

Human Papillomavirus Types in Connecticut, 2008–2009

Human papillomavirus (HPV) is the most commonly reported sexually transmitted infection in the United States. There are over 40 types of genital HPV: approximately 22 low-risk types that cause genital warts and approximately 18 high-risk types that cause cancers, including cervical cancer. Since 2006, the United States Food and Drug Administration has licensed 2 vaccines, Gardasil and Cervarix, which prevent infections associated with types HPV-16 and HPV-18 that cause 70% of cervical cancers.

In 2008, the Centers for Disease Control and Prevention (CDC) began efforts to monitor the impact of the HPV vaccine at 5 Emerging Infections Program (EIP) sites. Effective January 1, 2008, the Connecticut Department of Public Health added cervical cancer precursors, cervical intraepithelial neoplasia grade 2 and higher and adenocarcinoma in situ (CIN 2+/AIS), to the list of reportable diseases (1). As part of surveillance, available tissue specimens from New Haven County residents 18–39 years of age were typed by the CDC pathology laboratory. This report describes HPV types in cervical cancer precursors from 2008 and 2009, before vaccines were likely to have had an impact.

Surveillance Results

Cervical biopsy specimens were obtained from 12 pathology labs in Connecticut. Of 1125 eligible specimens, typing was completed on 610 and included 376 (61.6%) CIN 2, 84 (13.8%) CIN 2/3, 147 (24.1%) CIN 3, and 3 (<1%) AIS; median age was 26 years. Most of the specimens typed were collected from cervical biopsies (477, 78.2%) or cone biopsies/loop electrosurgical excision procedures (115, 18.9%). HPV types in 521 (85.4%) specimens were identified using the Linear Array HPV Genotyping Test (Roche). INNO-LiPA HPV Genotyping Extra, a line probe assay by Innogenetics, was used when the Roche test was negative or inconclusive. The following HPV types were classified as high risk: 16, 18, 26, 31, 33, 35,

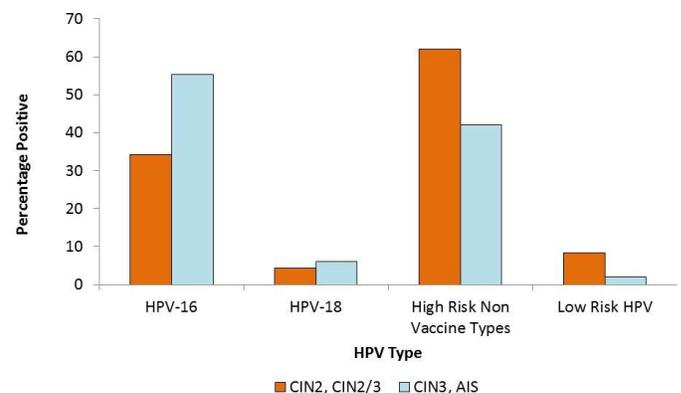
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39, 45, 51, 52, 53, 56, 58, 59, 66, 68, 73, and 72, as described by Munoz (2).

Overall, 570 (93.4%) specimens contained at least one high-risk HPV type, and 89 (14.6%) contained 2 or more high-risk types. The most common type was HPV-16 in 241 (39.5%) specimens (Figure 1). The other high-risk vaccine type, HPV-18, was present in 29 (4.8%) specimens. In total, 267 (43.8%) specimens contained high-risk HPV types covered by available vaccines. After HPV-16, the next most common type, HPV-31, was found in 72 (11.8%) specimens. HPV-16 and HPV-18 were significantly more common in specimens with a diagnosis of CIN 3 or higher compared to those with a diagnosis of CIN 2 or CIN 2/3 (61.3% vs. 38.0%, $p < .001$). HPV-16 and HPV-18 were more likely to be detected in women ages 20–24 and 25–29 (44.1% and 53.7%, respectively, $p = .006$ and $p = .073$ for respective comparisons to women ages 35–39)(Figure 2). There was no statistically

Figure 1. Percentage of specimens testing positive for HPV (n = 610) by HPV types and diagnosis (CIN 2 & 2/3: n = 460 and CIN 3 & AIS: n = 150); women aged 18–39 diagnosed with CIN 2+; New Haven County, Connecticut



significant difference in type distribution by year ($p=.37$).

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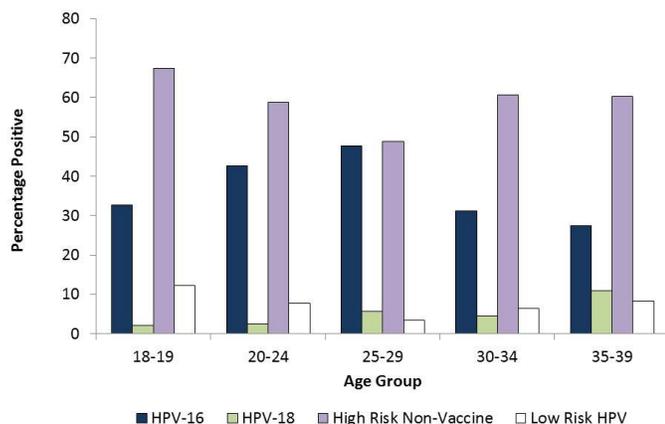
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Editorial

With increasing usage of the HPV vaccine, it is likely that the proportion of CIN2+/AIS cases attributed to HPV-16 and HPV-18 will decrease over time. We did not observe any significant changes in type distribution in these preliminary data (2008 and 2009). These data provide an important baseline from which to monitor changes in type distribution over time.

Because HPV-16 and HPV-18 are present in nearly half of cervical cancer precursors, HPV vaccination has the potential to significantly reduce CIN2+/AIS morbidity, as well as that of invasive disease. Due to the high burden of HPV-16 and HPV-18 related disease among young women < 30 years of age, it will be possible to observe vaccine impact in this population in the near future. Nevertheless, due to the high prevalence of high-risk non-vaccine HPV, cervical cancer screening remains important even for vaccinated women.

Figure 2. Percentage of specimens testing positive for HPV (n = 610) by HPV types and age groups; women aged 18–39 diagnosed with CIN 2+; New Haven County, Connecticut



This analysis indicates that HPV vaccination has significant potential to reduce cervical disease among young women in Connecticut. Ongoing surveillance efforts will monitor this impact over time and be used to guide vaccination and other prevention programs.

References

1. [Reportable Diseases and Laboratory Reportable Significant Findings - Changes for 2008, Connecticut Epidemiologist 28\(1\) 2008; 1-5.](#)
2. [Munoz N, Castellsague X, de Gonzalez A.B., Gissmann L. Chapter 1: HPV in the etiology of human cancer, Vaccine 24 \(Suppl 3\) 2006;S3/1-S3/10.](#)

An Outbreak of Gastroenteritis After a Holiday Party, Connecticut — December, 2010

In December 2010, the Connecticut Department of Public Health (DPH) Epidemiology and Emerging Infections Program was notified of a group of co-workers who became ill with gastrointestinal symptoms after attending a holiday party 3 days earlier. Preliminary information indicated that 12 persons attended the party held at Restaurant X, with food served at approximately 6:00PM. Staff from the DPH and local health department (LDH) initiated an outbreak investigation on the same day as notification to determine the source and extent of the outbreak, and to recommend control measures. This report summarizes the findings of the investigation.

Epidemiologic Investigation

Telephone interviews with all 12 attendees were performed by DPH staff and included questions regarding demographics, illness history, and food consumption at the party. A case was defined as a person who attended the holiday party and subsequently developed illness characterized by vomiting and/or diarrhea (consisting of ≥ 2 stools per 24 hour period) within 2 days following the event. Of the 12 attendees, 9 (75%) met the case definition; 1 attendee was excluded because this person experienced gastrointestinal symptoms that did not meet the case definition.

Of the 9 cases, all reported nausea, 8 (89%) vomiting, 7 (89%) diarrhea, 7 (78%) abdominal cramps, 6 (67%) muscle aches, 6 (67%) chills, and 2

(22%) fever. None reported bloody stools. The median age was 38 years (range 27–71 years); 7 (78%) were female. No cases were hospitalized or sought medical care. The median incubation period was 27 hours (range 12–33 hours); the median duration of illness was 42 hours (range 24–72 hours).

Shared foods consumed at the holiday party included several appetizers, biscuits, items from a salad bar, and a mixed alcoholic beverage. Additionally, attendees consumed individually ordered entrees, but because a wide variety of selections were ordered, entrees were not statistically assessed. Among shared food and drink items that were statistically assessed, no specific item was significantly associated with illness. However, spinach artichoke dip had the highest relative risk (RR) and was the only food item that neared statistical significance (RR = 3.00; 95% Confidence Interval = 0.61–18.46; p-value = 0.0545). Furthermore, consumption of spinach artichoke dip was reported by 8 of the 9 cases.

Laboratory Investigation

Among party attendees, 7 submitted stool specimens to the DPH State Laboratory for testing; 6 were positive for norovirus genogroup I (NoV GI). These 6 attendees all had gastrointestinal symptoms that met the case definition and tested negative for routine enteric bacterial pathogens (*Salmonella*, *Shigella*, *E. coli* O157, and *Campylobacter*). A total of 29 food workers had stool specimens tested for NoV^{*}; 6 tested positive for NoV GI. Of the 6 NoV GI-positive food workers, 4 reported recent history of gastrointestinal illness.

Environmental Investigation

An environmental investigation was conducted at Restaurant X by LDH and DPH Food Protection Program staff. The investigation included interviews of food workers, an evaluation of food-handling procedures, a detailed review of spinach artichoke dip preparation, and collection of food worker stool specimens. Of the 56 food workers interviewed, 6 reported experiencing recent gastrointestinal illness. Onset dates ranged from 9 days prior to, and 7 days after the party; 3[†] worked while symptomatic.

The primary refrigeration units for foods on the cooking line were unable to maintain required food

temperatures ($\leq 45^{\circ}\text{F}$). Equipment thermometers for these refrigeration units were nonfunctional and available food thermometers did not produce accurate temperature readings. Bare-handed contact by food workers with ready-to-eat foods and inadequate hand washing were observed.

Spinach artichoke dip was prepared by combining defrosted, cooked spinach with chopped, canned artichokes and a defrosted commercial cream sauce. The dip was prepared in bulk and the excess was held in a walk-in refrigeration unit. Prior to serving, the dip was heated in a microwave oven, then removed and garnished with a commercial, grated Parmesan cheese. During direct observation of preparation procedures for the dip, a food worker was seen using bare hands to garnish the spinach artichoke dip and other foods with Parmesan cheese.

One of the NoV GI-positive food workers was responsible for garnishing the spinach artichoke dip with Parmesan cheese prior to the dip being served to holiday party attendees; this person was symptomatic with gastrointestinal illness on the day of the holiday party.[§]

Control Measures

During the control period of the outbreak, food workers were required to use gloves and avoid bare-handed contact with ready-to-eat foods; regular checks for ill food workers and complaints of patron illness were also required. Additional control measures included: 1) temporary closure of Restaurant X until refrigeration units were repaired because no alternative refrigeration area was available; 2) availability of accurate temperature measuring devices for foods and equipment; 3) use of adequate utensils for handling ready-to-eat foods; 4) education on proper hand-washing practice; 5)

Footnotes:

* Two additional food workers with recent gastrointestinal illness did not return stool kits and therefore were not tested.

† For 2 of the 6 food workers who reported gastrointestinal illness, work schedules on days of reported illness were unknown; both were symptomatic after the holiday party.

§ This food worker is not the same one that garnished the dip using bare hands during direct observation as part of the environmental investigation.

kitchen cleaning; 6) education on management of ill food workers; 7) display of posters describing the protocol for ill food workers.

Reported by

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Editorial Note

Epidemiologic and laboratory evidence suggest an outbreak of NoV GI occurred among holiday party attendees at Restaurant X; spinach artichoke dip might have been the source. The exact mechanism of contamination is uncertain but could have occurred through bare-handed garnishing of the spinach artichoke dip by an ill food worker on the evening of the holiday party.

NoV is the leading cause of foodborne-disease outbreaks in the United States (1). Currently, 5 NoV genogroups are recognized; of these, 3 (GI, GII, and GIV) affect humans. In recent years, variants of a particular GII genotype have been the most common cause of NoV outbreaks (2). In Connecticut during 2006–2010, 78% of all confirmed NoV outbreaks were caused by GII and 22% were caused by GI. The fact that GI is observed less frequently in Connecticut NoV outbreaks supports the hypothesis that NoV GI infection in food workers at Restaurant X led to the NoV GI outbreak among holiday party attendees.

Six food workers had stools that tested positive for NoV GI, suggesting that a small NoV GI outbreak occurred among Restaurant X food workers; given the range of illness onset dates, transmission possibly occurred by person-to-person spread. A total of 6 food workers reported recent gastrointestinal illness and half of them continued to

work while symptomatic. This outbreak illustrates that food establishments must strictly enforce adequate sick food worker policies to protect the health of both patrons and staff. Managers must educate food workers about such policies, require ill food workers to report gastrointestinal illness to the manager, and not allow ill food workers to return to work until 72 hours after symptom resolution. Among NoV GI-positive food workers, 2 were asymptomatic. This demonstrates that the absence of reported symptoms in food workers should not necessarily preclude stool testing in the setting of an outbreak investigation.

Suspected foodborne outbreaks should be immediately reported to the DPH and LHD to facilitate rapid investigation and implementation of control measures. Please contact the DPH Epidemiology Program (860-509-7994), the DPH Food Protection Program (860-509-7297), and relevant LHD to report suspected foodborne outbreaks.

References

1. CDC. Surveillance for Norovirus Outbreaks. <http://www.cdc.gov/features/dsNorovirus/>. Accessed 5 February, 2011.
2. CDC. Norovirus Technical Fact Sheet. <http://www.cdc.gov/ncidod/dvrd/revb/gastro/norovirus-factsheet.htm>. Accessed 5 February, 2011.

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