Understanding Statistics Used to Estimate Risk and Recommend Screening [1]

This section has been reviewed and approved by the Cancer.Net Editorial Board [2], 02/2014

Key Messages

- Statistics are used to help doctors understand who is at risk for cancer.
- Several types of statistics are used to determine cancer risk for large groups of people: incidence, prevalence, and mortality.
- Understanding your risk of cancer can help you receive appropriate screening tests and make lifestyle choices to lower your cancer risk.

Many people may want to know their individual risk of being diagnosed with cancer. Statistics are used to determine the risk of cancer for groups of people and are often helpful to estimate your risk of cancer based on individual aspects that are similar to the groups at risk. However, statistics cannot tell you if you will develop cancer. Read below to learn more about the types of statistics used to estimate cancer risk.

Estimating how many people will be diagnosed with cancer during the year

Incidence is used to determine an *estimate* of the number of the people diagnosed with cancer in a given population (for example, all men in the United States) over a specific period of time (typically one year). Expected incidence of cancer cases for the current year is calculated by using the number of cancer cases that occurred each year over a range of years and fitting those numbers to a statistical model, which predicts the number of new cases that are expected for the current year. The range may be used differently in different statistical reports and for different types of statistics.

Example: In the American Cancer Society?s publication, *Cancer Facts & Figures 2014,* the estimated cancer incidence for 2014 was calculated by using the number of cancer cases from 1995 to 2010.

Incidence is frequently given as an **incidence rate** that states the number of people *estimated* to be diagnosed with cancer per 100,000 people.

Example: The estimated 2014 incidence rate for prostate cancer in the United States is 146.6, which means that almost 147 out of every 100,000 men in the United States are expected to be diagnosed with prostate cancer in 2014.

Incidence is often stated as an **age-adjusted incidence rate**. The number of people who fall into different age groups varies (for example, there are many more 30 to 40 year olds than 80 to 90 year olds). This is referred to as *age distribution*. Incidence rates can be adjusted to account for these age distribution differences so that populations can be compared.

Example: Florida has a large number of older adults, while most people who live in Alaska, by comparison, are young. Because the incidence of breast cancer increases with age, the annual *absolute* incidence rate of invasive breast cancer is much higher in Florida than in Alaska. However, when adjusted for age, the annual age-adjusted incidence rate (cases per 100,000 women) for Alaska was higher than that of Florida from 2006-2010: 114.3 in Florida compared with 127.7 in Alaska.

Incidence statistics can be given for large populations, such as all people in the United States, or for more specific population groups, such as only women ages 20 to 24. Large population statistics are usually estimates based on information collected from a smaller sample of the whole population. When these statistics describe particular population groups, they are usually referred to as ?specific.?

Example: The **age-specific incidence rate** for breast cancer in 20-year-olds to 24-year-olds is 1.5 (per 100,000 women).

Incidence statistics may also be given for several cancers combined, for specific types of cancer, for specific stages of a type of cancer, or for specific cancer risk factors (anything that increases a person?s chance of developing a type of cancer).

Calculating how many people have or have had cancer

Prevalence is used to describe the number of people in a specific population that have a certain type of cancer at a specific point in time. While incidence describes the estimated number of people *newly* diagnosed with cancer, prevalence can describe *all* people with cancer, including newly diagnosed and people who are being treated or who have been treated for cancer in the past. Prevalence can be expressed in terms of an absolute number or as a percentage.

Example: The estimated prevalence of ovarian cancer in the United States in 2012 was 186,138. This means that 186,138 of the women in the United States were living with or had a history of ovarian cancer.

Prevalence rates express the number of people with cancer per 100,000 people.

Example: The estimated prevalence rate for ovarian cancer in the United States in 2012 was about 117. This means, in 2009, almost 117 out of every 100,000 women were living with or had a history of ovarian cancer.

Like incidence, prevalence can also be used for large populations, specific population groups,

several cancers combined, specific types of cancer, specific stages of a type of cancer, or cancer risk factors.

Example: Genetic mutations in either one of two specific genes, *BRCA1* and *BRCA2*, are associated with increased breast cancer risk. It is estimated that the prevalence of mutations of one of these two genes is less than 1%. This means that less than 1% of women have a mutated *BRCA1* or *BRCA2* gene. However, the prevalence of a *BRCA* gene mutation among women with breast cancer is approximately 5% to 10%. This means that out of all women who have breast cancer, 5% to 10% have a *BRCA* gene mutation. The increased prevalence of *BRCA* gene mutations among women with breast cancer means that a woman with a *BRCA* gene mutation has an increased risk of breast cancer.

Calculating how many people die from cancer

In cancer statistics, **mortality** is used to describe the number of deaths from cancer during a specific time period. The cancer **mortality rate** describes the number of deaths from cancer per 100,000 people during a specific time period, usually one year. Mortality rates can be calculated for specific types of cancer and for specific subsets of the population (such as children under 12, smokers, or women with the *BRCA1* gene mutation). As with incidence rates, mortality rates can also be given as **age-adjusted mortality rates**.

Mortality rates can change dramatically with advances in treatment, screening, and prevention.

Example: The age-adjusted mortality rate for Hodgkin lymphoma in the United States in the early 1960s was greater than 1.55 (1.55 deaths per 100,000 people). Following the introduction of combination chemotherapy in the late 1960s, the rate dropped to less than 0.5 by the 1990s.

Estimating a person?s risk of cancer to recommend screening

By looking at the incidence and prevalence statistics for different types of cancer in various groups of people, researchers can estimate which groups of people may have an increased risk of developing certain types of cancer. Statistics tell us that older women are at higher risk for breast cancer than younger women, black men are at higher risk for prostate cancer than white men, and people who drink alcohol often are at higher risk for liver cancer than people who don?t drink alcohol.

Risk information from incidence and prevalence statistics is combined with mortality statistics to provide some of the basis for cancer screening recommendations.

Example: Prevalence and incidence statistics show that colorectal cancer is among the most common cancers in the United States. Age-specific prevalence and incidence rates also show that colorectal cancer is most common in people over age 50. The mortality rates for colorectal cancer show that treatment is much more successful when cancer is found early than if the cancer has spread. Therefore, combining these pieces of information, doctors recommend that routine screening for colorectal cancer begin at age 50 to increase the likelihood of prevention or early detection.

Other risk factors, such as family history, presence of other illnesses, and various lifestyle

factors, are also taken into account when making screening recommendations specific to an individual. Learn more about cancer risk factors [3].

Points to remember

- Statistics are estimates that describe trends in large numbers of people. Statistics *cannot* be used to predict what will actually happen to a single person.
- Incidence, prevalence, and mortality statistics for different cancer stages, age groups, or time periods can vary dramatically. People are encouraged to ask their doctor for the most appropriate statistics based on their individual medical condition.
- As with any medical information, talk with your doctor for clarification if cancer-related statistics seem unclear.

Statistics adapted from the American Cancer Society's publication, Cancer Facts & Figures 2014, *and the National Cancer Institute Surveillance Epidemiology and End Results (SEER) database.*

More Information

Understanding Statistics Used to Guide Prognosis and Evaluate Treatment [4]

Cancer Screening [5]

Understanding Cancer Risk [3]

Links:
[1] http://www.cancer.net/navigating-cancer-care/prevention-and-healthy-living/understanding-statistics-used-estimate-risk-and-recommend-screening
[2] http://www.cancer.net/about-us
[3] http://www.cancer.net/node/25007
[4] http://www.cancer.net/node/24961
[5] http://www.cancer.net/node/24972