

## Compliance with Exclusion Requirements to Prevent Mumps Transmission

**To the Editor:** Control of communicable diseases often relies in part on school and workplace exclusion. Exclusion policies are also likely to play a role in pandemic influenza control and currently are used as policy for control of several vaccine-preventable diseases, including mumps (1). Mumps virus is typically present in saliva from 2–3 days before to 4–5 days after onset of parotitis. However, virus has been isolated from saliva as early as 6 days before and as late as 9 days after the first signs of salivary gland involvement (2).

In Illinois, persons with mumps are excluded from school and the workplace for 9 days after onset of parotitis (3) to reduce transmission of mumps virus. However, exclusion policy is not consistent among all states. For example, persons diagnosed with mumps in Iowa are excluded from school and the workplace for 5 days, whereas persons with mumps in New York and California are excluded for 9 days.

Illinois experienced a mumps outbreak during 2006 that resulted in 796 cases. We describe a telephone survey administered during April–June 2006, to a convenience sample of 174 persons  $\geq 9$  days after onset of parotitis during this outbreak to assess compliance with school and workplace exclusion requirements. The survey response rate was 68% (174/257).

Among 94 (54%) persons with mumps who had attended school, 85 (93%) of 91 spent time at home after they began experiencing parotitis, and 6 (7%) of 91 did not stay home from school. Most persons were told by local health department staff, student health services staff, or their medical

provider to remain at home for 9 days. Among persons with mumps who spent some time away from school, 48 (56%) of 85 remained at home for  $\geq 9$  days. However, 37 (44%) of 85 persons did not remain at home for the entire exclusion period (median 5 days; range 1–8 days). Among 111 (64%) persons who worked outside the home, 93 (87%) of 107 spent time at home after they began experiencing parotitis.

Among persons who spent time away from work, 53 (57%) of 93 remained at home for  $\geq 9$  days. However, many persons (41%, 38/93) remained at home for fewer than the 9 days required by the state (median 5 days, range 1–8 days) after onset of parotitis. Reasons for complete noncompliance (not remaining at home from work during any part of the exclusion period) included not feeling ill enough to remain at home (50%, 7/14) and not receiving a diagnosis until after the exclusion period had elapsed (36%, 5/14) (Table). Because almost 80% of these noncompliant persons acknowledged being told not to work, lack of such instruction did not play a major role in this subset of cases.

Despite public health control measures, including expanded vaccination recommendations (4) and school and workplace exclusion, mumps cases in Illinois increased 90% from 419 during January 1, 2006, through May 17, 2006, to 796 through December 31, 2006. Given limited resources of local health departments, monitoring and ensuring compliance with exclusion control measures are likely to be a

barrier in control of mumps, and these difficulties should be recognized as a potential issue in pandemic influenza planning. Additional studies targeting reasons for failure to comply and how to improve compliance will be useful preparedness activities.

An examination of whether exclusion for 9 days rather than only 5 days is a more effective mumps transmission control measure is also needed, given the difficulty with ensuring complete compliance for the full 9 days. Evidence for 9 days of shedding of mumps virus was based on a small number of experimentally infected children ( $N = 15$ ), 8 of whom were asymptomatic (2). However, mumps exclusion policy states that 9 days is needed for persons with symptoms of parotitis. In addition, the population studied included no specimens from adults, although the exclusion policy derived from these data applies to persons of all ages. Finally, exclusion policy based only on parotitis may be feasible but would not affect persons with subclinical and nonspecific clinical infections who may shed mumps virus. A uniform evidence-based policy for exclusion is needed.

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Table. Reasons reported by 14 persons with mumps for not remaining home from work for any part of the exclusion period

Reason	Frequency,* no. (%)
Did not feel ill enough to miss work	7 (50)
Did not receive mumps diagnosis until after exclusion period	5 (36)
Was not told to remain at home	3 (21)
Could not financially afford to miss work	2 (14)
Too busy to miss work	1 (7)
No sick leave available	1 (7)

\*Some persons reported  $>1$  reason for not remaining home from work.

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## Letters

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## Alveolar Echinococcosis, Lithuania

**To the Editor:** Alveolar echinococcosis (AE), a serious zoonosis caused by the tapeworm *Echinococcus multilocularis*, has been reported in neighboring countries of Lithuania in recent years (1–4), but no published epidemiologic information is available. The red fox (*Vulpes vulpes*), the main definitive host of *E. multilocularis* in Europe (1), and important intermediate rodent hosts (e.g. *Arvicola terrestris*, *Microtus arvalis*) are present in Lithuania (5), but to date they have not been investigated systematically. The helminth fauna of carnivores in Lithuania had been investigated in a study in 1976, but no record was made for *E. multilocularis* (6). Notably, *E. multilocularis* has recently been identified in 1 of 5 muskrats (*Ondatra zibethicus*) captured in the Šilutė district of Lithuania (7). The objectives of our study were to estimate the prevalence of *E. multilocularis* in definitive hosts and to gather first information concerning AE in humans in Lithuania.

From 1997 to July 2006, 80 AE cases have been diagnosed at the reference hospital for AE, the Hospital of Tuberculosis and Infectious Diseases in cooperation with the Santariškių Clinic, Vilnius University. Diagnoses were based on serologic testing using ELISA (Bordier Affinity, Crissier, Switzerland) and Western blot (LDBIO, Lyon, France) or imaging methods (ultrasound scan, computed tomography). In 6.7% of the cases identified by imaging techniques, serum antibodies were not detected by ELISA. Diagnoses in all cases were confirmed by histopathologic examination or typical liver lesion morphologic features. Most of the cases were registered in the past 5 years (10–16 cases/year in 2002–July 2006 compared with 0–4 cases/year

in 1997–2001). In 26 (33%) of 80 patients, metacestodes were found in the bilateral liver lobes; in 20 (25%) metacestodes were found in the right lobe. Metacestodes had also spread into extra hepatic tissues and metastasized to the right lung, right kidney, spleen, and genitals in 18 (23%) of the patients. AE was diagnosed in 62 (78%) of patients in the third to fourth clinical stage of the disease, according to the PNM (P, parasitic mass in the liver; N, involvement of neighboring organs; M, metastasis) classification: P2-3N0-1M0, P4N1M1 (8); twelve (15%) patients died, 7 of them within 4–24 months after diagnosis. The patients' ages varied from 21 to 83 years (mean age 58 years). Women were more frequently infected (63%) than men (38%), which could be explained by women's more frequent involvement in gardening. Eighty-one percent of AE patients were farmers or persons involved in agricultural activities. Most AE patients originated in the northwestern and northeastern parts of Lithuania, but cases were recorded from many parts of the country (Figure), which suggests that the whole territory of Lithuania should be considered as an AE-endemic area.

To assess the prevalence of *E. multilocularis* in definitive hosts, the small intestines of 206 hunted red foxes were collected from randomly selected districts from October 2001 to April 2004 and examined following strict safety precautions by the sedimentation and counting technique. *E. multilocularis* was detected in 118 red foxes (57.3%, 95% confidence interval [CI] 50.2%–64.1%). The tapeworm was present in foxes from most tested localities; the highest prevalence of 62.3% (CI 49.0–74.4%) was observed in the Kaunas district (Figure). The median worm burden per infected fox was 56 (1–20, 924) in this district. The high prevalences of *E. multilocularis* in foxes in the examined areas support the hypothesis that foxes play the key role as definitive