

Surge Capacity for Influenza Surveillance, Novel Event Investigation and Outbreak Events

Surge Capacity Requirements

1. Maintain a year-round virologic surveillance system that is flexible and scalable for rapid, effective response to support diagnostic needs and case counts in rare/novel influenza event investigations, and enhance surveillance for outbreak and pandemic scenarios and has criteria to determine when to scale up and ramp down.
2. Incorporate the role and resource needs of the PHL in the state pandemic plan. PHL representatives should be part of state pandemic planning processes
3. Develop and maintain a laboratory pandemic surge plan that addresses criteria for specimen triage, algorithm changes to improve throughput, and resource needs (e.g. staff, equipment, space, reagents and supplies).

Requirements Intent

Virologic surveillance is vital to support rare/novel influenza event and outbreak investigations and pandemic response. Pre-event and during an event, communication and coordination between epidemiology and laboratory leadership is essential to develop, refine and change the strategy for virologic surge sampling and testing. However, the term “surge capacity” has many different meanings which can result in unrealistic expectations of the virologic surveillance system. While seasonal surveillance provides the warm base of expertise and infrastructure necessary to provide surge capacity, the response needed for a local outbreak investigation, emergence of a novel influenza virus or a pandemic response are qualitatively and quantitatively very different. The Institute of Medicine Medical Surge Capacity Workshop report grossly defines surge capacity as the ability to rapidly accommodate a large number of patients from a defined mass-casualty incident or pandemic, and considers surge capacity on a continuum with three distinct stages: conventional capacity, contingency capacity and crisis capacity.¹⁹ These medical surge definitions are adapted here to provide standardized terminology to improve planning and response:

- Conventional capacity: routine virologic surveillance capacity to test adequate sample size to produce meaningful data with reasonable confidence levels.
- Contingency capacity: minor adaptations are made that generally have limited impact on routine operations. This “spare” capacity must be maintained to deal with fluctuations in testing that may be necessary during a bad influenza season (e.g., increased hospitalizations, rapid transmission within the community, drifted virus), a local outbreak investigation or a rare/novel influenza event investigation. Efficient use of contingency capacity may require emphasis on targeted testing based on event specific criteria.

- Crisis capacity: a fundamental, systematic change into a system in which standards of operation are significantly altered. When crisis capacity is reached, the focus will shift to expanded hours of operation utilizing staff from other programs or areas of the laboratory, changes in testing algorithms and most importantly, significantly limiting testing based on event specific governance criteria.

These definitions of capacity relate to the equipment and supplies available and even more importantly to the staff needed to provide all the tasks required for specimen accessioning, processing, testing, data management and analysis. Therefore each jurisdiction may have different triggers that will cause a shift from one stage to another.

Novel Event/Outbreak Investigations

Following identification of a potential outbreak, a rare/novel influenza virus or other rare event, populations that will be targeted for testing will be determined based on:

- Epidemiologic criteria (e.g., exposure, geographic location, event specific risk factors),
- Clinical criteria (e.g., severe or fatal illness),
- Specimen sources (e.g., ILINet or other primary care providers, clinical laboratories using high performing assays).

Although epidemiologists will serve as gate-keepers for PHL testing, collaborative epidemiology-laboratory pre-event planning and event response is needed to ensure common understanding and expectation of contingency and crisis capacity. PHL influenza testing capacity models²⁰ and Right Size [Sample Size Calculators](#) can be used to identify system efficiencies and limitations. The APHL Infectious Disease Planning and Response Framework is another useful tool for planning.²¹

H1N1 Response: Lessons of the Virus

Public health labs opened their doors to let in specimens from clinical labs because they had the best test and were eager to fulfill their surveillance mission... You can't just hire a molecular biologist off the street. The layers of quality assurance involved in validation add critical steps to the process. Specific, sophisticated instruments and expensive reagents are required. Regulatory clearance can add time to the process. The subtleties don't always translate to the general public or political representatives. For them, the gold-standard is an immediate yes-no answer at the point of care.¹⁰

Pandemic Surge

In the event a novel virus emerges that is highly transmissible, the PHL will likely be the only resource for diagnostic testing at the start of the event, particularly if the commercially available tests do not reliably detect or differentiate the virus. As demonstrated in the 2009 H1N1 pandemic response, PHL testing capacity will be stretched by testing demands, rapidly reaching unsustainable crisis capacity. Effective governance for triage of cases eligible for testing at the PHL will be necessary. Epidemiologists, in collaboration with the PHL leadership, will need to manage the demand for diagnostic testing and ensure that surveillance testing that is representative of the relevant populations is prioritized so that effective response and control measures can be effectively implemented.

Even when diagnostic testing demand can be met by the clinical laboratory sector, the PHL will be the primary resource for virologic surveillance data. Therefore, the PHL should be represented in state pandemic planning activities. The role and resource needs of the PHL should be addressed in the state pandemic plan. Expectations for state and local epidemiologists to serve as gate-keepers for specimen testing demands should be coordinated in advance and defined in the plan.

All PHLs should develop and maintain an internal pandemic surge plan that addresses criteria for specimen triage, algorithm changes to improve testing and reporting throughput and resource needs (e.g., staff, equipment, space, safety, reagents and supplies).