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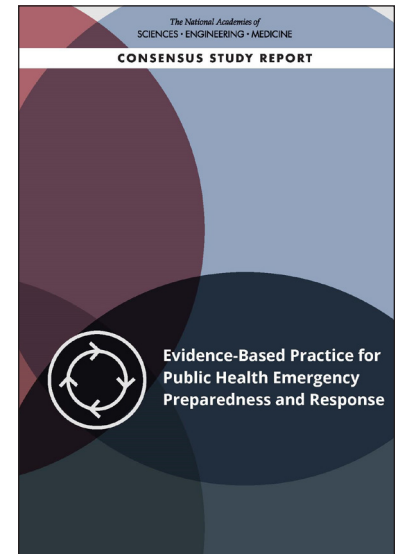
Evidence-Based Practice for Public Health Emergency Preparedness and Response

State, local, tribal, and territorial (SLTT) public health agencies play a vital role in preparing for and responding to public health emergencies. To save lives, prevent disruption to the social fabric of society, and mitigate damages and costs, public health practitioners and other response partners need clear and accessible guidance regarding effective practices that is supported by scientific evidence.

In the aftermath of September 11, 2001, and the subsequent anthrax bioterrorism attacks, the Centers for Disease Control and Prevention (CDC) and other governmental and nongovernmental organizations together invested billions of dollars and immeasurable human capital to develop and enhance public health emergency preparedness and response (PHEPR) infrastructure, systems, and science. Since 2011, 15 foundational Capabilities—defined in CDC’s *Public Health Emergency Preparedness and Response Capabilities: National Standards for State, Local, Tribal, and Territorial Public Health*—have guided public health agencies in building and sustaining robust systems to prevent, protect against, quickly respond to, and recover from public health emergencies.

Public health emergencies are becoming increasingly common and complex—a trend likely to continue. Recognizing the need to advance PHEPR system capabilities to respond to increasing threats, CDC asked the National Academies of Sciences, Engineering, and Medicine to convene an expert committee to develop a methodology for and to conduct a systematic review and evaluation of the evidence for selected PHEPR practices that fall within CDC’s 15 PHEPR Capabilities. A key element of the committee’s task was to develop and apply criteria for the selection of PHEPR practices to include in the systematic reviews. This process was intended to result in a methodology that would be applicable across the full range of PHEPR practices. The resulting report, *Evidence-Based Practice for Public Health Emergency Preparedness and Response*, presents recommendations intended to transform the infrastructure, funding, and methods of PHEPR research and provides evidence-based practice recommendations and/or implementation guidance for PHEPR practitioners relating to:

- Engaging with and training community-based partners to improve the outcomes of at-risk populations after public health emergencies
- Activating a public health emergency operations center
- Communicating public health alerts and guidance with technical audiences during a public health emergency
- Implementing quarantine to reduce or stop the spread of a contagious disease



THE STATE OF THE EVIDENCE ON PHEPR PRACTICES

Despite an increase in published empirical studies over the last two decades, the body of PHEPR research remains overwhelmingly descriptive. Overall, research in this area lacks objective evaluations based on validated measures that can support conclusions on the effectiveness of PHEPR practices. Moreover, existing PHEPR research is uneven across CDC's 15 PHEPR Capabilities—few (and in some cases no) studies of effectiveness were identified for the majority of PHEPR practices. The committee's review found that, in the absence of evidence, practices in the PHEPR field are largely informed by tradition and anecdotal experience. Overall, the committee concluded that the science underlying the nation's response to public health emergencies is seriously deficient, which hampers the nation's ability to effectively respond to emergencies, save lives, and preserve well-being.

DEVELOPING A NATIONAL PHEPR SCIENCE FRAMEWORK

In order to support the adoption of evidence-based PHEPR practices, an enduring national framework is needed to establish goals and objectives for improving coordination, integration, and alignment among existing but often fragmented PHEPR research efforts, and specifically to direct and coordinate available research funding to address prioritized PHEPR knowledge gaps (see Figure 1). Through this framework, the committee proposes steps



Figure 1. National PHEPR Science Framework

to ensure that high-quality, rigorous research and evaluation support the systematic and continuous development of knowledge in the PHEPR field.

Due to its role as the funding agency with the primary mission responsibility in PHEPR, the committee concluded that CDC should take the lead in developing and implementing the proposed National PHEPR Science Framework. CDC's role would include establishing an authority and process for supporting high-quality, rigorous, and sustainable research before, during, and after emergencies. CDC would also ensure that adequate research funding, capacities, and infrastructure are in place. However, the committee acknowledges that no one agency can transform the PHEPR research enterprise on its own. Multiple stakeholders and funding partners, including those in other agencies and disciplines, should work together to develop and imple-

DEVELOPING AND SUPPORTING AN EVIDENCE REVIEW AND EVALUATION PROCESS FOR PHEPR

ment this goal. It is important for this process to be inclusive of governmental, nongovernmental, private, and academic organizations. The process should also include broad public input from practitioners, policy makers, researchers, and communities.

Research and other evidence generated by the proposed National PHEPR Science Framework will be useful to PHEPR practitioners only if it can be synthesized and translated into evidence-based practices. With this consideration in mind, the committee developed a fit-for-purpose, mixed-method methodology for systematically reviewing and evaluating PHEPR evidence and for understanding the balance of benefits and harms of PHEPR practices. In doing so, the committee drew on—and in some cases adapted—elements of existing frameworks and approaches, including those of the U.S. Community Preventive Services Task Force and Grading of Recommendations

Assessment, Development and Evaluation (GRADE). The committee used an iterative process to simultaneously develop and test the methodology while conducting the reviews of its four PHEPR practices, which were selected taking into consideration not only the evidence needs of stakeholders but also the diversity of the practices with respect to both the research and evaluation methodologies used to generate the evidence base for them and their characteristics, such as the type and scope of event in which the practice is implemented and whether it is preparedness- or response-oriented. This process was intended to result in a methodology with sufficient flexibility not only to accommodate the diversity of evidence for the four PHEPR practices it reviewed, but also to be applied and adapted as needed to support future PHEPR evidence reviews.

While the committee acknowledges that tools other than systematic review methods may be useful in addressing the evidence needs of PHEPR practitioners and policy makers, there remains a clear need for a sustainable process that can be used to generate evidence-based PHEPR recommendations and guidelines. To meet this need, the committee believes CDC should create an independent task force that would conduct evidence reviews of PHEPR practices on an ongoing basis. In addition to guiding PHEPR practice and decision making, such a mechanism has the potential to drive improvements in the evidence base over time and guide a research agenda through the identification of evidence gaps.

IMPROVING THE QUALITY OF PHEPR RESEARCH AND PRACTICE EVALUATION

Improving and expanding the evidence base under the proposed National PHEPR Science Framework will require incentives for PHEPR researchers and practitioners. Improvements can be made in the quality of PHEPR research if policy makers and funders can implement clear guidelines for evaluation methods and study designs that will produce credible answers to important practice questions. This should include consideration of research designs and approaches used in other fields, such as public health services and systems research, behavioral and social sciences, and operations research, among others. Needed as well are guidelines for reporting the design and results of evaluations of the effectiveness of PHEPR practices to promote the transparency and reproducibility of research, as well as to facilitate implementation in practice settings.

Much of the evidence currently available concerning PHEPR practices is based on evaluation from real-world contexts, such as after action reports, and is largely anecdotal. This evidence could be more useful for informing evidence-based practices if it were more reliable and could be analyzed in a systematic and rigorous manner. Ensuring such evidence yields information useful and meaningful for the evaluation of PHEPR practices will require fostering a culture of improvement, protecting sensitive data, strengthening methodological approaches to evaluation, and developing mechanisms for analysis and dissemination of lessons learned.

TRAINING AND SUPPORTING THE PHEPR PRACTITIONER AND RESEARCHER WORKFORCE

Expanding and improving the PHEPR evidence base will depend on the development and support of PHEPR researchers and practitioners with the skills necessary to ensure quality PHEPR research and program evaluation. Enhanced workforce capacity could be achieved through a combination of training, technical assistance, peer networking, and sustainable practitioner–researcher partnerships. This will necessitate stronger systems, infrastructure, and norms around an integrated PHEPR research and practice system that includes both those who are focused on advancing the science and those applying this knowledge. Ensuring a diverse, adequately trained, and sufficiently available interdisciplinary workforce of disaster researchers will require investment in improved training programs and grants (e.g., career development awards), particularly those aimed at increasing PHEPR research capacity to evaluate complex interventions and present findings in a succinct and accessible manner. The gap between PHEPR research and practice can be narrowed by training researchers in translation and implementation science and supporting workforce development programs that strengthen the implementation capacity of public health agencies.

CONCLUSION

Research and continuous learning should become the expectation, not the exception, for the PHEPR field. Research needs to be embedded within the PHEPR system, conducted for the PHEPR system, and applied by the PHEPR system. The nation is increasingly facing public health emergencies that present opportunities to observe and learn and conduct real-time research in order to develop a strong empirical and analytical evidence base. As the PHEPR research field continues to evolve and mature, this evidence base represents the essential foundation of future policy and practice changes.

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