Rapid collaboration between public health authorities in the Philippines and Finland led to appropriate action at the site of origin of the rabies case within a few days. In a country in which rabies is not endemic, diagnosing rabies and implementing control measures in healthcare settings are often difficult because of limited experience with this disease. The last human rabies case in Finland was diagnosed in 1985, when a bat researcher died after being bitten by bats abroad and in Finland (5). For imported cases, patient history may be incomplete, but use of RT-PCR for saliva can provide a rapid confirmation of the diagnosis. To support risk assessment and decision making, better definition of the roles of public health authorities regarding a mandate or responsibility to acquire information concerning international ships is needed.

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Eye-Opening Approach to Norovirus Surveillance

To the Editor: It is said that a picture is worth a thousand words. The Figure illustrates this axiom and provides several new insights into the spread of norovirus infections. These infections are assumed to greatly affect society, but little is known about the prevalence of the disease in the community. Samples sent to laboratories usually originate from hospitalized persons and thus give a good view of the situation in healthcare settings. We suspect, however, that these numbers do not depict the true prevalence of norovirus infections in society. We therefore present a new approach to estimate the number of cases and spread of norovirus infections in the community.

We plotted the number of queries for *vomit* (asterisks denote any prefix or suffix) submitted to the search engine on a medical website in Sweden (www.vardguiden.se). This number was normalized to account for the increasing use of the website over time and aggregated by week, starting with week 40 in 2005. We also plotted the number of norovirus findings per week from 16 regional laboratories, as recorded by the Swedish Institute for Infectious Disease Control.

For the time series on Web search queries and laboratory findings (Figure), we fitted harmonic functions on the half-year with no or little activity, defining baselines for each series (*1*,*2*). By performing this procedure, we can identify the onset of each activity that is assumed to occur when the level rises above the 99% prediction interval of the baseline. The week this increase occurs is shown in the Figure. The Figure also contains the number of media articles on winter vomiting disease provided by a search engine for news in Sweden (www.eniro.se/nyhetssok). By analyzing the figure and investigating the statistical outcomes, we glimpse the prevalence of norovirus infections in society, as estimated by the search pattern.

We found 3 striking insights. First, the onset of vomiting in the community precedes the onset of confirmed norovirus infections in healthcare settings. In 3 of the 4 full seasons investigated, this precedence was 1–4 weeks. Second, the curve for the Web queries shows much sharper increases and decreases than does the curve on the number of reported norovirus findings. Third, neither search behavior nor reporting of positive tests is driven by media for the winter vomiting disease (confirmed by a linear regression).

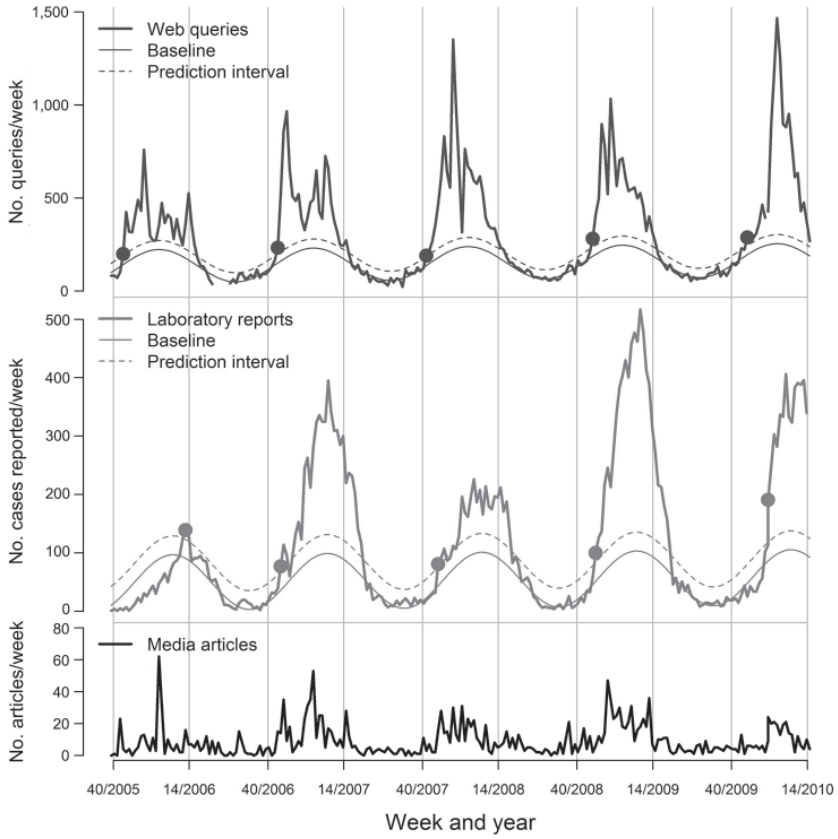

Figure. Number of queries for *vomit* submitted to a medical Web site (A), number of laboratory-verified norovirus samples (B), with baselines and 99% prediction intervals, and number of media articles about winter vomiting disease (C) in Sweden, 2005–2010. A color version of this figure is available online (www.cdc.gov/EID/content/16/8/1319-F.htm).

In the 2005–06 season, the laboratory reporting raised above the defined prediction interval in week 13, much later than the Web queries. This season had no new variants of norovirus genotype GII.4. This season still showed community infections, even though few reports came from institutions. For the current season (2009–10), the interval between onset of Web queries and onset of norovirus infections in hospitals (week 46 and week 1, respectively) was 8 weeks. In comparison with previous seasons, this delay could mean a low total number of reported cases. However, in late December, a new variant of GII.4 affected healthcare settings in southern Sweden with increasing norovirus infections, while the rest of the country still showed relatively low virus activity.

Other pathogens such as rotavirus, *Salmonella* spp., *Staphylococcus aureus*, and *Bacillus cereus* can cause vomiting. Usually in Sweden, rotavirus infections peak in late winter, and bacterial diseases have a minor incidence compared with norovirus. In our opinion, these other pathogens would not interfere with the interpretation of the results.

In our routine surveillance of Web queries, we also include other query terms, such as diarrhea and stomach flu. However, searches for vomiting show the most distinct pattern, and vomiting is the most pronounced symptom of a norovirus infection.

The use of harmonic functions for describing baseline Web searches and laboratory reporting is a simple model, especially because the parameters are estimated by using the half-year with the least activity. Nonetheless, it is a direct approach, and we believe that the method still captures the time of onsets well.

Web queries indicate the presence of norovirus infections in communities. Predictions of the onset of the norovirus laboratory reporting should also be possible, but further studies are needed to confirm that theory. Web queries have previously been correlated with influenza (*3*–*7*) and have been explored retrospectively for listeriosis (*8*), *Salmonella* spp. (*9*), West Nile virus, and respiratory syncytial virus (*10*). With the Web queries, we get an additional surveillance system for the time of the year when few norovirus tests are conducted. In addition, knowing more about the impact of norovirus in the community means that we could provide more adequate information and advocate wiser measures for prevention and control.

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Possible Recurrent Pandemic (H1N1) 2009 Infection, Israel

To the Editor: We report 2 cases of possible recurrent laboratory-confirmed infection with pandemic (H1N1) 2009 virus in Israel. Patient 1, a 24-year-old man, had Noonan syndrome (*1*,*2*). He was hospitalized on August 10, 2009, because of high-grade fever and cough. At admission, a nasopharyngeal specimen was collected for pandemic (H1N1) 2009 virus real-time reverse transcription–PCR (RT-PCR) (ABI 7500; Applied Biosystems, Foster City, CA, USA) for the pandemic hemagglutinin gene; a validated in-house protocol developed at Israel Central Virology Laboratory was used, as previously described (*3*). Briefly, the in-house assay was validated against the assay for pandemic (H1N1) 2009 virus developed by the Centers for Disease Control and Prevention (CDC; Atlanta, GA, USA). The in-house assay was as sensitive as the CDC assay; however, the in-house primers and probes were more specific for detecting pandemic (H1N1) 2009 virus with 105% amplification efficiency of viral RNA that was logarithmically serially diluted. In addition, of 100 samples tested side by side with the in-house and CDC assays, 75 samples were positive by both assays, and 25 were negative by both assays; thus, the sensitivity and specificity of the in-house assay were 100%.

The patient was not treated with neuraminidase inhibitors and did not require supportive treatment; after 1 day of hospitalization, he was discharged with a diagnosis of upper respiratory tract infection. The laboratory subsequently reported the RT-PCR as positive for pandemic (H1N1) 2009 virus. On November 22, the man was hospitalized again for dyspnea and fever. The RT-PCR result from a nasopharyngeal sample collected at admission was positive. Hemagglutination-inhibition assay demonstrated a high titer (320) of serum antibody against pandemic (H1N1) 2009 virus in a blood sample taken at admission. The patient took oseltamivir for 5 days, and his condition markedly improved. Result of a repeat RT-PCR at discharge was negative.

An identical neuraminidase gene sequence was detected during both illness episodes (August and November). The specimens were also tested with an experimental RT-PCR assay for rapid detection of the oseltamivir resistance mutation H275Y on the pandemic neuraminidase gene (*4*). For specimens collected during both episodes, the virus was oseltamivir sensitive.

Patient 2, a 13.5-year-old boy, had severe cerebral palsy. On July 27, 2009, high-grade fever with dyspnea developed. He was treated as an outpatient for 5 days with oseltamivir and clinically improved. However, on August 11, he had fever with respiratory distress and was hospitalized. RT-PCR for pandemic (H1N1) 2009 virus was positive on August 14. A second course of oseltamivir was administered for 10 days with the dosage adjusted for age and doubled from that of the previous regimen. Further testing with the experimental rapid RT-PCR indicated the viral strain had the oseltamivir resistance mutation. On September 14, RT-PCR was negative.

On December 11, the boy was again hospitalized because of respiratory distress and high-grade fever. On December 14, RT-PCR was positive for pandemic (H1N1) 2009 virus, and a 5-day regimen of oseltamivir was started. Another specimen taken the same day was negative. A high serum antibody titer (320) to pandemic (H1N1) 2009 virus was measured by hemagglutination-inhibition assay on December 16; no oseltamivir resistance mutation was found. Additional laboratory testing included a complete panel for respiratory viruses, which