The IRIDA genomic epidemiology ontology

Standards to improve infectious disease outbreak detection and investigation

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Infectious disease outbreak investigations using microbial genomic data are currently hampered by delays incurred when manually integrating essential laboratory and epidemiological data from heterogeneous sources. An ontology-based approach, combined with semantic web technology, will enable robust data integration and more efficient analysis within IRIDA.

METHODS

1. INTERVIEWS WITH KEY PERSONNEL

1.1. EPIDEMIOLOGISTS

- Study design
- Case management
- GIS

1.2. MEDICAL PERSONNEL

- Clinical
- Laboratory
- Test centric

1.3. COMPUTER SCIENTISTS

- Data synthesis
- Global tools
- Internal tools

2. COMPETENCY QUESTIONS

- Are we above the baseline? In time? In geography?
- Has this pathogen increased/decreased/no change over X period of time?
- Are we above the baseline?
- What are the exposures reported? Has a common exposure (e.g., event, restaurant) been reported by other stakeholders?

3. REVIEW EXISTING RESOURCES

3.1. LITERATURE

- Basic
- Advanced

3.2. GUIDELINES

- Infection control
- Clinical

3.3. AVAILABLE TOOLS

- Clinical
- Laboratory
- Test centric

4. KEY ONTOLOGICAL GAPS TO ADDRESS

- Type
- Method
- Scope
- Software

CONCLUSION

By adhering to the best practices of the Open Biomedical and Biological Ontology (OBO) Consortium, our model allows consolidation of various existing ontological efforts into a resource directly compatible with IRIDA. Our modular development approach also ensures that it will be extendable, supporting more comprehensive coverage in the future, e.g., in the domain of food categories.

This research is a key component of the IRIDA platform to allow data integration and processing in a more automated fashion, alleviating the burden of manual analyses. Standardized reporting should also facilitate automated epidemiology and more efficient outbreak detection and mitigation, triggering action for example after auto-detecting deviations above expected biosurveillance baselines.

TAKE HOME

- #1. Genomic epidemiology can help detect infectious disease outbreak earlier
- #2. Integrated Rapid Infectious Disease Analysis platform is being deployed in Canada, supported by a set of ontologies and standards
- #3. IRIDA capitalises on existing resources to make genomic epidemiology a practical reality

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