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A norovirus GII.P21 outbreak in a boarding school, Austria 2014

Yung-Ching Lin [a,b], Elisabeth Hipfl [c], Ingeborg Lederer [a], Franz Allerberger [a], Daniela Schmid [a,*]

[a] Austrian Agency for Health and Food Safety (AGES), Währingerstraße 25a, 1096 Vienna, Austria
[b] The European Programme for Intervention Epidemiology Training (EPIET), European Centre for Disease Prevention and Control, Stockholm, Sweden
[c] Public Health Authority, Carinthia, Austria

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SUMMARY

Objectives: An Austrian boarding school reported a cluster of gastroenteritis on January 10, 2014. Environmental swabs from the school cafeteria and a nearby kebab restaurant tested positive for norovirus. The outbreak was investigated to identify its source(s).
Methods: An outbreak case was defined as a student or staff member with diarrhoea or vomiting that developed between January 7 and 13. Details on food exposure were collected via a self-administered questionnaire; risk ratios (RR) and 95% confidence intervals (CI) were calculated. Norovirus from the stool specimens of cases and asymptomatic kebab restaurant workers were genotyped.
Results: Twenty-eight cases were identified among 144 persons (attack rate 19%). The outbreak emerged and peaked on January 9, and ended on January 12. Compared to those who did not eat kebab, those who ate kebab on 7, 8, and 9 January were respectively 11 (95% CI 4.2–28), 6.7 (95% CI 3.4–13), and 9.3 (95% CI 4.0–22) times more likely to develop disease within the following 2 days. Stool specimens from three cases and three restaurant workers were positive for norovirus GII.P21.
Conclusions: The kebab prepared by norovirus-positive restaurant workers was the most likely source of the outbreak. It is recommended that food handlers comply strictly with hand hygiene and avoid bare-handed contact with ready-to-eat food to minimize the risk of food-borne infection.

1. Introduction

A meta-analysis published in 2014 suggests that norovirus (NV) causes almost a fifth of all cases of acute gastroenteritis worldwide.[1] Genogroups I, II, and IV, including at least 25 genotypes, are responsible for human infections.[2,3] The infectious dose is approximately 18 to 1000 viral particles. Thus, NV is highly contagious. Transmission takes place through faecal–oral route, aerosol–vomitus route, or contact with contaminated food, water, or environment. The incubation period ranges from 10 to 51 h, with most cases occurring at between 24 and 48 h after exposure.[1,2]

Since 2005, food-borne NV illness has been notifiable in Austria. The Austrian public health authorities reported 54 NV outbreaks in 2010, 32 in 2011, 16 in 2012, and 26 in 2013.[4,5] The dominant strain was GII.P4 New Orleans 2009 during 2010–2012, and the new strain GII.4 Sydney 2012 in 2013.[4]

On January 10, 2014, the school director of a boarding school in Carinthia, Austria informed the provincial public health office about a cluster of vomiting and diarrhoea involving 19 students, which occurred on January 9 and 10. Environmental swabs taken from the serving hatch of the school cafeteria tested positive for NV using RT-PCR on January 11. Based on this result, food inspectors closed the school cafeteria for cleaning and disinfection on that day. Stool samples obtained from all 10 school kitchen workers, who had no gastrointestinal symptoms, tested negative for Shigella, Salmonella, Campylobacter, and enterohaemorrhagic *Escherichia coli* by culture, and negative for NV by real-time RT-PCR. On January 13, the provincial public health officer interviewed the 19 students and found that at least half of them had eaten kebab in a nearby kebab restaurant 1–2 days before the onset of illness. The food inspector examined the kebab restaurant and collected specimens from typical kebab ingredients, such as lettuce, onion, and tomato, and from 11 environmental swabs (five from the pizza oven, six from the dishwashing area), which were tested in the provincial food safety laboratory. On January 14, the inspector closed the kebab restaurant because one of five swabs from the pizza oven (handles) and one of six swabs from the

* Corresponding author. Tel.: +43 (0)50 555 37304; fax: +43 (0)50 555 37109.
E-mail address: daniela.schmid@ages.at (D. Schmid).

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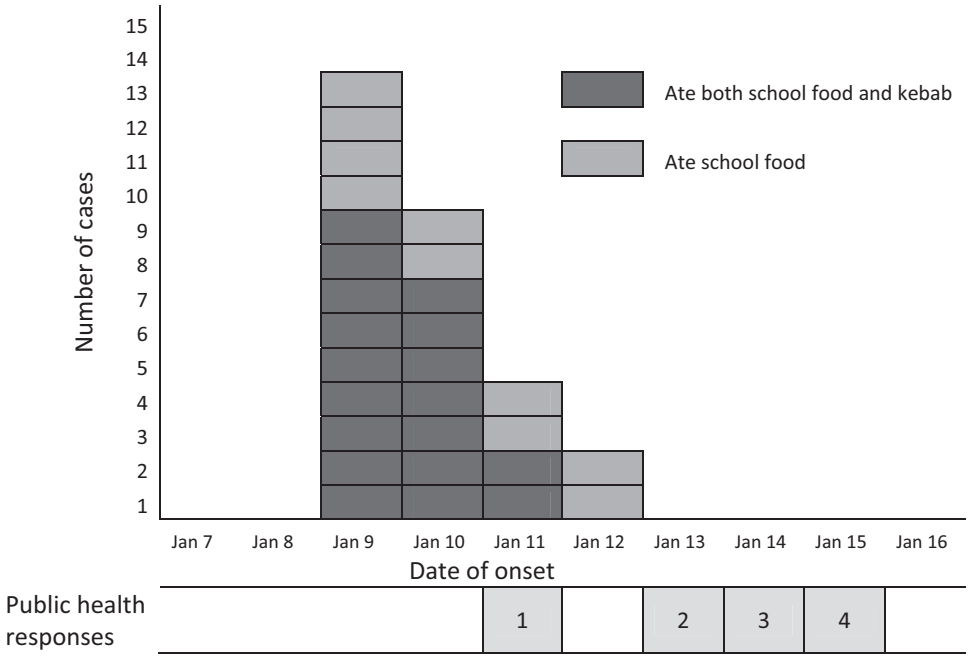

1. School student-cases positive for norovirus
   School cafeteria staff negative for norovirus
   School cafeteria environment positive for norovirus
   School cafeteria closed
2. Common link of kebab found
3. Kebab restaurant food negative for norovirus
   Kebab restaurant environment positive for norovirus
   Kebab restaurant closed
4. Kebab restaurant workers positive for norovirus

Figure 1. Distribution of dates of onset of probable outbreak cases in a boarding school, and public health responses by the provincial public health authority, Carinthia, Austria, January 7–16, 2014 (n = 28).

dishwashing area were positive for NV. On January 15, the provincial public health officer mandated the Austrian Agency for Health and Food Safety (AGES) to investigate the outbreak in order to assess its magnitude, identify the source(s), and to propose preventive measures.

2. Materials and methods

2.1. Descriptive epidemiology

A probable outbreak case was defined as any student or staff member at the boarding school with the onset of diarrhoea or vomiting during the period January 7–13. Those whose stool specimens were positive for NV were considered confirmed outbreak cases.

To search for cases and to collect additional information, the provincial public health officer distributed self-administered questionnaires to all students and members of staff on January 15; the following information was collected: age, sex, boarding status, clinical symptoms, and time of symptom onset. The outbreak was described by person, place, and time.

2.2. Analytical epidemiology

A retrospective cohort study was conducted among the school students and staff. The students and kitchen workers provided information on the consumption of food in the school cafeteria and at the local kebab restaurant between January 7 and 10, using a self-administered questionnaire. Attack rates were calculated by age, sex, and date (January 7–10). For food exposures on January 7, 8, 9, and 10, day-specific cohorts were established with participants who had remained disease-free up to that specific day. The number of cases within the following 2 days was divided by the day-specific denominator to calculate the day-specific attack rate (AR). For each specific day (January 7, 8, 9, and 10), those who ate school food or kebab were compared with those who did not through the calculation of risk ratios (RR), the 95% confidence intervals (CI), and the population attributable fractions (PAF%). The analysis was stratified to identify effect modifications and confounding between kebab consumption, school food consumption, and boarding school attendance using bivariate exact Poisson regression, setting the significance level at 0.05. Data were entered into Epi Info software version 7 and all statistical analyses were conducted using Stata version 12.

2.3. Laboratory and environmental investigations

The NV reference centre in AGES tested stool specimens from three outbreak cases and three food handlers at the kebab restaurant for NV by real-time RT-PCR and performed sequence-based genotyping as described elsewhere.[6,7] Viral RNA from the NV-positive environmental swabs, obtained from the pizza oven and dishwashing area in the kebab restaurant, was sent to the Consultant Laboratory for Norovirus in Germany for genotyping.