

2019 NPCR PENNSYLVANIA SUCCESS STORY

Pennsylvania Cancer Registry: Wendy Aldinger, RHIA, CTR

Ewing's Family of Tumors, Childhood Cancer, and Radiation-Related Cancer Incidence Review

NATIONAL PROGRAM OF CANCER REGISTRIES SUCCESS STORY

SUMMARY:

We used cancer registry data for cancer cluster initial assessment to address public concerns. A suspected cancer cluster investigation report was created using Pennsylvania Cancer Registry (PCR) data. The report compared the cancer incidence rate in the concerned area to the rest of the state via three time periods. We concluded the cancer incidence rates analyzed in the report in the area of concern were not statistically higher than the reference area. The report was disseminated via email and the department website to the general public and reporters.

CHALLENGE:

Cancer cluster is a major concern in Pennsylvania with many historical industrial contamination sites. We receive many inquiries about suspected cancer clusters from concerned citizens, reporters, and health practitioners, especially from areas with historical environmental contaminations or current suspected possible hazardous environmental exposures. While environmental assessment on suspected environmental exposure is important, health outcome analysis including cancer cluster evaluation usually are the critical concerns.

Since the first story on Ewing's sarcoma aired on news channel WPXI on Feb. 13, 2019 (<https://www.wpxi.com/news/investigates/former-student-diagnosed-with-rare-cancer-that-killed-classmate/919279319>), the state health department has received many calls from concerned parents regarding the potential cancer cluster in the area. The news reported multiple children in Canon-McMillan School District, Washington County, had been diagnosed with Ewing's sarcoma, and several parents came forward saying their children were also diagnosed with the same disease. Residents in the area were concerned and thought all the cases occurred in the same area over a very short period, since the news report did not state the location of the cases or when they were diagnosed.

Ewing's sarcoma incidence rate was explained by a UPMC oncologist as rare type cancer with incidence rate of 3 per million children and only about 200 children are diagnosed each year in the United States. This incidence only account for Ewing's sarcoma of the bones and does not include extraosseous (or extra-skeletal) Ewing's sarcomas. However, Ewing's sarcoma of the bone is thought to only represent about 80 percent of all Ewing's family of tumors (EFOT). The incidence rate for the broad grouping of Ewing's family of sarcomas in the United States was expected to be higher.

Upon the initial news reporting, inquiries from the general public in the area surged and responding to their concerns, educating the general public, easing their concerns with scientific evidence based on data become an important public health priority.

SOLUTION:

Cancer registry data were used to compare cancer incidence in the area with the cancer incidence with the rest of the state as a reference following CDC's cancer cluster investigation guidelines. Upon the initial news reporting and subsequent inquiries from the general public, we learned citizens from the area were also concerned about historical radiation-related environmental issues in the area; Canonsburg and vicinity had a uranium processing plant, and a disposal area under federal agency oversight remains. (https://www.lm.doe.gov/Canonsburg/Fact_Sheet_-_Canonsburg.pdf, <https://www.nrc.gov/docs/ML1117/ML11172A144.pdf>, <https://www.nytimes.com/1982/09/12/us/town-lives-with-uranium-wastes-and-fears.html>).

Even though radiation is not a known risk factor for Ewing's family of sarcomas, we also included radiation-related cancer analyses in the report. Childhood cancer analysis was also included to addresses parents' concerns about childhood cancers. Cancer data were analyzed in three time periods: 1985-1994, 1995-2004 and 2005-2017. These three time periods were used to assess cancer incidence trends over time. This analysis used the mid-time period census population (1990, 2000 and 2010 census data) for age-adjustment. Age-adjusted standardized incidence ratios (SIRs) for cancers and their 95% confidence intervals (CIs) for Washington County and Canon-McMillan School District residents were calculated, respectively, by sex to determine whether the residents experienced a statistically significant excess of cancer incidence compared to the rest of the Pennsylvania population.

We geocoded all cases of childhood EFOT using the patients' address at the time of diagnosis. A case density map was created using the point density method in ArcGIS (ESRI 2019 (See Figure 1). ArcGIS Desktop: Release 10.4.1. Redlands, CA: Environmental Systems Research Institute). A spatial cluster analysis using Getis-Ord General G-Statistics is used to identify any hotspots for childhood EFOT in the state.

The results were posted as a report on the state health department's website and sent to reporters and state representatives. Individual inquires or public with questions about the report via phone were also addressed by epidemiologists in the department. Public meetings were also scheduled to answer their questions.

RESULTS:

EFOT incidence: There were no EFOT cases reported during the first two time periods. There were three cases reported during the 2005-2017 time period; incidence rates based on these small number of cases were considered unstable and were not statistically significantly different from the rest of the state.

Childhood cancer incidence:

Both female and male childhood cancer incidence rates were not statistically significantly different from the rest of the state during any of the three time periods.

Childhood cancer incidence rates in the school district decreased during the last two time periods.

All cancers (children plus adults) incidence: The male incidence rates for all cancers (children plus adults) combined were 10 percent (SIR = 0.90, 95% CI: 0.84, 0.97) and 9 percent (SIR = 0.91, 95% CI: 0.85, 0.97) lower than the rest of the state during 1985 to 1994 and 1995 to 2004; however, the all cancer rate for males was not statistically significantly different from the rest of the state during 2005 to 2017. The female incidence rate for all cancers (children plus adults) combined was 11 percent (SIR = 0.89, 95% CI: 0.83, 0.96) lower than the rest of the state during 1985 to 1994; however, it was not statistically significantly different from the rest of the state during the other two time periods.

Radiation-related cancer (children plus adults) incidence: The female and total population's liver cancer incidence rates were 191 percent (SIR = 2.91, 95% CI: 1.33, 5.53) and 97 percent (SIR = 1.97, 95% CI: 1.15, 3.15) higher than the rest of the state during 1985 to 1994; however, the female liver cancer incidence rate was not statistically significantly different from the rest of the state during the other two time periods. The male liver cancer incidence rate gradually decreased over the three time periods and was 47 percent lower than the rest of the state during 2005-2017 (SIR = 0.53, 95% CI: 0.31, 0.85). The male myeloma incidence rate was 88 percent (SIR = 1.88, 95% CI: 1.05, 3.09) higher than the rest of the state during 1985 to 1994; however, it decreased during the latter two time periods. The female myeloma incidence rate was not statistically significantly different from the rest of the state during any of the three time periods. The male stomach cancer incidence rate gradually increased over the three time periods, and it was not statistically significantly different from the rest of the state during any of the three time periods. The female stomach cancer incidence rates were consistently higher during the three time periods, and it was statistically significantly higher (65 percent, SIR = 1.65, 95% CI: 1.05, 2.48) than the rest of the state during 2005 to 2017.

All childhood EFOT were geocoded using patients' addresses at the time of diagnosis. A case density map was created using the point density method in ArcGIS. The EFOT density distribution is consistent with the population density distribution of children in the state. More childhood EFOT cases were found in areas with more children. A spatial cluster analysis using Getis-Ord General G-Statistics did not find any hotspots for childhood EFOT in the state.

Conclusion: no conclusive findings indicating that the incidence rates of Ewing's family of tumors in area for female and male populations were consistently and statistically significantly higher than the rest of the state over the time periods reviewed. However, we will take seriously the concerns about EFOT and pediatric cancers raised by this community and other communities in the Commonwealth and will work closely with them on their health concerns.

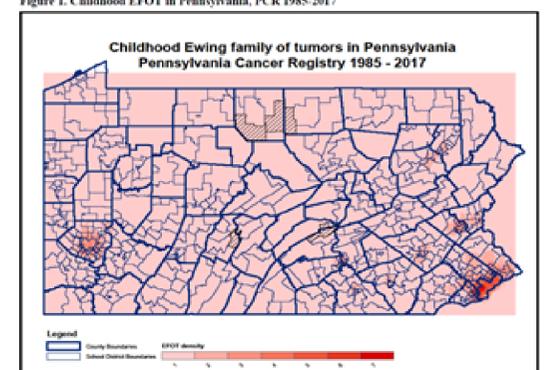
SUSTAINING SUCCESS:

Systemic review of cancer registry data could be performed with experienced cancer epidemiologist, especially in areas with historical hazardous environmental exposures. Trainings about cancer registry data and analysis could be implemented for public health practitioners. General education about cancer cluster via different methods could be performed for general public.

CONTACT INFORMATION:

Phone: 1-800-272-1850
Website: <https://www.health.pa.gov/topics/Reporting-Registries/Cancer-Registry>

Figure 1. Childhood EFOT in Pennsylvania, PCR 1985-2017



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