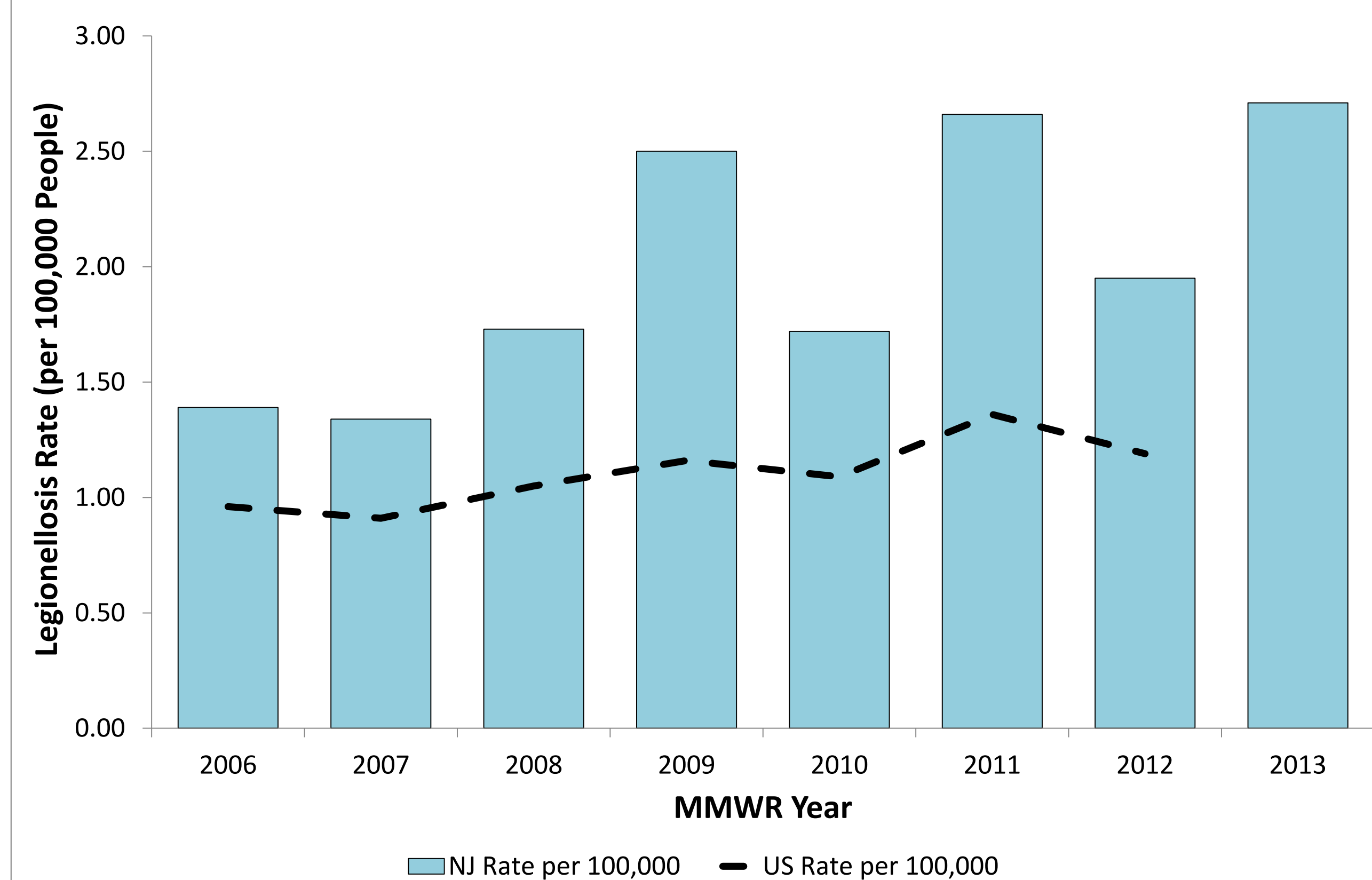


## BACKGROUND

- Since 2003, New Jersey (NJ) state regulation (N.J.A.C. 8:57-1.5) requires healthcare providers, administrators, and laboratories report confirmed cases of legionellosis within 24 hours of diagnosis to their local health department.
- Legionellosis includes both Legionnaire's Disease (LD) and Pontiac Fever, however a vast majority of legionellosis cases in NJ are LD.
- Since 2006, after case definition was changed, NJ rate of reported legionellosis nearly doubled from 1.39 cases per 100,000 people in 2006 to 2.71 in 2013 (Figure 1).
- The number of confirmed cases for NJ ranged from 116-241 per year during this time period.
- For entire date range, NJ legionellosis rates have been considerably higher than the national rate, as reported by the Centers for Disease Control and Prevention (CDC). The NJ rate is 45-115% greater than US rate from year to year.<sup>1</sup>

Figure 1: Annual Rate of Legionellosis in New Jersey, 2006-2013



## OBJECTIVES AND METHODS

### OBJECTIVES

- Determine if the NJ legionellosis surveillance system is currently meeting the larger goals of a surveillance system as outlined by the CDC surveillance system evaluation guidance<sup>2</sup> due to geographic distribution of disease and higher than average rates of legionellosis in New Jersey.
- Describe NJ legionellosis surveillance system and evaluate all nine surveillance system attributes, with focus on data quality and timeliness.

### METHODS

- Used "Updated Guidelines for Evaluating Public Health Surveillance Systems" as evaluation guidance.<sup>2</sup>
- Analyzed qualitative data from New Jersey's electronic reportable disease system, Communicable Diseases Reporting and Surveillance System (CDRSS).

## RESULTS

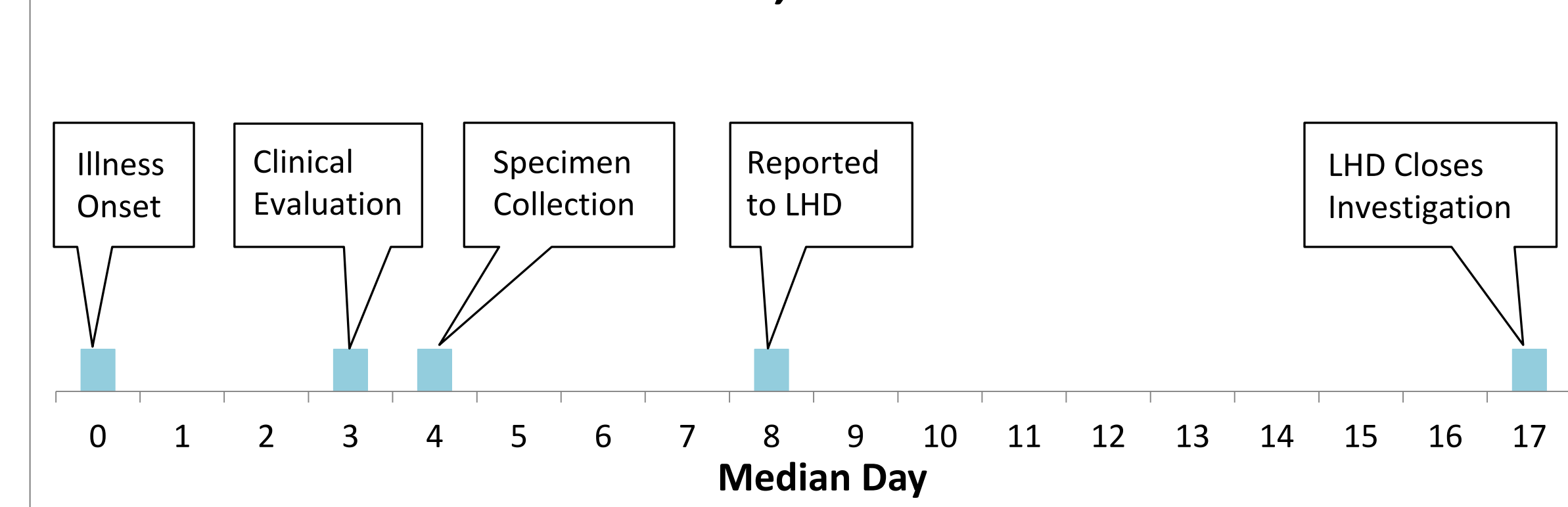
### Description of System

- New Jersey has 21 counties and 95 local health departments.
- Legionellosis cases are reported directly to local health departments (LHDs) and investigated under authority of the health officer.
- Investigations are conducted by communicable disease investigators, comprised mostly of public health nurses and registered environmental health specialists.
- The New Jersey Department of Health (NJDOH) provides subject matter expertise and reviews cases before closing out and transmitting to CDC.

### System Attribute: Timeliness

- Investigations of cases are fairly timely (Figure 2).
- The delay in reporting to the LHD is the lagging step of investigation process. This occurs a median of four days after initial diagnosis and specimen collection (usually urine).
- Not pictured in Figure 2 is transmission to CDC, which occurs each Tuesday for all confirmed cases at that time.

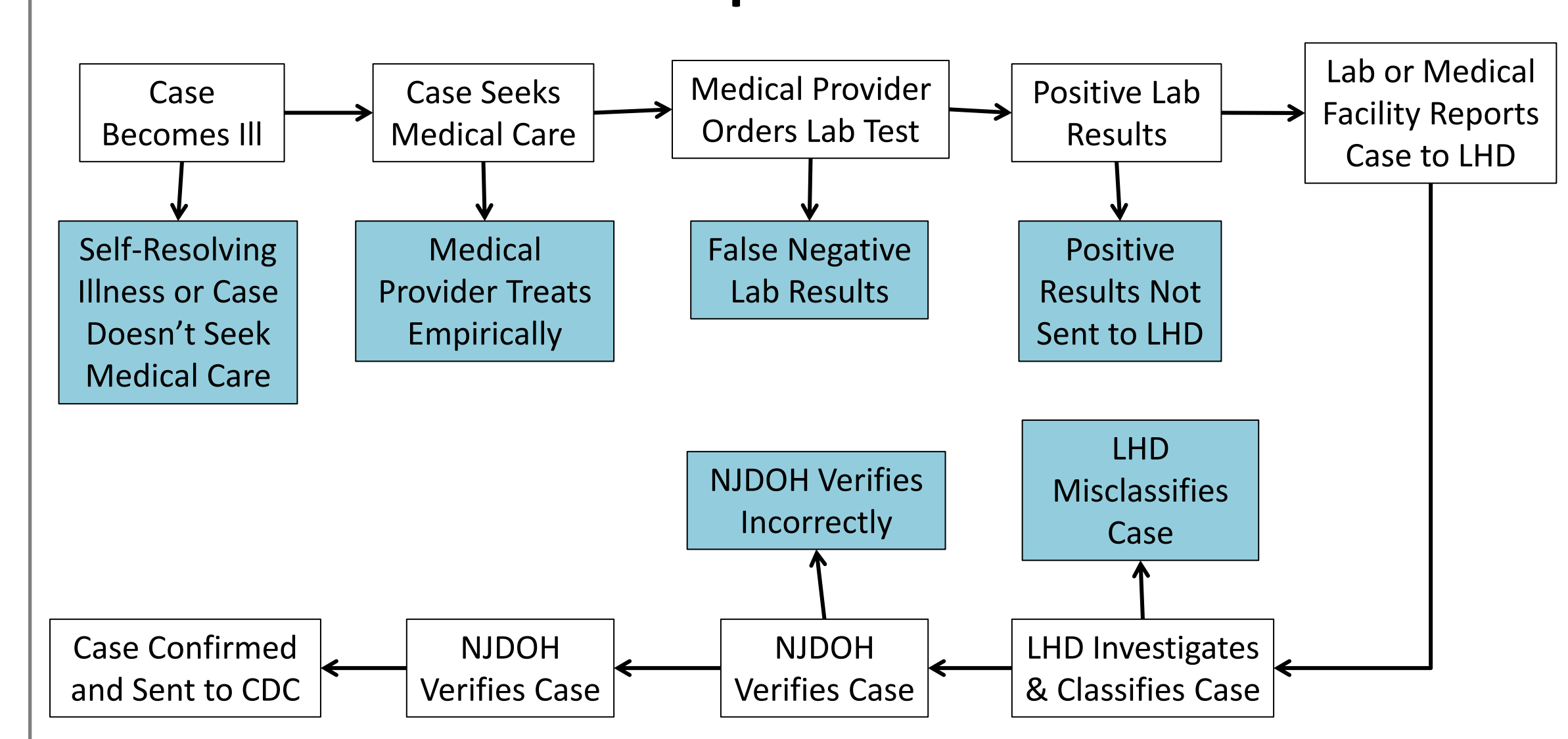
Figure 2: Legionellosis Case Investigation Timeline, 2006-2013



### System Attribute: Simplicity, Stability, and Acceptability

- These attributes were only descriptively assessed due to prior analysis already completed for the CDRSS system overall.
  - Simplicity=good (after brief training or prior experience with public health surveillance system)
  - Stability=great (few server outages, great connection with LHDs, healthcare facilities, and laboratories, and reliable data management/storage)
  - Acceptability=moderate (overall participation high, completeness/timeliness of case form often lacking)

Figure 3: Depiction of Potential Legionellosis Case Dispositions



### System Attribute: Data Quality

- 1,404 legionellosis cases in NJ from 2006-2013 were analyzed for completeness of several demographic/case and sign/symptom variables (Table 1).
- Race and admission to ICU were the variables least likely to be completed. The LD clinical definition requisite signs and symptoms most frequently missing include myalgia, chills, and cough.

Table 1: Missing Data for Legionellosis Case Variables, 2006-2013

Variable	# Missing	% Missing
Gender	0	0
Date of Birth	0	0
Race	314	22.4
Illness Onset	18	1.3
Died	75	5.3
Admitted to ICU	604	43.0
Signs and Symptoms		
Fever	73	5.2
Chills	946	67.4
Pneumonia	95	6.8
Cough	946	31.8
Myalgia	1267	90.2

### System Attribute: Flexibility

- The ability for the legionellosis surveillance system to change is largely limited.
  - For example, changing symptom variables to adapt for definition change is allowable, but adding new variables such as "healthcare association" cannot occur without major software re-design.
- Interaction with outbreak database is very limited.

### System Attribute: Representativeness

- Unable to quantify due to the limited scope of demographic information collected in CDRSS and lack of an alternate data source in which to compare CDRSS data.

### System Attribute: Predictive Value Positive

- Likely very high due to both specificity of diagnostic tests and case review by NJDOH.
  - Urine antigen test very specific for *Legionella pneumophila* serogroup one<sup>3</sup>, and this test used in 96% of reported NJ cases.
  - Before case is confirmed, it is reviewed at state level.

### System Attribute: Sensitivity

- Unable to quantify since true disease frequency unknown, but likely low due to many factors that would lead to underreporting (Figure 3).
- Legionellosis cases in NJ have many opportunities to be missed by surveillance system.

## DISCUSSION

### SYSTEM STRENGTHS

- Great at guiding immediate action for cases and measuring incidence and trends of legionellosis.
- Simplicity, stability, and predictive value positive of system are very satisfactory.
- Certain variables within CDRSS, most demographic information, collected frequently and at sufficient level.
- Public health steps of investigation and data updates are timely.

### SYSTEM LIMITATIONS

- System not currently used to plan public health programs to prevent and control legionellosis, or to prioritize the allocation of health resources, due to data limitations.
- There is room for improvement in sensitivity, acceptability, and flexibility of legionellosis system.
- Certain variables (namely race and symptoms) should be more frequently collected in legionellosis investigations.
- Reporting step of investigation is not timely.
- There is no way to differentiate cases of LD vs. Pontic Fever.
- There are restricted means of signifying outbreak investigations and healthcare associated cases within system.

## RECOMMENDATIONS

- Standardized training and case investigation protocols for LHDs, including case data entry guidelines, should be utilized for better data quality.
- Increase in electronic reporting, along with education of clinicians and laboratories, should cut down on reporting delays.
- Sensitivity of the system should be improved with education of Pontiac Fever and alternative diagnostic testing (sputum culture in addition to urine antigen test).
- The flexibility and acceptability of legionellosis surveillance system is currently being addressed by upcoming overall re-design of CDRSS; addition of outbreak features and capacity to change variables within diseases is planned.
- Also being added is the ability to differentiate between cases of LD and Pontiac Fever.

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