Using Quality Improvement to Measure and Assess Public Health Emergency
Preparedness Programs: Current Strategies, Opportunities, and
Recommendations

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A Master’s Paper submitted to the faculty of
the University of North Carolina at Chapel Hill
in partial fulfillment of the requirements for
the degree of Master of Public Health in
the Public Health Leadership Program

Chapel Hill

Fall 2015

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ABSTRACT

Since 2002, Congress has provided nearly $9 billion dollars of funding to state, local, tribal, and territorial public health departments to improve the nation’s ability to respond to public health threats. This significant investment of federal dollars has called into question whether funding has effectively improved the nation’s health preparedness. Public health emergency preparedness (PHEP) programs have evolved over the last decade with federal agencies providing guidance to state and local entities on public health preparedness standards and calling for the use of quality improvement to increase accountability and measure progress in PHEP programs. However, quality improvement (QI) is data-driven, and performance measures to quantitatively assess PHEP programs are limited. Quality improvement has been utilized in various industries, such as manufacturing and healthcare, to increase efficiency and improve performance. QI is increasingly being used by state and local health departments to assess the public health system and the current climate for increased application of QI in PHEP is favorable as more guidance and evidence-based best practices are shared with the public health preparedness community. This paper reviews current leadership strategies to measure and assess PHEP programs, explores emerging quality improvement initiatives and assessment strategies, and provides recommendations on how to utilize QI to improve performance in PHEP programs.

BACKGROUND/INTRODUCTION

The September 11th attacks and subsequent emergencies, such as Hurricane Katrina and H1N1, have highlighted the importance of the nation’s public health emergency response
systems and the need to build capacity. Since 2002, Congress has allocated billions of dollars to improve the public health system’s ability to respond to public health threats and emergencies (CDC, 2015). The Centers for Disease Control and Prevention (CDC) provides critical funding via the Public Health Emergency Preparedness (PHEP) Cooperative Agreement to public health departments throughout the nation to build and sustain the public health response system (CDC, 2015). However, in light of waning federal dollars, it is necessary to assess the effectiveness of this investment and demonstrate how funding has enhanced public health emergency response capabilities.

Various federal agencies have acknowledged the need to assess and measure performance in PHEP programs. In its early stages, PHEP was dynamic – goals and high priority functions were not clearly defined - but more efforts have been made within the last decade to standardize health preparedness and move towards a capability-focused PHEP system (Nelson, 2008). In 2010, the Department of Health and Human Services developed the National Health Security Strategy (NHSS), a strategic plan that calls for increased coordination among federal, state, and local agencies to minimize mortality and morbidity associated with health incidents. The NHSS also outlines the need for accountability and the use of quality improvement to assess the nation’s health preparedness and response capabilities. In addition, the NHSS highlights the need for development of performance measures to assess PHEP programs and continuous quality improvement to assure programs are utilizing federal dollars to maintain or improve preparedness and response capabilities.

**WHAT IS QUALITY IMPROVEMENT?**
Quality improvement is defined as “systematic approach for understanding and measuring performance, identifying solutions to performance shortfalls, and implementing changes to improve outcomes” (Lotstein, 2008). QI has been used in other sectors to measure performance, decrease waste, and improve efficiency. Although the application of QI varies from industry to industry, all QI programs use the following set of core concepts (Seid, 2007):

- **Emphasis on process.** Organizational activities are viewed as defined processes, where each chain in the process has a specific outcome.

- **Emphasis on systems.** Improvement happens when system work more effectively together.

- **Product or outcome focused.** QI efforts are aimed at achieving a specific outcome.

- **Use of quantifiable measures.** Each outcome has an associated performance measure that is data-driven.

- **Reduction in variability.** QI reduces the variability in products and services.

- **Continuous improvement.** QI is an ongoing effort that is adopted as part of the organizational culture and not a one-time activity.

The implementation of quality improvement in public health preparedness is challenging because emergencies are rare and not repeatable, but QI relies on repeatability to obtain quantitative data to compare performance over time. Even in emergencies that happen more frequently (i.e. hurricanes), due to the multifactorial nature of responses, there are too many variables impacting the response to make comparisons from one disaster response to another.
(Nelson, 2008). In addition, public health emergency response typically involves multiple agencies, and the multisectoral nature of a response also increases the number of factors that impact the response. This variability and multisectoral nature of an incident means that each event is unique and no two disasters are exactly alike. Exercises allow PHEP programs to test operational plans but real events serve as better indicators of performance (Nelson, 2008). Moreover, each health department is unique and variability exists among PHEP programs across the nation, an indication that the implementation of QI and development of performance measures may also vary from health department to health department (Nelson, 2008).

While PHEP programs would benefit from the application of QI methodology, QI has not yet been widely adopted in PHEP. So if emergencies are the best indicator of performance but are rare, how can PHEP assess its performance? How do PHEP programs develop performance measures if the evidence-base is not robust? Despite these challenges and questions, there are opportunities to facilitate QI in PHEP programs. Although the current evidence-base for improving public health preparedness is limited, lessons learned from the application of QI in other fields, such as manufacturing, healthcare, and transportation, may be adapted to public health (Nelson, 2008). Since emergencies are rare, PHEP programs can draw parallels from other industries where QI is widely used by identifying opportunities to implement QI methods in day-to-day or routine activities (e.g. staff call-down drills, annual flu vaccination clinics, staff Incident Command System trainings, etc.) and using process mapping to divide complex
response activities into “building blocks” in which each block has an associated measurable outcome (Seid, 2007). For example, process mapping can be applied to medical countermeasure distribution/dispensing by dividing each step in the process into “building blocks,” such as site activation, staff call-down, warehouse operations, etc. and each block would have a specific outcome and measure. This method allows PHEP practitioners to identify which blocks in the process are most likely to fail and are in need of concerted efforts for improvement (Nelson, 2008).

In addition, best practices for the facilitation of QI to measure and assess PHEP programs are increasing as more public health departments adopt a culture of QI and research efforts add to the evidence-base. Recommendations for the implementation of QI methods to measure and assess PHEP programs will be further discussed later in this paper upon examination of current strategies.

**CURRENT STRATEGIES: STRENGTHS & LIMITATIONS**

Opportunities to develop performance measures and assess preparedness programs begins with defining the public health emergency preparedness response system. The *National Health Security Strategy* developed by the Department of Health and Human Services (2010) and Federal Emergency Management Agency’s *National Response Framework* (2013) provides federal-level guidance to delineate responsibilities, objectives, and capabilities for each agency involved in an all-hazards and health-related incidents (Gibson, 2012). From the federal guidance, the scope and responsibilities of the PHEP system can be further defined and subsequently public health-specific performance measures can be developed. The following is
a review of the strengths and limitations of guidance documents and emerging public health initiatives that can be utilized to facilitate quality improvement in PHEP programs.

**Public Health Preparedness Capabilities**

In March 2011, the CDC released *Public Health Preparedness (PHP) Capabilities: National Standards for State and Local Planning*, a guidance document outlining public health preparedness priorities and capabilities in alignment with the *National Health Security Strategy*. The *PHP Capabilities* identifies 15 public-health specific emergency preparedness and response capabilities that represent the national standard for state and local health departments (CDC, 2011). Examples of capabilities include community resilience, emergency operations coordination, medical surge, and responder safety and health. For each capability, the CDC includes a definition of the capability and identifies associated functions, performance measures, tasks, and resource elements needed to achieve full performance for that capability. The document is intended to aid PHEP programs in the conduct of strategic planning, to identify current planning strengths and gaps, and to identify priority capabilities and functions for further development (CDC, 2011).

The *PHP Capabilities* guidance has multiple strengths – it was developed from evidence-based best practices, included input from subject matter experts from public health preparedness at the federal, state, and local levels to ensure applicability to the practice community, and created a standardized set of capabilities and activities from which PHEP programs can assess performance. However, there are still limitations to the document, specifically the lack of measurable performance measures. There are several CDC-defined
performance measures throughout the document, but the vast majority of the capabilities and functions do not currently have performance measures (CDC, 2011). If these are the standards by which PHEP programs should assess performance and implementation of QI is dependent on quantifiable outcomes, how can PHEP programs derive quantifiable measures based on the PHP capabilities?

**After Action Reports/Improvement Plans (AAR/IPs)**

The Homeland Security Exercise and Evaluation Program (HSEEP) provides guidelines on the design, conduct, evaluation, and improvement planning for exercises and real incidents. The improvement planning process includes identification of strengths, challenges, and corrective actions from exercises and real events. The HSEEP process has continuous quality improvement built into its framework since corrective actions identified during exercises and real events are intended to be implemented by updating organizational emergency plans and protocols to address lessons learned (FEMA, 2013). The After Action Report/Improvement Plan functions as a QI tool that captures these lessons learned and identifies corrective actions to remediate challenges from an exercise or real event (Singleton, 2014).

Although, continuous QI is considered to be part of HSEEP doctrine, there are limitations that prevent successful implementation of QI from AAR/IPs. First, many corrective actions do not address the root cause of a problem (Singleton, 2014). Corrective actions that do not address the root cause of the identified problem or challenge may increase the recurrence of the same problem in subsequent exercises and/or real events. Improvement does not occur if the same challenges are continually identified in after action reviews (Singleton, 2014). Second,
corrective actions may not contain enough information (e.g. specific and measurable) to be executable (Singleton, 2014). Third, although the AAR/IP is widely used in the emergency management field as a QI tool, there is no incentive to implement corrective actions. Moreover, if a corrective action is implemented, many jurisdictions do not close the loop to assess whether or not the corrective action successfully remediated the observed challenge (Stoto, 2013).

**National Health Security Preparedness Index**

In response to the *National Health Security Strategy*’s call for quality improvement to measure preparedness and accountability, The National Health Security Preparedness Index (NHPSI) was developed to quantitatively measure each state’s and the nation’s overall health preparedness level based on a set of evidence-based indicators (RWJF, 2014). The NHPSI tool includes 194 measures (RWJF, 2014) to provide a comprehensive reflection of the nation’s health security preparedness. Currently, the NHPSI tool only provides index scores for the nation and each state and the application of the tool to local and regional jurisdictions is not clear nor explicitly addressed.

**National Voluntary Public Health Department Accreditation**

The Public Health Accreditation Board (PHAB) is the entity that awards state, tribal, and local, health departments with the recognition of Public Health Department Accreditation. PHAB Accreditation is awarded to public health departments that demonstrate high performance against national standards, focusing on advancing quality improvement and the 10 Essential Public Health Services (PHAB, 2013). The PHAB Standards and Measures (2013)
outlines the criteria health departments must meet in order to achieve accreditation. In addition, the PHAB Accreditation process seeks to incorporate a culture of quality improvement in the public health field by requiring health departments to develop QI plans and demonstrate department-wide support of QI trainings (PHAB, 2013).

Accreditation can serve as the catalyst for state and local health departments to implement QI to assess effectiveness, especially in PHEP programs. Implementation of QI methods allow health departments to assess current performance compared to minimum standards and to then maintain and advance performance from the baseline assessment (Baker, 2007). In 2012, a research team at the CDC conducted a crosswalk between the PHP Capabilities and PHAB Standards and the results of the crosswalk identified synergy between the documents and opportunities to leverage accreditation efforts to support quality improvement and accountability in PHEP programs (Singleton, 2014). Furthermore, a study conducted by the University of North Carolina Preparedness and Emergency Preparedness Research Center comparing H1N1 preparedness activities between accredited and non-accredited health departments found that accredited health departments performed more response activities and initiated them faster compared to non-accredited health departments. This suggests that there is a link between accreditation and improved PHEP program performance due to the emphasis on accountability and meeting an established set of performance criteria (Singleton, 2014). Although PHAB Accreditation may be leveraged to improve PHEP program performance, it is important to remember that it is voluntary accreditation. Health departments may choose to not participate in PHAB Accreditation and,
therefore, PHEP programs in non-accredited health departments may not gain the same exposure and training to QI as health departments that are accredited or seeking accreditation (Singleton, 2014).

RECOMMENDATIONS

Significant work has been accomplished over the last decade to establish PHEP standards and facilitate the use of quality improvement to measure and assess public health preparedness systems. However, additional work can be done to increase and support use of QI in PHEP programs. The following are recommendations to improve upon existing strategies and leverage emerging opportunities of QI in the public health field.

Public Health Preparedness Capabilities Guidance

The PHP Capabilities is a great resource because it outlines specific activities that PHEP programs should aim to achieve for each capability. However, there are a limited number of CDC-defined performance measures and additional performance measures must be defined in order to obtain quantifiable outcomes. CDC should continue to provide technical assistance to state and local PHEP programs and develop more performance measures as research efforts reveal additional best practices that may be added to the evidence-base and to facilitate sharing lessons learned from exercises and real events so PHEP programs can learn from each other.

Because each health department is unique and variability exists among different PHEP programs, preparedness planning priorities will likely differ from program to program.

Jurisdictions should utilize the PHP Capabilities document, and other existing guidance
documents, as resources to conduct a strategic planning process and develop its own performance measures, if CDC-defined performance measures do not exist or are not adequate, for its prioritized capabilities. The strategic planning process should include an assessment of current performance across the 15 capabilities, identification of planning gaps, and development of strategies and activities to measure and improve upon gaps (Baker, 2007).

In order to accomplish this, PHEP personnel should receive training in quality improvement concepts to include process mapping, plan-do-study-act (PDSA) cycles, other QI models/frameworks (Lotstein, 2008). With the right tools and training, jurisdictions should feel empowered to develop its own performance measures and conduct QI processes to improve programs.

**After Action Report/Improvement Plans**

HSEEP should emphasis the importance of root cause analysis and provide guidance on how to develop corrective actions that are measurable and specific (Singleton, 2014). Emergency management personnel should also receive training on QI methods and concepts to include root cause analysis. While exercises are an important mechanism to test operational plans in the absence of real events, the lessons learned from real events are better indicators of how the public health response system will perform in the future (Stoto, 2013). Since emergencies are rare, federal and state partners should facilitate opportunities (e.g. central repository or webinars) for PHEP programs to share best practices and lessons learned from exercises and real events.
In addition, PHEP programs should implement corrective actions and close the loop by conducting smaller, focused drills to assess whether the implemented corrective action effectively remediated the observed challenge. Federal and state partners should consider incentivizing the improvement planning process through use of financial incentives or inclusion corrective action follow-through in grant deliverable requirements (Seid, 2007).

**National Health Security Preparedness Index**

The NHSPI is a useful tool that utilizes measurable indicators to derive a numerical index score for each state. However, while scores are available at the national and state level, guidance is needed on how local jurisdictions can apply the methodology of the NHSPI tool to assess the preparedness level of local PHEP programs. In addition, the methodology and measures should be continually assessed to incorporate new evidence-based performance measures.

**National Voluntary Public Health Department Accreditation**

The linkages between PHAB Accreditation and the PHP capabilities have demonstrated that accredited health departments are likely to improve performance in preparedness activities because of accreditation’s focus on quality improvement and accountability. In addition, the PHAB Accreditation process moves health departments toward adopting an organizational culture of quality improvement through the requirement of developing an agency QI plan. Leadership support and creating a culture of QI are important factors that lead to successful implementation of QI in organizations. Health departments should consider
seeking PHAB Accreditation if possible; however, barriers (e.g. funding and staffing limitations) may prevent some health departments from pursuing accreditation. PHEP programs in non-accredited health departments can still benefit from PHAB Accreditation by using lessons learned in the application of QI in preparedness activities from accredited health departments (Baker, 2007).

**The Role of Leadership in Assessing and Improving PHEP**

The role of public health leadership in the successful planning, implementation, and evaluation of emergency preparedness is critical. As a matter of fact, public health leadership is necessary for any of the above recommendations to be successfully implemented.

QI in PHEP is dependent on the local public health leader prioritizing and extending QI methods, which have been established and successfully implemented in other sectors like traditional clinical service and manufacturing activities, to PHEP QI. Because PHEP is an evolving and novel program and that the utilization of QI methods in the public health field is an emerging trend and not yet widely adopted, there may initially be resistance among PHEP leadership and personnel due to lack of familiarity and time to learn it well.

Similarly, the PH Capabilities document recommendations require local public health officials to use strategy and skill to match and modify the proposed performance measures to their local needs and resources. Moreover, given the lack of evidence base and limited resources, PHEP leaders must use critical thinking and decision making to determine where to allocate these limited resources by strategically focusing its planning efforts on activities that would be most beneficial to improving its preparedness capabilities, which can be especially challenging when data and evidence-based practices are scarce.
The conduct of exercises is an established part of the preparedness planning cycle, but public health leaders must drive the process by encouraging the conduct and design of quality exercises to assess current plans to identify planning strengths and gaps. Because the after action review will result in identification of gaps and weaknesses in current protocols/organizational processes, which may result in contentious discussions as to why gaps exist, PHEP leaders must have courage and take risks in order to have meaningful exercises that truly tests the public health emergency response system.

Strategies mentioned in the Recommendation section such as root cause analysis and the use of the National Health Security Index are to be used and learned from; federal public health agencies and academia must take the lead in “selling” them and communicating with the state and local public health officials so they better understand how it applies to local programs.

It takes leadership and incentives for local and/or state public health departments to opt in for accreditation. This is a very time-consuming and requires health departments seeking accreditation to pay yearly fees, and, hence, a resource-intensive process. Nonetheless, it is a potentially very important process that can bring awareness of QI activities to all aspects of the health department’s activities and establish PHEP as a key component of the programs and QI for the whole LHD.

CONCLUSION

Fostering the facilitation of quality improvement in PHEP programs requires coordination, support, and leadership from all levels of government – federal, state, and local - but ultimately, state and local programs are responsible for identifying their own preparedness
planning and response priorities and to define outcomes and develop performance measures for its own jurisdiction. Successful implementation of QI to assess and measure PHEP programs is dependent on having an organizational culture of QI, organizational leadership support, training on QI methods, defined public health preparedness and response system standards, and valid, reliable performance measures. Federal agencies and academic research centers should continue to develop the tools, guidance, and evidence-base to assist PHEP programs with identifying measures and priorities for assessing performance. PHEP programs have evolved significantly since 2002 and will continue to do so as the adoption of QI in public health continues to gain momentum through PHAB Accreditation and congressional pressures to justify how federal funding has improved preparedness. As the evidence-base grows and best practices and lessons learned from exercises and real incidents are shared amongst PHEP programs, the implementation of quality improvement to measure and assess PHEP has the potential to become a widely adopted practice.
Bibliography


