ORIGINAL RESEARCH

The Angolan Pandemic Rapid Response Team: An Assessment, Improvement, and Development Analysis of the First Self-sufficient African National Response Team Curriculum

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ABSTRACT

Objective: The purpose of this study was to assess, through participant self-assessment, the effectiveness of a rapid response team curriculum based on the World Health Organization (WHO) Ebola Virus Disease Consolidated Preparedness Checklist, Revision 1.

Methods: A pre-and-post survey for the purpose of process improvement assessment involving 44 individuals was conducted in Angola. The survey was conducted before and after a 6-day training workshop held in Luanda, Angola, in December 2017. A paired t-test was used to identify any significant change on six 7-point Likert scale questions with $\alpha < .05$ (95% CI).

Results: Two of the 6 questions, "I feel confident the team can effectively work together to accomplish its assigned goals and objectives during a suspected contagious hemorrhagic fever disease outbreak" and "I understand basic pandemic response concepts" changed significantly from the presurvey to the postsurvey. The 4 remaining questions had near statistical significant change or an upward trend.

Conclusion: This Angolan rapid response team training curriculum based on WHO guidelines, After Action Reports, and internationally accepted standard operating procedures provides the nation of Angola with the confidence to rapidly respond at the national level to a highly infectious contagion in the region. (*Disaster Med Public Health Preparedness*. 2019;13:577-581)

Key Words: Ebola, rapid response teams, public health emergencies of international concern, hemorrhagic fever

The 2014 Ebola epidemic in Western Africa[1,2] (Liberia, Sierra Leone, Guinea, and Nigeria) infected tens of thousands of individuals and claimed more than 11 000 lives, with a case fatality rate of approximately 60%. This outbreak challenged the local, regional, and national medical community to prevent a global pandemic. The global response involving logistical, epidemiological, public health, and medical interventions slowed and eventually contained the spread. These experiences awakened the global medical community to the fragility of the global health response system and provided a template from which to address future pandemics.

One of the mitigation and response lessons learned was the importance of rapid response teams (RRTs) that are trained and prepared and can be mobilized immediately when a suspect case is identified. In August 2014, the Liberia Ministry of Health and Social Welfare, supported by the US Centers for Disease Control and Prevention (CDC), the World Health Organization (WHO), and other agencies in Liberia, began to implement a strategy of rapid isolation and treatment of Ebola[1] to systematically respond to suspected cases in remote areas.

The goal of this response team was to rapidly isolate and treat patients, safely transport patients to existing Ebola treatment units, safely collect and transport laboratory samples, identify the index case, conduct contact tracing, train teams in safe burial procedures, and observe contacts for 21 days.

This rapid response concept was one of the factors that helped contain the Ebola virus disease (EVD) outbreak in the Democratic Republic of Congo (DRC) in May 2017. The first suspect case was identified May 11, 2017, and the official end of the outbreak was declared July 2, 2017, which marked the completion of all contact observation periods.[3] The number of cases for this DRC 2017 outbreak included 8 total suspected and confirmed cases with a total of 4 deaths (50%). In comparison, the timeline for the 2014 multinational outbreak spanned from December 2013, when the first index case was suspected, to February 2015, when the last known cluster of EVD cases were contained.[2]

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During the outbreak of 2014, a variety of organizations, including the US Armed Forces, the CDC, and respective African nations, developed RRTs that can be rapidly deployed in a variety of environments to mitigate and contain spread. The nation of Angola, due to its proximity to EVD-endemic areas and its own experiences with Marburg disease and the 2017 yellow fever epidemic, created a hemorrhagic fever RRT sponsored by the national military and Angolan Ministry of Health. The Angolan team members were trained for 1 week in December 2017 by the US Navy and guest experts from the CDC. This week of training included tabletop scenarios; individual breakout sessions; didactic lectures; hands on training with equipment, including personal protective equipment; and patient scenarios. A pretraining and posttraining survey was completed by the participants, which included self-assessments of their perceived ability to perform their respective team duties.

Objectives

The purpose of this study was to assess, through participant self-assessment, the effectiveness of a RRT curriculum based on the World Health Organization (WHO) Ebola Virus Disease Consolidated Preparedness Checklist,4 Revision 1. The impact of the training on the participants' self-perceived ability to perform their duties was assessed by means of a pre-post confidential questionnaire with nine 7-point Likert scale questions and 1 open-ended comments section.

MATERIALS AND METHODS

Study Design and Setting

This pre-post study was conducted in the Hospital Militar Principal in Luanda, Angola. A conference room providing space for presentations, breakout sessions, and simulation was used during the week of training in the hospital. Two native Portuguese speakers provided by the US Armed Forces provided direct translation when needed. All educational materials, including presentations, were translated by native Portuguese speakers prior to the event. The planning team from the Angolan military and US Navy met 3 times during the year prior to the event in order to establish the training topics, activities, and schedule.

A survey was provided to the 44 study participants before the initiation of training and immediately upon completion of the training. The pre-event survey included 6 Likert scale questions assessing the individuals' perceived ability to fulfill their designated role on the team and manage a highly infectious patient/scenario as well as their knowledge of basic response concepts. The postsurvey questionnaire included these same 6 questions, 3 additional Likert scale questions assessing the overall effectiveness of the training, and a final tenth question requesting comments for needed additional training. The study design uses SQIRE 2.0 guidelines for quality improvement reporting.[5]

The study received a waiver from the Internal Review Board.

Selection of Participants

A total of 44 Angolan classroom participants completed the course and the surveys. These 44 participants were identified by the Forças Armadas Angolanas and the Angolan Ministry of Health to be members of the RRT. The 44 participants identified were a mixture of civilian and military physicians, nurses, social workers, security specialists, and medical technicians. This program was sponsored by the US Africa Command. There were 4 additional full time classroom participants including 3 medical providers from the Serbian Armed Forces and 1 from the South African Armed Forces. These individuals were active participants in the program but were not assigned to be members of the Angolan RRT. Additional intermittent observers of the training program included members from the armed forces of Mali, Cote d'Ivoire, and Portugal, who did not officially participate in the full training program.

Intervention

A survey was provided to the 44 study participants before the initiation of training and immediately upon completion of the training. The pre-event survey included 6 Likert scale questions that assessed the individual's perceived ability to fulfill their designated role on the team and manage a highly infectious patient/scenario as well as their knowledge of basic response concepts. A week-long training from December 4 through December 9, 2017, covered topics and training that the planning teams from Angola and the United States identified prior to the training.

The week-long curriculum covered national and global tabletop planning, response, and mitigation concepts, including a gap analysis; didactic presentations that involved experts from the US Embassy's US Agency for International Development (USAID) and CDC staff; participant breakout sessions followed by group presentations; building fundamentals for an emergency operations plan; practical application of an incident command system and media concepts in simulated scenarios; hands on training with personal protective equipment in simulated environments and patient scenarios; and didactic and hands-on training in the setup and management of an Ebola treatment unit. Specific infectious disease topics covered included Ebola, Marburg, Lassa, Rift Valley fever, yellow fever, and Crimean-Congo hemorrhagic fever. The training provided used accepted protocols developed by various organizations during the Ebola outbreak[4] and followed the World Health Organization Ebola Virus Disease Consolidated Preparedness Checklist, Revision 1.

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The postsurvey questionnaire included the same 6 presurvey questions, 3 additional Likert scale questions assessing the overall effectiveness of the training, and a final question that solicited comments for needed additional training (Table 1).

Methods of Measurement and Outcome Measures

The primary outcome was the calculated change in the 6 Likert-scored questions that were asked before and after the training to assess self-perceived competence and ability to perform duties on the team. These 6 questions were provided on an anonymous form, in Portuguese, using a 7-point Likert scale ranging from 1, designated as "strongly disagree," to 7, designated as "strongly agree." Portuguese translators were available to assist with questions on the survey. The participants were instructed to circle 1 number from 1 to 7 for each of the Likert scale questions. Each participant was given a unique identifier allowing for anonymity and pairing analysis.

Secondary outcomes included the results of the 3 additional Likert scale questions assessing overall effectiveness of the training and a final, open-ended comment section eliciting recommendations for any additional training that the participant felt is needed or desired. For consistency, the 3 additional postsurvey questions used the same 7-point Likert scale as the presurvey assessment.

Primary Data Analysis

The completed survey data were entered into a Microsoft Office Excel spreadsheet (Microsoft Office Excel 2007). Means and standard deviations (SD) were calculated for each of the 6 presurvey and postsurvey questions that were repeated on the surveys for comparison and the 3 questions that were only asked on the postsurvey questionnaire. The comments elicited from the final question were translated into English by a professional translator identified by the US Armed Forces team. Using the unique identifiers, the 6 repeated presurvey and postsurvey self-assessment questions were compared using a paired t-test. Means, standard deviations, 95% confidence intervals (CI), and 2-tailed *P* values were calculated for each of the 6 questions. Means and standard deviations were calculated for the 3 unique postsurvey questions regarding participants' assessment of the training program.

Forty-four presurvey and 42 postsurvey questionnaires were completed. The presurveys and postsurveys were paired by means of the unique identifiers. Two individuals were unable to participate at the end of the final training day because they left early to set up the follow-on simulation site. These 2 individuals were considered lost to follow-up.

RESULTS

Answers to 2 of the 6 questions, "I feel confident the team can effectively work together to accomplish its assigned goals and objectives during a suspected contagious hemorrhagic fever disease outbreak" (95% CI, −0.79 to −0.06; $P = .02$) and "I understand basic pandemic response concepts" (95% CI, −0.68 to −0.19; $P = .0008$) changed significantly. The 4 remaining questions had a nearly statistically significant change or upward trend (Table 1).

The mean scores for the postsurvey questions, which were not included in the precourse survey, were as follows: "The nation of Angola is better off because of this training," 6.71; "I can more effectively perform my role/position because of the training I received during this course," 6.76; and "This training was valuable," 6.95. The question "This training was valuable" scored consistently high among the participants. The open-ended comments responses were consistently positive, such as "This investment is the best way to avoid hemorrhagic fever epidemics. The best way to prevent and fight these diseases is to be prepared to combat from the start." In addition to these positive remarks, there were also requests

TABLE 1

Precourse and Postcourse Survey Questions

Question	Precourse Mean ± SD (n = 44)	Postcourse Mean ± SD (n = 42)	*P* Value
1. I feel confident fulfilling my current position/role during a real scenario.	6.61 ± 1.45	6.79 ± 0.81	.75
2. I feel safe working in the anticipated environment during a real scenario.	6.43 ± 1.26	6.74 ± 0.77	.31
3. I feel as if I can appropriately manage a potentially highly contagious patient.	6.05 ± 1.36	6.41 ± 0.95	.07
4. I feel confident the team can effectively work together to accomplish its assigned goals and objectives during a suspected contagious hemorrhagic fever disease outbreak.	6.23 ± 1.46	6.65 ± 0.77	.02
5. I understand basic pandemic response concepts.	6.41 ± 0.90	6.90 ± 0.44	.0008
6. I understand basic hemorrhagic fever concepts.	6.70 ± 0.67	6.93 ± 0.26	.058
7. The nation of Angola is better off because of this training.		6.71	
8. I can more effectively perform my role/position because of the training I received during this course.		6.76	
9. This training was valuable.		6.95	

Scores based 1 to 7 Likert scale. 1 = strongly disagree, 4 = neutral, 7 = strongly agree.

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for continued training to maintain skills, such as "To improve my competency, I'd like more training on biosecurity."

DISCUSSION

The West African Ebola outbreak in 2014 infected over 20 000 individuals and caused approximately 10 000 deaths.[2,3] This outbreak taught many lessons, including the need for increased surveillance, more effective ecological health interventions, expanded prediction modeling, improved risk communication, improved diagnostic tools, improved medications and vaccines, and improved local and global response.[3] One of the interventions created during the outbreak was RRTs, which have since been employed around the world to respond to highly infectious disease outbreaks. For example, the nation of Ghana sent 5 providers for training, sponsored by the World Health Organization Regional Office for Africa (WHO-AFRO) in Brazzaville from August 26 to 28, 2014, which included a plan for building Ebola capacity in 10 regional medical centers and 3 specifically designated Ebola treatment centers.[6] However, this type of response is passive and lacks the speed and flexibly of the RRTs. The Angolan RRT described here is being trained in the appropriate response to an infection of public concern as well as larger concepts of disaster response and management that will help contain the spread of any potentially infectious disease outbreak. The nation of Angola, with the assistance of the US Armed Forces, identified 44 individuals of various specialties to form their hemorrhagic fever RRT.

The World Health Organization Ebola Virus Disease Consolidated Preparedness Checklist,[4] Revision 1, which identifies 11 key components of preparedness that require minimal resources, was used as a baseline for the training competencies. These competencies were supplemented with protocols, checklists, standard operating procedures, and the experiences from providers participating as instructors training this team. The team's training on these concepts, as assessed by the precourse and postcourse surveys, showed statistically significant changes in 2 categories, near statistically significant change in 2 additional categories, and upward trending means in 2 final categories. These scores of self-perceived improved abilities, knowledge, and confidence provide evidence that this type of training improves personnel's perception in the team's ability to respond to an outbreak.

During the 2014 outbreak, the United Nations Security Council and the United Nations General Assembly established the United Nations Mission for Ebola Emergency Response. This team was headquartered in Accra, Ghana, and brought together the respective United Nations agencies and response assets. These response assets, including the WHO Ebola response team in coordination with the Global Alert and Response Network, provide direct assistance in the field. This structure can result in uncertainty about which is the lead agency during a response and who is ultimately responsible for the management of an outbreak, and it can discourage internal capacity building.[7]

The use of a national RRT addresses these concerns. Implementation of these competencies and the use of the WHO RRT concept can be considered as factors that helped contain the 2017 DRC outbreak, which ended with only 8 cases and 4 deaths. Trained and capable response teams can be used for Ebola as well as other highly infectious disease. Working in highly contagious and volatile environments requires confidence in one's abilities, as well as knowledge of the situation and environment. Formal training based on lessons learned, consensus protocols and checklists, and provider experience provide a foundation for adequately trained teams that can effectively intervene and contain a global outbreak.

To our knowledge, this is the first study to assess any formal training of an RRT. These data are limited to self-assessment survey data that showed statistical significance and upward trending scores in 6 self-assessed competencies. This self-assessed ability and knowledge is important when personnel work in a highly infectious and dangerous working environment such as active Ebola or Marburg outbreaks. The team conducted a comprehensive functional exercise in Pambala, Angola the week following the training, in which they implemented the skills and knowledge learned in the training. During this training, the RRT successfully completed a full-day, full-scale exercise without external assistance. The results of this engagement suggest that a sustainable training program promotes an independent and self-sufficient team capable of responding at the national level to a highly infectious contagion to contain and mitigate an epidemic or potential global pandemic. This independence mitigates future outbreaks via limiting the need for external assistance and decreasing response time.

A long-term follow up of the participants' abilities, as well as a follow-up assessment if the team is activated in the future, may further strengthen the perceived benefits of this training curriculum.

CONCLUSIONS

In Conclusion, this Angolan RRT training curriculum based on World Health Organization (WHO) guidelines, after action reports, and internationally accepted standard operating procedures, provides the nation of Angola with the confidence to rapidly respond at the national level to a highly infectious contagion in the region.

Limitations

There are several limitations to the study. The first limitation is the frequent use of translation to Portuguese from

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English. Native Portuguese speakers from the US Armed Forces were used for translation of instructional materials, surveys, and presentations when needed. Some of the participants took part in prior training in disaster and/or Ebola workshops 2 years prior to this intervention. This earlier training was provided by the lead instructor; therefore, some program participants already had some baseline knowledge of the presented material. Additionally, in preparation for the final workshop, the RRT conducted some of their own training prior to the engagement. The survey focused specifically on the week-long training event; however, prior training received by some of the participants would potentially contribute to the relatively higher scores on the presurvey questions for some questions. The team was hand-picked by the Angolan Ministry of Health and the military, which could potentially introduce selection bias for better trained and educated personnel. The assessments are based on self-reported competence and ability after the training and simulations and do not reflect actual events. Finally, this study's limitations include those inherent to a preassessment and postassessment.

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Disclaimer

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Conflicts of Interest

The authors declare no conflicts of interest.

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