How an Immunization Information System Can Improve Acute Disease Investigations and Surveillance

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Introduction

- State Health Online Tracking System (SHOTS)
- Florida’s immunization information system (IIS)
- Established in 2002
- Receives immunization data from health care providers across the state
- Applies algorithms for immunization forecasting
- Participation is voluntary, except for all 67 Florida county health departments (CHDs)
- As of February 2015, supporting 5,600 organizations with 14,500 active public and private sites
Introduction

• Merlin
  • Florida’s reportable disease surveillance system
  • Established in 2001
  • Collects reportable disease case data statewide for epidemiological investigations and disease control (111 different disease codes)
    • Includes data for vaccine-preventable diseases (VPDs)
  • Used by all 67 Florida CHDs
Previous infrastructure: Systems are not interoperable, so time-consuming duplicate work and inefficiencies in locating patients occur.
Introduction

Redesigned infrastructure: Build interoperability to provide more efficient workflows and reduce duplicate work.
Methods

• Meetings between the Merlin and SHOTS project teams were held to develop the project timeline and a phased implementation schedule.

• Timeline:

  - May 2014: Merlin and SHOTS teams initial meeting; decide on 3 phased approach
  - June 2014: Resolution of legal concerns, and SHOTS interoperability enhancement released
  - July 2014: Merlin team planning begins
  - Summer 2015: Phase 2 release
  - January 2015: Phase 1 release
  - Fall 2015: Phase 3 release
Methods

• Phased approach

  • Phase 1: Merlin enrolled in SHOTS like a provider, (display) using the same HL7 specifications document. Merlin receives and displays information from SHOTS.

  • Phase 2: (update) Merlin receives and reads demographic, contact, and vaccination information from SHOTS and updates records in Merlin.

  • Phase 3: (return) Merlin sends demographic, contact, and vaccination information to SHOTS, and SHOTS updates records.
Methods

• Merlin users surveyed before Phase 1 planning and after Phase 1 implementation
• Additional user feedback gathered after Phase 1 training sessions
• Analysis of web service transaction records since Phase 1 implementation
  • Compared the transaction records and the number of VPD cases
Results

• Before Phase 1 planning survey:
  • 88% of responding Merlin users reported also having a SHOTS account.
  • 59% of those with a SHOTS account reported accessing it at least once per week.
• Merlin user feedback:
  • “Would love to have vaccine info available via Merlin.”
  • “I think it will be great.”
  • “It would be amazing to have both systems talking to each other! All vaccine preventable diseases we follow up on require we at least confirm if the patient/suspect is in the FL SHOTS system.”
  • “Not having to get out of Merlin and log into FL SHOTS would be a time saver.”
Results

Phase 1: SHOTS Data Viewing Window in Merlin
Results

Phase 1: SHOTS Data Viewing Window in Merlin

Exact Match
Results

Phase 1: SHOTS Data Viewing Window in Merlin

Multiple Matches
Results

Phase 1: SHOTS Data Viewing Window in Merlin
Multiple Matches
Results

Phase 1: SHOTS Data Viewing Window in Merlin
Multiple Matches
Results

Phase 1: SHOTS Data Viewing Window in Merlin

Division of Disease Control and Health Protection

To protect, promote and improve the health of all people in Florida through integrated state, county, and community efforts.
Results

• After Phase 1 implementation survey:
  • All Merlin users who had used the viewing window said it was useful.
  • Merlin user feedback:
    • “Glad to have this feature!”
    • “I think it is a wonderful addition to Merlin!”
    • “This will be a great resource for all vaccine preventable diseases. I wish all providers (PCP's) would take advantage of using Florida SHOTS.”

• Merlin user feedback after training sessions:
  • Users want information on religious and medical exemptions.
  • Users want to be able to update SHOTS records.
Results
Web Service Transactions, Week 2 to Week 10, 2015

Number of Transactions vs. Weeks

- 2015-02
- 2015-03
- 2015-04
- 2015-05
- 2015-06
- 2015-07
- 2015-08
- 2015-09
- 2015-10

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Results

VPD Persons Under Investigation, Week 2 to Week 10, 2015
Results
Three-Year Average of Cases for Select VPDs
by Month of Occurrence

Phase 1 launched
Results

• Epidemiologists need to interpret the immunization data in the context of when a case became ill.
  • For example, there were 6 measles cases last year.
    • At the time of illness onset:
      • How many cases were fully vaccinated?
      • How many cases received only one dose of vaccine?
      • How many cases were unvaccinated?
Results

**Current information retrieved from Florida SHOTS.**

### Vaccine History

<table>
<thead>
<tr>
<th>Vaccination Type</th>
<th>Date Given</th>
<th>Injection Route</th>
<th>Manufacturer</th>
<th>Lot Number</th>
<th>Dose Number</th>
<th>Dose Validity</th>
<th>Reason Code</th>
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<td>DTAP</td>
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<td>Other manufacturer</td>
<td>C4186AA</td>
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<td>4</td>
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</tbody>
</table>

### Profile / Case Information

- **Name:** AB, RA
- **Address:**
- **SSN:**
- **Age at Event:**
- **Date of Birth:** 01/21/2011
- **FL Disease Code:** Pertussis - 03390
- **Event Date:** 06/13/2011
- **Case #:** 478529
- **Case Status:** REPORTED TO CDC
- **Ext. Status:** Accepted
- **DX Status:** Confirmed

### Vaccination History

14. Has the case ever received any doses of diphtheria, tetanus and/or pertussis-containing vaccines?  
   - Yes
   - No
   - Unknown

If case was not vaccinated, what was the reason?  
- UNDER AGE FOR VACCINE

**Challenge:** For a case, need to know vaccination status at the time of illness onset
Next Steps

Phase 2: Updating Merlin with SHOTS information

• Provide epidemiologists with ability to update Merlin demographic and contact information with SHOTS data

• Algorithm to compare vaccine types and dates vaccines administered to onset date of VPD case
  • Will look at SHOTS vaccines, as well as vaccines manually entered and temporarily stored in Merlin
  • Store calculated information at the time of the case’s illness onset
Next Steps

Phase 3: Sending Merlin information to SHOTS

• “How can epidemiologists improve the IIS?”
  • By updating and adding records
    • Immediate Merlin user feedback: Consistently finding better information during investigations than is available in the registry
  • Legal barriers for consideration
    • Sharing data while maintaining confidentiality of patients with a reportable disease
Next Steps
Phase 3: Sending Merlin information to SHOTS
- Vaccines sent to SHOTS from Merlin will initially be viewed as unverified ("unattached").

Vaccines in SHOTS from unattached sources have blank Provider/Person
Next Steps

Phase 3: Sending Merlin information to SHOTS

• Once SHOTS can evaluate and accommodate Merlin as a new type of data source, epidemiologists will be able to directly enter and update vaccines in SHOTS from within Merlin.
Conclusions

• Building interoperability between an IIS and a reportable disease surveillance system will benefit users of both systems.

• New system functionality leads to improved user satisfaction.

• Phase 1:
  • Epidemiologists have better access to quality data.
    • Linkage was already in place for:
      • Enhanced measles response.
      • Higher morbidity months of pertussis and varicella.
Conclusions

Next Steps:

- **Phase 2:**
  - Save time by reducing duplicate data entry
  - More efficient workflow
  - Improved decision support for epidemiologists

- **Phase 3:**
  - Update IIS through an additional data source, providing more complete contact and demographic information as well as immunization history information
  - Update existing IIS profiles
  - Add people not previously in IIS
Acknowledgements

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