



COMMONWEALTH of VIRGINIA

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June 1, 2015

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Suspected Cancer Cluster Analysis

Summary of Findings

Introduction

An official in the risk management office of the Fairfax County government contacted the Fairfax Health District in early March of 2015 regarding a suspected cancer cluster at the Franconia District Police Station in the County. The official also contacted the Virginia Cancer Registry in the Virginia Department of Health in Richmond concerning the same issue. As a result of these contacts, public health staff in the district and at the cancer registry cooperated on actions to address the concern. The partnering agencies collected and analyzed data and prepared a summary report. This document is the report; it consists of one section on methods employed and one that discusses results of the analysis. A fact sheet comprises a condensed version of material presented in this summary.

Methodology

Officials in the Fairfax Health District received information in March 2015 about 12 cancer cases diagnosed among Franconia District Police Station officers. Station staff were concerned that a cancer cluster existed and contacted the Health District office for help. The Health District in turn coordinated with the Virginia Department of Health (VDH) central office to analyze the suspected cluster. The VDH office that did the analysis is the Virginia Cancer Registry (VCR). Virginia law requires VCR to collect, analyze, and store reports for all Virginians who are diagnosed with or treated for cancer. Using its store of case records, VCR produces information and statistics about cancer in the Commonwealth. Public health officials use the VCR products to help set policy and to investigate suspected cancer clusters, among other uses.

To understand who is affected when citizens report a suspected cancer clusters to VDH, certain information needs to be collected for each patient. This information includes name, sex,

birth date, the diagnosed cancer, the date of diagnosis, the diagnosing facility, and other incidental facts. In this instance, the suspected cluster centered on police officers working from the Franconia District Police Station.

One patient requested that VDH staff remove his case from the group because the date of diagnosis was prior to employment with the county. Therefore, the suspected cluster constituted 11 cases. These 11 cases included 3 colorectal, 1 bone marrow, 1 brain cancer, 1 prostate case, and 1 cancer of the thymus. Franconia Station staff collected case information that they then sent to the health department. Patients self-reported their cancer diagnoses. Franconia Station officials were not able to collect complete information on two cases that were diagnosed and treated in Maryland and were not able to obtain any information, other than patient names, for two cases. Given these limitations, the analysis of cases from the site included seven cases.

To detect whether a cancer cluster exists, an epidemiologist defines a geographic area of concern. For the Franconia Station, VDH staff selected three US Census tracts. The selected tracts included the one Franconia Station is in, and two tracts that border the first on the east and west. The next section describes the results.

Results

Census tracts are units the US Census Bureau defines for conducting the ten-year census. The Bureau counts the population of every tract. VCR selected three tracts that surround Franconia Station and used the population numbers to analyze cancer incidence. For the period 2002 – 2011, the cancer registry has reports of 328 cancers of all types in the combined tract area (Table 1, below). Colorectal cancers were 9.8 percent of all cancers. Cancers of the brain were 1.2 percent of the total and lymphomas and thymus cancers were 0.3 percent each. A statistical analysis of these census tracts compared to the entire state showed that the incidence of these cancers was either not different from or was significantly lower than the state incidence for each site. This important evidence strongly suggests that no cancer cluster exists.

The data obtained from the police department and the data for the three census tracts analyzed do not provide evidence of a cancer cluster. The conclusion about cancers among Franconia Station officers is founded on answers to three questions:

1. Are the cancers unusual? No, colorectal, bone marrow (a cancer of the blood), prostate, and brain cancer are not unusual cancers. Only thymus cancer is a less common type. Of the 7 patients for whom age at diagnosis and site are known, 71.4% are common cancers for patients of these ages.
2. Did the cases occur among people who, because of their ages, are unlikely to develop cancer? No, over two thirds of the cases were diagnosed after age 35. Age is a risk factor strongly associated with the likelihood that a person will develop cancer. The age-adjusted cancer rate for all cancers in the US between 2002 and 2011 increased 52% in the 35-39 age group over the 30-34 group. For the 40-44 age group, the rate increase was 64% over the 30-34 group, and the increase in the 45-49 group was 63% higher than the 40-44 group. Of the 7 patients for whom age at diagnosis and site are

known, 71.4% were diagnosed at ages when cancer diagnoses begin to increase

- Do the cancers share risk factors? No, the risk factors associated with the seven cancers are diverse. The one exception is the thymus case, for which scientists have not identified a strong risk factor. see table 2

A risk factor is a personal behavior or an agent that scientists know is associated with a type of cancer. Tobacco and lung cancer and ultraviolet (UV) light and skin cancer are two examples of risk factors associated with particular cancers (see Table 2, below).

For actual cancer clusters, scientists expect to identify a risk factor that is common to the cancers in the suspected cluster. This is not the case with the cancers in the Franconia Police Station group. Neither was it the case in the analysis of the census tract data. If a common risk factor exists, it is not identifiable from the information available.

Table 1. Age-adjusted malignant cancer rates and counts for selected Fairfax County, VA census tracts, Fairfax County, and Virginia, 2002 - 2011

Cancer Site	Tracts 4202.01, 4210.01, 4223.02 Rate	Tracts 4202.01, 4210.01, 4223.02 Count	Fairfax County Rate	Fairfax County Count	Virginia Rate	Virginia Count
Breast (Female Only)	106.73	64	126.25	7,141	123.66	53,197
Prostate	99.54	53	135.13	6,274	149.41	53,805
Lung and Bronchus	47.52	39	45.77	4,040	66.82	51,214
Colon and Rectum	34.50	32	36.69	3,450	43.79	33,774
Corpus and Uterus, NOS	~	~	11.92	1,278	11.49	9,347
Bladder	~	~	18.66	1,656	18.93	14,315
Melanoma of the Skin	~	~	18.37	1,868	21.60	16,880
Non-Hodgkin Lymphoma	~	~	16.70	1,603	17.31	13,390
Kidney and Renal Pelvis	~	~	10.88	1,092	13.97	11,093
Thyroid	~	~	14.57	1,629	9.88	7,906
Thymus	~	~	0.29	31	0.29	233
Brain	~	~	5.92	614	6.17	4,814
Hematopoietic and Reticuloendothelial Systems	~	12	15.85	1,487	20.33	15,412
All Sites	304.33	328	402.14	39,650	447.53	350,282

~ Case counts from 1 to 10 are suppressed to protect patient confidentiality. Rates for case counts between 1 and 15 are not calculated because small case numbers make such rates unstable and difficult to interpret. Source: Virginia Cancer Registry, Virginia Department of Health, May 2015.

Franconia District Police Station Suspected Cancer Cluster Fact Sheet

As of May 12, 2015, the Virginia Cancer Registry had compiled name, race, date of birth, date of diagnosis, age at diagnosis, and cancer site codes for 7 of the 11 cases reported from Franconia Station. Information about the remaining 4 cases was not available. VCR follows the World Health Organization's cancer classification system, which is the *International Classification of Disease - Oncology, version 3 (ICD-O-3)*. All cancer registries in the US use this standard.

To analyze a suspected cancer cluster, epidemiologists compare cancer incidence in the cluster area to incidence in a comparison area. They divide the number of cases (incidence) by the number of people at risk (the total resident population) in the cluster area. They then multiply this fraction by a standard age percentage the US Census Bureau defines. The result is an age-adjusted rate. The risk of cancer increases as people age. Because age-adjusting removes the effect of age on cancer rates, scientists can compare areas directly, even if their age structures are different. For example, in Fairfax Health District between 2007 and 2011, the age-adjusted rate for all cancers was 397.2 per 100,000 compared to 443.9 per 100,000 in Virginia.

The number of reported Franconia Police Station cancers is 11 but only seven cases had information sufficient for analysis. This small number of cases hinders statistical analysis. Further, defining a suitable geographic area, which is necessary to count the resident population was not possible. Because VCR analysts could not define a resident population, they could not calculate age-adjusted rates for Franconia Station.

The small number of cases and the inability to calculate age-adjusted rates limited analysis to cases counts, percents, and risk factor associations. Conclusions based on these measures are not as precise as ones that use age-adjusted rates, but they do provide a good sense of whether a cancer cluster could exist. Answers to the three questions posed above provide the necessary context:

1. Are the cancers unusual? No, colorectal, bone marrow (a cancer of the blood), prostate, and brain cancer are not unusual cancers. Only thymus cancer is a less common type.
2. Did the cases occur among people who, because of their ages, are unlikely to develop cancer? No, over two thirds of the cases were diagnosed after age 35. Age is a risk factor strongly associated with the likelihood that a person will develop cancer. The age-adjusted cancer rate for all cancers in the US between 2002 and 2011 increased 52% in the 35-39 age group over the 30-34 group. For the 40-44 age group, the rate increase was 64% over the 30-34 group, and the increase in the 45-49 group was 63% higher than the 40-44 group.
3. Do the cancers share risk factors? No, the risk factors associated with the seven cancers are diverse. The one exception is the thymus case, for which scientists have

not identified a strong risk factor.

Analyzing the information available leads to the conclusion that a cancer cluster does not exist at the Franconia District Police Station.

Does the evidence show a need for further study? It does not. A more thorough study would require work that is exacting and demanding, costly and complex. Detailed information about each patient's case would be required. Compiling patient medical histories from hospital and physician office records is necessary. Recording family cancer histories is also necessary. Patient exposure to environmental risks and patient behaviors, such as smoking or tanning, need to be identified, measured, and evaluated. For some cancers, analysis of the patient's genetic makeup would be needed. Specialists would need to investigate the working environment carefully. The goal of such an investigation would be to identify a risk factor common to the cancer types reported. The evidence already developed and evaluated does not warrant taking these steps. The available data do not provide evidence that a cancer cluster exists at Franconia Station.

Table 2: Identified Risk Factors for Cancers Reported from Fairfax County, VA Census Tracts 4202.01, 4210.01, and 4223.02 by Site, Risk, and National Cancer Institute Source Information

Cancer Site	Risk Factor										
	smoking / tobacco	alcohol	UV radiation	ionizing radiation	radon gas	obesity	environment exposure	age	genetics / family	reproductive factors	
Breast (Female Only)		x		x				x	x		
Prostate								x			
Lung	x			x			x				
Colorectal	x	x			x				x		
Uterine					x				x		
Bladder	x			x			x			x	
Melanoma							x				
Non-Hodgkin Lymphoma			x								
Kidney									x		
Thyroid						x			x		
Thymus									x		
Brain											
Hematopoietic and Reticuloendothelial Leukemia (hematopoietic)	x			x							

Cancer Site	NCI source link
Breast (Female Only)	http://www.cancer.gov/cancertopics/types/breast/risk-fact-sheet
Prostate	http://www.cancer.gov/cancertopics/prevention-genetics-causes/prostate
Lung	http://www.cancer.gov/cancertopics/pdq/prevention/lung/HealthProfessional#_172_toc
Colorectal	http://www.cancer.gov/cancertopics/pdq/prevention/colorectal/HealthProfessional
Uterine	http://www.cancer.gov/cancertopics/types/uterine
Bladder	http://www.cancer.gov/cancertopics/pdq/treatment/bladder/HealthProfessional#_17_toc
Melanoma	http://www.cancer.gov/cancertopics/pdq/prevention/skin/HealthProfessional#_186_toc
Non-Hodgkin Lymphoma	http://www.cancer.gov/newscenter/cancerresearchnews/2012/EarlyLifeNHLRiskFactors
Kidney	http://www.cancer.gov/newscenter/cancerresearchnews/2011/NonHodgkinLymphomaRiskFactors
Thyroid	http://www.cancer.gov/publications/patient-education/WYNTK_Kidney.pdf
Thymus	http://www.cancer.gov/cancertopics/pdq/treatment/thyroid/HealthProfessional
Brain	http://www.cancer.gov/cancertopics/pdq/treatment/thymoma/HealthProfessional#_261_toc
Hematopoietic and Reticuloendothelial Leukemia (hematopoietic)	http://www.cancer.gov/publications/patient-education/brain.pdf
	http://www.cancer.gov/cancertopics/types/leukemia