



Evidence-Based Practice for Public Health Emergency Preparedness and Response

Committee Membership

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EVIDENCE REVIEW METHODOLOGY

- **HOLGER SCHUNEMANN**, McMaster University



Charge to the Committee

- Develop the methodology for conducting a comprehensive review of evidence for public health emergency preparedness and response (PHEPR) practices, including the criteria by which to assess the strength of evidence and a tiered grading scheme;
- Develop and apply criteria to determine which PHEPR capabilities should be prioritized for inclusion in the comprehensive review;
- Apply the committee's evidence review methodology to assess the effectiveness of the selected practices;
- Develop recommendations for practices that communities, state, territorial, local, and/or tribal agencies should or should not adopt, based on evidence; and
- Provide recommendations for future research to address critical gaps, as well as processes needed to improve the overall quality of evidence within the field.



Key Terminology

- **Public health emergency preparedness and response (PHEPR):** The capability of the public health and health care systems, communities, and individuals to prevent, protect against, quickly respond to, and recover from health emergencies, particularly those whose scale, timing, or unpredictability threatens to overwhelm routine capabilities
- **PHEPR practice:** A type of process, structure, or intervention whose implementation is intended to mitigate the adverse effects of a public health emergency on the population as a whole or a particular subgroup within the population.
- **Evidence-based interventions:** Public health practices and policies that have been shown to be effective based on evaluation research. Often, lists of evidence-based interventions are identified through systematic reviews, but they sometimes need adaptation to unique or varied settings, populations, or circumstances
- **Mixed-method evidence synthesis:** An evidence synthesis approach involving the integration of quantitative, mixed-method, and qualitative evidence in a single review



Developing and Applying a PHEPR Evidence Review and Evaluation Methodology



Overview of the Mixed-Method Review Process

1. Select the review topic, considering published literature on gaps/priorities and stakeholder input.
2. Develop the analytic framework and key review questions in consultation with appointed PHEPR practitioner consultants.
3. Conduct a search of the peer-reviewed and gray literature and solicit papers from stakeholders.
4. Apply inclusion and exclusion criteria.
5. Separate evidence into methodological streams (quantitative studies, including comparative, noncomparative, and modeling studies, and descriptive surveys; qualitative studies; after action reports [AARs]; and case reports) and extract data.
6. Apply/adapt existing tools for quality assessment of individual studies based on study design.



Committee's Systematic Review Topics

- Engaging with and training community-based partners (CBPs) to improve the outcomes of at-risk populations after public health emergencies (Community Preparedness Capability)
- Activating a public health emergency operations center (Emergency Operations Coordination Capability)
- Communicating public health alerts and guidance with technical audiences during a public health emergency (Information Sharing Capability)
- Implementing quarantine to reduce or stop the spread of a contagious disease (Non-pharmaceutical Interventions Capability)

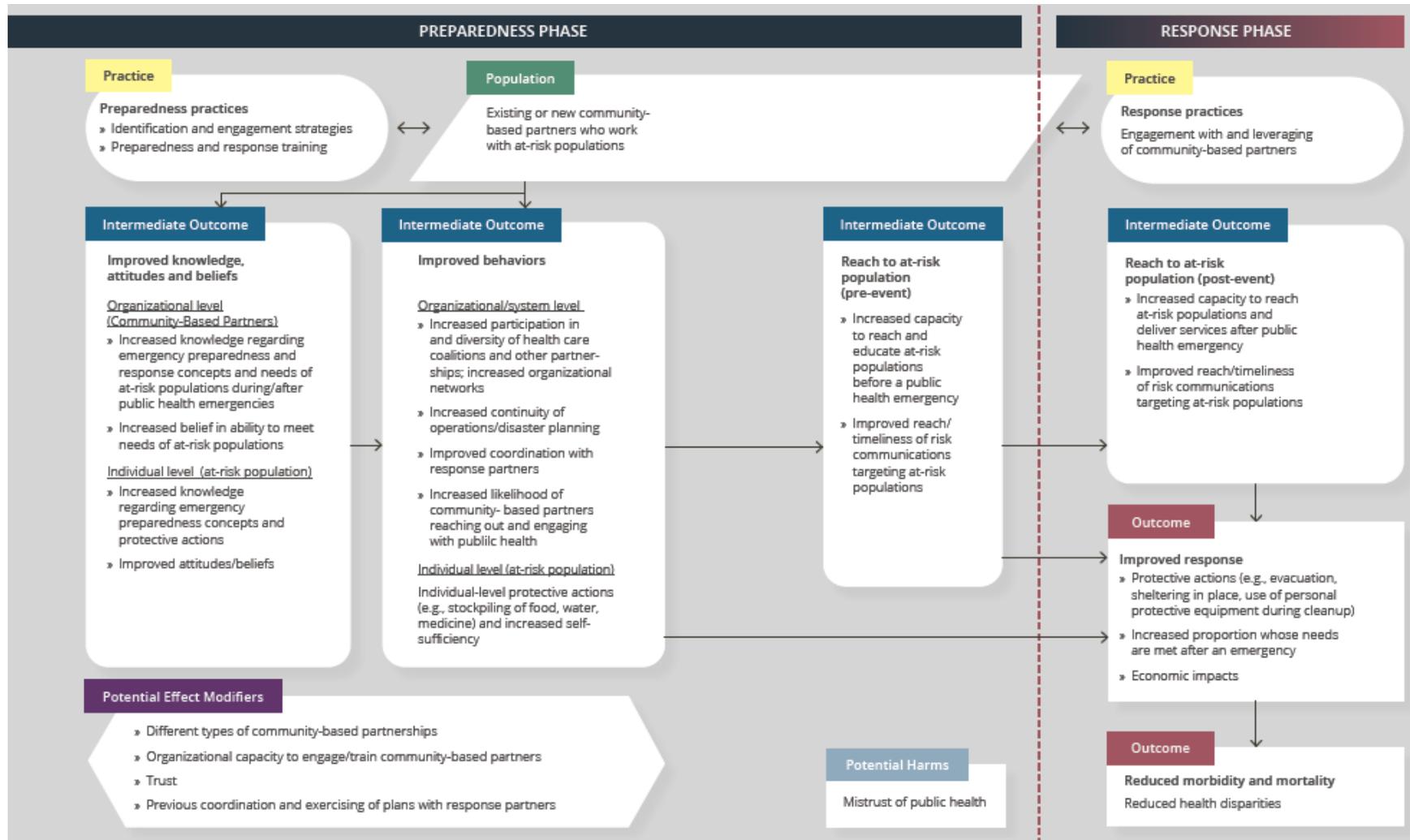


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Example Analytic Framework: Engaging With and Training Community-Based Partners to Improve the Outcomes of At-Risk Populations



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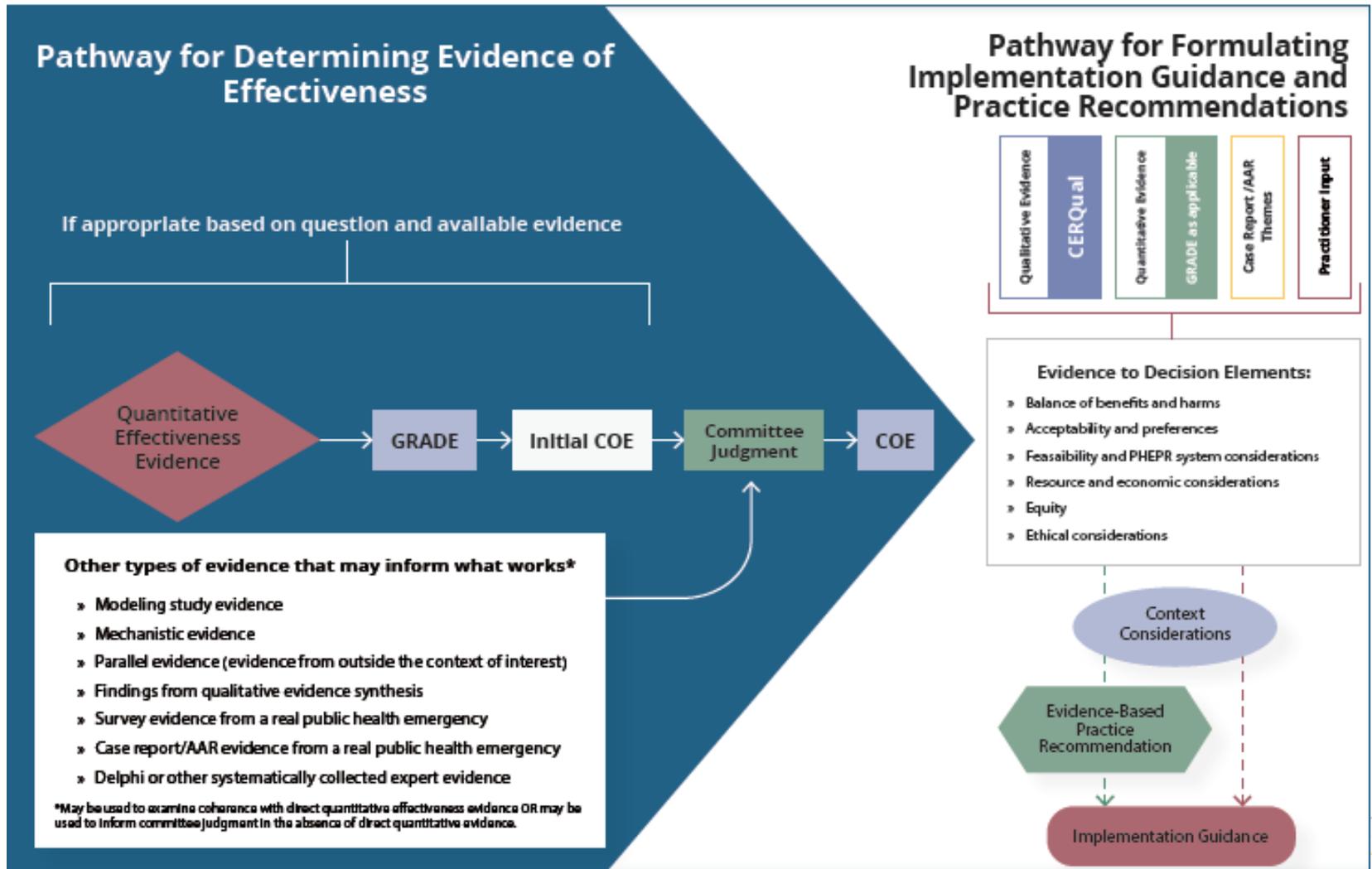


Mixed-Method Review Process Continued...

7. Synthesize the body of evidence within methodological streams and apply an appropriate grading framework (GRADE for the body of quantitative research studies and GRADE-CERQual for the body of qualitative studies to assess the certainty of the evidence [COE]/confidence in the findings, respectively).
8. Consider evidence of effect from other streams (e.g., modeling, mechanistic, qualitative evidence, and AARs/case reports) and support for or discordance with findings from quantitative research studies to determine the final COE.
9. Integrate evidence from across methodological streams to populate the PHEPR Evidence to Decision framework and to identify implementation considerations.
10. Develop practice recommendations and/or implementation guidance.



Framework for Integrating Evidence to Inform Recommendation and Guidance Development for PHEPR Practices



Mixed-Method Review Process Continued...

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9. Integrate evidence from across methodological streams to populate the PHEPR Evidence-to-Decision framework and to identify implementation considerations.
- 10. Develop practice recommendations and/or implementation guidance.**



Systematic Review Results: Engaging With and Training Community-Based Partners

Included Evidence Types: Quantitative comparative and noncomparative and qualitative studies, case reports, surveys, parallel evidence (systematic reviews)

Key Findings: Culturally tailored preparedness training programs for CBPs and at-risk populations they serve improve the PHEPR knowledge (moderate COE) and preparedness behaviors (moderate COE) of trained at-risk populations.

Practice Recommendation (abbreviated):

Engaging and training CBPs serving at-risk populations is recommended as part of SLTT public health agencies' community preparedness efforts so that those CBPs are better able to assist at-risk populations they serve in preparing for and recovering from public health emergencies. Recommended CBP training strategies include

- the use of materials, curricula, and training formats targeted and/or tailored to the individual CBPs and the at-risk populations they serve; and
- train-the-trainer approaches that utilize peer or other trusted trainers to train at-risk populations.



Systematic Review Results: Engaging With and Training Community-Based Partners

Implementation Guidance (abbreviated list):

- Ensure that multistakeholder collaborations with CBPs are diverse and inclusive, with particular attention to those groups that are often excluded and marginalized.
- Engage umbrella organizations (e.g., American Red Cross, United Way) to reach smaller, local community-based organizations.
- Consider participatory engagement strategies that allow for ongoing, bidirectional communication with CBPs to build trust and buy-in prior to an emergency.
- Tailor the curriculum and format of CBP preparedness training programs to the learning needs and preferences of specific audiences, and ensure that they are culturally sensitive and appropriate.
- Consider soliciting stakeholder feedback in the evaluation of training program materials and content.



Systematic Review Results: Activating an Emergency Operations Center

Included Evidence Types: Qualitative studies, AARs, case reports

Insufficient Evidence Finding:

Activating a public health emergency operations center (PHEOC) is a common and standard practice, supported by national and international guidance and based on earlier social science around disaster response. Despite widespread use and minimal apparent harms, **there is insufficient evidence to determine whether activating a PHEOC and what specific components are or are not effective at improving response.** This does not mean that the practice does not work or should not be implemented, but that more research and monitoring and evaluation around how and in what circumstances a PHEOC should be implemented are warranted before an evidence-based practice recommendation can be made.



Systematic Review Results: Activating an Emergency Operations Center

Implementation Guidance (abbreviated list):

Considerations for WHEN to activate public health emergency operations:

- A public health emergency is large in size and complex in scope
- A novel response may require multiple new tasks or partnerships
- An event occurs that requires public health support functions, large-scale information sharing, or response coordination
- Resource, cost, technological, legal, and logistical constraints need to be overcome
- An incident requires high levels of interagency partnership

Considerations for WHEN TO REFRAIN from activating public health emergency operations (e.g., the cost of activating is higher than any potential resource needs for the emergency)

Considerations for HOW to make the decision to activate public health emergency operations (e.g., respect staff knowledge, and involve staff with past emergency experience in leadership discussions)



Systematic Review Results: Communicating Alerts and Guidance with Technical Audiences

Included Evidence Types: Quantitative comparative and qualitative studies, surveys, AARs, case reports

Key Findings: Electronic messaging systems (e.g., email, fax, text) are effective channels for increasing technical audiences' awareness of public health alerts and guidance during a public health emergency (moderate COE). Different technologies have differing impacts; however, data are insufficient to conclude what technology is best for which audiences in which scenarios.

Practice Recommendation:

Inclusion of electronic messaging channels (e.g., email) is recommended as part of SLTT public health agencies' multipronged approach for communicating public health alerts and guidance to technical audiences in preparation for and in response to public health emergencies. The practice should be accompanied by targeted monitoring and evaluation or conducted in the context of research when feasible so as to improve the evidence base for strategies used to communicate public health alerts and guidance to technical audiences.



Systematic Review Results: Communicating Alerts and Guidance with Technical Audiences

Implementation Guidance (abbreviated list):

- Engage technical audiences in the development of communication plans, protocols, and channels.
- Reduce message volume when feasible, and highlight new information and any differences from previous or other existing guidance.
- Develop distribution lists in advance of public health emergencies, and ensure that contact information is kept up to date.
- Consider designating liaisons and institutional points of contact and leverage existing networks (e.g., medical societies and associations) to facilitate broad message dissemination.



Systematic Review Results: Quarantine

Included Evidence Types: Quantitative comparative and noncomparative, modeling and qualitative studies, case reports, surveys, mechanistic evidence

Key Findings: There is high COE that quarantine can be effective in certain circumstances, but evidence also points to substantial undesirable effects and harms, including increased risk of infection in congregate quarantine settings (high COE), psychological harms (moderate COE), and individual financial hardship (high COE). Frequent and transparent risk communication/messaging and access to employment leave may improve adherence to quarantine (moderate COE).

Practice Recommendation:

Implementation of quarantine by state, local, tribal, and territorial (SLTT) public health agencies is recommended to reduce disease transmission and associated morbidity and mortality during an outbreak only after consideration of the best available science regarding the characteristics of the disease, the expected balance of benefits and harms, and the feasibility of implementation.



Systematic Review Results: Quarantine

Implementation Guidance (abbreviated list):

Considerations for WHEN to implement quarantine:

- Early in the outbreak, especially when there is a shortage or absence of available medical countermeasures
- Only after weighing the resources required against the expected benefits
- The R_0 is in a range in which quarantine can be expected to importantly reduce transmission
- Quarantine for durations commensurate with the expected duration of asymptomatic infectiousness is feasible
- Absence of or short asymptomatic infectious period

Considerations for HOW to implement quarantine (e.g., consider voluntary before legally enforced quarantine, avoid congregate quarantine, consider the at-risk populations, protection of civil rights and protection from avoidable harms)

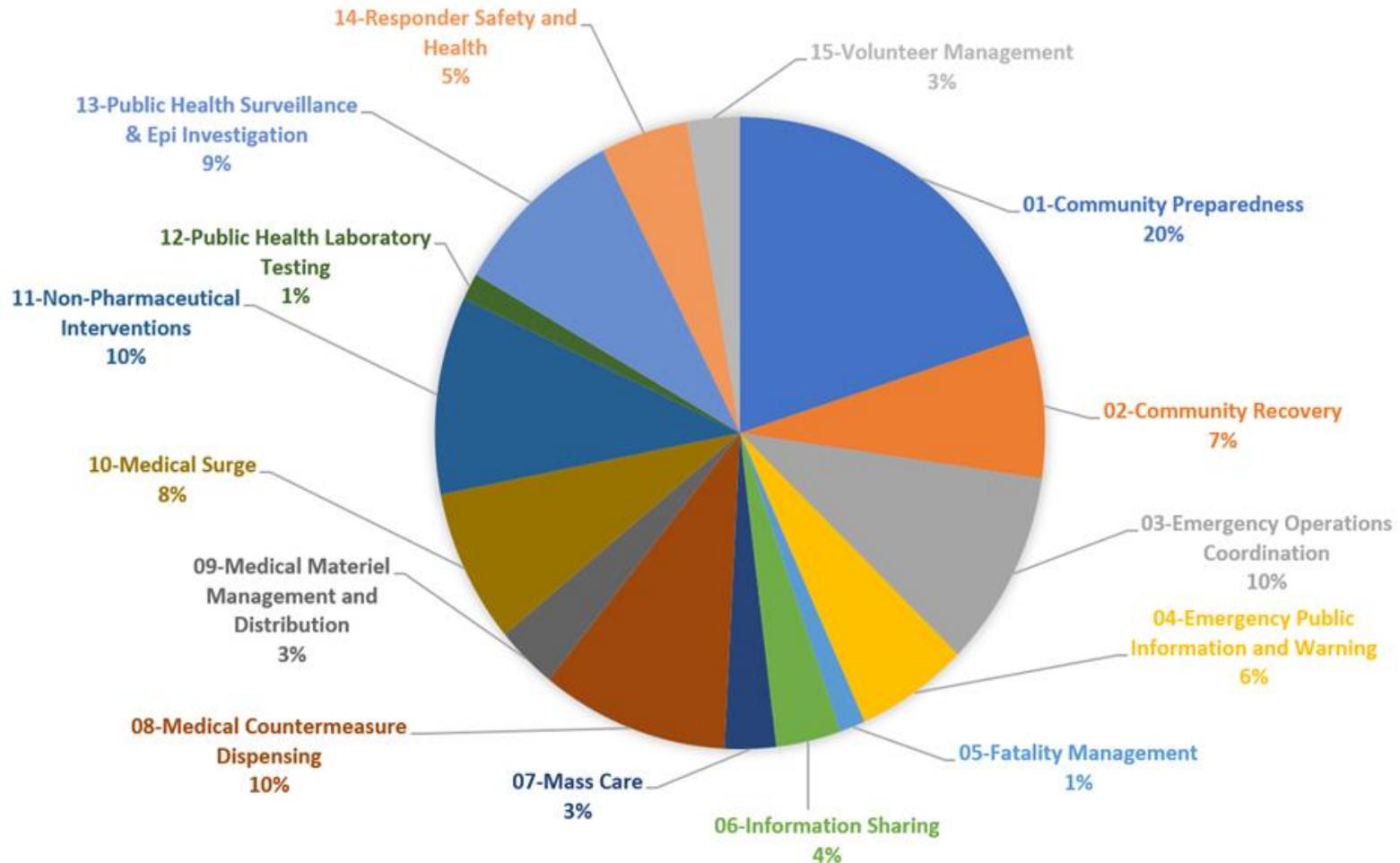
Considerations for DURING and AFTER the implementation of quarantine (e.g., providing clear messaging on the rationale for quarantine and financial compensation, food, and social and psychological support)



A Broader View of the State of the Evidence for PHEPR

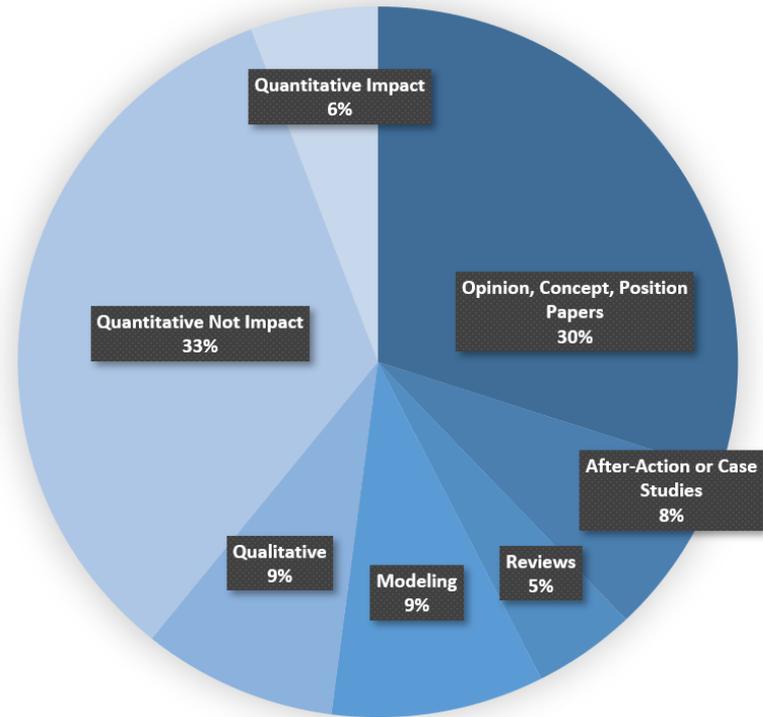
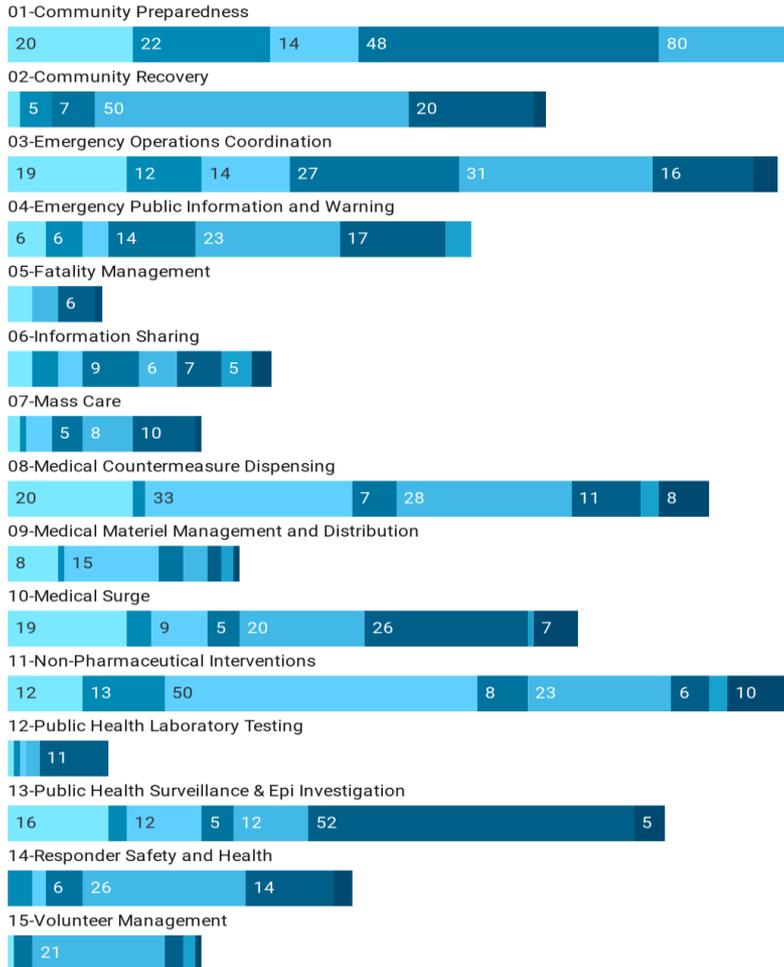


Results from Commission Scoping Review and Evidence Maps: Distribution by Capability



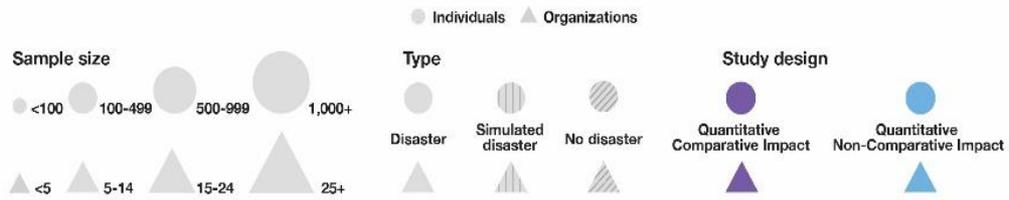
Results from Commission Scoping Review and Evidence Maps: Distribution by Study Design

■ After-Action or Case Studies
 ■ Reviews
 ■ Modeling
 ■ Qualitative
 ■ Quantitative Not-Impact (surveys)
 ■ Quantitative Not-Impact (non-surveys)
 ■ Quantitative Non-Comparative Impact
 ■ Quantitative Comparative Impact



Results from Commission Scoping Review and Evidence Maps: U.S. Impact Studies

PHEPR Capability



Committee Conclusion on the State of PHEPR Evidence

Overall, the committee concluded that the science underlying the nation's response to public health emergencies is seriously deficient, hampering the nation's ability to respond to emergencies most effectively to save lives and preserve well-being.



Improving and Expanding the Evidence Base for PHEPR



RECOMMENDATION 1:

Appoint a PHEPR Evidence-Based Guidelines Group

CDC should appoint and support an independent group to develop methodologically rigorous and transparent evidence-based guidelines for PHEPR practices on an ongoing basis.

This group should take the methodology developed by the committee as a starting point, but should also be charged with its continued development.

The group should also identify and communicate key PHEPR evidence gaps in annual reports to CDC and Congress to guide future research on the effectiveness of PHEPR practices.



RECOMMENDATION 2:

Establish Infrastructure to Support Ongoing PHEPR Evidence Reviews

CDC should establish the infrastructure, policies, and procedures needed to ensure a sustained process for conducting and updating evidence reviews and generating evidence-based practice guidelines, in collaboration with other relevant federal agencies. The infrastructure should include an open-access repository for evidence-based PHEPR practices.



RECOMMENDATION 3:

Develop a National PHEPR Science Framework

To enhance and expand the evidence base for PHEPR practices and translation of the science to the practice community, CDC should work with other relevant funding agencies, SLTT public health agencies, academic researchers, professional associations, and other stakeholders to develop a National PHEPR Science Framework so as to ensure resourcing, coordination, monitoring, and execution of public- and private-sector PHEPR research.



RECOMMENDATION 3: Continued...

- Build on and improve coordination, integration, and alignment among existing PHEPR research efforts and ensure integration with the activities of the PHEPR evidence-based guidelines group proposed in Recommendation 1.
- Recognize and support PHEPR science as a unique academic discipline.
- Create a common, robust, forward-looking PHEPR research agenda.
- Support meaningful partnerships between PHEPR practitioners and researchers.
- Prioritize strategies and mechanisms for the translation, dissemination, and implementation of PHEPR research.



RECOMMENDATION 4:

Ensure Infrastructure and Funding to Support PHEPR Research

CDC, in collaboration with other relevant funding agencies, should ensure adequate and sustained oversight, coordination, and funding to support a National PHEPR Science Framework and to further develop the infrastructure necessary to support more efficient production of and better-quality PHEPR research. Such infrastructure should include

- sustained funding for practice-based and investigator-driven research;
- support for partnerships (e.g., with academic institutions, hospital systems, and SLTT public health agencies);
- development of a rapid research funding mechanism and interdisciplinary rapid response teams; and
- enhanced mechanisms to enable routine, standardized, efficient data collection with minimal disruption to delivery of services (e.g., preapproved, adaptable research and IRB protocols, a research arm within the response structure).



RECOMMENDATION 5:

Improve the Conduct and Reporting of PHEPR Research

CDC, the Office of the Assistant Secretary for Preparedness and Response (ASPR), the National Institutes of Health (NIH), the Department of Homeland Security (DHS), the National Science Foundation (NSF), and other relevant PHEPR research funders should use funding requirements to drive needed improvements in the conduct and reporting of research on the effectiveness and implementation of PHEPR practices. Such efforts should include

- developing guidance on and incorporating into funding decisions the use of appropriate research methods;
- establishing guidelines for evaluations using different designs, evidence streams and concepts from emerging evaluation approaches, such as complex intervention evaluations; and
- developing reporting guidelines, including essential reporting elements in partnership with professional associations, journal editors, researchers, and methodologists.



RECOMMENDATION 6:

Pursue Efforts to Further a Process of Quality Improvement to Enhance the Quality and Utility of After Action Reports

CDC, in collaboration with ASPR and FEMA, should convene an expert panel of relevant federal agencies, SLTT public health agencies, and professional associations to advance a process for quality improvement at the local, regional, state, and national levels to enhance the quality and utility of AARs and support their use as sources of evidence for evaluating the effectiveness of PHEPR practices. This process should foster a culture of improvement in public health emergency response and include, but not be limited to, discussions aimed at

- defining the essential core elements of a PHEPR AAR;
- establishing an independent review panel with a standardized after action reporting process;
- establishing and maintaining a national repository of AARs; and
- exploring the privacy issues and the protection of information in AARs from use in legal proceedings or in other punitive actions.



RECOMMENDATION 7:

Support Workforce Capacity Development and Technical Assistance Programs for PHEPR Researchers and Practitioners

CDC and ASPR should work with professional and academic organizations that represent multiple disciplines to guide and support the creation of the workforce capacity development and technical assistance programs necessary to ensure the conduct of quality PHEPR research and evaluation and improve the implementation capacity of SLTT public health agencies. Such efforts should include

- developing a research training infrastructure and career development grants;
- providing training grants for PHEPR researcher and practitioner teams;
- providing ongoing technical assistance and peer networking for both PHEPR researchers and practitioners; and
- creating a training and certification program for CDC project officers and state preparedness directors.

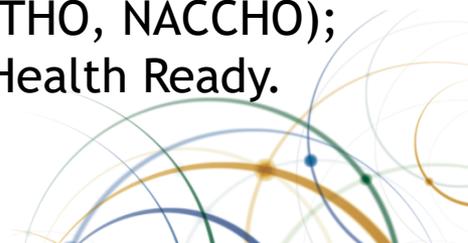


RECOMMENDATION 8:

Ensure the Translation, Dissemination, and Implementation of PHEPR Research to Practice

CDC should use a coordinated implementation science approach to ensure that the evidence-based practice recommendations resulting from the PHEPR evidence-based guidelines group proposed in Recommendation 1 achieve broad reach and become the standard of practice of the target audience. Strategies to this end include

- incorporating evidence-based practices into the *Public Health Emergency Preparedness and Response Capabilities* guidance document;
- building evidence-based practices into the design of and funding decisions for the PHEP Cooperative Agreement;
- incentivizing and requiring SLTT public health agencies to test and evaluate new or adapted practices and embed evaluations into routine operations;
- disseminating evidence-based practices via CDC communication platforms (e.g., *MMWR*) and those of partnering organizations (e.g., ASTHO, NACCHO);
- leveraging PHAB accreditation and NACCHO's Project Public Health Ready.



Concluding Thoughts

- The release of this report in the context of the COVID-19 pandemic puts the challenges of limited research to support evidence-based PHEPR practice in bold relief.
- The committee's recommendations around adequate stable funding, robust design and conduct of research studies, development of the research workforce and programs, and a commitment to collaboration between public health practitioners and experienced researchers all are vital to ongoing support of the knowledge development for and implementation of interventions that will better protect the public's health and minimize the impact of the broad spectrum of emergencies that have and will certainly continue to threaten the security of our nation.



Thank You!

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