

Under-recognized Respiratory Disease Outbreaks: When to Look for Zebras Instead of Horses

Nicki Britten, MPH
Berrien County Health Department

Susan Peters, DVM
MDCH Division of Communicable Disease

Outline

- Examples of outbreaks due to “Zebras”
 - Unusual organism
 - Unusual timing
 - Unusual population/setting
- MI local health department experience



Respiratory Outbreak “Horses”

- Viral
 - Influenza
 - RSV
 - Rhinovirus
 - Parainfluenza
 - Adenovirus
- Bacterial
 - Strep pneumoniae
 - Pertussis
 - Legionella

Respiratory “Zebras” to Consider

- Viral
 - Coronavirus
 - Human metapneumovirus
 - Enteroviruses
 - Echoviruses
- Bacterial
 - Mycoplasma pneumoniae
 - Chlamydia pneumoniae
- The “unknown” pathogen

Keys to PH Investigation

- Population
 - Age range
 - Rise in individual cases vs. contained facility
 - Residents vs. staff
- Disease characteristics
 - Symptoms and severity
 - Incubation period
 - Length of outbreak
- Current activity/surveillance
- Lab testing
- Vaccination status
- Infection control/treatment



Unusual Organism: Coronavirus - WI

- October-December 2008 in a LTC facility
- Acute onset of sore throat, fever, chills, fatigue, myalgia, nasal drainage
- Residents and staff affected
 - Attack rates of 31% and 40%
 - Staff had longer duration of illness and more symptoms
 - 3 deaths in residents
- Why not flu?
 - Rapid tests on residents and staff negative
 - Low flu activity in that part of the state
 - Confirmatory testing was negative for flu
- Lab testing
 - Human Coronavirus OC-43+ at WI state lab and CDC

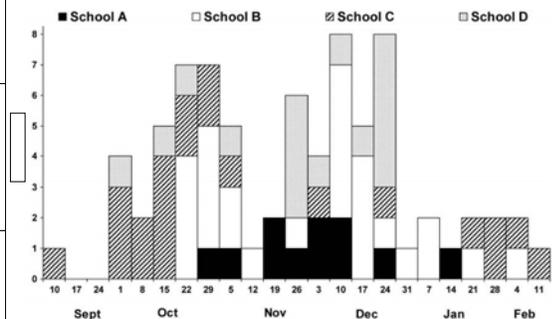
Unusual Organism: Mycoplasma – RI

- November-December 2006
- Pediatrician saw 3 children w/ encephalitis in 2 wks
- Attended 2 schools, which had high student rates of pneumonia
- 2 separate nearby schools also had high rates of pneumonia
- Pneumonia incidence 3.4-6.6x higher than expected
- Why not flu?
 - Very high rate of pneumonia
 - Flu activity low at the time
 - Further in the investigation, testing for flu –
- Lab testing: 10+ for M. pneumoniae via PCR at CDC

Unusual Organism: Mycoplasma – RI

- During 22 week outbreak, among student cases:
 - 76 cases pneumonia
 - 3 cases neurologic disease
 - Most cases presented with tracheobronchitis
- 42% of students w/ pneumonia had 2° transmission to household members
- Control measures implemented at schools in early January
- 1200 doses of antibiotics distributed by one school
- 3 school districts closed for 2 days

Number of cases of pneumonia among students at schools A–D in Rhode Island, by week of symptom onset, from September 1 2006 through 9 February 2007.



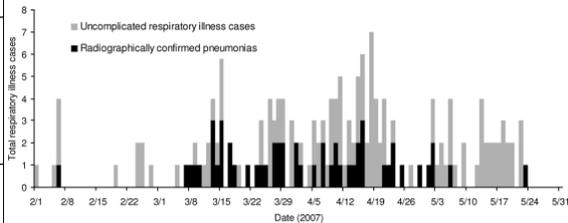
3 peaks separated by 4-6 weeks

Walter N D et al. J Infect Dis. 2008;198:1365-1374

Unusual Timing: Mycoplasma – Navy ship

- February-May 2007
- 179 respiratory disease cases, 50 w/ pneumonia
- Respiratory illness attack rate of 17%
- 5.4 pneumonia cases per week
- Why not flu?
 - Epi curve inconsistent with influenza
 - High rate of pneumonia
 - Negative lab testing
- 24+ for M. pneumoniae via PCR at naval lab
- M. pneumoniae outbreaks tend to occur in fall

Unusual Timing: Mycoplasma – Navy ship



Note multiple, staggered peaks (incubation 1-4 weeks)

Sliman JA et al. Outbreak of acute respiratory disease caused by Mycoplasma pneumoniae on board a deployed U.S. navy ship. J Clin Microbiol. 2009 Dec;47(12):4121-3. Epub 2009 Oct 21.

Unusual Population: RSV - MI

- April-May 2011 in a LTC facility
- Nasal discharge, cough, few possible pneumonias
- Quick symptom resolution
- 23% attack rate in residents; no ill staff
- Why not flu?
 - Negligible flu activity at that time
 - Lack of fevers
 - Most residents vaccinated
 - Confirmatory testing was negative for flu
- Lab testing: 2/2 positive for RSV via PCR at MDCH
- RSV activity was declining but higher than flu

Zebras in Berrien County



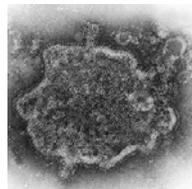
The Local Health Department Experience

Human Metapneumovirus

- Paramyxoviridae
 - SS negative sense RNA, enveloped virus
 - Two major groups, 4 subgroups
- Identified 2001
- Symptoms
 - Cough, congestion, fever, sore throat, SOB, vomiting
- No routine testing or surveillance

Human Metapneumovirus

- Information sources limited
- Incubation
 - 3-9 days (?)
- Length of illness
 - At least 7 days
- Epidemiology
 - Common worldwide
 - Young children



Facility Information

- Resident Population: 81
- Staff: 120
- Three units
- Long- and short-term care
- History of problems with infection control procedures

Monday 2/22/2010

- Initial report from facility
 - Illnesses began 2/19
 - 13 residents, 3 staff ill
 - 14 C, 2 N units
 - Respiratory Sx
- Suspicious of 2009 H1N1 influenza
- 3 Rapid influenza tests, all negative
 - Tamiflu started in 4 residents

Monday 2/22

- Recommendations given:
 - 3 NP swabs sent for full resp. panel
 - Keep residents in rooms
 - Reduce visitors
 - Exclude ill employees
 - Keep employees in one unit only, no floaters
 - Droplet precautions for symptomatic residents

Case Definition

Any individual with acute onset of illness with respiratory symptoms (cough, congestion, sore throat) who has had contact with the facility within the week prior to illness

Tuesday 2/23

- 22 total reported ill
 - 16 C, 6 N units
- Begin receiving more detailed clinical information
 - Cough, congestion, fever, pneumonia
 - No response to Tamiflu
- Infection control challenges
 - Administration not overly concerned
 - Excluding ill employees

Wednesday 2/24

- Full respiratory panels negative
- Residents quarantined, few visitors, most staff restricted to just one unit
- Director of Nursing becomes ill
- BCHD obtains 5 samples for MDCH-BOL
 - 3 nasal
 - 2 nasopharyngeal

Thursday 2/25

- Specimens arrive at BOL
 - Negative for H1N1
- More residents becoming ill; seems to have slowed in employees
 - Now in S unit
- All ill residents are still symptomatic
- DON hospitalized
- Droplet precautions for whole facility recommended

Friday 2/26

- Deliver masks to facility (x2)
- Transmission continues
- Positive result for Human Metapneumovirus (2/5 specimens)
 - Different nurses
 - Nasal vs NP swabs
 - Request additional samples

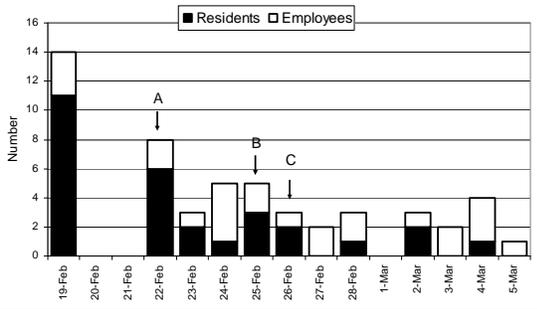
Monday 3/1

- MDCH-BOL obtains 3 additional specimens
 - 5/7 positive for hMPV
- Symptoms beginning to resolve
- Transmission continues
- Infection control measures remain in place
- Off-unit employees becoming ill (i.e. Lobby, Kitchen, etc.)

Waning Transmission 3/1-3/5

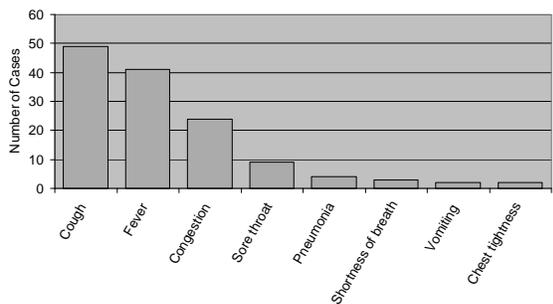
- Last case had onset on 3/5
- Quarantine lifted unit by unit over following week
- Total ill: 53
 - 32 Residents (39.5%)
 - 21 Staff (17.5%)

EpiCurve: Onset of Illness (N=53)



A: Initial notification to public health authorities and recommendation of initial infection control measures
 B: Recommendation of facility-wide droplet precautions
 C: Laboratory confirmation of first HMPV-positive specimen

Frequency of Reported Symptoms (N=53)



Age and Duration of Illness

Age of cases

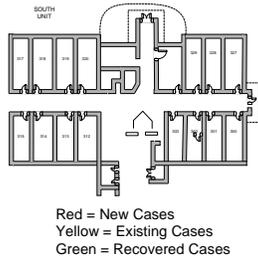
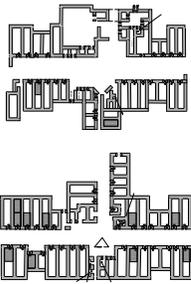
	Age (years)		
	Mean	Median	Range
Residents	83	85	46-95
Staff	38	36	18-59

Duration of illness

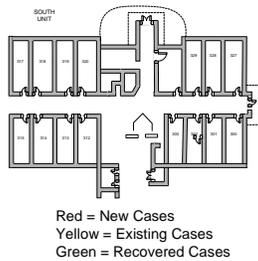
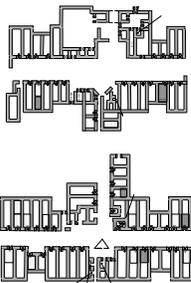
	Duration of Illness (days)		
	Mean	Median	Range
Residents	13.4	13	3-24
Staff	N/A	N/A	N/A

75% female

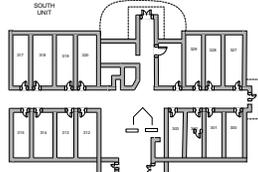
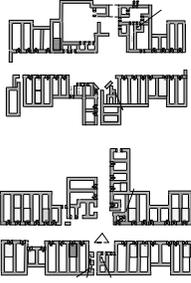
February 19-21



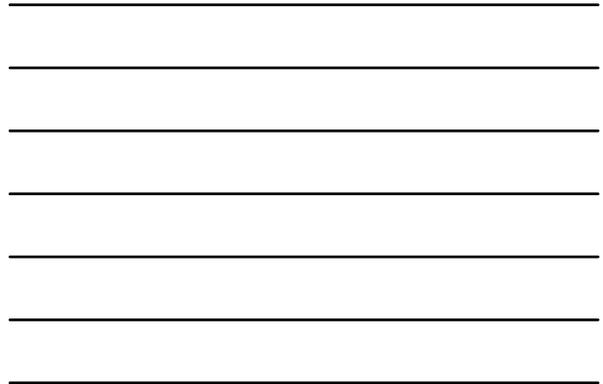
February 22



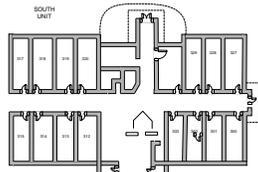
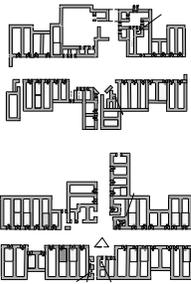
February 23



Red = New Cases
 Yellow = Existing Cases
 Green = Recovered Cases

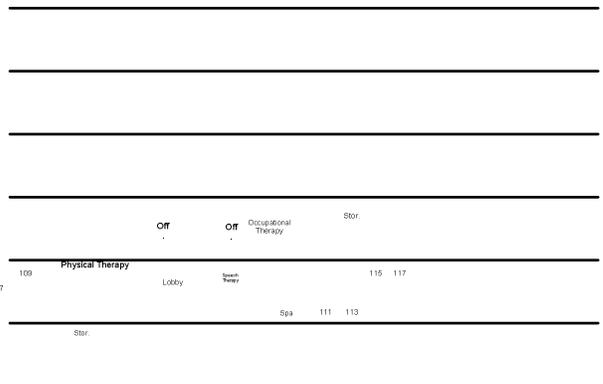
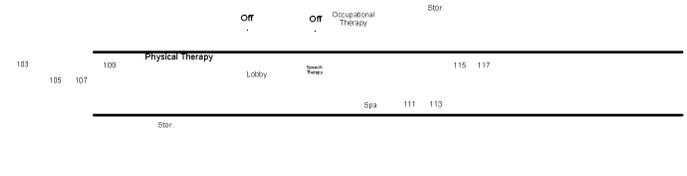


February 24

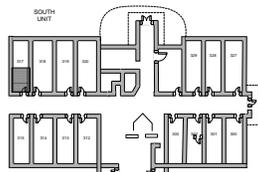
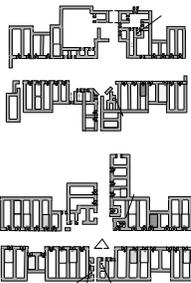


Red = New Cases
 Yellow = Existing Cases
 Green = Recovered Cases

NORTH
 UNIT

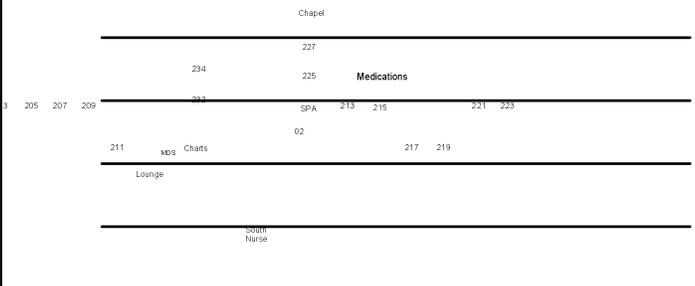


February 25

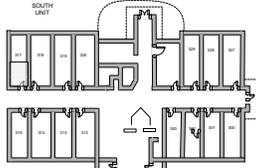
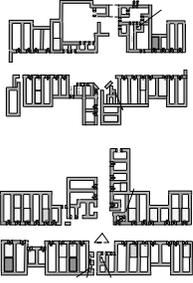


Red = New Cases
 Yellow = Existing Cases
 Green = Recovered Cases

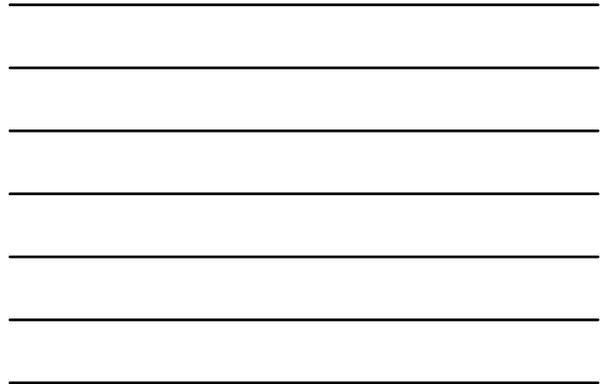
CENTRAL
 UNIT



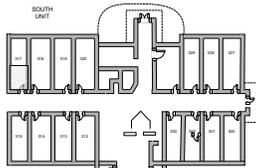
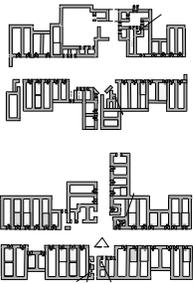
February 26



Red = New Cases
 Yellow = Existing Cases
 Green = Recovered Cases

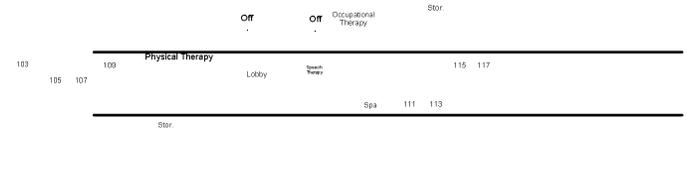


February 27

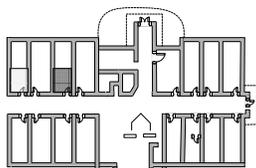
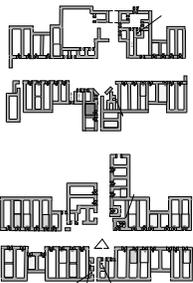


Red = New Cases
 Yellow = Existing Cases
 Green = Recovered Cases

NORTH
UNIT

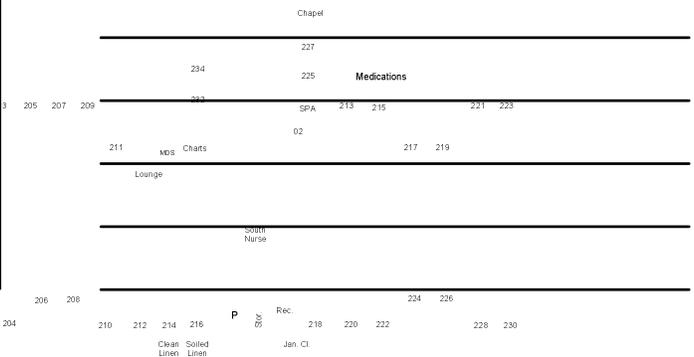


February 28

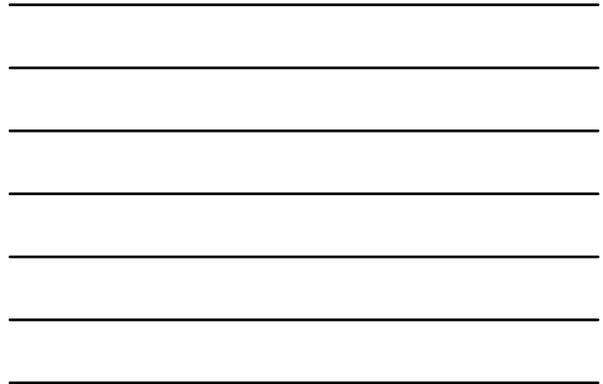
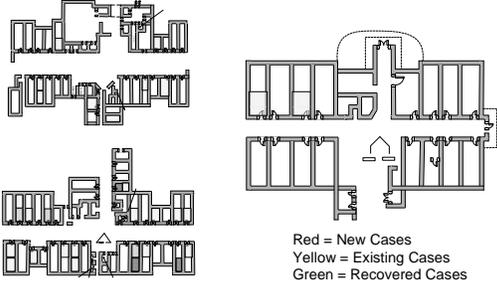


Red = New Cases
 Yellow = Existing Cases
 Green = Recovered Cases

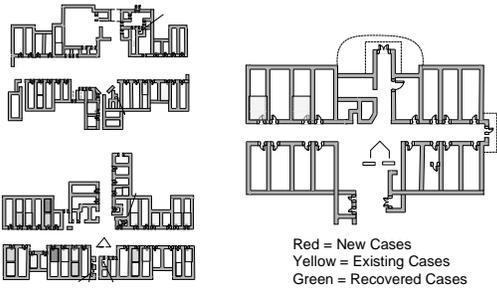
CENTRAL
UNIT



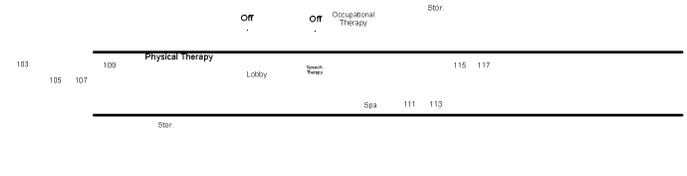
March 1



March 2

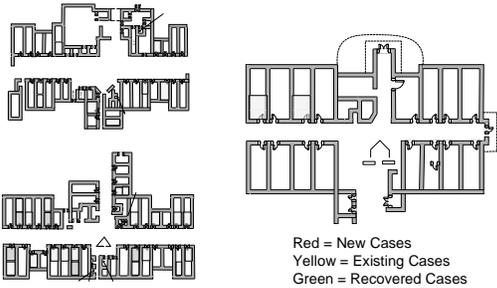


NORTH
UNIT

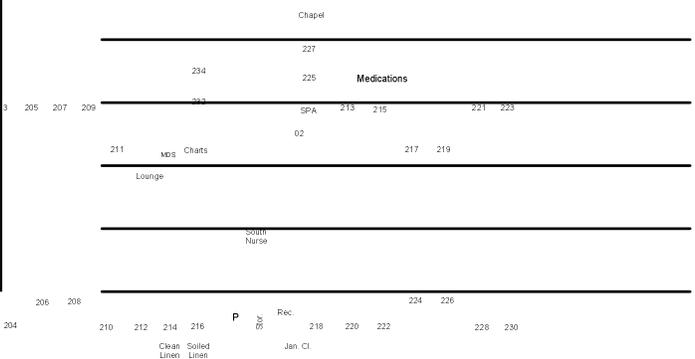


SOUTH
UNIT

March 3



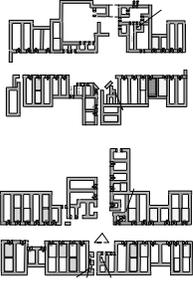
CENTRAL
UNIT



317 318 319

315 314 313

March 4



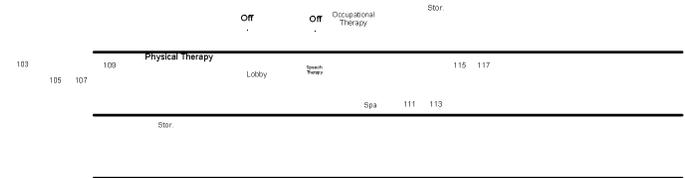
Red = New Cases
 Yellow = Existing Cases
 Green = Recovered Cases

Discussion

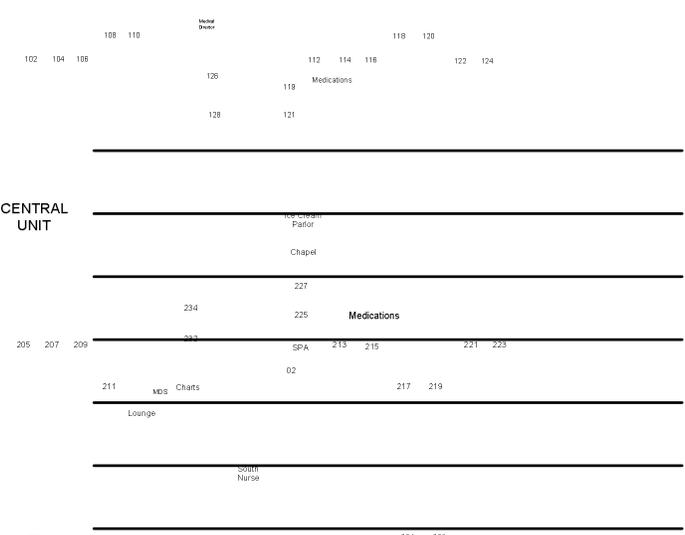
- ❑ Keep the zebras in mind!
- ❑ Lack of infection control measures contributed to spread
- ❑ Nasal vs. nasopharyngeal specimens
- ❑ Work with local lab to preserve samples during an outbreak
- ❑ Regional communications crucial



NORTH
UNIT



SOUTH
UNIT



202 204

210 212 214 216
 Clean Linen Soiled Linen
 218 220 222
 Jan. Cl.