

HPV Vaccine Target Groups and Benefits: Cervical Cancer Epidemiology in Connecticut, 1994–2003

Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States. There are currently over 20 million people affected by the virus, with 6.2 million new infections diagnosed each year (1). Although most infections are cleared by the immune system, in some cases HPV can cause cervical cancer. Infections occur soon after onset of sexual activity, with as many as 50% of women infected within 3.5 years in one study (2).

In June 2006, a vaccine was approved against 4 types of HPV (types: 6, 11, 16, and 18) (3). Types 16 and 18 are responsible for 70% of all cervical cancers, while HPV types 6 and 11 account for 90% of all genital warts. The vaccine is currently approved for all women aged 9–26 years and is recommended for all 11–12 year old girls with catch-up vaccination for women aged 13–26 years.

To determine the potential benefits of HPV vaccine and identify target groups for the vaccine, the Connecticut Department of Public Health (DPH) conducted a descriptive epidemiological analysis of the most recent 10 years of cervical cancer data from the Connecticut Tumor Registry. Only data on cervical cancer, not carcinoma in situ, was included in the analysis. For overall and late-stage disease, incidence rates and relative rates were analyzed by age, race, ethnicity and urban residence (residence in one of the five towns with >100,000 people). Incidence rates were calculated using census data and intercensus estimates.

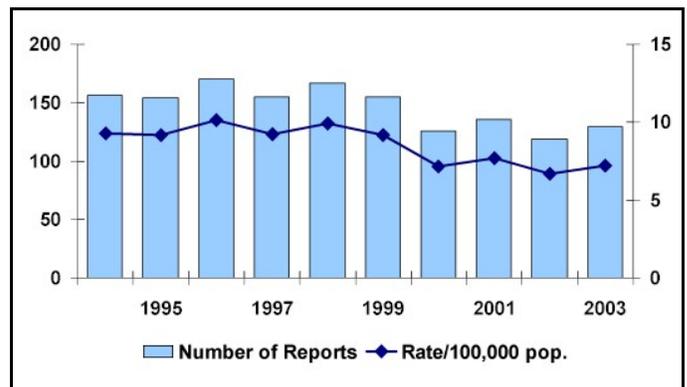
A total of 1467 cases of malignant cervical cancer were diagnosed during 1994–2003 in Connecticut residents. The median age of cases was 50 years (range: 18–104 years). Late-stage diagnoses accounted for 16% of all cases. At the time of this analysis, just over one-third of the patients in the database had died and at least 44% had a cause of death attributable to their cervical cancer diagnosis.

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An average of 147 cases of cervical cancer were reported each year with an overall annual incidence rate of 8.4 cases per 100,000 population (Figure 1). Both the number of cases reported and the annual incidence rate decreased over the 10-year period. Incidence for overall and late-stage disease was highest among women aged 60–64 years.

Figure 1. Cervical Cancer Reports and Annual Incidence Rates, Connecticut, 1994-2003



Overall, persons of white race accounted for 84.5% of all cases, while persons of black race accounted for 12.5% of all cases. Cases described as being of Hispanic ethnicity increased from 7.1% in 1994 to 18.6% in 2003 ($p < 0.01$). Overall incidence rates were higher for persons of Hispanic ethnicity, of black race, and for urban residents compared to the overall rate (10.0, 11.3 and 12.1/100,000 respectively).

Incidence rates for these three groups were analyzed for the latter five years of data (1999–2003) and cases were divided by those younger than 40 years and those 40 years and older. For women younger than 40 years, those most likely to have been infected at a young age, Hispanic, black

Table 1. Cervical Cancer Incidence Rates by Age Group and Race-ethnicity, Connecticut, 1999-2003

	Age <40 years		Age ≥40 years	
	Incidence*	RR**	Incidence	RR
Overall	1.6		5.9	
White Race	1.4	reference	6.1	reference
Black Race	2.3	1.6	8.4	1.4
Hispanic Ethnicity	4.0	2.9	7.2	1.2
Urban Residence	2.5	1.8	8.5	1.4

* Per 100,000 women in specified age and race or ethnic group
** Rate Ratio

or urban residents were 2.9, 1.6 and 1.8 times more likely than white women to be diagnosed with cervical cancer (Table 1).

Reported by: L Sosa MD, J Hadler MD, MPH, Epidemiology and Emerging Infections Program, Connecticut Department of Public Health.

Editorial Note:

In 2007, it is estimated that 11,150 new cases of invasive cervical cancer will be diagnosed in the United States. Approximately 3670 women will die that same year as a result of this disease (4). Given that 25% of girls report being sexually active by age 15 years (5) and the rapid rate at which exposure to HPV occurs after sexual debut, it is essential to vaccinate girls aged 11-12 years to get full benefit of the vaccine. However, given the spectrum of onset of sexual debut and the fact that exposure to HPV types 16 and 18 may not occur immediately, it is also important to make vaccine available to all females aged 13-26 years, particularly teenagers in recognized risk groups.

In Connecticut, the data on cervical cancer, as well as other sexually transmitted diseases such as gonorrhea and chlamydia, show that Hispanic and black teenage females are at particular risk. Thus, efforts should be made to target them with HPV vaccine.

HPV vaccine is available through the federally funded Vaccines for Children (VFC) Program for qualifying females aged 9-18 years from any

provider who participates in the VFC Program. For more information on HPV vaccine, please contact the DPH Immunizations Program at 860-509-7929.

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Outbreak of Gastroenteritis Associated with Consumption of Chopped Barbeque Pork, Connecticut, 2006

In August 2006, the Connecticut Department of Public Health (DPH) was notified of a possible outbreak of gastrointestinal illness involving employees at a business (Business A). Ill employees had attended an onsite luncheon catered by a local restaurant. Food was served buffet style in a conference room at Business A and over several hours. The menu included macaroni and cheese, rice, beans, corn, fried chicken, and chopped barbeque pork. Because of the possibility of a foodborne outbreak, staff from the DPH and the local health department conducted an epidemiological and environmental investigation.

Contact information was available for 52 (87%) of 60 luncheon attendees. Interviews were conducted in-person and by telephone and included questions about demographics, illness history, and food consumption. A case was defined as vomiting and/or diarrhea (≥ 2 episodes in a 24 hour period) in a person who attended the luncheon on August 30, 2006 and subsequently developed illness with onset between August 30 and August 31. Of the 52 attendees interviewed, 29 (56%) had illnesses consistent with the case definition: 27 (93%) had diarrhea, 27 (93%) nausea, 26 (90%) cramps, 20 (69%) vomiting, 20 (69%) headache, 9 (31%) chills, 6 (21%) fever and 4 (14%) muscle aches. The

median age was 47 years (range 21 - 66 years); 27 (93%) were female. The median incubation period was 4.5 hours (range 1-14.5 hours); the median duration of illness was 1 day (range 1 - 2 days). Of those who were ill, 18 (62%) sought medical care for their illness; 16 were evaluated at local hospital emergency departments, and one was hospitalized. None of the 52 attendees interviewed reported any gastrointestinal symptoms (including vomiting and/or diarrhea) in the week before the catered luncheon, or any other common food exposures.

Persons who ate chopped barbeque pork served at the luncheon were more likely to become ill (risk ratio [RR] = 4.60, 95% confidence interval [CI] = 1.63-13.03, p-value [p] < 0.0001) than those who did not eat the food item. Illness was also associated with drinking bottled water (RR=1.61, 95% CI=1.02-2.54, p=0.0467). After stratification, consumption of the barbeque pork remained significantly associated with illness independent of water consumption (RR=4.79, 95%CI=1.48-15.53, p=0.0002).

Interviews with food preparation staff from the restaurant found no ill food handlers. Stool specimens collected from 14 food handlers and five luncheon attendees all tested negative for *Bacillus cereus*, *Campylobacter*, *Escherichia coli* O157, *Salmonella* and *Shigella*, and norovirus. *Clostridium perfringens* testing was performed on four of the five luncheon attendee specimens; all were negative.

Local health department staff collected samples of food items served at the luncheon. DPH Laboratory testing of the chopped barbeque pork was negative for *Bacillus cereus*, *Staphylococcus aureus*, and staphylococcal enterotoxin. *Enterococcus* (270,000/gram) was isolated.

As part of the environmental investigation, preparation of the chopped barbeque pork was observed. Six pork shoulders (approximately 50 lbs) were cooked for 4 hours beginning at 8:30 am. The chef determined doneness by sight and touch. If no obvious blood was seen, and the meat was easily pulled away from the bone, it was considered cooked. Temperatures of the cooked pork shoulders, as determined by the investigator, ranged from 168° to 188°. Depending on the ambient temperature of the room, the pork remained at room temperature for at least 30 minutes to allow it to cool to touch. The hand sink

located in the preparation area had been inoperable for > 1 week.

At 1:00 pm, the chef started to separate the pork from the bones. The pork was then chopped, and placed in a plastic pan approximately 6" x 18" x 24". The height of the chopped pork in the plastic pan was approximately 4 inches. The entire process took 75 minutes for all six pork shoulders. The chef then prepared the spice mixture (crushed pepper, sugar, vinegar, and salt) and mixed it with the pork using gloved hands. When this was completed, the temperature of the pork was again taken and measured 91°F. While gloves were worn during this demonstration, gloves were not worn before the outbreak. In addition, no hand washing occurred during this entire process.

The pan of chopped pork was refrigerated overnight in an empty, walk-in cooler with a set temperature of 43.7°F. At 7:15 am the following morning, the local health department recorded the pork temperature to be 42°F. No additional temperatures were taken.

On the day of the luncheon, the pork may have been combined with a batch of chopped pork prepared two days earlier. The pork was then reheated at 10:30 am for approximately 30 minutes. After reheating, the chopped pork was put into a 4-inch-high catering pan, transported by van, and delivered to Business A at 12:00 noon. Employees consumed the food between 12:30 pm – 2:00 pm. No warming plates were used for any of the luncheon food items during transportation from the restaurant to Business A or during the luncheon itself.

A small portion of the chopped pork was served to patrons who dined at the restaurant. No complaints of illness from restaurant patrons were received.

Reported by: D Mlynarski, MPH, T Rabatsky-Ehr, MS, MPH, Q Phan, MPH, P Mshar, MPH, Epidemiology and Emerging Infections Program, DPH; T Weeks, MS, Food Protection Program, DPH; C Welles, A Kinney, State Laboratory, DPH.

Editorial Note:

While no etiologic agent was identified in this outbreak, the symptoms, estimated short incubation period, and duration of illness are consistent with a toxin-mediated illness. DPH Laboratory testing of the chopped barbeque pork was negative for *B. cereus*, *Staphylococcus aureus* and staphylococcal

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enterotoxin. *Enterococcus*, a type of bacterium normally found in the feces of humans and animals, was isolated from the pork (270,000 organisms gram), although how the pork was contaminated remains unknown.

The chopped barbecue pork was the only food item associated with illness. Inadequate hand washing and bare-hand contact identified during the environmental investigation may have allowed a toxin-mediated pathogen to be introduced. Time and temperature abuse during the holding and cooling stages may have allowed the pathogen to proliferate in the chopped pork, and the toxin to be released. The pan of chopped pork was placed in a 43.7°F empty, walk-in cooler. A walk in cooler that is intended to hold a large quantity of foods below 45°F would normally have an ambient temperature well below 43.7°F when empty. In addition, because of the large volume and depth of the food products, and the higher than normal temperature of the empty walk in cooler, the pork may not have reached the required 6-hour cooling temperature of < 45°F.

This outbreak emphasizes the importance of proper food preparation, handling, heating, and cooling techniques. The environmental investigation of the restaurant identified factors that may have contributed to the outbreak, such as non-use of gloves and no hand washing. These factors are frequently observed in outbreaks resulting from foodborne intoxications. Portioning large amounts of food into several small, shallow containers allows for quicker cooling during refrigeration, discouraging bacterial proliferation. Reheated foods should be kept at proper temperatures during transport and holding if they are not consumed immediately. Failure to observe these practices may result in increased risk of foodborne illness.

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Infectious Diseases Section Director

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Connecticut Epidemiologist

Editor: Matthew L. Cartter, MD, MPH

Assistant Editor & Producer:
Starr-Hope Ertel