Respiratory Syncytial Virus (RSV) Surveillance: A New Initiative for NM

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Objectives

1. Describe basic virology, symptoms, clinical course, epidemiology, and burden of RSV
2. Describe the history and current state of RSV vaccine development
3. Understand the importance of vaccinations in reducing the spread of RSV
4. Understand the potential benefits of participating in NM-specific RSV surveillance initiatives

RSV: Basic Overview

Respiratory Syncytial Virus

- Enveloped RNA virus (family *Paramyxoviridae*)
  - Two subgroups: A & B
    - Circulate concurrently
    - Clinical significance not determined, but some strains may be more virulent
- Humans only source of infection
  - Direct/close contact with secretions, via droplet, or via fomites
  - Persists on surfaces for several hours, hands for ~ 30 minutes
- Incubation period: 2-8 days (4-6 most common)

Colored transmission electron micrograph of respiratory syncytial virus particles, courtesy Science Photo Library

Symptoms

Symptoms of RSV infection are similar to other respiratory infections, such as flu, and include[1]:

- Runny nose
- Decrease in appetite
- Coughing
- Fever
- Sneezing
- Breathing difficulties
- Wheezing

In young infants symptoms may also include[1]:

- Irritability
- Decreased activity

Sometimes the only symptom of infection is breathing difficulties[1]

References

1. Centers for Disease Control and Prevention. Respiratory syncytial virus infection (RSV): Symptoms and Care. [Online]. Available at: http://www.cdc.gov/rsv/about/symptoms.html Last accessed October 2015.

janssen

Consequences

- Most common cause of bronchiolitis and pneumonia in children <1 year old
- Sequelae:
  - Upper respiratory tract infections
  - Otitis media
  - Bronchiolitis
  - Pneumonia
  - Exacerbated asthma
- When first exposed:
  - 25-40 out of 100 will have signs/symptoms of bronchiolitis or pneumonia
  - 5-20 out of 1,000 require hospitalization (most younger than 6 months)
  - Weakened immune system after recovery

Populations at Risk

- Infants
  - Prematurity
  - Male sex
  - Crowding
  - Daycare exposure
  - Children younger than 2 years old with chronic lung disease or heart problems
- Adults 65 years and older
- Immunocompromised patients

Burden of RSV

- In the US each year:
  - 57,527 hospitalizations among children younger than 5 years
  - 2.1 million outpatient visits among children younger than 5 years
  - 177,000 hospitalizations and 14,000 deaths among adults older than 65 years
- Underreporting almost certain
- Incurs great cost
  - 2-12% of admitted cases require intensive care unit admission

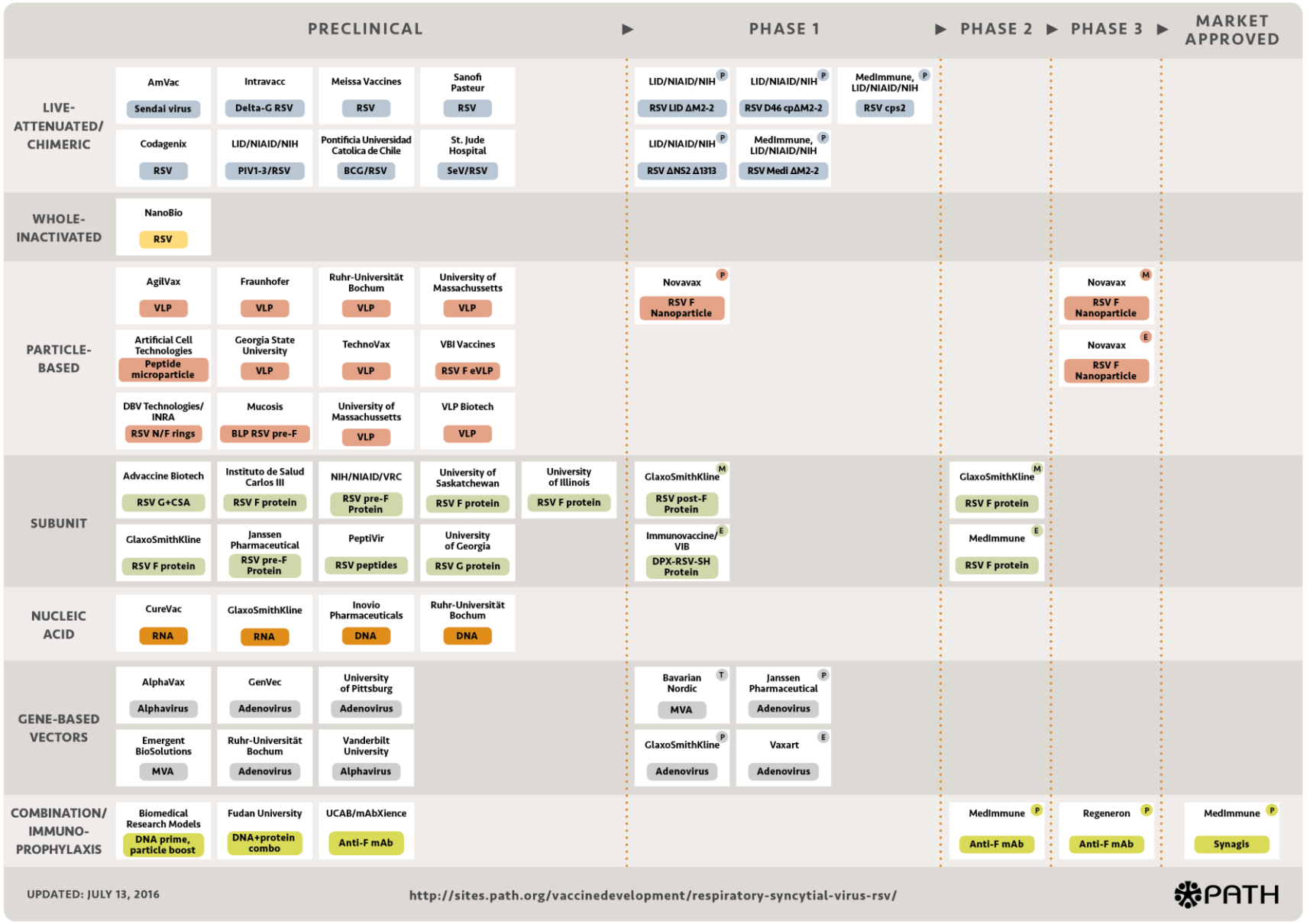
Vaccine History & Development

Previous RSV Vaccine Trials

- Merck and NIH developed an inactivated vaccine – 4-site clinical trials in winter of 1965-66
  - "Lot 100"
- Not only failed to protect, but more severe disease after wild-type infection
  - 16x fold increase in hospitalizations among vaccinated infants
  - 2 infant deaths
- Researchers and developers historically hesitant to work on RSV

RSV Vaccine and mAb Snapshot

TARGET INDICATION: (P) = PEDIATRIC (M) = MATERNAL (E) = ELDERLY (T) = TBD



UPDATED: JULY 13, 2016

http://sites.path.org/vaccinedevelopment/respiratory-syncytial-virus-rsv/

PATH

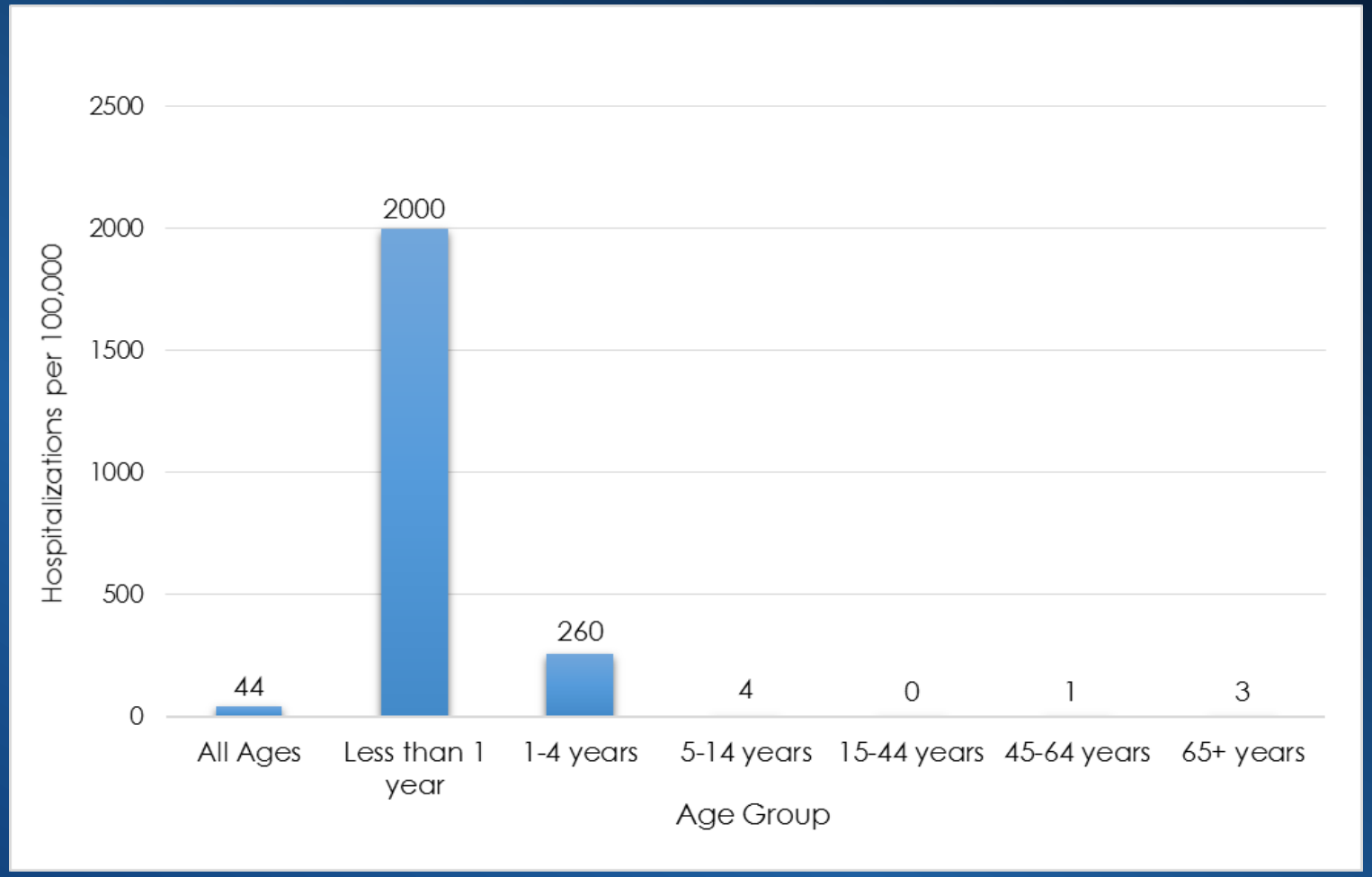
Although Obstacles Seem Formidable…

RSV vaccine would prevent:

- 23,069 hospitalizations annually
- 66 deaths annually per vaccinated birth cohort
- Direct medical costs (excluding vaccine): $236 million annually
- Income and productivity losses: $134 million

RSV Surveillance Initiative in NM

Hospital Discharge Rates per 100,000 (1999-2014)

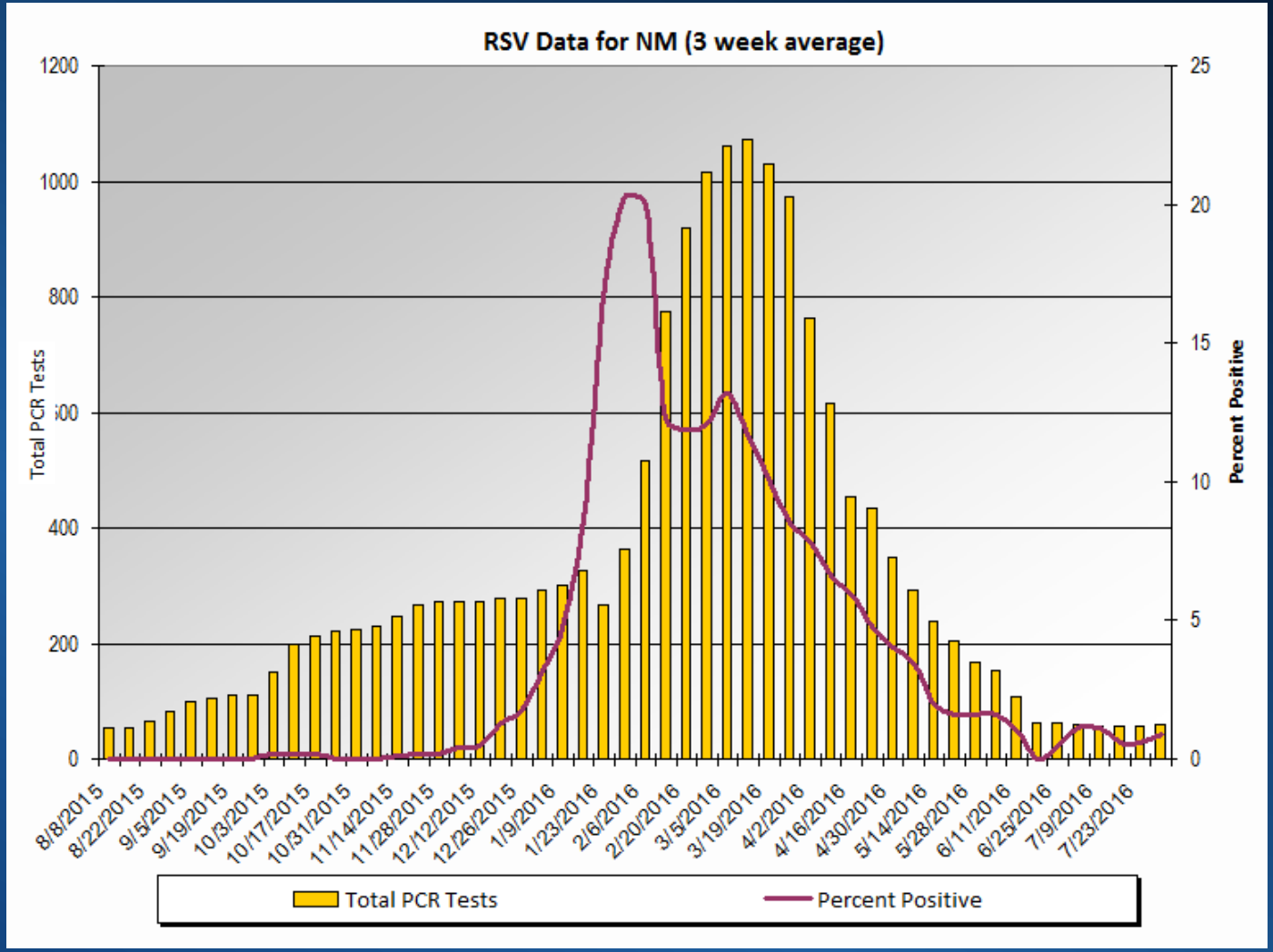


Source: NMDOH IBIS

Bed Shortages

- According to Bureau of Health Emergency Management (BHEM), bed shortages have been a historical problem in NM
- Pediatric RSV patients have overwhelmed facilities
- Led to creation of BHEM's electronic system for tracking bed shortages, and working with other states (AZ, CO, TX) to manage overflow

Burden of RSV in New Mexico – PCR Tests



Courtesy of: National Center for Immunization and Respiratory Diseases, Division of Viral Diseases

Unanswered Questions

- Currently:
  - Clinical characteristics of RSV in NM?
  - Specific populations at risk in New Mexico?
  - Cost/burden on healthcare system?
- When vaccines are introduced:
  - How do trends change?
  - Establishing baseline helps differentiate adverse events

Photo courtesy of Shutterstock

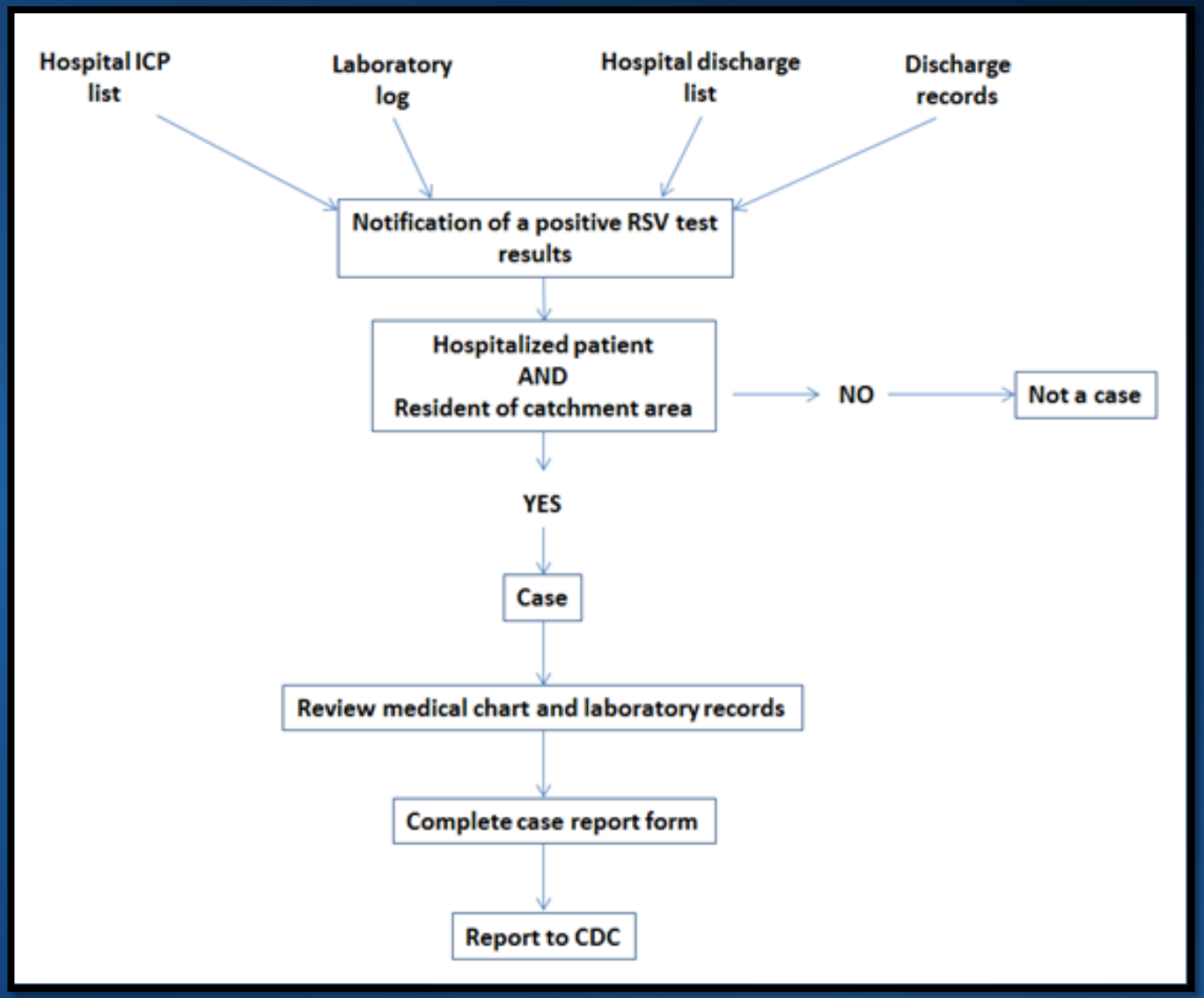
Objectives for Surveillance

- Describe age-specific rates for RSV infection among target populations during respiratory season (October 1st – April 30th)
- Describe RSV testing frequency by hospital and/or surveillance site to correct for under-detection
- Describe characteristics of individuals with lab-confirmed RSV
- Describe rates of severe RSV-associated complications
- Assess risk factors for RSV-associated complications
- Disseminate information to clinicians regarding RSV season

Case Definition

- A resident of a pre-identified geographic area
  - Bernalillo, Santa Fe, San Juan, Grant, Chaves, Dona, Luna
- Admitted from October 1-April 30 to a hospital where FluSurv catchment residents receive care
- Positive RSV test 7 days prior or 3 days after hospital admission
- Evidence of a positive RSV test by at least one of the following methods:
  - Viral culture
  - Immunofluorescence antibody staining (Direct [DFA] or indirect [IFA])
  - Molecular assay (e.g., Biofire, RT-PCR)
  - A commercially available rapid diagnostic test

Population-Based Surveillance Project



RSV Pilot Surveillance Protocol, version 1.0

Benefits of Participation

- Ability to assess burden of RSV in NM and nationally
- Answer how vaccine affects burden of disease
- Obtain better information around RSV season in NM
- Opportunity for leadership
- RSV surveillance will mimic that of FluSurv-NET

How to Participate

- In order to participate in this study, will most likely require IRB approval
- Any questions, concerns, etc. can be addressed to either:
  - Sarah Shrum, EIP Surveillance Officer
    505-827-2305
    Sarah.Shrum@state.nm.us

  Or
  - Marisa Bargsten, FluSurv-NET Principal Investigator
    505-827-0082
    Marisa.Bargsten@state.nm.us

Thank You!

- Thanks to all NMEIP partners for their cooperation and assistance