

Pertussis – A Big A\$\$ Cluster

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During 2004, a thirty-three-fold increase in pertussis (whooping cough) incidence in Southeastern Wisconsin triggered the activation of the unified command of the public health consortium involving the fourteen local public health agencies in Milwaukee and Waukesha counties. This outbreak represented the second time in as many years that unified command was convened by the consortium. This case study focuses on the policy development and assurance challenges associated with coordinating the outbreak response within the public health consortium and in conjunction with the State Division of Public Health.

INTRODUCTION

In 2002, two counties formed a consortium to meet the public health preparedness grant objectives. The consortium, the MW County Consortium for Emergency Public Health Preparedness, consisted of the 13 local public health agencies in M County (2000 Census population: 940,164) and the county health agency in W County (2000 Census population: 360,767). The 14 member agencies signed a memorandum of understanding (MOU) agreeing to work collaboratively, and had a mutual aid agreement (MAA) in which they agreed to share staff and resources if an emergency affected other agencies. The consortium's main purpose was to address issues surrounding public health preparedness within the two county area and to strengthen relationships for responding to all public health emergencies.

In June 2003, unified command was established to coordinate the monkeypox outbreak response in seven member agencies. This dual use capacity was employed again in August 2004 when member agencies unanimously voted to initiate unified command for the coordination of the burgeoning pertussis epidemic. The purpose of the unified command was to coordinate the pertussis epidemiological investigations on a regional level, to share and develop guidelines, and to share knowledge.

It is important to note that Wisconsin is a home rule state. Under Wisconsin State Statute, Chapter 66.0101, "Home rule, manner of exercise", governing authority and powers reside with the local municipalities. In other words, the local governmental units make the decisions. This is further supported by Wisconsin emergency management statute, Chapter 166.03(5a): "Unless otherwise specified by law, the role of any state agency... is to assist local units of government and local law enforcement agencies in responding to the emergency."

BACKGROUND

Pertussis (whooping cough) was endemic in Wisconsin for years, especially in the more populated southeastern region. Historically, pertussis accounted for approximately 170 cases annually in the state and caused small, isolated clusters in different regions. Prior to 2004, M and W counties (contiguously located within the southeastern region) averaged 34 and 15 pertussis cases per year, respectively. Though M and W counties were not affected, the state experienced a regional outbreak of pertussis cases in the northeastern portion in 2003; over 700 cases of pertussis were reported during this year, with the majority of cases related to the increased incidence in the northeastern region.

Pertussis is an acute respiratory disease caused by the bacterium, *Bordetella pertussis*. Pertussis often begins insidiously with cold-like symptoms, including runny nose, possible low-grade fever and a mild, irritating cough that gradually becomes paroxysmal, usually within 1-2 weeks. The paroxysms are distinguished by a violent, explosive coughing that may interrupt breathing, eating and sleeping; vomiting may follow paroxysms. As they struggle to inhale air, patients may make a loud “whooping” sound characteristic of pertussis; infants and vaccinated individuals, however, may not have the typical whoop or cough paroxysm, making diagnosis difficult.^{1,2}

Spread through direct contact with respiratory droplets, pertussis is most contagious in the early stages of illness prior to developing paroxysms (generally the first two weeks). Communicability gradually wanes and becomes negligible in about three weeks, although the contagious period can be reduced to five days following effective antibiotic treatment. Persons with pertussis should be isolated from school, work or similar activities until they have completed at least five days of an appropriate antibiotic therapy. Appropriate antibiotics include a 5-day course of azithromycin, a 7-day course of clarithromycin, or a 14-day course of erythromycin or trimethoprim/sulfamethoxazole. Prophylaxis with an appropriate antibiotic is also recommended for close contacts (especially household contacts) of a case, to prevent or reduce illness severity.

Pertussis is confirmed using polymerase chain reaction (PCR) or by laboratory culture of a nasal-pharyngeal swab specimen obtained during the early stages of illness. PCR has recently replaced culture as the test of choice for pertussis laboratory diagnosis because of its increased sensitivity, and the State Laboratory of Hygiene began using PCR for pertussis diagnosis in fall 2002.

Vaccination with the diphtheria, tetanus and acellular pertussis vaccine (DTaP) is recommended for all persons under age seven who haven't completed the five-dose vaccination series; the vaccine is not recommended for those over seven years because vaccine reactions are more frequent. Despite vaccination, the effectiveness of the vaccine is estimated to be only 80 percent in children receiving at least three doses. Additionally, recent research has shown that immunity begins to wane five to ten years following the last dose.

CHRONOLOGY

The start of 2004 brought increased pertussis rates in many areas of the state, including both M and W counties. Pertussis cases were reported to local health agencies at a steady rate throughout the first quarter of the year, with many local public health agencies reaching their average annual number of cases within the first few months of the year. Initially, public health practitioners believed the increased incidence was due in part to the 2003 outbreak in the northeastern portion of the state.

January/February 2004

M County cases: 9 in January; 8 in February (17 cumulative total for year)

W County cases: 4 in January; 6 in February (10 cumulative total for year)

- State Health Officials within the Division of Public Health (DPH) sent 2003 provisional data on pertussis cases to local public health agencies stating, "... it appears that pertussis morbidity is beginning to subside..."

March/April 2004

M County cases: 8 in March; 12 in April (37 cumulative total for year)

W County cases: 4 in March; 10 in April (24 cumulative total for year)

- Pertussis cases continued to increase and local public health agencies realized they were in the midst of a situation.
- Clinical presentation was atypical from the "classic" pertussis symptoms, hampering accurate diagnosis. Most cases presented with prolonged minimal cough, with or without paroxysm or "whoop."
- The majority of cases occurred in adolescents and young adults who were fully immunized.
- New cases required challenging cross-jurisdictional case management.

May 2004

M County cases: 48 (85 cumulative total for year)

W County cases: 21 (45 cumulative total for year)

- Local Health Officers requested weekly or more frequent updates from DPH on pertussis activity in all regions and guidance on pertussis case management.
- Questions arose as to whether DPH was monitoring incidence rates.
- One local health agency instituted incident command (IC), to more effectively manage the pertussis epidemiological follow-up.
- Other agencies informally changed their usual way of doing business, including reprioritization of daily functions and increased staff education, briefing, and updates.
- Regional DPH personnel visited local health agencies to educate staff on pertussis.

- DPH sent a letter to local health agencies on “significant increase in incidence of pertussis,” reiterating standard protocols as identified in DPH epidemiology manual.

June 2004

M County cases: 57 (142 cumulative total for year)

W County cases: 58 (103 cumulative total for year)

- In absence of DPH guidelines, local public health agencies devised protocols to define and prioritize epidemiological follow-up.
- DPH distributed 1999 CDC pertussis manual with updated state treatment guidelines.
- DPH began posting positive laboratory results on the Health Alert Network (HAN) secure internet site after confidentiality concerns had been resolved.
- Local public health agencies questioned reliability and validity of polymerase chain reaction (PCR) laboratory test.
- Summer camp cases arose and frequently crossed jurisdictions. DPH sent 250 letters to camps with pertussis notification.
- DPH sent letters to physicians on case definition, testing, and treatment.
- An Antibiotic Resistant Network ongoing media campaign educated providers regarding appropriate antibiotic use. “Clinicians have worked hard to change their prescribing habits and to educate patients about the futility of antibiotics in the treatment of acute cough illnesses. The increased use of antibiotics caused by the pertussis outbreak is frustrating for clinicians who desire to both avoid antibiotic use for viral illness, and yet appropriately respond to a genuine public health need.” This contradicted public health protocols for pertussis prophylaxis, confusing providers about proper treatment guidelines and thereby increasing the difficulty of local public health agencies to assure appropriate prevention and control.
- Local public health agencies needed to convey unified case management policies (case definition, close contact definition, testing, treatment, and isolation) to health care providers serving clients in multiple jurisdictions.

July 2004

M County cases: 69 (211 cumulative total for year)

W County cases: 87 (190 cumulative total for year)

- A second local public health agency instituted IC.
- PCR results displayed with regularity on the HAN.
- DPH offered training on nasopharyngeal (NP) swabs to test for pertussis.
- DPH assisted in obtaining test results from private clinical labs.
- DPH instituted weekly pertussis teleconferences.
- DPH issued a press release focusing on camps and recreation facilities due to increased incidence in these settings.
- One local public health agency developed a suspect flow sheet.

- The CDC did not administer guidance on accelerated pertussis vaccination schedule in spite of the “increased sustained incidence.”
- DPH press release: “Pertussis usually has a three- to four-year cycle when we have larger numbers of cases. We’re in one of those cycles.”
- Local public health was perceived as too aggressive with providers and was advised by state health officials to relax pursuance of guideline requirements. Distributing current policies to providers clarified the responsibility of local public health to prevent and control the spread of disease in the community.

August 2004

M County cases: 65 (276 cumulative total for year)

W County cases: 75 (265 cumulative total for year)

- The consortium member agencies voted unanimously to activate unified command due to a concern of increased transmission when the school year began.
- Unified command was led by the consortium chair and initially consisted of weekly teleconferences to problem-solve issues with epidemiological follow-up
- The consortium issued a press release announcing activation of unified command.
- DPH sent letters to school districts regarding pertussis, vaccine, and exclusions.
- Local public health agencies communicated with schools, hospitals, clinics, and day cares on communicable disease prevention, control measures, and surveillance surrounding pertussis.
- DPH held a press conference and issued a press release on the “particularly high” number of pertussis cases.
- Local public health agencies were concerned about costs related to managing pertussis.
- Local public health agency staff resources were limited. Mutual aid was not requested due to a perception that all consortium resources were exhausted.

September 2004

M County cases: 58 (334 cumulative total for year)

W County cases: 57 (322 cumulative total for year)

- DPH sent a letter to clinicians on *aggressive* control measures, including widening case definition to any cough of seven-day duration.
- DPH approved use of consortium grant funds for antibiotics, staffing, and overtime costs.
- Prioritization and resource allocation guidelines were disseminated by unified command.
- The unified command encouraged local public health agencies to request mutual aid, if needed.
- Consortium sent letter to clinicians updating them on current situation.
- Local public health agencies enhanced surveillance efforts with school districts.

- The unified command secured drug samples for uninsured and underinsured.
- The consortium held a press conference regarding current situation.
- DPH sent a letter to college/university health services with fact sheets, treatment information, case definition, and specimen collection.
- DPH acknowledged a pertussis *outbreak*: “Upon review of the epidemic curves of the pertussis cases... it is clear that a sustained outbreak of pertussis is occurring.”
- Due to time restraints, many local public health agencies were unable to participate in weekly teleconferences.
- The consortium unified command developed minimum standards for case investigation, which aided local public health agencies with time restraints.

October/November/December 2004

M County cases: 99 in October; 94 in November; 43 in December (570 cumulative total for year)

W County cases: 64 in October; 63 in November; 39 in December (488 cumulative total for year)

- Local public health agencies were forced to reprioritize due to influenza vaccine shortage.
- Local public health agencies had concerns about the cost associated with probable and suspect cases without an epidemiological link.

January 2005

M County cases: 15

W County cases: 13

- Unified command was demobilized.
- Estimates maintained by member agencies throughout 2004 identified a cost of approximately \$450 per case to manage the outbreak.

CONCLUSION

This case study highlights multiple policy development and assurance challenges associated with a prolonged and sustained communicable disease outbreak. Unified command proved invaluable for the coordination of epidemiological investigation protocols and documents across multiple jurisdictions within the MW Consortium. In addition, unified command enhanced communication and collaboration among member agencies. However, unified command was not without limitations, including the lack of incident command knowledge and infrequent participation of some member health departments. Although previously utilized during the monkeypox outbreak, this situation represented the first experience with unified command for half of the MW Consortium members. There was a steep learning curve for many members early in unified command activation, though all members will benefit from future discussions regarding ways to resolve limitations in the unified command structure prior to the next outbreak.

REFERENCES

1. Heymann DL, (ed.) Control of Communicable Diseases Manual, 18th Ed. (2004). American Public Health Association: Washington.
2. Evans AS, Brachman PS. Bacterial Infections of Humans, 3rd Ed. (1998). Plenum: New York.

STUDY GUIDE QUESTIONS

1. Identify key examples of how core functions were addressed within the unified command system.
2. What communications deficiencies were existed early in 2004? How were these deficiencies addressed by the unified command system?
3. What kind of leadership was exemplified from Local Health Officers? From DPH?
4. What kind of leadership was needed from Local Health Officers? From DPH?
5. Was this a true unified command system as defined by the Federal Emergency Management Agency (FEMA)?
6. What are some steps DPH could have taken to prepare local health departments, in anticipation of the disease spreading to their areas?
7. What were some of the strengths and limitations to the unified command structure in this outbreak?
8. Would activation of unified command within the consortium prior to August have changed the scope of this outbreak? Why or why not?
9. Did local public health lose credibility from the medical community in light of the myriad conflicting messages disseminated throughout the outbreak? If so, how might local public health regain credibility?