Michigan 2012 CAP LPX Survey Analysis

Introduction

The College of American Pathologist (CAP) Laboratory Preparedness Exercise (LPX) survey provides clinical laboratories with an educational exercise that can be used to help prepare for the detection of pathogens of public health importance, including pathogens that might be used as biothreat (BT) agents. Another purpose of the LPX is to prepare participant laboratories for effective and efficient communication of critical information related to potential BT agents to public health authorities.

This report summarizes the results of the Michigan Laboratory Response Network (LRN) Sentinel Laboratories on the 2012 LPX-A and LPX-B survey panels in aggregate and compares Michigan lab responses to those of participating labs throughout the country.

Performance Summary

The LPX survey consists of organism identification (rule out) plus a notification component to test communications between LRN Sentinel Laboratories and LRN Reference Labs. In these exercises, LRN Sentinel Labs are required to contact their LRN Reference Lab if, after following the established Sentinel Laboratory Guidelines on a challenge isolate, they are unable to rule out an agent of bioterrorism. Both organism rule out and notification are summarized below.

Approximately 40% of Michigan sentinel labs participated in the 2012 LPX surveys. We congratulate participating laboratories for a job well done and encourage all laboratories to consider enrolling in this worthwhile educational exercise.

The **2012 LPX-A** survey contained the following samples:

LPX-01	*Yersinia pestis*
LPX-02	*Bacillus megaterium* with *Staphylococcus epidermidis* as a contaminant
LPX-03	*Bacillus anthracis* with *virdians streptococcus* sp. as a contaminant

Correct Result Reporting LPX-A	N = 42
Sample Number	% of MI Labs with Intended Response
LPX-01	88.1% (37/42)
LPX-02	100% (42/42)
LPX-03	97.62% (41/42)

The **2012 LPX-B** survey contained the following samples:

LPX-04 *Eikenella corrodens*
LPX-05 *Burkholderia thailandensis*
LPX-06 *Francisella tularensis*, the live vaccine strain (avirulent)

Correct Result Reporting LPX-B N = 40	
Sample Number	% of MI Labs with Intended Response
LPX-04	100% (40/40)
LPX-05	75% (30/40)
LPX-06	92.5% (37/40)

Notification Drill Results

Notification Drill LPX-A			
Sample Number	Notification Required	% MI Labs Indicating Would Notify the LRN Ref Lab	% MI Labs Actually Notified the LRN Reference Lab
LPX-01	Yes	100% (38/38) ^	86.8% (33/38) ^
LPX-02	No	100% (10/10) #	70% (7/10) #
LPX-03	Yes	95.1% (39/41) ∞	87.8% (36/41) ∞

^ All laboratories unable to rule out a BT agent in this sample indicated they would notify their LRN Reference Lab. N = 38 as 38 labs could not rule out a BT agent.
# Although notification of the LRN Reference Laboratory was not needed, all laboratories that could not rule out a BT agent in this sample indicated they would notify their LRN Reference Lab. However, only 70% did contact their LRN Reference Lab.
∞ N=41 because 41 laboratories could not rule out a biothreat agent.

Notification Drill LPX-B			
Sample Number	Notification Required	% MI Labs Indicating Would Notify the LRN Ref Lab	% MI Labs Actually Notified the LRN Reference Lab
LPX-04	No	-	-
LPX-05	Yes	100% (32/32) §	59.4% (19/32) §
LPX-06	Yes	100% (40/40)	62.5% (25/40)

§ All Sentinel Laboratories that could not rule out a BT agent in this sample indicated they would contact their LRN Reference Laboratory. N = 32 as 32 labs could not rule out a BT agent.

Analysis by Sample

LPX-01: *Yersinia pestis*		
Submitted Answers	Michigan Participants	All Participants
§ *Yersinia pestis*, refer for confirmation	3/42 7.1%	127/1320 9.6%
§ *Yersinia* sp., refer to rule out *Yersinai pestis*	14/42 33.3%	389/1320 29.5%
§ Gram-negative bacillus, refer to rule out *Yersinia pestis*	20/42 47.6%	628/1320 47.6%
Non-BT Culture	4/42 9.5%	72/1320 5.5%
Gram-negative baccilus/coccobacillus, refer to rule out *Francisella tularensis*	1/42 2.4%	-

§ Acceptable response for Sentinel Laboratories

LPX-02: *Bacillus megaterium*		
Submitted Answers	Michigan Participants	All Participants
§ Non-BT Culture	32/42 76.2%	1150/1330 86.5%
§ *Bacillus* sp., refer to rule out *Bacillus anthracis*	8/42 19%	176/1330 13.2%
§ Gram-positive bacillus, refer to rule out *Bacillus anthracis*	2/42 4.8%	52/1330 3.9%

§ Acceptable response for Sentinel Laboratories

LPX-03: *Bacillus anthracis*		
Submitted Answers	Michigan Participants	All Participants
§ *Bacillus anthracis*, refer for confirmation	1/42 2.4%	78/1325 5.9%
§ *Bacillus* sp., refer to rule out *Bacillus anthracis*	31/42 73.8%	905/1325 68.3%
§ Gram-positive bacillus, refer to rule out *Bacillus anthracis*	9/42 21.4%	273/1325 20.6%
Non-BT Culture	1/42 2.4%	205/1325 15.5%

§ Acceptable response for Sentinel Laboratories

LPX-04: *Eikenella corrodens*		
Submitted Answers	Michigan Participants	All Participants
§ Non-BT Culture	40/40 100%	1272/1336 95.2%

§ Acceptable response for Sentinel Laboratories

LPX-05: *Burkholderia thailandensis*		
Submitted Answers	Michigan Participants	All Participants
§ Suspect *Burkholderia pseudomallei*, refer for confirmation	4/39 10.26%	380/1352 28.1%
§ *Burkholderia* sp., refer to rule out *Bukholderia pseudomallei*	12/39 30.77%	197/1352 14.6%
§ Gram-negative bacillus, refer to rule out *Burkholderia pseudomallei*	14/39 35.9%	502/1352 37.1%
Non-BT Culture	7/39 17.95%	-
Gram-negative coccobacillus, refer to rule out *Burkholderia mallei*	2/39 5.1%	-

§ Acceptable response for Sentinel Laboratories

LPX-06: *Francisella tularensis*		
Submitted Answers	Michigan Participants	All Participants
§ Suspect *Francisella tularensis*, refer for confirmation	6/40 15%	412/1349 30.5%
§ *Francisella* sp., refer to rule out *Francisella tularensis*	6/40 15%	135/1349 10.0%
§ Gram-negative bacillus/coccobacillus, refer to rule out *Francisella tularensis*	25/40 62.5%	715/1349 53.0%
Suspect *Brucella* sp., refer to rule out	1/40 2.5%	-
Gram-negative bacillus, refer to rule out *Yersinia pestis*	1/40 2.5%	-
Gram-negative coccobacillus, refer to rule out *Brucella*	1/40 2.5%	-

§ Acceptable response for Sentinel Laboratories

Discussion

LPX-01

This challenge was a simulated blood specimen from a Colorado rancher with painful right inguinal lymph node enlargement and recent onset of fever. The specimen contained *Yersinia pestis* in pure culture. The intended response for Sentinel Laboratories was either *Yersinia pestis*, refer for confirmation, *Yersinia* sp., refer to rule out *Yersinia pestis* or Gram-negative bacillus, refer to rule out *Yersinia pestis*.

Eighty-eight percent of Michigan laboratories responded with the intended response. Four laboratories ruled out all BT agents. One laboratory suspected the challenge contained a *Francisella tularensis.*

Yersinia pestis is a cause of naturally occurring zoonotic infections. Wild rodents are the most common reservoirs for this agent; human infection is caused by handling infected animals or being bitten by rodent fleas infected by feeding on an infected rodent. Most infections in the United States are acquired in the Southwestern States.

Since *Y. pestis* has the potential for use as a BT agent, notification of Public Health as soon as possible is needed for epidemiologic investigation. Use of the Sentinel Laboratory Guideline will facilitate timely reporting and minimize the potential for laboratory acquired infections.

Participants who did not achieve the expected results for this challenge should review their laboratory protocols and QC records. If participants did not perform key tests as outlined in the Sentinel Laboratory Guideline, their protocols should be reviewed for the application of appropriate testing for potential BT agents. If your laboratory desires refresher training on any of the LRN Rule Out Procedures, please contact the Michigan Department of Community Health Bureau of Laboratories Bioterrorism Coordinator, Valerie Reed, via e-mail at ReedV@michigan.gov.

The results of this challenge required notification of the LRN Reference Laboratory. All Michigan participating laboratories who could not rule out a biothreat agent stated they would complete this notification. However, only 86% of Michigan participating laboratories actually did notify their LRN Reference Laboratory. **Remember, Sentinel Labs MUST actually contact their LRN Reference Laboratory when a biothreat agent cannot be ruled out. It is not sufficient to simply state you would make that contact.**

LPX-02

This challenge was a simulated wound specimen from a housing contractor with a slow-healing ankle wound acquired while working on an excavation site in California. This challenge specimen contained *Bacillus megaterium* with *Staphylococcus epidermidis*

added as a contaminant. The intended response for Sentinel Laboratories was either Non-BT Culture, *Bacillus* sp., refer to rule out *Bacillus anthracis*, or Gram-positive bacillus, refer to rule out *Bacillus anthracis*. The intended response was given by virtually all participants, but the responses suggest that some participants may have failed to recognize the *Bacillus* species in the culture. Participants should have recognized the two different colony types.

Though the colony morphology of *Bacillus megaterium* is not typical of *B. anthracis*, isolation of a non-hemolytic *Bacillus* species from a wound could be consistent with cutaneous *Bacillus anthracis* infection, and should be ruled-out by further testing.

All of Michigan labs participating in this survey responded with an acceptable response, however, it is unclear if they did so because they failed to recognize the *Bacillus* species in the culture. Participants who did not recognize the *Bacillus* species in this challenge should review their laboratory protocols for culture examination to ensure that mixed cultures are consistently identified. Participants who did not perform key tests as outlined in the Sentinel Laboratory Guideline, should review their protocols for the application of appropriate testing for potential BT agents. If your laboratory desires refresher training on any of the LRN Rule Out Procedures, please contact the Michigan Department of Community Health Bureau of Laboratories Bioterrorism Coordinator, Valerie Reed, via e-mail at ReedV@michigan.gov.

This challenge should have triggered a communication with the participant's LRN Reference Laboratory if the Sentinel Laboratory could not rule out a biothreat agent. The challenge would not have triggered a communication if the Sentinel Laboratory reported Non-BT Culture.

LPX-03

This challenge was a simulated bronchoalveolar lavage specimen from a weaver who uses native wools from the Mideast on open looms with rapid onset of shortness of breath and mediastinal widening on chest x-ray. This challenge contained *Bacillus anthracis* with a *viridans streptococcus* species added as a contaminant. The intended response for Sentinel Laboratories was either *Bacillus anthracis*, refer for confirmation; *Bacillus* sp., refer to rule out *Bacillus anthracis*; or Gram-positive bacillus, refer to rule out *Bacillus anthracis*. One of the intended responses was reported by a majority of participants; however, nation-wide, 15.5% of participants reported a Non-BT Culture.

Over ninety-seven percent of the Michigan laboratories who participated in this survey responded with an acceptable response. Only one Michigan laboratory failed to confirm a BT agent in this culture.

Participants who did not achieve expected results on this challenge should review their laboratory protocols and QC records. If your laboratory desires refresher training on any of the LRN Rule Out Procedures, please contact the Michigan Department of Community

Health Bureau of Laboratories Bioterrorism Coordinator, Valerie Reed, via e-mail at ReedV@michigan.gov.

The results of this challenge required notification of the LRN Reference Laboratory. 97% of Michigan participating laboratories who could not rule out a biothreat agent stated they would complete this notification. One Michigan laboratory stated they would refer this sample to a commercial reference laboratory to rule out *B. anthracis*. **If Sentinel Laboratories are unable to rule out a biothreat agent, these samples MUST be forwarded to their LRN Reference Laboratory for confirmatory testing.** Also, only 87% of Michigan participating laboratories actually did notify their LRN Reference Laboratory. **Remember, Sentinel Labs MUST actually contact their LRN Reference Laboratory when a biothreat agent cannot be ruled out. It is not sufficient to simply state you would make that contact.**

LPX-04

This challenge specimen contained a pure culture of *Eikenella corrodens*. The intended response was Non-BT Culture.

Eikenella corrodens is a normal flora of the oral cavity, but may cause infections, as in bite wounds and clenched-fist trauma. It is also an important cause of endocarditis.

This isolate should not have triggered a communication with the participant's LRN Reference Laboratory.

LPX-05

This challenge was a simulated wound specimen from Vietnam veteran who develops cellulitis on the left lower leg after revisiting Vietnam, Laos, and Thailand on vacation. This challenge contained *Burkholderia thailandensis* in pure culture. *Burkholderia thailandensis* is a mimic for *Burkholderia pseudomallei* using the appropriate Sentinel level Clinical Microbiology Laboratory Guideline. Differentiation of the two species requires further testing by an LRN Reference Laboratory. The intended response for Sentinel Laboratories was either Suspect *Burkholderia pseudomallei*, refer for confirmation; *Burkholderia* sp., refer to rule out *Burkholderia pseudomallei* or Gram-negative bacillus, refer to rule out *Burkholderia pseudomallei*.

Melioidosis, the disease caused by *B. pseudomallei*, can have an asymptomatic, acute, subacute, or chronic course. Most of those infected have an asypmptomatic course. Those with an acute course typically present with pneumonia, with high fever, shortness of breath, and pleuritic chest pain. The pneumonia can be accompanied by bacteremia, sepsis, genitourinary infection, and encephalitis. The subacute infection can resemble *M. tuberculosis* and a chronic infection is similar to miliary tuberculosis with granulomatous lesions seen in many organs. Immunocompromised persons are at greater risk of a

symptomatic infection. Meliodosis is rare in the United States with most recent reports involving travel to an endemic area.

Participants who did not achieve expected results on this challenge should review their laboratory protocols and QC records. If your laboratory desires refresher training on any of the LRN Rule Out Procedures, please contact the Michigan Department of Community Health Bureau of Laboratories Bioterrorism Coordinator, Valerie Reed, via e-mail at ReedV@michigan.gov.

The results of this challenge required notification of the LRN Reference Laboratory. All Michigan participating laboratories who could not rule out a biothreat agent stated they would complete this notification. However, only 59% of Michigan participating laboratories actually did notify their LRN Reference Laboratory. **Remember, Sentinel Labs MUST actually contact their LRN Reference Laboratory when a biothreat agent cannot be ruled out. It is not sufficient to simply state you would make that contact.**

LPX-06

This challenge was a simulated wound specimen from a rabbit hunter from Arizona with an ulcerated lesion on his right arm and recent fever, chills, and headache. This challenge contained *Francisella tularensis,* the live vaccine strain. The intended response for Sentinel Laboratories was either Suspect *Francisella tularensis*, refer for confirmation; *Francisella* sp., refer to rule out *Francisella tularensis* or Gram-negative bacillus/coccobacillus, refer to rule out *Francisella tularensis*; the intended response for LRN Reference Laboratories was *Francisella tularensis*, confirmed.

This organism is considered a potential biologic weapon since its release as an aerosol in an urban area could result in many cases of respiratory disease, as the infectious dose by inhalation or inoculation can be as low as ten organisms. However, given the slow dividing time of the organism, the disease should progress at a slower rate than would occur with respiratory disease caused by *Yersinia pestis* or *Bacillus anthracis*, and this may lead to delays in its recognition as the causative agent.

Participants who did not achieve expected results on this challenge should review their laboratory protocols and QC records. If your laboratory desires refresher training on any of the LRN Rule Out Procedures, please contact the Michigan Department of Community Health Bureau of Laboratories Bioterrorism Coordinator, Valerie Reed, via e-mail at ReedV@michigan.gov.

The results of this challenge required notification of the LRN Reference Laboratory. All Michigan participating laboratories who could not rule out a biothreat agent stated they would complete this notification. However, only 62% of Michigan participating laboratories actually did notify their LRN Reference Laboratory. **Remember, Sentinel Labs MUST actually contact their LRN Reference Laboratory when a biothreat**

agent cannot be ruled out. It is not sufficient to simply state you would make that contact.

Michigan Notification Drill Cumulative Results

Michigan Notification Results		
Year	Lowest % of MI Labs that Actually Notified the LRN Reference Lab When Notification Required	Highest % of MI Labs that Actually Notified the LRN Reference Lab When Notification Required
2009	41.9%	53.5%
2010	56.8%	72.7%
2011	67.4%	80%
2012	59.4%	87.8%

Sentinel Labs MUST actually contact their LRN Reference Laboratory when a biothreat agent cannot be ruled out. It is not sufficient to simply state you would make that contact.

Participation in Drills and Exercises

Drills and exercises provide an opportunity to determine preparedness and practice response. BT drills can be performed in multiple ways, paper-based table-top exercises, computer simulation, and/or operational drills.

National BT Drill Participation Over the Last Two Years		N = ~1364
	Drill Type	% ∞
	Internal (within your laboratory)	22.1
	Internal (within your institution)	27.9
	External (involving outside agencies)	31.9
	Did not participate in BT drill in past two years	42.3

Michigan BT Drill Participation Over the Last Two Years LPX-A		N = 42
	Drill Type	% ∞
	Internal (within your laboratory)	7.1
	Internal (within your institution)	33.3
	External (involving outside agencies)	26.2
	Did not participate in BT drill in past two years	47.6

Michigan BT Drill Participation Over the Last Two Years LPX-B		N = 40
	Drill Type	% ∞
	Internal (within your laboratory)	22.5
	Internal (within your institution)	30.0
	External (involving outside agencies)	32.5
	Did not participate in BT drill in past two years	37.5

∞ Does not total 100% as some laboratories participated in multiple types of drills.

Our concern still exists for the lack of participation in drills and exercises in Michigan laboratories. If your laboratory wishes to discuss participation in a bioterrorism drill or exercise, please contact the Michigan Department of Community Health Bureau of Laboratories Bioterrorism Coordinator, Valerie Reed, via e-mail at ReedV@michigan.gov.

Thank you for participating in the CAP LPX Exercise. Over time, improvement has been made by participating laboratories in both the testing and notification components of these exercises providing Michigan with improved biothreat agent detection and preparedness status.