

Original Research

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Adapting WHO Rapid Response Teams Advanced Training Program to Saudi Arabia's Public Health Needs: A Systematic Process

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Abstract

Objectives: To enhance the emergency response preparedness of public health professionals in Saudi Arabia, the World Health Organization Rapid Response Team Advanced Training Package (WHO RRT ATP) was adapted. It was designed to align with local cultural and operational contexts.

Methods: A 2-day workshop was conducted involving experts who reviewed and modified the adapted WHO RRT ATP training materials. The process was structured into 7 phases: needs assessment, stakeholder analysis, cultural tailoring, content adaptation, module selection, implementation planning, and evaluation framework development.

Results: Key challenges revealed included inadequate hospital coordination, shortage of trained personnel and medical services, and insufficient knowledge of disease transmission. Core training modules were adapted, and supplementary materials were reviewed. Key considerations included addressing existing gaps, cultural sensitivity, and current outbreak trends in KSA. Participants' feedback showed high satisfaction, with 86.7% of participants providing a mean rating of 4.77 on day 1 and 80% of participants giving an average rating of 4.67 on day 2 on a Likert scale of 1-5.

Conclusions: Cultural and country needs were key factors in the workshop's successful outcomes. The adapted training program is anticipated to significantly enhance the preparedness of health care professionals in KSA to manage public health emergencies.

The increasing incidence of public health emergencies necessitates to raise awareness and develop the skills of health care workers to improve their readiness and resilience in responding to unexpected events.^{1,2} While all domains of the health care system should be prepared and trained to manage public health emergencies, public health professionals, in particular, must be equipped to handle these situations using standard guidelines.^{1,3} Pandemics, especially COVID-19, proved that health professionals have gaps in protecting themselves and the public, and many emergency interventions fail to produce the required outcomes in many aspects, such as a lack of preparedness strategy.^{4,5}

During disasters, access to effective training, equipment, and communication were the main challenges.⁶ Public health emergencies rapidly transform the landscape of the health care system in Saudi Arabia.^{7–9} These emergencies, whether man-made or natural, such as disasters and infectious disease outbreaks, are driven by factors like globalization, urbanization, and climate change.^{10,11} Rather than viewing these emergencies as disruptions, they should be seen as opportunities to better prepare the health care workforce to address them effectively.^{8,10} Rapid response teams (RRTs) are pivotal in addressing these crises by providing immediate interventions tailored to the context. However, standardized training programs like the WHO RRT Advanced Training Program (WHO RRT ATP) require adaptation to ensure relevance and effectiveness across diverse cultural and regulatory environments.¹² For example, the strong family bonds in Saudi Arabia made the quarantine of a family member challenging during an outbreak.^{13,14} Hence, frontline workers need to be trained to consider the cultural values of Saudi society. Additionally, specific modifications or adaptations to the training curriculum are necessary to meet the needs of the community.¹⁵ Political structures and the existing capacity of the health care workforce must also be considered for effective emergency response.¹⁶

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Hence, the study aimed to adapt the WHO RRT ATP to enhance the emergency response preparedness and capabilities of public health professionals in Saudi Arabia. The adaptation was designed to align with local cultural and operational contexts and to provide a structured framework for implementing long-term training plans. This ensures that trained professionals are thoroughly prepared to respond effectively to public health emergencies and can also serve as trainers at both national and international levels. This manuscript describes the systematic process of adapting the WHO RRT ATP to Saudi Arabia's unique public health needs, highlighting key challenges and lessons learned.

Methods

Study Design

This is a mixed-methods program adaptation and evaluation study aimed at adapting the WHO RRT ATP to Saudi Arabia's specific contexts and needs. The study design included qualitative methodologies of document analysis and feedback to capture the complexities of the adaptation process, along with quantitative evaluations to assess the ATP's feedback outcomes. The qualitative component involved thematic analysis, where documents and feedback from previous piloted program reports were manually coded to identify key themes and insights. Because this paper is based on document analysis, it was exempt from obtaining ethical approval.

Study participants

The study involved 15 representatives from various MOH and the Public Health Authority departments. Specifically, there were 6 representatives from Epidemiology and Public Health, 4 from Infection Control, and 5 from Emergencies and RRT Management. The experts were selected based on several criteria, including their backgrounds in epidemiology, case and contact management, infection prevention control, environmental health, risk communication, and laboratory personnel. Additionally, the participants selected should have first or postgraduate degrees in their specialties with field experience of 2 years in public health. The adaptation process by participants was conducted under the supervision of the WHO Collaborating Centre for Public Health Education and Training at Imperial College London (WHOCC) experts in curriculum design and educational methodologies with backgrounds in developing training frameworks for national and international health care settings. These participants completed the WHO's "RRT Essentials Online Course (RRT ESOC)" on the WHO Health Security Learning Platform (HLSP) before participating in the workshop.¹² The online course consists of 12 short modules, each taking 30-45 minutes to complete. Upon completing all modules, participants received a certificate of completion.¹²

Adaptation approval process and revision workshop

The 2-day workshop was conducted to give the chance for the facilitators to review the adapted material, comprehend it, and approve it with the supervision of the WHOCC to be able to deliver it during the upcoming 9 packages of the RRT ATP program around all Saudi regions. So, the objectives of the workshop were: (1) to review and approve the applicability of the adapted WHO RRT ATP modules to the Saudi Arabian context and (2) to demonstrate how the program could be adapted to local regulatory

frameworks and cultural practices to enhance its relevance and effectiveness. This adaptation process followed multiple steps:

Step 1: The adaptation process began during the pilot study in October 2022 when the material was adapted and reviewed by MOH and WHO experts.

Step 2: The second review and adaptation phase took place over 2 months, from July-August 2023, by the WHOCC. The original materials, sourced from the WHO RRT ATP, were adapted to fit the context of Saudi Arabia.

Step 3: During the workshop, the adapted WHO RRT ATP was reviewed by participants who developed a comprehensive understanding of the WHO principles and the importance of adapting these materials to the local context to enhance the effectiveness of emergency response efforts.¹² During the workshop, the WHOCC explained how to adapt to emergencies using lessons learned from previous global crises. They analyzed Saudi Arabia's health care system and existing emergency response mechanisms. A needs assessment was conducted to identify challenges and gaps in the system. This assessment helped pinpoint areas and specific WHO training modules that needed adaptation, particularly focusing on culture, communication, and values.

Phases of adaptation

The adaptation process followed WHO guidelines for adaptation in the ATP package. Our adaptation consisted of 7 phases: needs assessment, stakeholder analysis, cultural considerations, content adaptation, module selection, training implementation plan, and evaluation framework (Figure 1). The process followed here is guided by previous frameworks examining cultural psychology perspectives.¹⁷ A brief description of each phase is provided below:

1. *Needs assessment.* This initial phase involved a comprehensive evaluation of existing WHO guidelines and recommendations for emergency preparedness. A review was conducted on the documents of the 2021 pilot RRT training program and scientific literature on previous outbreaks in Saudi Arabia. Epidemiological data and past disease outbreaks, including Middle East Respiratory Syndrome (MERS), Rift Valley fever, and COVID-19, were analyzed to identify prevalent diseases and potential health risks.¹⁸⁻²⁶ This document analysis involved a review of national health emergency policies, prior

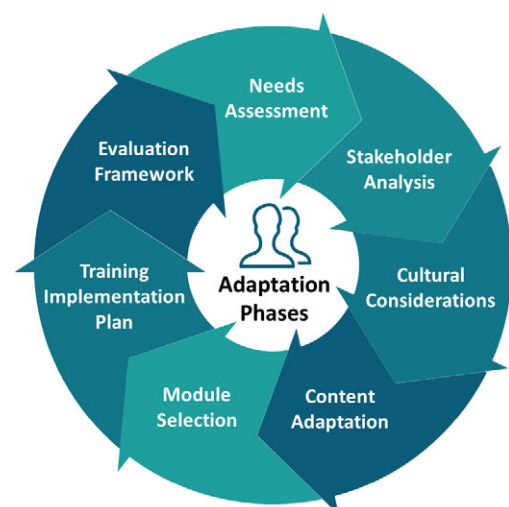


Figure 1. Seven phases of the adaptation process.

RRT training evaluations, and local regulatory frameworks, which provided a robust foundation for understanding the specific needs and challenges within the Saudi Arabian context.

2. *Stakeholder analysis.* Engaging various stakeholders, including the MOH and local authorities, was paramount. An in-depth analysis of case studies on successful public-private partnerships was performed to derive effective strategies for stakeholder engagement. This phase ensured that all relevant parties were considered and involved in the adaptation process, thereby fostering collaborative efforts.
3. *Cultural considerations.* Recognized as a critical component of the adaptation process, cultural sensitivity was rigorously addressed. Extensive research into Saudi Arabian cultural norms and practices was conducted to identify factors impacting emergency response behaviors. The insights gained were instrumental in developing culturally sensitive training materials that align with local customs and expectations, thus enhancing the relevance and acceptance of the training program.
4. *Content adaptation.* The training content was tailored to align with the unique health care system, resources, infrastructure, and emergency response mechanisms in Saudi Arabia. This phase involved integrating data from Saudi Arabia's regulatory framework, local guidelines, and protocols for health care and emergency response into the training materials. Additionally, feedback from a pilot conducted a year prior, along with input from the WHO, was incorporated to refine the content further.
5. *Module selection.* Participants collaboratively prioritized modules from the WHO training package based on the gaps and challenges identified during the needs assessment phase. This detailed analysis guided the selection of relevant modules that address Saudi Arabia's specific needs, ensuring the training program's comprehensiveness and applicability.
6. *Training implementation plan.* The MOH developed a comprehensive training implementation plan outlining resource requirements, timelines, and team responsibilities. This plan was informed by data on the availability of essential resources, including trainers, materials, and facilities, ensuring a well-organized and efficient rollout of the training program.
7. *Evaluation framework.* The WHO evaluation framework was adopted to measure the effectiveness of the adapted training materials. This framework provided a structured approach to assessing the training's impact on emergency preparedness, allowing for systematic evaluation and continuous improvement of the training program. This framework was used throughout the implementation of the 9 RRT workshops in 2023–2024.

Results

ATP Units Selected for Adaptation

The technical units selected for adaptation were distributed as RRT technical components, RRT composition and context, and the debriefing at percentages of adapted documents at 54.6%, 34.6%, and 9.3%, respectively (Table 1). However, the simulation case scenario was reviewed as a separate, detailed, comprehensive document (Table 1).

Table 1. Titles of modules and the number of WHO RRT ATP documents adapted by the participants

Units	Number of documents
Unit A: RRT in context	n = 26 (34.6%)
A1 Frameworks for emergency response	7
A2 RRTs: functioning & coordination	5
A3 Deployment & logistic requirements	3
A4 RRT deliverables	4
A5 Occupational Safety and Health	3
A6 Emergency Operations Centers and IMS	1
A7 Ethics, prevention of sexual abuse and exploitation in emergencies	3
Unit B: Technical Modules	n = 41 (54.6%)
B1 Basic epidemiology for public health practice	1
B2 Epidemiological surveillance in emergencies	6
B3 Data management in emergencies	1
B4 Outbreak investigation	11
B5 Risk assessment	4
B6 Infection Prevention & Control	6
B7 Laboratory sample management	1
B8 Community engagement	4
B9 Emergency risk communications	5
B10 Psychological First Aid	2
Unit C: Scenario-based skills-drill	n = 1 (1.3%)
C1 RRT activated	180 Slides
C2 At the hospital: interview with medical staff	
C3 At the hospital: interview with a patient	
C4 Communication and community engagement	
C5 Active case finding and contact tracing	
C6 Investigation report	
Unit D: Debriefing and way forward	n = 7 (9.3%)
D1 Participant satisfaction	4
D2 Participant learning	2
D3 Learning transfer to the job	1

Findings of 7 Phases of Adaptation

Needs assessment and stakeholder analysis findings

Several challenges within Saudi Arabia's emergency response framework were identified. Key issues included a lack of coordination between hospitals and other health care facilities, a fragmented approach to public health management, and a shortage of trained workforce, affecting team stability and response effectiveness. There was also a significant shortage of emergency medical services during disasters, with a considerable imbalance in the male-to-female ratio, as only 3.5% of the emergency service providers were females, and most of the emergency responders were technicians. Another challenge was the lack of adherence of health care workers to established disease control and prevention

guidelines. Lastly, limited international collaboration was challenged regarding sharing samples and strains for sequential analyses. Study participants also highlighted the lack of multidisciplinary RRT members, including environmental, animal, and human experts, who can respond to both animal and human diseases.

Module selection results

The modules included in the training were considered core modules, with the remaining as supplementary readings for the trainees. WHO had preselected core and supplementary modules, which were not used due to the results of our needs assessment and cultural adaptation. Table 2 summarizes the supplementary materials selected for inclusion, focusing on their alignment with local public health regulations and emergency response protocols. For completeness, the core modules are detailed in the accompanying text and include emergency risk communications, scenario-based exercise on descriptive epidemiology, community engagement in emergencies, psychological first aid in emergencies, outbreak investigation, active case finding, and contact tracing, data management during emergencies, infection prevention and control, epidemiological surveillance in public health emergencies, hand hygiene, personal protective equipment donning

Table 2. List of adapted RRT ATP supplementary materials for the KSA RRT trainings

#	Session
1	A1.1a The IHR framework and regional strategy in emergency response - Generic
2	A1.1ab The IHR framework and IDSR strategy in emergency response
3	A1.2 Annex 2 exercise
4	A1.3a Introduction to One Health
5	A1.3b One Health case study: Strange disease kills in Alpha country
6	A2.1b Group work: Composition of a RRT and members' tasks
7	A3.2b Exercise: logistics checklist
8	A5.1a PPT Occupational Safety and Health (OSH) for RRTs
9	A5.1b OSH: scenario-based exercises
10	A6.1 PPT Emergency Operations Centers and the Incident Management System
11	A7.1b PRSEAH workplace scenarios
12	A7.1c PRSEAH field scenario
13	B1.1 PPT Basic epidemiology for public health practice
14	B2.2b Exercise: active case finding and contact tracing
15	B4.2 Exercise: making an epi-curve
16	B4.3 OBI card game: A fun way to conduct Outbreak Investigation
17	B4.4_Case_study_unknown_disease
18	B6.2 PPT IPC - Environmental cleaning and disinfection
19	B8.1 PPT Community engagement in emergencies
20	B8.2 RCCE scenario
21	B8.3 CE exercise: Creating community discussion
22	B9.2 Exercise: Values voting
23	B9.3 Roleplay: Interview with a community radio
24	B10.2 PFA scenarios

and doffing, chlorine solution preparation, rapid risk assessment, and laboratory sample management. Epidemiologists in the team recommended training individuals on generating curves and graphs using different variables to understand disease patterns (Table 2).

Content adaptation results

Post-training assessments revealed significant improvements in participants' knowledge and skills in emergency response protocols (unpublished data). Compared to previous courses, the culturally adapted program demonstrated higher scores in participant engagement and application of learned skills during simulations. Another benefit is that participants comprehended the relevance of the material, and it was easy to remove barriers in applying their knowledge as the public health threats' scenarios were adopted from the Saudi previous, current, and future challenges.

The Health Electronic Surveillance Network Plus (HESN Plus) was incorporated into the adapted materials. HESN monitors disease trends, detects clusters, and outbreaks, and generates hypotheses about the origin of the concerned infection, thereby enhancing the public health services' ability to manage challenges. Case scenarios were adapted to include various Saudi surveillance systems. For example, scenarios related to the Hajj season included diseases such as Crimean-Congo Hemorrhagic Fever (CCHF), which has a high fatality rate in the western provinces of Saudi Arabia, dengue virus infections, Rift Valley Fever, invasive meningococcal diseases, MERS, H1N1, and chikungunya.^{27–37} They highlighted the difficulty of convincing families to quarantine due to strong family ties and social interactions, the popular use of complementary medicine, praying and religious activities, group hospital visits, misuse of disinfectants (even among health personnel), the stigma of wearing masks, gender-sensitive approaches, and adherence to cultural norms regarding authority and communication styles. These were integrated into team scenarios and case studies to enhance contextual relevance. Engaging stakeholders, religious scholars, and community leaders in implementing quarantine measures during outbreaks was also crucial.

Training implementation plan

The facilitators and participants agreed to conduct evaluations and updates of their training materials after every RRT ATP workshop. This will help keep the training up-to-date, sustainable, and resilient. A feedback mechanism was recommended to assess trainee progress, maintain regular training updates to avoid skill deterioration, and continuously improve the effectiveness of the training program through evaluations.

Adaptation workshop participant feedback

Thirteen of 15 participants (86.7%) provided feedback on the first day, with a mean rating of 4.77 on the Likert scale of 1–5 (Table 3). One participant mentioned expecting a more in-depth experience regarding cultural variations. On the second day of the workshop, 12 participants provided feedback, with an average rating of 4.67 out of 5. One participant praised the workshop's teaching methods.

Discussion

The WHO RRT ATP was adapted to fit the context of Saudi Arabia. This adaptation is crucial for effectively responding to health

Table 3. Feedback from participants obtained after the adaptation workshop

Theme	Average	Minimum	Maximum	Count
Contextual analysis of Saudi Arabia	4.77	4.0	5.0	13
Comments	Expected more feedback from audience on their cultural variation			
Interactive learning methods	4.67	2.0	5.0	12
Comments	Excellent way of learning			
Group activity: Module adaptation	4.67	3.0	5.0	12

emergencies in the country and ensuring that health care professionals are well-prepared to handle public health emergencies while considering the country's cultural dynamics and values.³⁸ The adaptation process involved conducting a needs assessment, considering cultural aspects, referring to local emergency guidelines, and selecting core modules. This process revealed significant issues, including a lack of coordination and adherence to guidelines, shortages in trained personnel, and a fragmented approach to public management. Comparatively, in Australia, where there is 1 provider for every 1400 people, Saudi Arabia has a shortage, with 1 provider for every 3871 people, leading to a delay in services of about 5 minutes compared to international standards.³⁹ Additionally, some health care personnel were reported to have demonstrated limited knowledge regarding disease transmission modes, which posed a barrier to preventing and controlling the spread of infections. To address these challenges, facilitators and trainers considered these gaps to improve technical and soft skills, particularly focusing on communication and educational materials for the participants of RRT ATP.

Adapting training materials to simplify content without compromising scientific concepts and ensuring cultural appropriateness is crucial for impacting population health. Diverse backgrounds, languages, cultural values, and contexts necessitate adaptation to ensure that health professionals can effectively translate knowledge into practical actions. This is in accordance with the fact that contextual factors such as social, political, organizational, norms, and culture must be considered.⁴⁰ This is consistent with Stirman et al. (2013), which revealed various adaptations, including modifying training materials to fit political and social contexts.⁴¹

Furthermore, the literature emphasizes that training materials may not achieve the desired outcomes unless they are appropriately modified. For instance, a study in Canada aimed to adapt and determine the acceptability of evidence-based education material to fit the local needs of the Indo-Asian population.⁴² The authors followed a 5-step process, working with community members to identify culturally specific knowledge and awareness needs, language variations, and translation of English material to the local language.⁴² They found that after adaptation, the participants found the educational material highly acceptable and better understood, considering the contextual needs of the Indo-Asian population.⁴²

In the health sector, adapting material necessitates the involvement of experts from multidisciplinary teams,⁴³ which was the case in this program. These experts must participate equally to provide insights on modifying the material. During the adaptation workshop, experts from various disciplines reviewed and helped modify the material according to the context of Saudi Arabia, contributing by sharing their knowledge and practical case stories. This aligns

with WHO guidelines,⁴⁴ which emphasizes the importance of tailoring training programs to the specific cultural, regulatory, and operational contexts of the target audience, such as infection control, hand hygiene, data collection and analysis, management and transportation of samples, and frontline workers. It is imperative to involve experts from various disciplines who can share their experiences and case-based scenarios from their practical lives working with communities and patients.

Once the material is well-adapted and customized to the cultural and social context, the next important consideration is evaluating its effectiveness. This was done after the 9 RRT ATP workshops were conducted from 2023-2024. Trainers had to be well-versed in the materials they delivered in these workshops and considered the trainees' different levels of knowledge, language efficiency, and skills.

A significant strength of this work is the contextual adaptation of training materials to meet local needs and cultural values in Saudi Arabia. Additionally, involving multiple stakeholders from various fields and disciplines provides diverse expertise in reviewing and adapting the material. However, there are limitations to consider.

Limitations

The impact of the adapted material on responding to public health emergencies can only be assessed when the materials are used in the actual workshops, which is beyond the scope of this study. A limited number of participants and reliance on qualitative data will be addressed in the future after training more workforce using culturally adapted materials and following the WHO evaluation framework to assess the effectiveness of the adapted materials. This study strongly recommends evaluating the effectiveness of the adapted material in maintaining the integrity of the technical and simulation parts of the emergency preparedness training package. Another study will be conducted on the effectiveness of the training material and RRT workshops developed and conducted by the MOH RRT and WHOCC ICL. This study's adaptation process can serve as a guide for training emergency teams and improving response in other countries.

Conclusion

The adaptation of the WHO RRT ATP to Saudi Arabia demonstrates a systematic approach to integrating cultural and regulatory considerations into global health training programs. The adapted materials have been used to train 270 rapid-response trainers in Saudi Arabia. This adaptation process can be helpful in preparing future RRT members to respond to health emergencies. It will also ensure that health care professionals are well-prepared to handle public health emergencies while considering the cultural dynamics and values relevant to the context of Saudi Arabia. The findings underscore the importance of contextual adaptation to enhance the relevance and effectiveness of emergency response training not only in Saudi Arabia. Future efforts should focus on evaluating the long-term impact of such adaptations on public health outcomes.

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validation, and contributed to manuscript writing, and conceptualization. ZA contributed to manuscript writing. SS, contributed to conceptualization, methods review, and manuscript review. LF, SA, HA, AbA, and GS contributed to the manuscript review. SR, MJ, and AKA contributed to conceptualization, supervised the study, and critically reviewed the manuscript for important intellectual content.

Competing interest. None declared.

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