Lessons Were Learned in the Mumps Outbreak

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KANSAS CITY, MO. — The resurgence of mumps in 2006 was unexpected but provided the medical community with some valuable lessons, two infectious disease experts reported at the National Immunization Conference sponsored by the Centers for Disease Control and Prevention.

Particularly vexing was the presence of cases without the classical presentation of parotitis and the inability to rule out cases based on negative laboratory results, said Dr. Gustavo H. Dayan of the CDC's Division of Viral Diseases, and Measles, Mumps, and Rubella team leader.

In Iowa, the hardest-hit state in the nation, 71 of 113 (63%) cases at two colleges presented without classic symptoms.

Laboratory diagnosis was very challenging because IgM response was usually absent and performance of different IgM assays was variable. Immunoglobulin G was present in many patients at the moment of diagnosis. Viral culture and polymerase chain reaction (PCR) had a low yield, especially when the specimens weren't taken early in the course of the disease, he said.

A viral shedding study using PCR assays in 31 consecutive Kansas cases resulted in only eight positive results. Seven of the eight samples were taken during the first 3 days after the onset of parotitis, Dr. Dayan said.

Surveillance was difficult because the new case-investigation report form was not adequate and different forms were being used by different states, he said. The Council of State and Territorial Epidemiologists clinical case definition of mumps does not include cases with classic complications of mumps without the presence of parotitis for 2 days.

"We really feel that some of the cases at the beginning of the outbreak may have been discarded based on the not very clear

clinical symptoms and negative results," he said. "However, during the outbreak, some of the cases may have been overcounted because the surveillance system was very enhanced and cases without symptoms may have been counted."

What is known is that the outbreak primarily affected young non-Hispanic white adults, aged 18-24, as well as females and those living on college campuses.

A total of 45 states reported mumps cases in 2006, and 8 states in the Midwest were the most affected. Iowa had the highest incidence at 66/100,000, compared with Minnesota, which had the lowest incidence at 2.8/100,000. Available data from these eight states show that about 43% of the cases had received two doses of mumps vaccine, Dr. Dayan said in an interview.

Overall, 6,330 cases were reported to the National Notifiable Diseases Surveillance System in 2006, and approximately 120 new cases have been reported in 2007, he said. Few infants were affected, and no large school or day care outbreaks were reported. The outbreak did not spread to unvaccinated populations.

The source of the outbreak is not known. But the mumps strain in Iowa and other affected states has been identified as genotype G5, which is the same one that circulated in the United Kingdom throughout the 2004-2006 outbreaks. Virus genotyping in Virginia from a cluster in the latter part of the year isolated the G1 genotype, which suggests a different source of importation, he said.

Compliance with the mumps-isolation recommendation proved challenging. Compliance was 87% for isolation less than 4 days and just 66% for isolation 4 days or more among 133 Kansas students for whom data was available.

Because of this and available viral shedding data, the CDC is expected to recommend in a memo to all the states that the isolation period for mumps be changed to 5 days, Dr. Dayan said.

Kansas changed its viral isolation recommendation to 4 days in early April 2006 but, later that month, reverted to 9 days, which is the period required by Kansas state law and recommended by the CDC, Ms. Jennifer Hill, an epidemiologist with the Kansas Department of Health and Environment, said in a separate presentation during the meeting.

Kansas was the second-hardest hit state in the United States, with 986 cases reported in late 2005-2006; 40% of these were among young adults (18-24 years old), 60% were among women and girls, and 30% were among college students.

Good cooperation and communication between local health and student health centers provided follow-up on almost all of the college students. But questions arose as to whether students should be isolated at home or at school, how long the isolation should last, and who was responsible for their follow-up compliance. Students were told not to go to school for 9 days, but officials received reports some students returned to class early to avoid missing exams, Ms. Hill said.

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Kansas also vacillated between one and two doses of mumps vaccine as its definition of adequate protection before ultimately deciding that patients who receive one dose of measles-mumps-rubella (MMR) vaccine are adequately vaccinated. Separate guidelines and algorithms were established for health care workers and day care workers that rely on self-reported vaccination history data.

Immunization history available on 85% of cases revealed that 73% had received one dose of MMR vaccine and 7% were unvaccinated, and 64% of all vaccinated patients had a history of two doses.

Laboratories were able to communicate those results to clinicians, but at times, there weren't enough qualified workers or materials to perform the necessary testing. After the testing, it wasn't clear how to interpret negative results and how to convince local authorities that it was still mumps. "Negative results do not rule out disease," Ms. Hill said.

Delayed recognition of the outbreak, enhanced transmission in colleges, and unrecognized importations all contributed to the outbreak, according to Dr. Dayan. "In addition, two doses of mumps vaccine may confer about 90%-95% vaccine effectiveness, which may result in accumulation of susceptible persons sufficient to sustain transmission and a sizeable outbreak on a periodic basis," he said. There was no evidence of genetic drift, although the role of waning immunity is unclear.

"However, high MMR vaccine coverage levels and vaccine effectiveness likely prevented thousands of additional mumps cases, the incidence was relatively low, and the disease appeared to be modified with low rates of complications," Dr. Dayan said. ■