



Surveillance of Laboratory Exposure to Human Pathogens and Toxins – The Canadian experience

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PROTECTING AND EMPOWERING CANADIANS

Background

- Human pathogens and toxins use in laboratories can pose an inherent risk of exposure to those who work in them and broader public health, should they spread to the community.
- The Public Health Agency of Canada established one of the first comprehensive and standardized surveillance systems of laboratory incidents involving human pathogens and toxins at the national level.
- The Laboratory Incident Notification Canada (LINC) surveillance system was launched in December 2015 in r sponse to the requirements established by the 2009 Hu Pathogens and Toxins Act (HPT Act) and phacter is the Developed ons in 2015.

LABORATORY INCIDENT*

An event or occurrence with the **potential of causing** injury, harm, infection, intoxication, disease, or damage,

*Source: Canadian Biosafety Standard (2nd Ed. March 2015)

What incidents are reportable under the HPTA/R?

Exposure	 Exposure Suspected or confirmed laboratory- acquired infection or intoxication (LAI) 	Inhalation Ingestion Inoculation Absorption
Non- Exposure	 Inadvertent possession or production Inadvertent release Missing or stolen SSBA not received within 24hrs of expected arrival 	

- LAI = Laboratory-acquired infection
- HPTA = Human Pathogens and Toxins Act
- HPTR = Human Pathogens and Toxins Regulations
- SSBA = Security sensitive biological agent

Notifications received (Dec 1, 2015 to Sep 31, 2018)



Trends in notifications (Dec 1, 2015 to Sep 31, 2018)



Date of occurence of the incident

*For 8 incidents, the incident date was unknown so the notification date was used as proxy

Root causes analysis

- Causes of exposure incidents
 - Sharps-related incidents (n=45; 30%)
 - Procedure breaches (n=42; 28%)
 - Inadvertent possession (n=37; 25%)
- Area for improvements
 - Standard operating procedures (n=103; 73%)
 - Human interaction (n=55; 36%)



What do we do with this?

- Biosafety advisories, notifications and
- Inform and update biosafety standard
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RAPID COMMUNICATION Misidentification of Risk Group 3/Security

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Abstract

Background: Matrix-Assisted Laser Desorption/Ionization-Time of Flight Mass Spectrometry (MALDI-TOF MS) is a technology increasingly used in diagnostic identification of minrovenumisme. Unserver anarotatal avidance sugnastic that this technology is associated with (MALDLTOF MS) is a technology increasingly used in diagnostic identification of microorganisms. However, anecdotal evidence suggests that this technology is associated with misidentification of Risk Group 3 (RG3)/Security Sensitive Biological Agents (SSBA) resulting in

Sensitive Biological Agents by MALDI-TOF MS in

Canada: November 2015-October 2017

Objective: To investigate and characterize incidents related to the use of MALDI-TOF MS in Canada between November 6, 2015, and October 10, 2017.

Methods: Cases were identified from laboratory incident reports in the national Laboratory Methods: Cases were identified from laboratory incident reports in the national Laboratory Incident Notification Canada (LINC) surveillance system. Eligible cases referred directly to MALDI-TOP MS or one of three RG3/SSBA organisms, Brucolla species, Francisella tularensis and Burkholderia pseudomaile: A questionnaire was developed to identify potential risk factors burget and survey of the second second

and burkholdena pseudomaile: A questionnaire was developed to identify potential risk factors leading to the exposure. Reporters from organizations with selected incidents were interviewed using the questionnaire. Data were entered into an Excel spreadsheet and andred descriptive statistical analysis readomend to state compare characteristics and identify mashing its fattors. using the question many. Using were ensured into an excer spreadomet, and standard description statistical analysis performed to assess common characteristics and identify possible risk factors. Results: There were eight eligible incidents and a total of 39 laboratory workers were exposed to RG3/SSBA organisms. In five (out of eight) of the incidents, the reporters indicated that their device was anytimuad with both eliminal and research reference libraries. Eve air incidents where to reservate organisms in two (out or eight) of the incidents, the reporters indicated that their device was equipped with both clinical and research reference libraries. For six incidents where device was equipped with both cinical and research reterence libraries. For six incidents whe reporters knew the type of library used, only the cinical library was employed at the time of

the incident even though both libraries were available in five of these incidents. In all eight the incident even though both lonanes were available in two of these incidents. In all eight cases, the exposure occurred during the sample preparation stage with analyses performed on an open bench and directly from the specimen. And in all eight cases, patient specimens were an open denied without information proparation protected size.

Conclusion: This first national study characterizing the nature and extent of laboratory incidents concession: this true rational study characterizing the nature and extent or laboratory incider involving RG2/SBA that are related to the use of MALDI-TOF MS identifies risk factors and

Suggested citation: Pomerleau-Normandin D, Heisz M, Su M. Misidentification of Risk Group 3/ Security Sensitive Biological Agents by MALDI-TOF MS in Canada: November 2015-October 2017. Can Commun Dis Rep 2018;44(5):100-15. https://doi.org/10.14745/ccdr.v44i5a04

Key words: MALDI-TOF MS, misdiagnosis, Risk Group 3 organisms, SSBAs

Introduction

The Matrix-Assisted Laser Desorption/Ionization-Time of Flight The Matrix-Assisted Laser Desorption Ionization-Time or regin Mass Spectrometry (MALDI-TOF MS) technology has been described as " a revolution in clinical microbial identification" (1) described as a revolution in clinical microsial identification (1). Identification of microorganisms in cell cultures can take up to 18 hours to complete, with MALDI-TOF this takes approximately 15 minutes (2). This new technology is increasingly used for routine microbe identification in both clinical and reference laboratories due to its simplicity, rapidity and high throughput capacity (3).

This technology enables early diagnosis; the cost of the analysis MALDI-TOF mass spectrometry generates a characteristic spectrum, called a peptide mass fingerprint, formed as a result of the presence of up to 2,000 proteins found in a unique pattern in each organism (3). The MALDI-TOF MS software subsequently compares this nation of proteins to an internal reference library compares this pattern of proteins to an internal reference library compares this partners or proteins to an antenna remember to the that contains the spectra of known organisms. Because each

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Conclusion

- Data collected serves to **inform evidence-based** decision-making regarding biosafety and biosecurity.
- Baseline estimates are still being established but eventually, we will be able to **detect trends** and potential **patterns of concern** near real time
- LINC continue to identify risk factors and recurrent challenges in laboratory settings and contribute to building excellence in investigation and response to laboratory incidents by sharing expertise and lessons learned among the laboratory community.
- As stakeholders become more accustomed to reporting, the accuracy and timeliness of reporting will increase. This ultimately will benefit the culture of biosafety as well as public health in Canada.



Thank you! Any questions?



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PUBLIC HEALTH AGENCY OF CANADA >

Notifications and exposures reported by sector (Dec 1, 2015 to Sep 31, 2018)



- Other Government
- Public Health
- Private Industry/Business
- Academic
- Hospital

* Number of active licences as of September 31, 2018