

The presence of proline at the 249 aa position of the NS3 gene is a mutation related to increased viremia potential and virus transmission rates in corvids (8).

In a recent study, Jiménez de Oya et al. performed experimental infection of Eurasian magpies with 2 WNV strains currently circulating in Europe; they found magpies to be highly susceptible to WNV infection, with low survival rates for both strains (9). No WNV-associated bird death had been reported in Greece previously, which could be attributed to the lack of an organized wild bird surveillance system in the country. Nevertheless, mass deaths of Eurasian magpies showing neurologic signs, 1 month earlier than a human neuroinvasive outbreak in the area, demonstrate that monitoring sick birds (e.g., using oral swabs or feather pulp) or carcasses of dead wild birds, in an active and passive surveillance system, could benefit public health by recognizing areas in which prevention measures could be implemented to minimize the impact of WNV human disease outbreaks.

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Hemorrhagic Fever with Renal Syndrome, Russia

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In Russia, 131,590 cases of hemorrhagic fever with renal syndrome caused by 6 different hantaviruses were reported during 2000–2017. Most cases, 98.4%, were reported in western Russia. The average case-fatality rate was 0.4%, and strong regional differences were seen, depending on the predominant virus type.

Hemorrhagic fever with renal syndrome (HFRS) is caused by hantaviruses (order *Bunyavirales*, family *Hantaviridae*), enveloped, single-strand, negative-sense RNA viruses, predominantly carried by rodents and insectivores. In Asia, the primary HFRS pathogens are Hantaan virus (HTNV), Amur virus (AMRV), and Seoul virus (SEOV); in Europe, the primary pathogens are Puumala virus (PUUV) and Dobrava-Belgrade virus (DOBV) (1).

Russia, bordered by Europe in the west and Asia in the east, included HFRS in the official reporting system of the Ministry of Public Health in 1978 (2). Clinical and laboratory diagnoses for reported cases are confirmed serologically by indirect immunofluorescence assay (Diagnostikum HFRS; Federal Scientific Center for Research and Development of Immune and Biological Products of the Russian Academy of Sciences, <http://chumakovs.ru>).

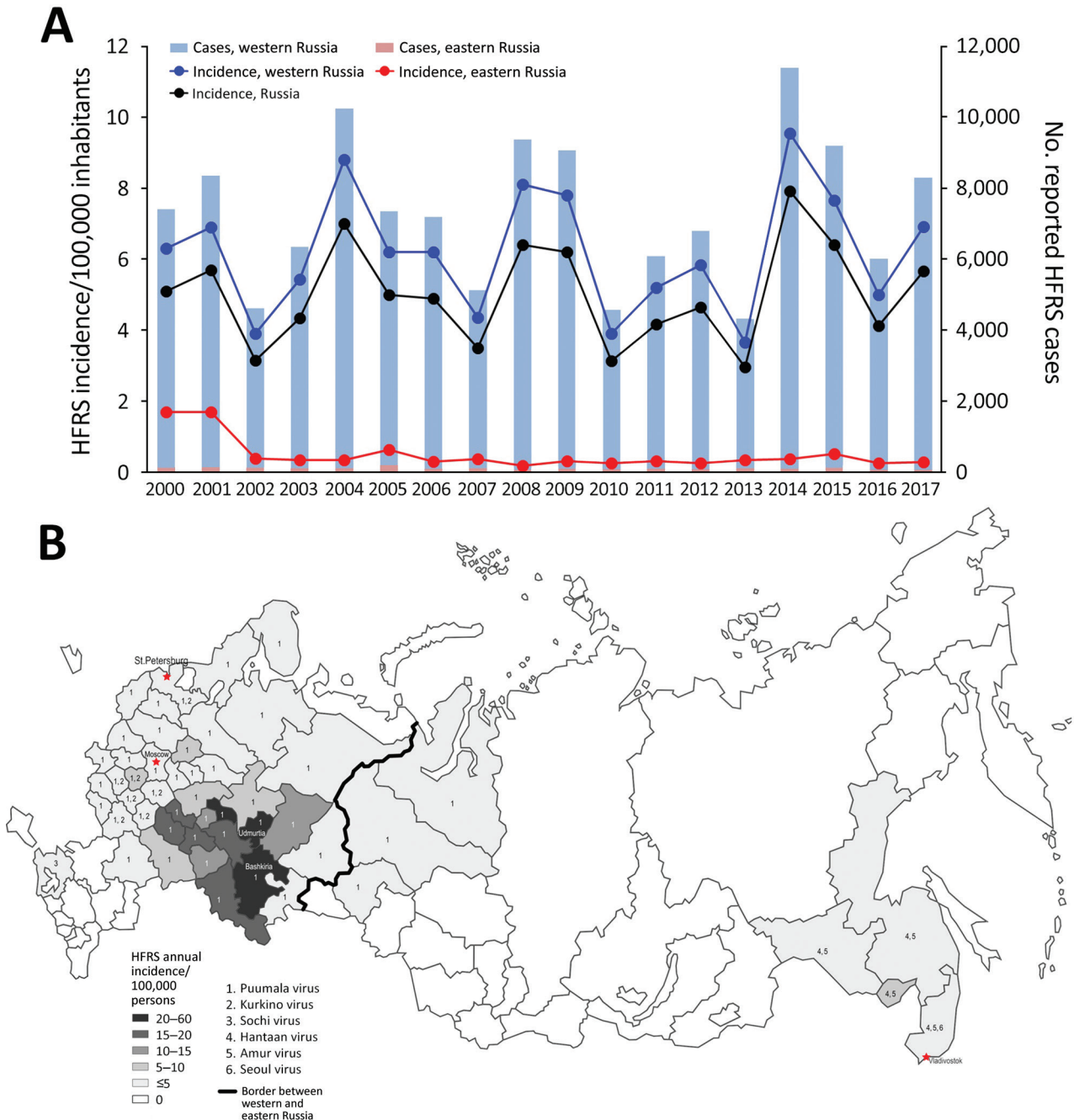


Figure. Distribution of hemorrhagic fever with renal syndrome caused by hantavirus in Russia, 2000–2017. A) Mean number of reported cases and incidence of disease, by region; B) geographic distribution and incidence rate of causative agents (indicated by numbers). Red stars indicate primary cities in Russia.

HFRS has the highest incidence rate of all reportable zoonotic viral diseases in Russia. In the west, in administrative regions close to the border with Europe, reported cases mainly are caused by PUUV carried by bank voles (*Myodes glareolus*) and to a lesser extent by 2 types of DOBV, Kurkino virus (KURV) and Sochi virus (SOCV) (3). Vectors for DOBV subtypes in western Russia are the western subtype of striped field mouse (*Apodemus agrarius agrarius*), which hosts KURV, in the central regions; and the Black Sea field mouse (*A. ponticus*), which hosts SOCV, in southern regions. In eastern Russia, near the border with Asia, HFRS cases primarily are caused by HTNV carried by the eastern subtype of striped field mouse (*A. agrarius manchuricus*), AMRV carried by the Korean field mouse (*A. peninsulae*), and, less frequently, SEOV carried by the Norway rat (*Rattus norvegicus*) (4,5).

During 2000–2017, a total of 68 of Russia's 85 administrative regions reported 131,590 HFRS cases, an annual average rate of 4.9 cases/100,000 inhabitants (Figure 1, panel A). Annual incidence rates varied greatly, and epidemics occurred every 2–4 years with occasional 2-year peaks, such as in 2008–2009 and 2014–2015. This phenomenon is related to sequential independent epidemic years in 2 distinct, highly affected regions rather than geographically synchronized hantavirus activity on a nationwide scale.

HFRS cases were distributed unevenly throughout Russia. Western Russia reported 129,530 (98.4%) cases in 52/60 regions and an average annual incidence of 6.0 cases/100,000 persons. Eastern Russia reported only 2,060 (1.6%) cases in 16/25 regions and an average annual incidence of 0.4 cases/100,000 persons (2). The Ural and Ural-Volga-Viatka foothill areas, which encompass 11 administrative regions of western Russia, had the highest HFRS incidence rates, ≥ 10 cases/100,000 persons (Figure 1, panel B). Overall, 77% of HFRS cases in Russia were reported from these 11 regions, which are characterized by lime forests that provide suitable habitat for the bank vole, the reservoir host of PUUV. Among these regions, 2 had the highest incidence rates in the country: Udmurtia had 61.4 cases/100,000 persons and Bashkiria 47.5 cases/100,000 persons.

In eastern Russia, the 4 administrative regions closest to Asia reported HFRS cases. Vladivostok reported 1,089 cases and an incidence rate of 3.0 cases/100,000 persons; Khabarovsk reported 519 cases and an incidence rate of 2.1 cases/100,000 persons; Amur reported 71 cases and an incidence rate of 0.4 cases/100,000 persons; and Jewish Autonomous Region reported 189 cases and an incidence rate of 5.8 cases/100,000 persons. Siberia reported only 179 cases, mainly from western Siberia, which likely were imported cases in temporary oil and gas field workers from other hantavirus-endemic regions, such as the neighboring Udmurtia and Bashkiria.

During 2000–2017, Russia had 564 fatal cases of HFRS, 483 in the east and 81 in the west. The overall case-fatality rate was 0.4%, but rates varied by region. Central regions of western Russia had case-fatality rates of 0.3%, but the Black Sea coastal area of western Russia, where highly pathogenic SOCV occurs, had a 14% HFRS case-fatality rate. The far eastern regions, which have endemic highly pathogenic HTNV, had a 7% case-fatality rate (6–9).

HFRS appears to affect persons 20–50 years of age most frequently (65%), and $\approx 80\%$ of cases in Russia were in men. Only 3,157 (2.4%) cases were reported among children ≤ 14 years of age. Most HFRS cases in western Russia occurred during the summer and autumn, but cases in the far eastern part of the country occurred in autumn and winter (4,5).

Comparative analyses of clinical courses indicated that even though infections by all recognized causative agents can cause mild, moderate, and severe clinical forms of HFRS, the frequency differs depending on the causative agent. SOCV infections had greater incidence of severe HFRS and high case-fatality rates (14%) and HTNV infections had case-fatality rates of 5%–8%, whereas PUUV, SEOV, and KURV infections had case-fatality rates $\leq 1\%$ (8–10). Of note, 97.7% of HFRS cases in Russia are reportedly caused by PUUV (5), possibly explaining the overall low case-fatality rate in the country. Nevertheless, considering the high case numbers reported from the west, HFRS remains a public health threat in Russia.

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Laboratory-Confirmed Avian Influenza A(H9N2) Virus Infection, India, 2019

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A 17-month-old boy in India with severe acute respiratory infection was laboratory confirmed to have avian influenza A(H9N2) virus infection. Complete genome analysis of the strain indicated a mixed lineage of G1 and H7N3. The strain also was found to be susceptible to adamantanes and neuraminidase inhibitors.

Low-pathogenicity avian influenza A(H9N2) viruses have a wide host range, and outbreaks in poultry have been recorded since the 1990s in China (1). In India, avian specimens indicated no serologic evidence of H5N1 and H9N2 during 1958–1981 (2); however, 5%–6% persons with direct exposure to poultry had H9N2 antibodies (3). Human cases of influenza H9N2 virus infection have been observed in Hong Kong, China, Bangladesh, and Pakistan (4–7).

An institutional review board approved an ongoing community-based surveillance in 93 villages of Korku tribes in Melghat District, Maharashtra State, India, to determine incidence of respiratory syncytial virus (RSV)—associated deaths among children <2 years of age. A total of 2,085 nasopharyngeal swabs from children with severe or fatal pneumonia were transported to India's National Institute of Virology to test for influenza, RSV, and other respiratory viruses. A nasopharyngeal swab from a 17-month-old boy received on February 12, 2019, tested positive by PCR for influenza A(H9N2) virus.

The child, a resident of Melghat, had fever, cough, breathlessness, and difficulty feeding for 2 days after illness onset on January 31, 2019. His high intermittent grade fever had no diurnal variation and no association with rash or mucocutaneous lesions. Examination revealed a conscious, restless child with a respiratory rate of 48 breaths/min and lower chest wall in-drawing with intermittent absence of breathing for ≥ 20 seconds. He was fully immunized for his age, with bacillus Calmette–Guérin, diphtheria, hepatitis B, poliovirus, and measles vaccines. Both length and weight for age were less than -3 SD. History of travel with his parents to a local religious gathering 1 week before symptom onset was elicited. The father had similar symptoms on return from the gathering but could not undergo serologic testing because of his migrant work. No history of poultry exposure was elicited. The child received an antibacterial drug and antipyretics and recovered uneventfully.

We tested the clinical sample using duplex real-time PCR for influenza A/B, H3N2, and 2009 pandemic H1N1 viruses; RSV A/B; human metapneumovirus; parainfluenza virus types 1–4; rhinovirus; and adenovirus. The sample was strongly positive for influenza A virus (cycle threshold value 20) but negative for seasonal influenza viruses and all respiratory viruses. Real-time PCR analysis for avian influenza viruses H5N1, H7N9, H10N8, and H9N2