Michigan 2008 CAP LPX-B Survey Analysis

Introduction

One purpose of the CAP LPX survey is to provide laboratories with an educational exercise that can be used to help prepare for the detection of pathogens of epidemiologic importance, including pathogens that can be used as biothreat agents. Another purpose of the LPX is to prepare participant laboratories for effective and efficient communication of critical information related to potential BT agents. This report summarizes the results of the Michigan Laboratory Response Network (LRN) Sentinel Laboratories on the 2008 LPX-B survey panel in aggregate and also compares Michigan lab responses to those of 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 performing 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.

Forty four (~40%) of Michigan sentinel labs participated in the 2008 LPX-B survey.

Correct Result Reporting		
Sample Number	Intended Response	% of MI Labs with Intended Response
LPX-06	*Y. pestis*	86.36% (38/44)
LPX-07	*C. diphtheriae*	100% (39/39) *
LPX-08	*S. aureus*	97.73% (43/44) #
LPX-09	*F. tularensis*	93.02% (40/43) ^
LPX-10	*Malbranchea* sp.	92.10% (35/38) ◊

* 5 labs indicated they do not perform *C. diphtheriae* culture
# correctly identified as Non-BT culture
^ 1 lab reported as exception code 11 (unable to analyze)
◊ 6 labs indicated they do not perform fungal culture

Notification Drill		
Sample Number	Notification Required	% MI Labs Who Notified LRN Ref Lab
LPX-06	Yes	86.64% (39/44)
LPX-07	No	45.45% (20/44)∇
LPX-08	No	0% (0/44) ∇
LPX-09	Yes	90.91% (40/44)
LPX-10	No	27.27% (12/44) ∇

∇ Although notification was not necessary in these cases, it is great that sentinel labs are willing and able to communicate with their LRN Reference Lab.

Analysis by Sample

The 2008 LPX-B survey contained the following samples:

LPX-06	*Yersinia pestis*
LPX-07	*Corynebacterium diphtheriae*
LPX-08	*Staphylococcus aureus*
LPX-09	*Francisella tularensis*
LPX-10	*Malbranchea* sp.

LPX-06: *Yersinia pestis*		
Submitted Answers	Michigan Participants	All Participants
§ Gram-negative bacillus, refer to rule out *Yersinia pestis*	20/44 45%	531/1296 41%
§ *Yersinia* sp., refer to rule out *Yersinia pestis*	12/44 27%	292/1296 23%
§ *Yersinia pestis*, refer for confirmation	6/44 14%	312/1296 24%
Non-BT culture	4/44 9%	117/1296 9%
Bacillus sp., refer to rule out *B. anthrasis*	1/44 2%	-
Gram-negative bacillus/coccobacillus, refer to rule out *F. tularensis*	1/44 2%	-

§ Acceptable response

LPX-07: *Corynebacterium diphtheriae*		
Submitted Answers	Michigan Participants	All Participants
§ *Corynebacterium* sp. isolated, refer to rule out *C. diphtheriae*	21/44 48%	394/1295 30%
§ Gram-positive baccilus, aerobic, refer to rule out *C. diphtheriae*	12/44 23%	392/1295 30%
C. diphtheriae cultures not performed in this laboratory	7/44 16%	264/1295 20%
§ *Corynebacterium diphtheriae*	6/44 14%	219/1295 17%
Corynebacterium diphtheriae not isolated	0/44 0%	26/1295 2%

§ Acceptable response

LPX-08: *Staphylococcus aureus*		
Submitted Answers	Michigan Participants	All Participants
§ Non-BT culture	43/44 98%	1281/1291 99%
Testing not performed on site	1/44 2%	-

§ Acceptable response

LPX-09: *Francisella tularensis*		
Submitted Answers	Michigan Participants	All Participants
§ Gram-negative bacillus/coccobacillus, refer to rule out *F. tularensis*	35/44 80%	848/1292 65%
§ *Francisella tularensis*, refer for confirmation	5/44 12%	223/1293 17%
Non-BT culture	1/44 2%	75/1293 6%
Brucella sp., refer for confirmation	1/44 2%	-
Gram-negative coccobacillus, refer to rule out Brucella	1/44 2%	-
No response	1/44 2%	-
§ *Francisella* sp., refer to rule out *Francisella tularensis*	0/44 0%	113/1293 9%

§ Acceptable response

LPX-10: *Malbranchea* sp.		
Submitted Answers	Michigan Participants	All Participants
§ Mold isolated, refer to rule out *Coccidioides immitis*	28/44 64%	785/1289 59%
§ Non-BT culture	6/44 14%	95/1289 7%
Fungal culture not performed	6/44 14%	179/1289 13%
§ Mold isolated, not *C. imitis*	1/44 2%	162/1289 12%
Coccidioides immitis	1/44 2%	35/1289 3%
No response	1/44 2%	-
Brucella sp., refer to rule out *B. anthrasis*	1/44 2%	-

§ Acceptable response

Discussion

LPX-06

This challenge contained *Yersinia pestis*. 38 of the 44 (86%) Michigan laboratories who participated in this survey responded with an acceptable response indicating the possibility of *Y. pestis* being present in this sample. This compares to 88% nationally. Four participating Michigan labs reported this sample as a non-BT culture; 1 lab incorrectly identified the organism as a *Bacillus* sp.; and 1 lab incorrectly identified it as high probability to be *Francisella tularensis*.

Laboratories that did not perform appropriate screening tests, or where testing yielded aberrant results, should review their Sentinel Laboratory Guidelines and procedures to ensure recognition of possible *Yersinis pestis* clinical isolates.

The LRN Sentinel Laboratory Guidelines warn against the use of automated sytems for identification of *Y. pestis*. Nationally in this challenge, *Y. pestis* was reported in only 49% identifications from automated systems. These systems reported "No Identification" in 4% of users and a miss-identification in the remainder.

Only one Michigan participating lab that detected a pathogen that could potentially be used as a biothreat agent did not notify the LRN Regional Laboratory.

LPX-07

This challenge contained *Corynebacterium diphtheriae*. 39/39 (100%) of Michigan labs participating in this survey who perform cultures for *C. diphtheriae* responded with an acceptable response indicating the likelihood of *C. diphtheriae* being present in the sample. This compares to 98% of all participating labs who perform *C. diphtheriae* cultures.

Diphtheria remains a serious health problem in many areas of the world and, with the ease of global travel, poses a challenge for U.S. laboratories where cases are rarely seen. Many U.S. laboratories have lost the ability to recover and recognize this organism in clinical specimens. Long considered a disease diagnosed clinically, the emergence of non-toxigenic strains causing serious infections such as endocarditis and septic arthritis make rapid and accurate microbiologic methods to detect unsuspected cases of increasing importance.

Although contacting the LRN Reference Lab was not required for this sample, 45% of Michigan labs did contact the Reference Lab.

The inclusion of this sample was not intended to challenge the participant's ability to recognize any BT agent, but rather to provide an opportunity to work with a pathogen which, though rarely isolated, continues to be an important public health threat world-wide. Diphtheria is reportable in all states in the U.S.

LPX-08

This challenge contained *Staphylococcus aureus.* 43/44 (98%) of participating Michigan labs correctly reported this as a non-BT culture. One lab indicated this testing was not performed on site and the sample would be referred elsewhere for testing. This compares to 99% of all participating labs who identified this sample as a non-BT culture.

The use of Sentinel Lab Guidelines should quickly and efficiently rule out involvement of a BT agent in the infection presented by this challenge specimen and, for similar clinical isolates, would allow the lab to proceed according to their routine protocols.

When bioterrorism agents have been ruled out, LRN Reference Lab notification is not required. None of the Michigan labs participating in this challenge reported that they would have notified the LRN Reference Lab concerning this sample.

LPX-09

This challenge contained *Francisella tularensis.* 40/43 (91%) of participating Michigan labs responded with an acceptable response indicating the ability to detect a probable *F. tularensis* in the sample. This compares to 91% of all nationally participating labs. One

Michigan laboratory reported this as a non-BT culture; two labs incorrectly identified the organism as a possible Brucella; and one lab did not submit a response to this challenge sample.

Performance on this challenge suggests that opportunities for improvement exist in participant labs in terms of recognition of *Francisella*.

Francisella tularensis is occasionally isolated from clinical specimens in endemic regions in the United States. Identification of this organism in clinical microbiology labs is accomplished via bacterial culture. Identification may be performed using standard algorithms, but most clinical microbiology labs should not attempt to identify the bacterium because of the risk of a laboratory-acquired infection. To avoid potential exposure to lab personnel, antimicrobial susceptibility testing on suspect *F. tularensis* isolates should not be performed in most clinical microbiology labs. Automated identification systems may result in incorrect identification of *F. tularensis* isolates.

Gram stain results and growth characteristics should cause suspicion for *F. tularensis* and trigger communication with the LRN Reference Lab. All Michigan labs that identified the likelihood that the challenge sample contained *F. tularensis* notified the LRN Reference Lab of their findings.

LPX-10

This challenge contained *Malbranchea* sp. 35/38 (92%) of participating Michigan labs correctly identified this challenge as either a non-BT culture or a mold, either not *C. immitis* or referred to rule out *C. immitis*. This compares to 97% of all participating labs. One Michigan lab incorrectly identified the organism contained in this challenge as *C. immitis*; one incorrectly identified it as *Brucella*; and one lab did not submit a response for this challenge sample.

Malbranchea is a hyaline (nondematiaceous/non-melanin producing) *Hymphomycetes* mold with a world-wide distribution. It is frequently isolated from soil or decaying vegetation and is not typically a human pathogen. *Malbranchea* has morphological similarities to *C. immitis*, which may be confusing to the diagnostic microbiology lab. However, *Malbranchea* does not form spherules containing endospores and *C. immitis* can be ruled out using *C. immitis* exoantigen tests or DNA probes.

This sample was not intended to challenge the participant's ability to recognize a BT agent, but rather to provide an opportunity for participants to improve recognition of a pathogen that represents an important public health threat world-wide.

The isolate from this challenge should not have triggered a communication with the LRN Reference Laboratory.