Occupational Cancer – Cancer Clusters

Scenario

Three members of the staff of an elementary school were diagnosed with cancer over a two-year period; one person each with brain, liver, and ovarian cancer. Further inquiries led to the realization that four cases of breast cancer had also been recently diagnosed. Increased concern among employees regarding the potential association between the workplace and the cancers prompted a request for an investigation. The information below addresses clusters in general and provides information useful in responding to this type of scenario.

Health events, including cancers, often appear to occur in a cluster, which scientists define as an unusual concentration of health events in a defined area or time period. Concerns related to a cluster may also be raised when such health events occur among a group of workers. The CDC has provided “Guidelines for Investigating Clusters of Health Events” which is helpful in evaluating potential clusters of illness(1). The following discussion relates to how some of the principles of cluster evaluations can be applied to the scenario provided above. The discussion can be helpful in determining whether the cases of cancer may have a common cause or may be the coincidental occurrence of unrelated causes.

What do we look for when evaluating a cancer cluster?

Because cancer is a common disease, cancer can be found among people at any workplace. In the United States, over their lifetime, approximately one in two men and one in three women will develop or die from cancer(2). These statistics show the unfortunate reality that cancer occurs more often than many people realize. Disease or tumor rates may be variable in small populations (such as in a county) and rarely match the overall rate for a larger area (such as a state) so that, for any given time period, some populations have rates above the overall rate and others have rates below the overall rate. Although the occurrence of a health event may be random, the distribution of that health event within some specific group may not be uniform. So, even when there is an excess apparent within some defined (smaller) group, this may still be completely consistent with expected random variability of the population as a whole.

In the scenario above, 95 staff members had worked at the school since it opened in 1992. Excluding cancers of the skin, breast cancer is the most frequently diagnosed cancer in women(2). Because the school’s workforce was primarily composed of women, it was not unusual to see several cases of breast cancer. Although these breast cancers were diagnosed within a relatively short time frame, this made sense given the age of the staff and the age distribution for breast cancer.

Cancer clusters related to a workplace exposure usually consist of the same types of cancer. When several cases of the same type of cancer occur and that type is not common in the general population, it is more likely that an occupational exposure is involved. When the cluster consists of multiple types of cancer, without one type predominating, an occupational cause of the cluster is less likely. When cancer in a workplace is described, learning whether the type of cancer is a primary cancer or a metastasis (spread of the primary cancer into other organs) is important. Only primary cancers are used to investigate a cancer cluster.

In our example, four types of cancer were diagnosed among the elementary school staff.

When a known or suspected cancer-causing agent is present and the types of cancer occurring have been linked with these exposures in other settings, we are more likely to make the connection between cancer and a workplace exposure. For example, asbestos can be a concern in older buildings, but while it is known to cause lung cancer and mesothelioma, it is not

known to cause the types of cancer reported among this group of employees. We also look to see whether cancer is occurring among employees in particular jobs or areas of the workplace. This can help to identify potential exposures that had been previously unrecognized.

The time between first exposure to a cancer-causing agent and clinical recognition of the disease is called the latency period. Latency periods vary by cancer type, but for some cancers may be 15 to 20 years or longer. Because of this, past exposures are more relevant than current exposures as potential causes of cancers occurring in workers today. Often, these exposures are hard to document.

The average time from first employment in the school to the diagnosis of cancer among staff members in the elementary school in our example was 5.7 years.

Conclusions for the scenario above:

The distribution of types of cancer did not appear unusual given the age and gender of the employees. No known biologically significant exposures were identified. The building only became occupied six years prior to the concerns being raised; therefore, given what we know about latency periods, none of the cancer cases met the latency criterion. Given this information, it was concluded that the cancers reported among these workers were unlikely to be the result of employment at the elementary school.

This scenario illustrates some of the key questions that are typically addressed in response to cancer cluster inquiries.

Citations

1. Centers for Disease Control and Prevention. Guidelines for investigating clusters of health events. MMWR 1990;39(RR-11):1-16. Available at : https://www.cdc.gov/mmwr/preview/mmwrhtml/00001797.htm

2. American Cancer Society, Cancer Facts and Figures 2012 http://www.cancer.org/acs/groups/content/@epidemiologysurveilance/documents/document/acspc-031941.pdf

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