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Simulation Exercises for Public Health Emergencies: Evidence-Informed Practices to Enhance Design, Delivery and Evaluation

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Disclosures

Andrea Chaplin has no potential conflicts of interest to declare.

Presentation Overview

- **Introduction**
 - Learning Objectives, Our Organizational Role and Context
- **Background**
 - Terminology, Exercise Types, Benefits
- **Overview of the Rapid Review**
 - Methods, Key Findings, Implications for Practice
- **Reflection and Q&A**

Learning Objectives

- 1. Describe** different types of emergency preparedness exercises conducted in the public health agency context.
- 2. Identify** evidence-informed practices for designing, delivering and evaluating emergency preparedness exercises to optimize outcomes.
- 3. Discuss** opportunities to strengthen the quality of the literature on emergency preparedness exercises and enhance the use of evidence-based frameworks and measures.

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- Emergency preparedness and response is a core part of PHO's mandate and connected to many of our core services.
- We are committed to conducting research, synthesizing knowledge, building capacity, and providing scientific and technical advice in this area.



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Enhancing the design, conduct and evaluation of public health emergency preparedness exercises: a rapid review

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Abstract

Background Emergency preparedness exercises are essential in building a resilient public health system that can support increasingly frequent and complex public health risks. This rapid review describes evidence-informed practices or principles that can enhance all-hazards emergency preparedness exercises, with a specific focus on the public health agency context.

Methods Four databases were systematically searched, including MEDLINE, Embase, Global Health, and CINAHL (January 2013-June 2024) and complemented with a grey literature search. Studies were included if published in English, from a member country of the Organisation for Economic Co-operation and Development, relevant to the public health agency context, and reported outcomes that aligned with our primary research question. Included articles were assessed for quality based on study design. The analysis involved a descriptive summary and thematic analysis.



Background

Emergency Preparedness Exercises

“A simulation exercise is controlled activity where a situation/scenario, that could exist in reality, is imitated for training or assessment of capabilities and testing of plans”.¹



Types of Exercises

- Two primary exercise categories:²
 - Discussion based
 - Tabletop exercises
 - Operation based
 - Drills
 - Functional exercises
 - Full-scale exercises



What Can Be Exercised

- **Exercises can have different aims:**³
 - Accountability
 - Learning
 - Improvement
 - Evaluation
- **Exercises can be designed to test different areas of capacity:**
 - A specific skill/tasks
 - An emergency plan/policy
 - Specific component/function

What is the Value of Emergency Preparedness Exercises?

Reported benefits captured in the literature:^{2,4}

- Driver of improvements in the planning process - identifying gaps or limitations in plans, protocols or procedures
- Driver of actions to strengthen preparedness capacities
- Improved knowledge and increased self-efficacy to respond
- Promoting teamwork, interdepartmental relationships, and confidence in collective response efforts





Overview of the Rapid Review

Context for this Work

- Recognized need to enhance preparedness for emerging and reemerging threats and strengthened emphasis on the importance of emergency preparedness exercises
- Impacts of the COVID-19 pandemic on capacity
- Gaps in a public health lens applied to simulation exercise research and applied resources
- Limited focus on best practices and principles: how can we optimize exercise outcomes?



Research Questions

Primary: What are evidence-informed practices or approaches that can enhance the design, delivery and evaluation of emergency preparedness exercises in the public health context?

Secondary: What are available resources to help design, deliver and evaluate emergency preparedness exercises?

Methods

- Rapid review methodology
- Inclusion criteria:
 - Intervention: all types of emergency preparedness exercises
 - Context: public health
 - Outcomes: key findings on practices or approaches that can enhance exercise design, delivery and evaluation
- Included studies were assessed for quality based on study design
- Analysis involved a descriptive summary and thematic analysis



Overview of Results

Insights were extracted from 15 papers included in the review

Areas where exercises can be improved:

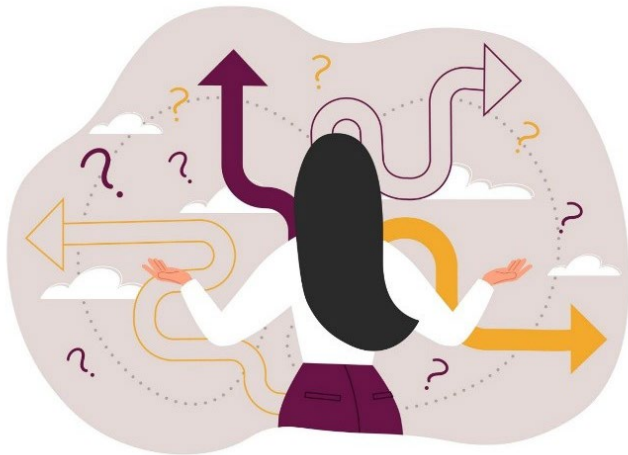
1. Exercise design
2. Participant selection
3. Exercise facilitation and discussion
4. Evaluation and improvement

Ten Practices to Enhance Exercises

- 1. Clarify the purpose**
- 2. Conduct research**
- 3. Add education**
- 4. Maximize realism**
- 5. Foster collaboration**
- 6. Ensure representation**
- 7. Prepare facilitators**
- 8. Align activities**
- 9. Tailor the evaluation**
- 10. Facilitate improvement**

Clarifying the Primary Aim of the Exercise

The quality of the exercise can be impacted by the alignment between the primary exercise aim and the design choices.



- Exercises have different aims: foster learning, drive improvements, evaluate an intervention, demonstrate accountability
- Different aims influence design choices:
 - Type of exercise
 - Types of exercise activities
 - Scenario design goal
 - Focus of learning/reflection activities
 - Evaluation design

Gathering Information to Support Exercise Design

The quality of the exercise can be impacted by the types of inputs that were used to direct the focus of the exercise.



Three recommended inputs to help focus exercise content:

1. **Priority issue areas:** review past after-action reviews or debriefs
2. **Core competencies:** review core competencies prioritized for development
3. **Pre-set objectives:** define specific objectives to keep the exercise content focused

Adding Education

Depending on the primary aim and what is being tested, the quality of an exercise can be strengthened by embedding educational elements.



Types of educational elements:

- **Pre-training or an orientation session** to enhance learning outcomes and better prepare participants to identify opportunities to strengthen emergency preparedness plans
- **Educational materials** can also be shared during the exercise (e.g., videos covering information on the hazard, reference materials)

Maximizing Realism

The quality of the exercise can be strengthened by maximizing realism in the design of the exercise.

- Ensure scenarios reflect structures, roles and processes relevant to your agency/jurisdiction
- Aim to ensure the scenario reflects accurate information about the hazard
- Consider opportunities to heighten the psychological fidelity of the exercise



Psychological fidelity is the degree to which the scenario prompts cognitive, behavioural and affective responses that would be similar to experiences of an actual event.⁵

Fostering Collaboration

The quality of the exercise can be strengthened by considering how to facilitate participant collaboration and engagement.



- Consider how to structure participant groups and activities
- Thoughtful participant selection and facilitation techniques can be used to exercise and improve collaboration
 - Do we have the right roles to support planned discussions and tasks?
- Reflect on how power dynamics may impact engagement

Tailoring the Evaluation

The value of exercises is strengthened by embedding well designed evaluation methods that align with the purpose of the exercise.



Three ways evaluation supports exercises:

1. Assess exercise quality – how well the exercise was designed and delivered
2. Identify improvements to strengthen preparedness capacities
3. Measure performance at an individual, team or organizational level

Additional Reflections on the Literature

- The rapid review responded to a gap in the literature by focusing on core principles and practices to enhance exercise outcomes
- There were limited publications that have evaluated the virtual delivery of exercises or that used other innovative technologies
- The quality of supporting evidence could be strengthened through more rigorous evaluation
- It would be valuable to further validate and expand on the key insights from this review through expert consultation methods



Feature Resources

- European Centre for Disease Prevention and Control
 - E-learning course on tabletop exercise design including library of exercises
 - Handbook on simulation exercises
 - Step-by-step guide on exercise design
- World Health Organization
 - Simulation exercise manual: exercise design decision tree

Acknowledgments

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Reflection and Q&A

