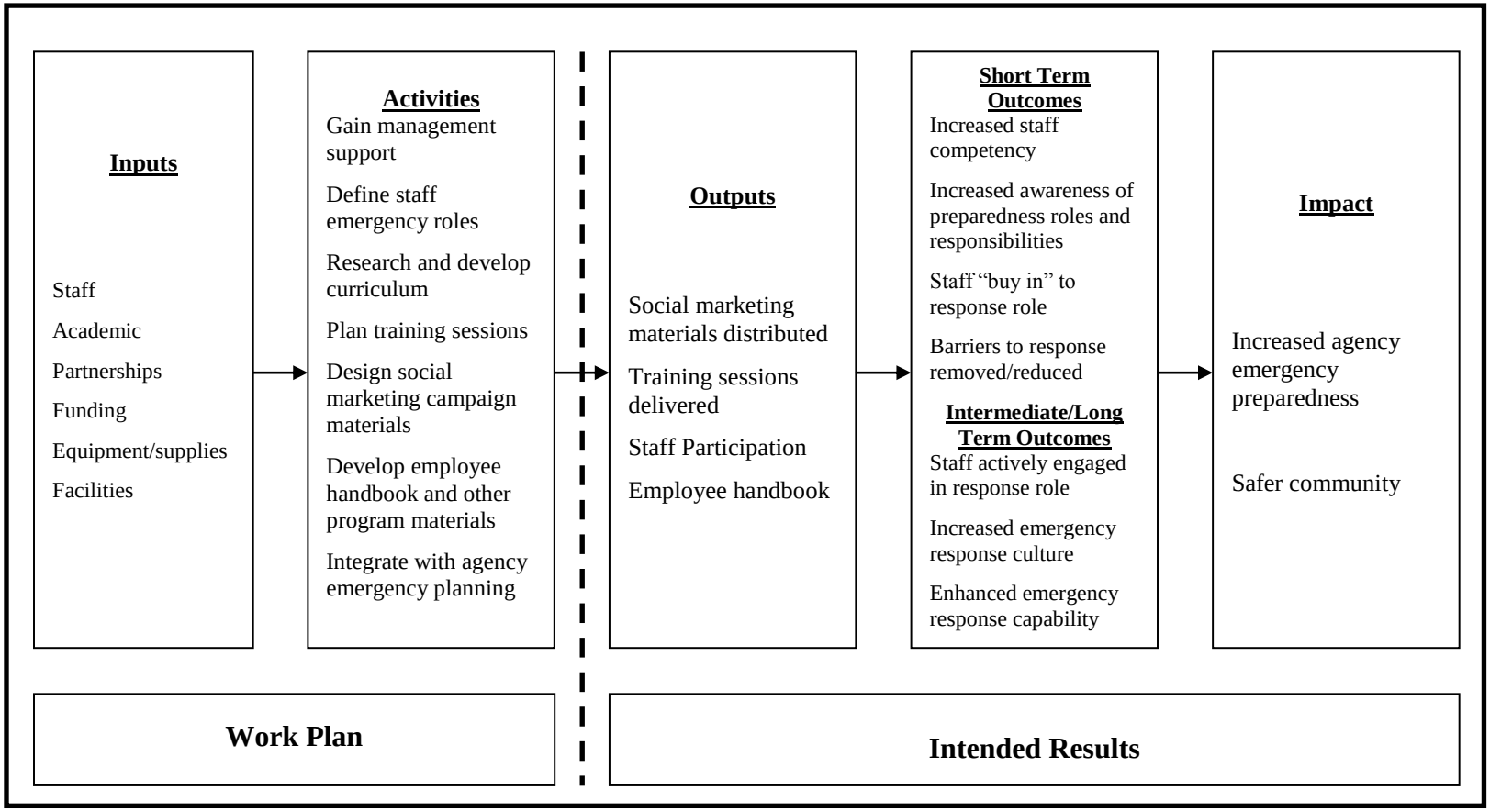
Local Heroes Program Logic Model

The inputs, activities and expected outcomes of Local Heroes are depicted in a logic model (Figure 1). Logic modeling is quite useful in the context of program evaluation because it depicts the logical flow and the relationship between program components and the distal outcomes expected of the program. Therefore, logic models help clarify the sequence of the program's resources, inputs, activities, short, intermediate and long-term outcomes and ultimately the intended long-term impacts of the program. (W.K. Kellogg Foundation, 2004)

As depicted in the logic model, the program's logical sequence of events is expected to proceed as follows: The APC staff, funded by NACCHO, provides staff time and expertise while leveraging relationships with academic and other partners to produce training materials and deliver the training to employees. As a result of the training employees will better understand their importance to the agency's response, their response role, and gain emergency preparedness

competencies. The output of the program inputs should be a more prepared and willing workforce with distal results being a better prepared health department and a safer community.

Figure 1. Local Heroes Logic Model



Evaluation Framework

This project uses the first two levels of Kirkpatrick's four level training evaluation model as the basis for measuring the effects of the training. Kirkpatrick's evaluation model has been in use since the late 1950s. It seeks to measure the effectiveness of training at four discreet points in the training process. (Phillips, 1997)

Level one of Kirkpatrick's model measures the reaction of trainees to the training program. This level is commonly referred to as "smile sheets" and measures the trainees' subjective, personal reactions to the training and the training environment. The purpose of measuring reaction is to determine whether trainees are engaged by the training and satisfied with the learning environment.

Level two of Kirkpatrick's model measures the knowledge acquired, skills improved, or attitudes changed as a result of the training. In the context of Local Heroes' competency-based approach, this level of evaluation should be focused on measuring any improvements in participants' basic skills applicable to their preparedness roles.

Level three of the Kirkpatrick model measures the degree to which participants apply the training and level four is an analysis of the outcomes of the training. Since the final two levels of Kirkpatrick's model are longer-term measures, they are not addressed in this project.

Summary

The DeKalb County Board of Health and the wider public health system continue to be challenged with gaps in employee preparedness training. This situation persists in spite of the benefits that appropriate, competency-based training can offer in the area of worker skills and willingness to report for duty in an emergency.

Local Heroes was designed to address these training needs through the use of a mixture of didactic training, an employee handbook and a social marketing campaign. This evaluation will measure the effects of one of these interventions, i.e. the didactic training, using the first two of Kirkpatrick's four levels of training evaluation.

Chapter III

Methods

Introduction

Local Heroes was designed to address knowledge deficiencies and other barriers to emergency response as outlined in the DCBOH training needs assessment document. This chapter describes the Local Heroes training product, its target audience, as well as the sampling method, data collection instruments and methods used. Analysis of the data is also described, as well as the scope and limitations of the evaluation.

Population and Sample

As a product commissioned by NACCHO, Local Heroes was designed to be customizable for use in any health department nationwide. However for the purposes of this formative evaluation, only implementation at DCBOH was considered. Therefore, the target population referred to in this project was comprised of a convenience sample of DeKalb County Board of Health employees that completed the training as of the date of data collection.

Training participants included in the final convenience sample totaled 49 employees that were tested pre and post training in groups by department. The pool of participants was comprised of agency staff from three different departments (Environmental Health, Health Assessment and Promotion and Office of the Director) that were trained and tested using only the Local Heroes training program materials.

Employees were trained face-to-face using a single lecture format in departmental groups. A training session was one six-hour class, three of which were conducted over a two week period. No demographic information was collected from any of the participants.

Research Design

Prior to beginning the training, participants were asked to complete a pre-test provided as a part of the Local Heroes training materials (Appendix A). The pre-test was designed to test participants' knowledge of specific preparedness policies, employee roles in an emergency as well as employee attitudes towards emergency response. Participants were also asked to self-assess their level of knowledge or competence in several preparedness knowledge domains. Responses to the pre-test questions were compiled and used to establish baseline levels of knowledge, attitudes and self-perceptions of competency and confidence.

After completing the training, participants were then asked to complete a post-test comprised of the same questions asked on the pre-test. In addition, participants were also asked to complete an evaluation of the training session itself, i.e. "smile sheets".

Procedures

Answers on both pre and post-test were scored using the answer key and scoring rubric provided with the Local Heroes materials. The change in correct responses to these questions on

post-test was measured and analyzed to determine the degree to which statistically significant change in participant knowledge was observed.

For the six questions with continuous scores, the Wilcoxon signed ranks test was used to assess the change observed in correct and incorrect answers on post-test. The Wilcoxon test was chosen for these questions because of normative deviations in the data. For the multiple choice questions, Fisher's Exact test was used to assess the change observed in correct and incorrect answers from pre-test to post-test.

One question (Q11) was a multi-part question that consisted of Likert scaled questions that asked participants to self assess their level of preparedness before and after training in an effort to determine the degree of change in self assessed competency or confidence.

The overall goal of this analysis was to determine the degree to which responses on individual questions corresponding to specific preparedness competencies, and self assessed competence/confidence showed a statistically significant change from pre-test to post-test.

Additionally, qualitative and quantitative data from training evaluation forms filled out by participants ("smile sheets") were collected and analyzed to determine the perceived value of the training and how well the trainer, materials, and learning environment met the needs and expectations of program participants.

Limitations and Delimitations

The pre-test, post-test and training evaluation tools were included with the Local Heroes training product and were not tested for reliability or validity. Additionally, the results of this project are based on a convenience sample and are not generally applicable to other departments or agencies. Finally, because the primary researcher also facilitated the training and is familiar with some participants, there is a risk of response, selection and other types of bias.

It is also important to note that Local Heroes contains additional tools and resources over and above the instructor led training, i.e. the employee handbook and the social marketing campaign. However the scope of this evaluation is limited to those parts of the program that directly affect the classroom learning experience and knowledge transfer, i.e. the didactic training component. Therefore, additional tools contained within the Local Heroes program are beyond the scope of this evaluation and were not considered as a part of this work.

Finally, since this formative evaluation is limited to the first two levels of the Kirkpatrick model, application of the new knowledge, skills, or attitudes ostensibly gained from the training is not measured and is not part of the scope of this work.

Summary

A convenience sample of DCBOH employees was tested pre and post-training to determine the extent to which statistically significant improvement was observed after the training. Continuous measures were evaluated using the Wilcoxon signed ranks test. Multiple

choice questions were evaluated using Fisher's Exact test. Additionally, smile sheet results were analyzed using quantitative and qualitative methods to determine participant satisfaction with the training.

Chapter IV

Results

Introduction

Participants in the Local Heroes training were administered pre and post-training tests made up of a combination of multiple choice and continuously scored questions. Participants' pre-test performance corroborated the results of the DCBOH training needs assessment and thus highlighted the need for and value of the Local Heroes program. Post-test results indicated significant improvement in most knowledge domains and in each of the three self assessed ratings of competence or confidence. Participants' smile sheet ratings and free text comments were mostly positive indicating good overall satisfaction with the training. Based on these results, there is good evidence that the Local Heroes program is an effective training tool

Findings

Participants were administered a pre-test (Appendix A) consisting of ten questions before taking part in the Local Heroes training curriculum. The bulk of the pre-test questions consisted of seven multiple choice questions (Q1, Q3, Q4, Q5, Q6, Q8, and Q9) with four choices each (A, B, C, and D) for which a single response was considered correct. Three Likert scaled questions were also included regarding self-perceptions of knowledge/confidence. Participants were asked to self rate their levels of confidence/knowledge from 1– 5, with one indicating less confidence or knowledge and five indicating the greatest degree of confidence or knowledge (Q11A, Q11B, and Q11C). Additionally, two scores were assigned that were sums of correct answers ranging

from 0 – 3 (Q2, Q7) and one question (Q10) to which only a non-response was scored as incorrect.

After the training, the identical test was re-administered to all participants (i.e. post-test). In an effort to answer the evaluation questions previously presented, the goals of this analysis were as follows: determine whether overall test scores showed a significant improvement from pre-test to post-test, and additionally whether performance across individual questions showed a statistically significant improvement from pre-test to post-test. The former is a rough measure of individual participants' overall knowledge, while the latter was used to determine whether there were specific knowledge deficits across all participants that were not addressed by the training.

Table 1 presents descriptive statistics for pre-test vs. post-test results. Questions with continuous scores are presented in the first five rows followed by the "total correct score" in the bottom row. The "total correct score" was calculated as the sum of the correct responses to the seven multiple choice questions. As can be seen in Table 1, all 49 participants took part in this aspect of the training, but for reasons that are unclear, many of the participants chose not answer questions 11A, 11B, or 11C on pre-test (n = 28) or on post-test (n = 29). Therefore, where the statistical tests used for the analysis required matched pairs, results were only available for those participants that completed both pre and post-tests.

Table 1

Descriptive Statistics for Continuously Measured Pre-test and Post-test Questions

	N	M	SD	*Range*
Pre-test				
Q2	49	2.45	1.06	0 - 3
Q7	49	2.35	1.13	0 - 3
Q11A	28	3.21	1.00	2 - 5
Q11B	28	3.18	1.02	1 - 5
Q11C	28	3.93	1.02	2 - 5
Total Correct – All Multiple Choice Questions	49	5.43	1.26	2 - 7
Post-test				
Q2	49	2.94	0.24	2 - 3
Q7	49	2.80	0.58	0 - 3
Q11A	29	4.38	0.68	3 - 5
Q11B	29	4.34	0.72	3 - 5
Q11C	29	4.62	0.49	4 - 5
Total Correct – All Multiple Choice Questions	49	6.57	0.64	5 - 7

Has knowledge of key preparedness concepts increased as a result of the training?

A Wilcoxon signed ranks test was performed to determine whether there were statistically significant improvements from pre-test to post-test for the five continuous measures. The non-parametric Wilcoxon Rank Sum test was used because normative deviations in the data were observed. The results of the Wilcoxon test are presented in Table 2.

Difference scores, which were computed by subtracting the pre-test scores from the post-test scores, are also presented. Positive difference scores indicate improvement from pre-test to post-test, whereas negative difference scores would indicate that scores decreased from pre-test to post-test. As can be seen in Table 2, none of the difference scores were negative, indicating that all participant scores increased from pre-test to post-test. Using the conventional significance level of $p < .05$, each of the six Wilcoxon tests showed statistically significant improvement in scores from pre-test to post-test.

Table 2

Wilcoxon Rank Sum Test Comparing Pre-test vs. Post-test Difference Scores on Continuously Measured Questions and Overall Score

Questions	N	*Pre-test* M (SD)	*Post-test* M (SD)	*Difference* M (SD)	Wilcoxon *z*	p (2-tailed)
Q2	49	2.45 (1.06)	2.94 (0.24)	0.49 (1.08)	-2.908	.004
Q7	49	2.35 (1.13)	2.80 (0.58)	0.45 (1.14)	-2.537	.011
Q11A	28	3.21 (1.00)	4.39 (0.68)	1.18 (0.86)	-4.226	.000
Q11B	28	3.18 (1.02)	4.36 (0.73)	1.18 (1.09)	-3.986	.000
Q11C	28	3.93 (1.02)	4.64 (0.49)	0.71 (0.90)	-3.337	.001
Total Correct – All Multiple Choice Questions	49	5.43 (1.26)	6.57 (0.64)	1.14 (1.10)	-5.189	.000

Note. Sample sizes, means, and standard deviations for Questions 11A, 11B, and 11C differ slightly from the post-test results displayed in Table 1 due to missing pre-test data for one participant. Therefore, this participant could not be included in the Wilcoxon test since respondents must have both sets of scores to be included.

A comparison of the percentages of correct vs. incorrect answers from pre-test to post-test using McNemar and Fisher's Exact tests on the results of the seven multiple choice questions and the one yes/no question was also undertaken to determine whether significant improvement

was seen in employee knowledge on post-test. These questions were all scored as correct or incorrect with a non-response being scored as incorrect. To assess whether the percentage of correct answers improved from pre-test to post-test, and to determine which questions, if any, did not show any improvement, cross-tabulations between the correct and incorrect answers on the pre-test and post-test for each of the eight questions were produced. Depending on the sum of the cross tabulations, either the McNemar test or Fisher's Exact tests was applied to determine whether there was a statistically significant change in the percentages of correct and incorrect responses from pre-test to post-test.

As depicted in Table 3, all 49 participants responded to the eight questions on the pre-test and post-test. Regardless of whether they responded or not, each participant received a score for these questions because they were given a score of "incorrect" for a non-response. Therefore there were no "missing" answers for these questions. Table 3 shows the number and percentage (out of 49) of respondents that fell into each of the four possible categories for each pair of questions: (a) answered correctly on pre-test but incorrectly on post-test, (b) answered correctly on both tests, (c) answered incorrectly on pre-test but correctly on post-test, and (d) answered incorrectly on both tests. The significance level was again set at the conventional level of $p < .05$ for both tests. Thus, as can be seen in Table 3, the percentage of respondents answering correctly showed statistically significant improvement for Questions 3, 4, 5, and 8 (all p values $< .05$). However for Questions 1 6, 9 and 10, significant improvement was not observed (all p values $> .05$). Nonetheless, it should be noted first that two questions (Questions 8 and 5) on which participants showed significant improvement were those missed by the largest percentage of participants on the pre-test. Moreover, two of the questions that did not show statistically

significant improvement, (Questions 1 and 6), were answered correctly by almost all participants on the pre-test. Therefore statistically significant improvement was not really possible on the post-test for these two questions.

Table 3

McNemar and Fisher's Exact Tests Comparing Percentages of Correct vs. Incorrect Answers for Pre-test Cross-Tabulated with Post-test

	Post-test (same question)				
	Incorrect	Correct	Total	McNemar *p*	Fisher's Exact *p*
Pre-test Q1					
Incorrect	1 (2.0%)	6 (12.2%)	7 (14.3%)		.472
Correct	3 (6.1%)	39 (79.6%)	42 (85.7%)		
Total	4 (8.2%)	45 (91.8%)	49 (100%)		
Pre-test Q3					
Incorrect	3 (6.1%)	4 (8.2%)	7 (14.3%)		.007
Correct	1 (2.0%)	41 (83.7%)	42 (85.7%)		
Total	4 (8.2%)	45 (91.8%)	49 (100%)		
Pre-test Q4					
Incorrect	1 (2.0%)	1 (2.0%)	2 (4.1%)		.041
Correct	0 (0.0%)	47 (95.9%)	47 (95.9%)		
Total	1 (2.0%)	48 (98.0%)	49 (100%)		

	Post-test (same question)				
	Incorrect	Correct	Total	McNemar *p*	Fisher's Exact *p*
Pre-test Q5					
Incorrect	3 (6.1%)	13 (26.5%)	16 (32.7%)	.000	
Correct	0 (0.0%)	33 (67.3%)	33 (67.3%)		
Total	3 (6.1%)	46 (93.9%)	49 (100%)		
	Incorrect	Correct	Total	McNemar *p*	Fisher's Exact *p*
Pre-test Q6					
Incorrect	1 (2.0%)	2 (4.1%)	3 (6.1%)		.061
Correct	0 (0.0%)	46 (83.9%)	46 (83.9%)		
Total	1 (2.0%)	48 (98.0%)	49 (100%)		
Pre-test Q8					
Incorrect	7 (14.3%)	25 (51.0%)	32 (65.3%)	.000	
Correct	0 (0.0%)	17 (34.7%)	17 (34.7%)		
Total	7 (14.3%)	42 (85.7%)	49 (100%)		
Pre-test Q9					
Incorrect	1 (2.0%)	9 (18.4%)	10 (20.4%)		.204
Correct	0 (0.0%)	39 (79.6%)	39 (79.6%)		
Total	1 (2.0%)	48 (98.0%)	49 (100%)		
Pre-test Q10					
Incorrect	1 (2.0%)	8 (16.3%)	9 (18.4%)		.337
Correct	1 (2.0%)	39 (79.6%)	40 (81.6%)		

Total	2 (4.1%)	47 (95.9%)	49 (100%)		
Please refer to Appendix A for full text of each question					

Has the program improved learner's self-perceptions of their competence to respond to an emergency?

This evaluation question can be best addressed by the results of the three Likert scaled questions regarding self-perceptions of knowledge/confidence (Q11A, Q11B, and Q11C). Participants were asked to self rate their levels of confidence/knowledge from 1– 5, with one indicating less confidence or knowledge and five indicating the greatest degree of confidence or knowledge. Again using the conventional significance level of $p < .05$ as shown on table 2, Wilcoxon tests for questions 11A, 11B, and 11C all showed statistically significant increases in self-rating of knowledge/confidence from pre-test to post-test.

What is the level of learner satisfaction with the training?

Participants were asked to rate the presenter, content, and training on six questions that were scored from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Table 4 presents descriptive statistics for each of these six questions. There were 47 participants that took part in this aspect of the project, with one participant not answering one of the questions.

Table 4

Descriptive Statistics for "Smile" Sheet Questions

	N	M	SD	*Range*	*Skewness*	*Kurtosis*
Presenter provided purpose and objectives of training	47	4.45	0.75	1 – 5	-2.27	8.67
Presenter was knowledgeable about topic	47	4.45	0.80	1 – 5	-2.06	6.20
Presenter addressed concerns and questions	46	4.46	0.78	1 – 5	-2.20	7.38
Teaching materials were interesting and easy to understand	47	4.40	0.90	1 – 5	-1.84	3.84
Training increased preparedness knowledge	47	4.36	0.87	1 – 5	-1.83	4.28
Understands agency and individual response role	47	4.45	0.78	1 – 5	-2.16	7.31

Note. These questions were scored from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Please refer to Appendix B for full text of each question

All of the questions had a mean score greater than 4.0, indicating that overall, there was good agreement with the questions. However, the answers did span the entire 1 – 5 scale for each question due to one participants' rating of "Strongly Disagree" for each item. Though it is only conjecture, it is possible that this participant misunderstood the rating scale and actually intended

to strongly *agree* with the statements. If that were the case, obviously the level of overall agreement with the statements would have been even higher.

To assess whether the answers to the questions were normally distributed, histograms were analyzed for each measurement. For each of the questions the histograms were negatively skewed. Additionally, skewness and kurtosis scores were also outside of the acceptable range for normality. However, since no inferential statistical tests were applied to these data, these deviations from normality should not be a concern.

Figure 2. Histogram for rating of presenter's presentation of purpose and objectives of training.

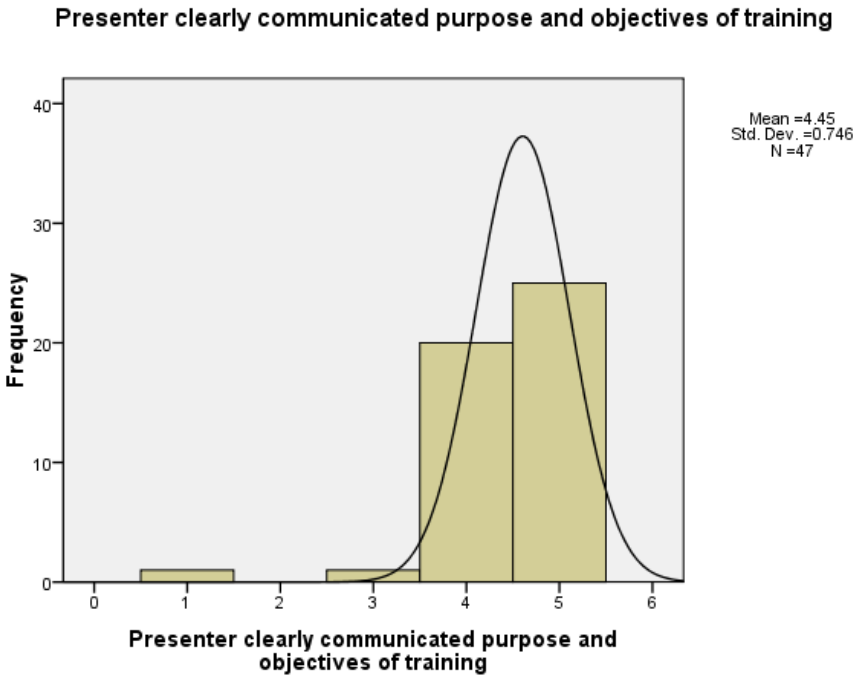


Figure 3. Histogram for rating of presenter's knowledge.

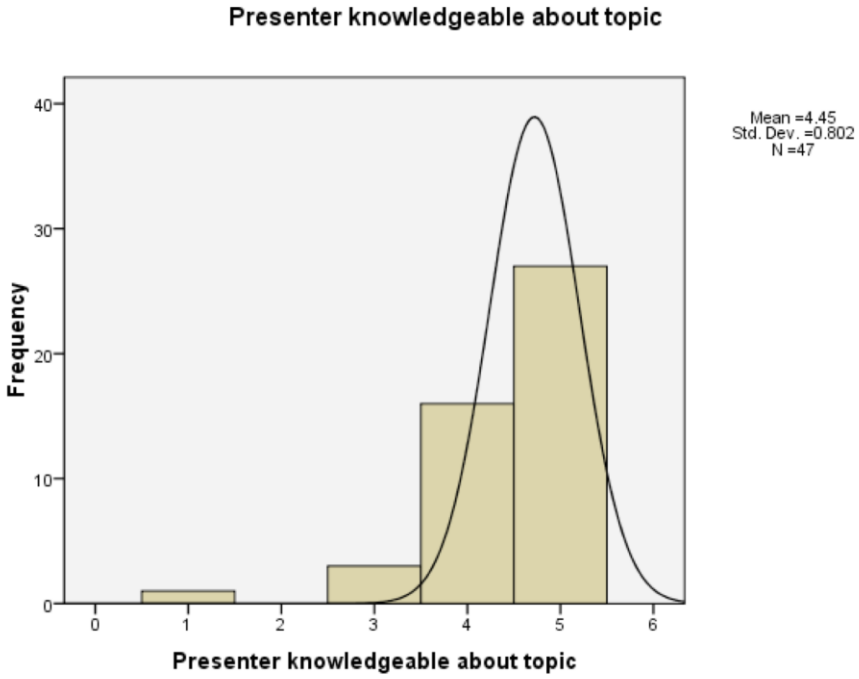


Figure 4. Histogram for rating of presenter's sensitivity to concerns.

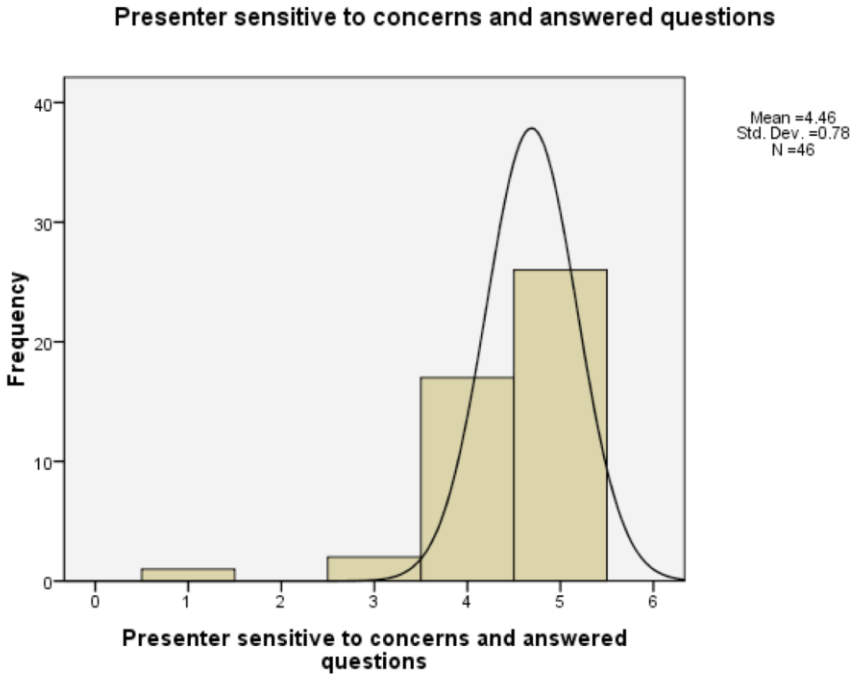


Figure 5. Histogram for rating of content and materials.

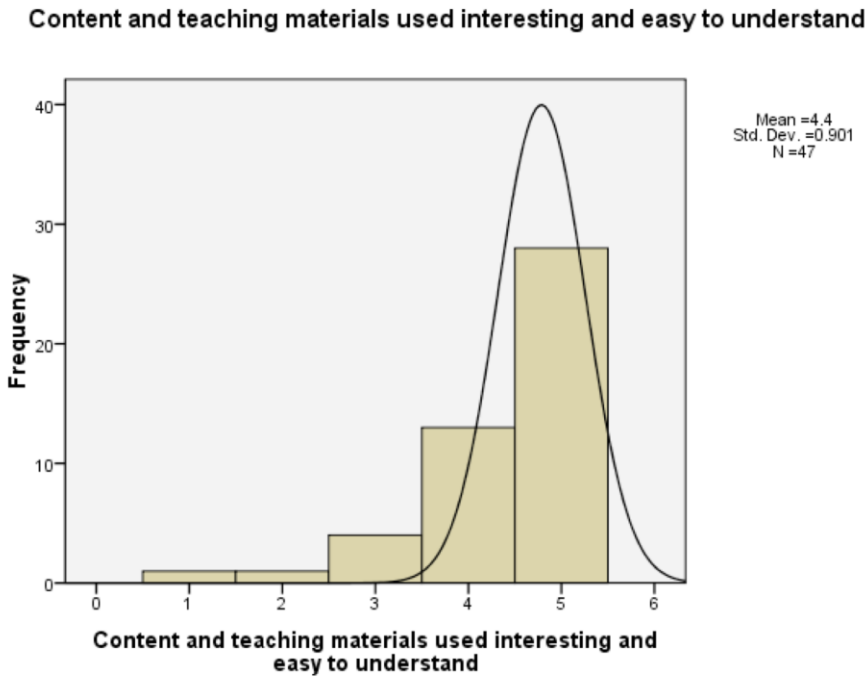


Figure 6. Histogram for rating of increase in knowledge of PH preparedness.

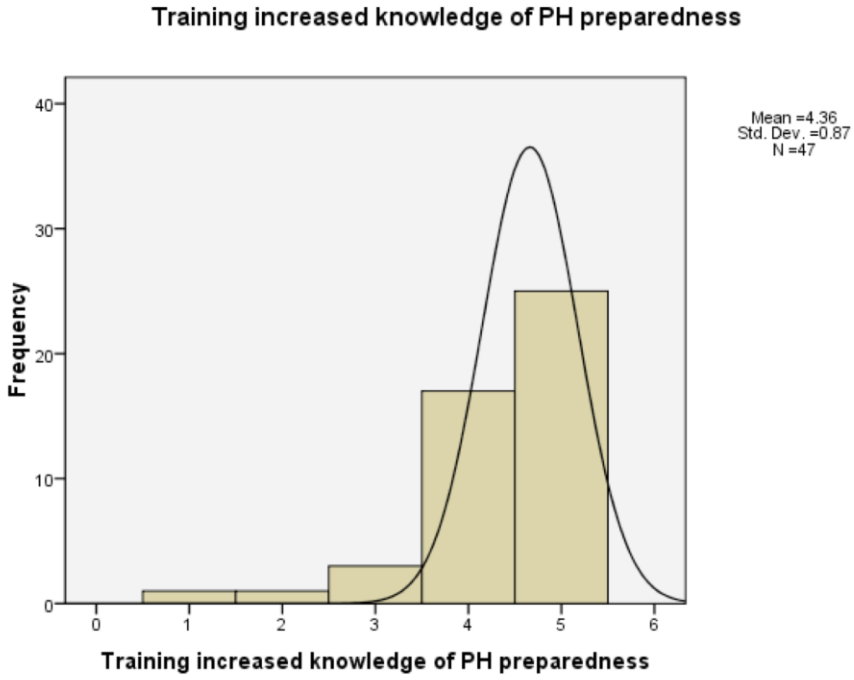
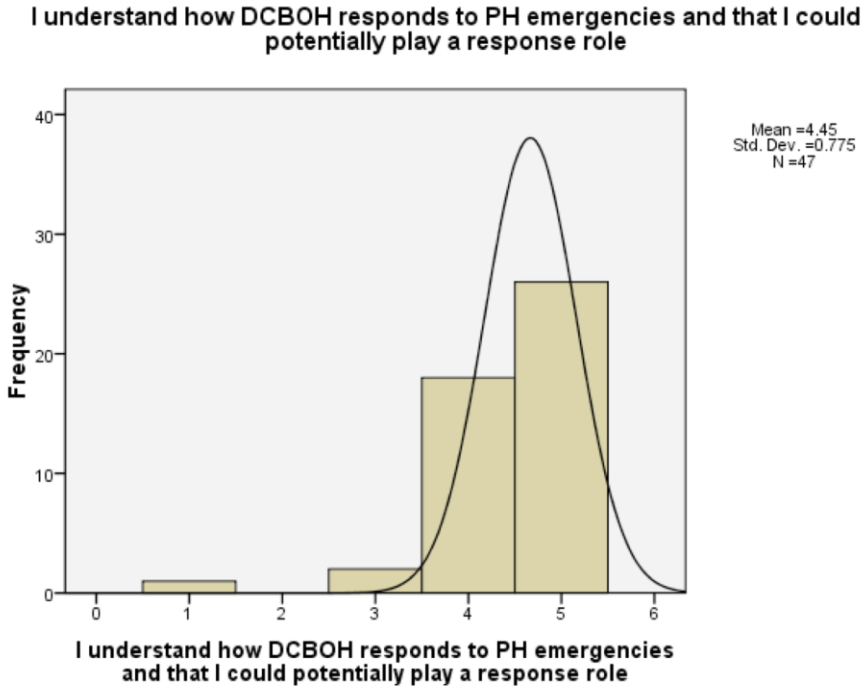


Figure 7. Histogram for rating of DCBOH response.



Following the Likert Scale items above, participants were asked to provide free-text feedback regarding possible improvements or any other comments in four areas: content of the training, the trainer, the room/equipment, and other suggestions or comments. Equal space for each of the four free-text sections was provided on the evaluation form to avoid differences in the amount of free-text feedback provided for any one section.

Forty-seven percent of program participants (n = 23) provided at least one free-text response. Most of these free-text responses were short, non-specific comments limited to one or two words. Of note, many of the free-text responses were entered in response areas that corresponded poorly or not at all to the area being evaluated, e.g., suggestions for name tags in the trainer rating area. Therefore responses for this section were analyzed in two ways. The first method was to consider the short, non-specific comments alone. These were coded to two

simple, straightforward categories for each rating item, i.e., positive or negative. The results for these short non-specific comments were overwhelmingly positive and are shown in Table 5 below:

Table 5

Free Text "Smile Sheet" Responses Coded as Non-Specific Positive or Negative

Rating Area	*Positive*	*Negative*
Content	90% (*n* = 9)	10% (*n* = 1)
Trainer	100% (*n* = 8)	0% (*n* = 0)
Room, A/V equipment, etc.	83% (*n* = 10)	17% (*n* = 2)
Other	100% (*n* = 6)	0% (*n* = 0)

In total, ninety-two percent (*n* = 33) of all these short comments coded to the non-specific positive category, e.g. "Great", "Very good", etc. Three comments coded to the non-specific negative feedback category, e.g., "Medicore" (sic), "Too cold", etc. Overall, these results indicate substantial participant approval of the training.

Free text responses were further analyzed by categorizing them according to the theme of participants' comments. Most of the participants' comments and suggestions coded to three main concepts: addition of a practical learning component (*n* = 4), better identification of program participants (*n* = 4), and improvements to the learning environment (*n* = 3).

Summary

The results of this work confirmed that the Local Heroes training program successfully increased participants' knowledge and confidence in their ability to respond. Descriptive statistics of the pre and post-test results showed improvement in post-test scores on most questions. Further analysis of the data showed that the increases observed on post-test were statistically significant for overall scores and for scores on most questions. Additionally, there were few complaints about the design and delivery of the training indicating high overall participant satisfaction. As a result, each of the three primary evaluation questions can be answered positively and hence the overarching evaluation question can as well, i.e. the Local Heroes program is an effective training tool.

Chapter V

Conclusions and Recommendations

Introduction

The results of this work show that the overarching evaluation question can be answered positively, i.e. the Local Heroes program is an effective training tool to address the knowledge deficits and competency requirements as outlined in the DCBOH training needs assessment. Regarding the first two primary evaluation questions, statistically significant improvement on post-test was observed on half of the multiple choice questions, in the overall test scores, and in self-perceptions of knowledge and confidence. As indicated by the generally positive "Smile sheet" results and free-text comments, employee satisfaction with the training was high. Regarding the final primary evaluation question, statistically significant improvement was also seen on post-test self-ratings of knowledge and confidence in questions 11A, 11B, and 11C.

However, in spite of these encouraging results, there are some areas where improvements to the design and delivery of the training can be made. Participants failed to show statistically significant improvement in some areas and did not do well on the pre-test on two questions in key areas suggesting a need for additional training. Other potential improvements include changes to the learning environment, clarifying questions on the testing instrument, and the addition of a practical learning component.

Discussion and Recommendations

Employee Knowledge Base

Questions 3 - 6, and 8 - 10 tested specific preparedness knowledge base items. Improvement between pre-test and post-test scores on half of these items was statistically significant (Q3, 4, 5, and 8). However it is important to note that the lowest pre-test scores were seen on questions 5 and 8, suggesting that existing knowledge in these areas was low prior to the training.

These questions tested knowledge of very important emergency preparedness concepts for healthcare responders, i.e. incident recognition (question 5) and the strategic national stockpile (question 8). Though significant improvement on these questions was achieved on post-test, it will be important to continue training of these concepts in the future to assure that any knowledge gains derived from the Local Heroes training program are maintained.

Significant improvement in scores on post-test were not achieved on questions 1, 6, 9, and 10. However scores for two of these questions (Q1 and 6) were quite high on the pre-test, hence statistically significant improvement was highly unlikely, if not impossible due to the ceiling effect. Thus it can be concluded that existing knowledge of these concepts was high, the test questions were not difficult enough, or both. Consideration should be given to reevaluating these test questions to determine if they are too simple or easily guessed.

Employee Self Perceptions of Knowledge and Confidence

Employees rated their self-perceptions of knowledge and confidence to respond to an emergency or disaster using three Likert scaled questions (Q11A, Q11B, and Q11C), which they were asked to score from 1 – 5. Significant improvement on the post-test was achieved on each of these items.

However even though significant improvement was achieved on these questions, it is important to note that the number of questions was small so it is difficult to draw firm conclusions solely from this instrument. Further research into this should be conducted to better determine employees' self-perceptions of their ability to respond to an emergency or disaster.

Nonetheless, as a rough indicator, the significant improvement on post-test results suggests that gains were made in this area.

All of the "smile sheet" questions had a mean score greater than 4.0 (out of 5) indicating good overall agreement with the evaluation questions. These results are encouraging and indicate broad agreement among participants that the training was well designed and delivered.

Most free-text responses were limited to one or two words. Therefore responses for this section were coded broadly to only two categories, i.e. non-specific positive and non-specific negative across each of the rating items. The overwhelming majority (n = 33) of these comments indicated approval. Moreover these results were not confined to a small number of participants since 47% (n = 23) of training participants provided at least one free text evaluation response. However there were a smaller number of comments that provided more detailed feedback that may be used to inform program improvements. These comments coded to a need

for more practical application of the course content, better identification of course participants, and complaints about the learning environment. Several comments and suggestions were provided to individual questions and are explained below:

Provide Practical Application Of Concepts (n = 4)

Comments included “More examples that make real world activities link with EP solid.”, “Case studies or examples in action”, and “Include Environmental Health topics in the curriculum”.

*Better Identification Of Participants (*n = *4)*

Comments included “Provide name tags so that participants can be addressed correctly” and “Introductions might be helpful”

Learning Environment (*n* = 3)

One participant felt the room was too cold, one pointed out issues with the A/V equipment and another suggested more breaks. Suggestions for addressing these issues are relatively straightforward, i.e., adding a practical learning component such as a brief tabletop exercise to the training, use of name tags instead of employee ID badges, and soliciting feedback before and during the training about the learning environment.

Addition of a Practical Learning Component

Several free text responses from the training evaluation instrument highlighted the participants’ desire for a practical learning component in the training. Therefore consideration should be given to adding case studies, practical examples and perhaps even a tabletop exercise to the training sessions.

The addition of a tabletop exercise, preferably customized for each department would allow participants to work through a response scenario relevant to their work area in a non-threatening environment. Doing so would not only allow participants to think and learn about their individual and departmental role in a response, it would also provide the opportunity for a competency-based assessment of strengths and areas in need of improvement. Moreover, not only would this information be available to management in the form of data analysis, but to employees as well by virtue of their experiences and collaborations during the course of the tabletop exercise. Such enhancements might help facilitate and provide the opportunity for competency-based assessments of employee strengths and areas for improvement.

Better Identification of Program Participants

Several free text responses from participants indicated the desire that training program participants be better identified. In particular, two participants suggested nametags and two suggested participant introductions. These suggestions are consistent with the high value placed on the opportunity to interact with other participants indicated by the results of the DCBOH training needs assessment. Providing name badges and table tents could easily and cheaply remedy this issue for participants and providing a brief introduction period during the training. An additional consideration might be to incorporate an "ice breaker" activity as well.

Improvements to the Learning Environment

Even though suggestions and comments in this area were relatively few, problems with the learning environment can cause serious interference with participant learning. Therefore it is worthwhile to explore this area for potential improvements. Comments and suggestions in this area included complaints about minor A/V equipment malfunctions (n = 1), requests for coffee

(n = 1) and additional training incentives (n = 2). Additionally, one suggestion was made to moderate the temperature of the room and another for 5 minute breaks, (though breaks were provided). Suggestions for addressing these issues are relatively straightforward. A/V and other training equipment should be checked prior to the training to assure it is in proper working order. Coffee and training incentives should be provided depending on budgetary constraints. Finally the trainer should periodically request feedback before and during the training about the need for breaks, temperature of the room etc.

Program Design Recommendations

Review of Testing and Evaluation Instruments

Minor changes to the program testing and evaluation instruments were also identified as an area of potential improvement during the course of this evaluation project. Review and revision of the pre and post-testing instruments, the learning needs assessment instrument as well as the scoring criteria for some questions should be strongly considered. Several questions on the pre-test resulted in significant numbers of correct responses by program participants. This suggests either a high level of pre-existing knowledge in some areas, that the pre-test questions may not have been challenging enough, or perhaps some combination of both. Therefore the testing instruments should be reviewed to determine whether the test questions present enough of a challenge to participants. If analysis of the testing instruments shows that the test questions are not challenging enough, this should be immediately remedied as it may create difficulties with evaluating the degree of improvement. This phenomenon is known as the “ceiling effect” and is

caused when high scores on the pre-test result in difficulty or inability to show significant improvement on the post-test because there simply isn't enough room for improvement.

Additionally it was noted that the wording of some questions on the pre/post-test and the program evaluation instruments was vague. Any questions with multiple rating items should be split into multiple questions or pared down to a single rating item. So for example, pre/post-test question 11 asks participants to rate their "degree of confidence or knowledge" in certain skills and abilities. Instead, participants should be asked to rate either their confidence or knowledge, not both. This issue should also be addressed in questions 1, 3, 4 and 6 of the training evaluation instrument ("smile questions").

Improvements to these instruments will result in more precise and complete data about the program that can then be used to drive future program evaluation and quality improvement efforts.

Review of Scoring Criteria

The scoring rubric for open-ended questions on the testing instruments should be improved to allow for better precision in scoring responses to these questions. The program guidance stipulates that only a non-response be counted as incorrect on these questions. This results in less accurate scoring and may artificially inflate scores. Instead, participant responses to these questions should be scored by comparison to a list of expected responses based on information taught in the training course or provided in the program guidance documents. Doing so would allow for a better understanding of specific concepts not being properly conveyed or fully understood by participants so that course content or teaching methods could be adjusted appropriately. Moreover changing the scoring rubric in this way may also have the added benefit

of helping to address the previously discussed issues with the "ceiling effect" observed on some test questions.

Collect Demographic Data

Participant demographic data were not collected as part of the Local Heroes training. Wherever possible, these data should be collected so that areas of differential performance related to department, gender, age, etc. can be assessed and if possible, addressed. However collection of demographic data should be done in such a way that the anonymity of participants is not compromised.

In addition to this work, future evaluations should be conducted to gain additional insights into program performance and to determine whether corrective actions implemented as a result of this work have been effective. Future evaluations should also determine the extent to which employees applied the knowledge gained to their everyday work and whether the program achieved its longer-term goals.

Conclusion

The results of this formative evaluation are encouraging. The participants' pre-test performance on certain questions corroborated the results of the earlier training needs assessment in highlighting employee knowledge deficits and thus helped demonstrate both the need for and value of the program. Moreover, the post-test results indicated significant improvement in most areas. Therefore based on the results demonstrated by the data, each of the evaluation questions was answered in the affirmative. Therefore the conclusion is that the Local Heroes training program did result in a significant increase in participant awareness, learning and confidence to

respond during an emergency and that there was significant learner satisfaction with the program.

Nonetheless improvements in each of these areas can be achieved with a modicum of effort. The addition of a practical learning component, a review of the pre/post-test instruments, as well as minor improvements to the learning environment would be helpful and might result in even better outcomes in the future.

Additionally this project highlighted the need for continued, ongoing evaluation of both the results of this program as well as the competency level of employees compared to the baseline levels established in the training needs assessment.

Even so, at this stage in its development the Local Heroes training program is achieving its goals of increasing DCBOH employee knowledge, competency and ability to respond to an emergency incident and has demonstrated its value in improving employee preparedness.

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APPENDIX A

Local Heroes Pre/Post-Test Answer Key

1. What is the purpose of the Local Heroes campaign?
    a. Teach the workforce how to conduct a mass vaccination
    b. Emphasize the importance of emergency preparedness
    c. Show public health workers that they perform heroic efforts every day
    d. Both B and C

2. List 3 characteristics of a hero.

    (Participants should list characteristics that were discussed in the group exercise)

3. Which is NOT an example of a 20th century public health accomplishment?
    a. Fluoridation of drinking water
    b. Free healthcare for all
    c. Motor vehicle safety
    d. Recognition of tobacco use as a health hazard

4. Which of the following are public health challenges of the 21st century?
    a. Pandemic flu
    b. Chronic disease
    c. Bioterrorism
    d. All of the above

5. Which is the correct definition of a public health emergency?
    a. The rise of chronic diseases such as diabetes and heart disease
    b. Hurricanes, earthquakes, tornadoes or any natural event that could kill large numbers of people
    c. The occurrence or imminent threat of exposure to a dangerous condition or highly toxic agent that poses a threat of substantial harm
    d. Any emergency to which the police or fire department would respond

6. Which of the following is NOT an example of a public health emergency?
    a. A natural disaster
    b. A hazardous material spill

c. SARS
d. Hearing and vision screening in a school system

7. List three things that a public health employee needs in order to be prepared.

(Participants should list needs that were discussed in the group exercise)

8. Which of the following supplies are NOT included in the Strategic National Stockpile?
   a. Emergency food rations
   b. Bandages
   c. Life-support medications
   d. Chemical antidotes

9. Which of the following are characteristics of the Incident Command System?
   a. Temporary
   b. One person in charge
   c. Clear reporting chain
   d. All of the above

10. List one reason why your Local Heroes handbook will be helpful to you.

(Participants should list one of the examples discussed in the training session)

11. On a scale of one to five with one indicating less confidence or knowledge and five indicating the greatest degree of confidence or knowledge, please rate your understanding of:

Less knowledge ⟶ More knowledge

1 2 3 4 5

How DCBOH responds to public health emergencies

1 2 3 4 5

The role you could potentially play in DCBOH's emergency response

1 2 3 4 5

The importance of a personal emergency preparedness plan

1 2 3 4 5

APPENDIX B

Local Heroes Workforce Training

Evaluation

Please help us to improve our Local Heroes Emergency Preparedness Training by completing this evaluation. Circle the answer that best reflects your agreement

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The presenter clearly communicated the purpose and objectives of the training.	**1**	**2**	**3**	**4**	**5**
2. The presenter was knowledgeable about the topic area.	**1**	**2**	**3**	**4**	**5**
3. The presenter was sensitive to my concerns and was able to adequately answer any questions.	**1**	**2**	**3**	**4**	**5**
4. The content and teaching materials used during the training were interesting and easy to understand.	**1**	**2**	**3**	**4**	**5**
5. The training increased my knowledge about public health preparedness.	**1**	**2**	**3**	**4**	**5**
6. I understand how DCBOH responds to public health emergencies, and that I could potentially play a role in this response.	**1**	**2**	**3**	**4**	**5**

Please make suggestions on how this training can be improved, as well as any other comments.

Content

Trainer

Room, A/V

equipment, etc.

Other