Annex 2. Laboratory Diagnostics

Responsible person: Laboratory Director
Back up: Microbiology Supervisor

Rationale:

- Provide influenza testing by Real Time PCR for outbreak control and surveillance including routine surveillance
- Characterize Influenza A viruses by Real Time PCR
- Identify and perform surveillance on influenza clinical sample for resistance to antivirals using pyrosequencing
- Act as a reference laboratory for local clinical labs for influenza specimens associated with mortality
- Routinely and as needed submit specimens to CDC Atlanta or laboratories designated by CDC Atlanta for further characterization and vaccine production

Assumptions:

- Sufficient staffing levels to process samples beyond normal surveillance capacity
- Sufficient laboratory hardware to process samples beyond normal, routine surveillance levels
- Sufficient laboratory reagents/ disposables to process samples beyond normal, routine surveillance levels
- Assays in place and validated for characterization of Pandemic influenza strain
- Assays in place and validated for antiviral resistance
- Screening assay NOT rendered ineffective secondary to mutation in virus

Overview:

HETL utilizes a CDC-FDA approved real time, reverse transcription polymerase chain reaction RT PCR assay for the identification of Influenza A and B viruses. HETL also utilizes this same technology for further characterization of influenza A viruses including identification of H1, H3, 2009 pandemic H1 and H5. This assay does not characterize the neuramindase(N) antigen. HETL utilizes this assay to perform routine surveillance during normal influenza season generally from November through April annually from specimens received from sentinel physician offices and clinical laboratories throughout Maine. However, HETL accepts and processes all influenza samples at any time of the year from any clinical submitter. HETL also performs anti-viral resistance analysis on all 2009 pandemic influenza A H1N1 viruses and currently circulating H3N2 influenza A viruses(11/2011). HETL utilizes pyrosequencing technology for detection of a mutation that confers resistance to oseltamivir(TAMIFLU) using the CDC Atlanta developed H275Y protocol. There is no fee charged to submitters for any influenza testing performed at HETL including pyrosequencing. HETL's laboratory hardware includes 4 ABI 7500 DX FAST real time thermocyclers with 96 well format, 2 Roche MagnaPure (1.0 and 2.0) nucleic acid extraction platforms capable of extracting approximately 64 clinical samples per hour, two Qiagen Qiacube nucleic acid extraction platforms capable of processing 24 samples per hour and a Qiagen Q96ID Pyrosequencer with 96 well format. During the 2009 H1N1 Pandemic HETL used split shifts and weekend shifts to process a record number of samples , up to 200 per day, and a total of ~10,000 specimens between April 2009 and December 2009. HETL's capacity for surge testing in the event of a pandemic is limited by its stock of reagents and disposables and availability of additional commodities in the event that a pandemic occurs. For screening purposes i.e. identification of influenza A or B in clinical

samples; HETL currently has the capacity to process approximately 300 samples per day. During the 2009 pandemic HETL modified its screening algorithm such that clinical samples were tested for influenza A only. In this case scenario, HETL's capacity for testing can be increased , depending on hours of operations. Lessons learned for the 2009 H1 N1 pandemic include:

- the importance of a sufficient stockpile of supplies for testing
- the need for additional administrative staff for reporting and processing test requisitions/data
- having a single contact person in the id-epi staff for HETL communications
- HETL establishing a single person for handling inquiries from clinical providers and communication with epi etc.
- Use of faxing and electronic transfer of laboratory results to decrease turnaround time for lab results
- capability to process increased amounts of biological/biomedical wastes
- Establishment of a supplemental form in addition to the normal HETL requisition so that specimens could be triaged at accessioning(pre-testing)
- Maintaining a copy of the HETL requisition, supplemental form and testing information on the HETL web site for access by clinicians.
- Utilizing the HETL web site for communication with submitters using a user friendly format
- Ability to have trained staff available for "split shifts" i.e 7-3 and 3-11 as well as weekends and holidays.
- Utilization of alternate personnel for normal testing/accessioning/reporting

Maine Inter-Pandemic Period

Mitigation and Preparedness
ME Level 0, I, II

1. Maintain stock of reagents for surge capacity testing
2. Maintain sufficient staff trained and proficient on instruments for testing
3. Maintain up to date forms and information on HETL web site
4. Maintain instruments utilized for testing with annual PM and qualification checks for assay
5. Maintain antiviral resistance testing platform, reagents and sufficient trained staff to run instruments

Maine Pandemic Alert Period

Heightened Preparedness: On Standby
ME Levels III, IV

1. Increase levels of stocks for testing
2. Train additional staff/and review competency of current testing staff
3. Plan use of physical space to accommodate possible surge in testing demand
4. Assign 1 staff in lab for communication with Epi/Clinicians/General Public
5. Update HETL website with announcements as necessary to communicate with stake holders.
6. Communicate with NORDX and ALI regarding their testing capacity
7. Finalize cooperative plan with NORDX and ALI for surge capacity testing
8. Have plan for "triaging" specimens and identify triggers for triaging
9. Identify alternative personnel for routine testing/testing support

Maine Pandemic Period

Activate Response Plan
ME Levels V, IV

- Modify work schedule of trained technicians and administrative/ accessioning staff
- Prioritize specimens according to urgency based on guidance from MeCDC ID-EPI i.e activate triaging

- Post necessary documents on HETL web site
- Assign and activate personnel for communication with EPI/clinicians/general public
- Utilize alternate personnel to perform routine testing/testing support
- If possible utilize ALI and NORDX for testing samples originating from respective regions. i.e Greater Portland/Bangor area

Maine Post Pandemic Recovery

Recovery Activities
ME Levels VII

1. Re-Stock supplies as necessary
2. Complete after-action lessons learned document and summary
3. Return to normal work schedules
4. Return to normal lab space utilization
5. Post informational documents for public on HETL web site on as needed basis
6. Continue with surveillance testing as dictated by MeCDC ID-EPI

Annex 2. Laboratory Summary Matrix:

Annex 2. HETL	**Maine Inter-Pandemic Period: Awareness** **Mitigation/ Preparedness** **ME Level 0, I, II**	**Maine Pandemic Alert Period: Standby** **Heightened Preparedness** **ME Levels III, IV**	**Maine Pandemic Period: Activate** **Response** **ME Levels V, IV**	**Maine Post Pandemic Recovery Period** **Recovery** **ME Levels VII**
Stocks For Surge Testing	→Maintain inventory for Surge of 1000-1500 Tests	→ Increase stocks to maintain 2000 surge capacity tests. Increase testing suites to 2.	→ Replenish stocks on a weekly basis to maintain capcity. Maintain two or three testing suites	Re stock supplies Reduce to one testing suite.
Trained Staff	→Complete competency assessment and maintain proficiency for 4 staff on flu testing	→ Complete competency assessment and maintain proficiency for 8 staff on flu testing	→ Bring individulas from other lab sections in to provide testing support/ordering/communications/ shipping/receiving/waste disposal/ accessioning	Decrease competent/proficiency to levels consistent with Awareness level
Maintain up to date forms and communiques on HETL Web Site	→Create a memo regarding flu testing for clinical providers reviewed by MeCDC	→Create a memo regarding flu testing available through HETL, NORDx and ALI for Clinical Submitters and establish email address and dedicated phone line for inquiries from clients	Update memos and add downloadable client forms for patient risk assessment to triage samples at receipt if necessary	Update web site and remove forms as necessary.

Maintain instruments utilized for testing	→ Maintain service contracts on all instruments and insure required PM's are completed	→ Maintain service contracts on all instruments and insure required PM's are completed. Stock pile user maintainence kits as necessary for some instruments	Maintain service contracts on all instruments and insure required PM's are completed. Stock pile user maintainence kits as necessary for some instruments. Consider manual extractions or Qiagen qiacubes as neccessary	Maintain service contracts on all instruments and insure required PM's are completed
Maintain antiviral resistance testing platform, reagents and sufficient trained staff to run instruments	→Maintain antiviral resistance platform with service contract and PM. Stockpile reagents. Maintain competency and proficiency for two trained staff	→ Add additional stocks to inventory as required and train one additional staff person on instrument	Maintain throughput and TAT as dictated by MeCDC ID-EPI based on epidemiological utility of test results. Add support staff as dictated by above.	Maintain antiviral resistance platform with service contract and PM. Stockpile reagents. Maintain competency and proficiency for two trained staff