Enhancing the Informatics Response to the Epidemic of Zika Virus Infection (Zika) in Puerto Rico

Using CRDM to Build Laboratory Test Ordering and Reporting Capacity for Timely Diagnosis

Juneka Rembert, MPH
(1) The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

No relationships to disclose
Background
PROTECT YOUR FAMILY AND COMMUNITY

HOW ZIKA SPREADS

Most people get Zika from a mosquito bite

1. A mosquito bites a person infected with Zika virus.
2. The mosquito becomes infected.
3. The infected mosquito bites a person and infects them with Zika.
4. Other mosquitoes bite that person and become infected.
5. More members of the community become infected when they are bitten by those infected mosquitoes.

Other ways people get Zika

During pregnancy
A pregnant woman can pass Zika virus to her fetus during pregnancy. Zika infection during pregnancy can cause serious birth defects and is associated with other pregnancy problems.

Through sex
Zika virus can be passed through sex from a person who has Zika to his or her sex partners.

Through blood transfusion
Zika virus may be spread through blood transfusion.

Accessible Version:
Objectives of the Informatics Response Project

- Understand the process for Zika surveillance, testing, data collection and storage
- Document PRDH’s current and future state business processes: collection, assessment and sharing of Zika virus information
- Document functional requirements for a PRDH Arbovirus laboratory management information system (LIMS)
- Development of system to meet the requirements
Methods
Approach

Needs Assessment
- Onsite assessment to better understand stakeholder challenges and determine opportunities for improvement.

Business Process and Requirements Discovery
- PRDH and PHII face-to-face CRDM workshop (includes business process analysis, business process redesign, and requirements gathering).

Vendor Analysis
- PHII vendor research and evaluation to determine vendor compatibility based on stakeholder prioritized requirements.

Solution Implementation
- PHII support for vendor contract execution, PRDH and PHII face-to-face implementation readiness review.

Project Report
- Report summarizing how the project impacted Zika response efforts in Puerto Rico.
Formative Evaluation

- What are the functions and business processes for Zika testing and lab results reporting?
  - What are the tasks?
  - What are the processes?
  - Who is responsible for Zika testing?
  - How is information shared?
  - How often is information shared?
  - Who has access to the data?

- What is the informatics capability?
  - Repair existing system?
  - Build a new system?
Formative Evaluation

- Assessment:
  - Needs assessment questionnaire sent to PRDH Information technology team (n=5)
  - PHII traveled to Puerto Rico to meet with representatives from PRDH; the Receiving Laboratory; Biological and Chemical Emergencies Laboratory, and CDC Dengue Branch Laboratory.
  - Qualitative interviews with staff
Evaluation of Business Processes

- Business process:
  - Entity, Transaction, Goal, Objective, Business rule
  - Trigger, Task Set, Input
  - Output and Outcome

- Business process analysis:
  - Collaborative Requirements Development Methodology (CRDM)™
  - Define processes, create task flows, refine processes, and develop requirements for public health information systems
Collaborative Requirements Development Methodology (CRDM™)

**Business Process Analysis**

**Think**

*How do we do our work now?*
- Define goals and objective
- Model context of work
- Describe tasks and workflow
- Identify common task sets

**Rethink**

*How should we do our work?*
- Examine tasks and workflow
- Identify inefficiencies
- Identify efficiencies with repeatable processes
- Refine business processes and business rules
- Remodel context of work
- Restructure tasks and workflow

**Describe**

*How can information systems support our work?*
- Define specific tasks to be performed for optimized business processes
- Describe the implementation of business rules
- Describe in words and graphics how an information system must be structured
- Determine scope of next phase of activities
Process and System Analysis

- Requirements of the Information System:
  - Information from the CRDM workshop and business process analysis was used to map business processes in matrices and diagrams
  - PHII facilitates the process with PRDH to prioritize functional requirements
  - Collaborative decisions on what the system will look like
Results
Figure 4. Web Portal Business Processes

1. Arbovirus Laboratory Test Ordering

2. PRDH Processes Laboratory Test Order

3. PRDH Receives Laboratory Test Results

4. PRDH Distributes Laboratory Test Results

5. Provider Retrieves Laboratory Test Results

6. Provider Information Management
Results:

- **Assessment:**
  - Highly complex
  - Cumbersome process
  - Numerous entities
  - Multiple data exchanges
  - Multiple information handlers
  - Paper-based and did not maximize the use of existing technology
  - Manual and resource-dependent process
Results: Business Process Analysis

- Business Process Analysis:
  - PRDH staff manually reviewed each order for accuracy and completeness.
  - Recording of laboratory results often involved manual data entry.
  - The mailing of laboratory results involved substantial manual effort.
  - Laboratory results were not routinely synced with the PRDH laboratory information management system known as StarLIMS.
Results: Data Analysis

- Internet web portal:
  - PRDH host a web portal to manage and store Zika tests (and other arbovirus)
  - Providers should have access to the portal, submit laboratory test orders, and view test results for their patients.

- Requirements:
  - General system requirements (platform)
  - Ordering laboratory tests; retrieving laboratory test results; managing provider information
  - Processing laboratory test orders; and performing laboratory testing
Results: Building Capacity

- Increased technical development competencies for PRDH IT staff:
  - Conducted HL7 training to PRDH staff in Spanish.
  - Conducted SQL training to PRDH staff in Spanish.
  - Developed the front-end of the PRDH arbovirus web portal.
Conclusion
Conclusion

- Creation of a web portal housed by PRDH datacenter
- Electronic submission of laboratory reports to PRDH
- Automated process for hospitals to order laboratory test
- Secure electronic process for sending laboratory test results to providers
- Provider management portal
Conclusion

- Functions of the PRDH web portal:
  - User Role-Based Access: Limit screens/information access per permissions
  - Unique Viewing Privileges,
  - Provider Search Functionality
  - Robust UI/UX: Multiple Languages/Dashboards
  - Provider Management
  - National Provider Identifier (NPI) Lookup Component
  - Laboratory Order Acceptance, Laboratory Order Results View
  - Email Verification
  - Laboratory Test Orders Management
  - Announcements Management
Conclusion

- Project Outcomes:
  - Increased understanding of the process for PRDH laboratory testing, data collection, and storage business processes
  - Improved timeliness of Zika test ordering and laboratory results reporting using new technology
  - Enhanced efficiency in secure data and information sharing
  - Increased capacity within PRDH in software programming skills for development of laboratory management information system
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THANK YOU!

For more information:

Juneka Rembert, MPH
Senior Business Analyst
Public Health Informatics Institute (PHII)
jrembert@phii.org