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

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Researchers use statistics to determine the risk of cancer for groups of people. Statistics can also help estimate your risk of cancer based on individual aspects similar to the groups at risk. However, statistics can't 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 doctors will diagnose with cancer each year

Researchers use **incidence** to *estimate* the number of people diagnosed with cancer in a given population. The estimate covers a certain period of time, usually 1 year. To calculate the expected incidence of cancer for the current year, researchers:

- Find the number of people diagnosed with cancer each year over a range of years, then
- Fit those numbers to a statistical model that predicts the estimated number of people who will be diagnosed with cancer.

Researchers may use a different range in different statistical reports and for various types of statistics.

Example: Take the American Cancer Society's publication, *Cancer Facts & Figures 2016*. In it, researchers used looked at the number of people diagnosed with cancer from 1998 to 2012. These numbers were used to calculate the estimated cancer incidence for 2016.

Research reports often give incidence as an **incidence rate**. The rate is the estimated number of people who will develop cancer per 100,000 people.

Example: The estimated 2016 incidence rate for prostate cancer in the United States is 131.5. This means doctors will diagnose an estimated 131.5 out of every 100,000 men in the country with prostate cancer in 2016.

Research reports often state incidence 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. Researchers call this **age distribution**. They can adjust incidence rates to account for these age distribution differences so that they can compare populations.

Example: Florida has a large number of older adults. In comparison, most people who live in Alaska are young. However, the incidence of breast cancer increases with age. The result is that the annual **absolute incidence** rate of invasive breast cancer is higher in Florida than in Alaska. But when researchers adjust for age, the numbers change. The annual age-adjusted incidence rate (cases per 100,000 women) for Alaska was higher than that of Florida from 2008 to 2012. The rate was 115.2 in Florida compared with 125.5 in Alaska.

You can get incidence statistics for large populations, such as all people in the United States. You can also get them for more specific population groups, such as only for black women. 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, researchers often refer to them as "specific."

Example: The **specific incidence rate** for breast cancer in black women is 124.3, per 100,000 women.

You can also get incidence statistics for:

- Several cancers combined
- Specific age ranges
- Specific types of cancer
- Specific stages of a type of cancer

 Specific cancer risk factors — anything that increases a person's chance of developing a certain type of cancer

Calculating how many people have or have had cancer

Prevalence is the number of people in a specific population who have a certain cancer at a point in time. While incidence describes the estimated number of people *newly* diagnosed with cancer, prevalence can describe *all* people with cancer. The number includes the newly diagnosed and people receiving treatment or who had cancer treatment in the past. Researchers can express prevalence as an absolute number or as a percentage.

Example: The estimated prevalence of ovarian cancer in the United States in 2012 was 192,446. This means that 192,446 of the women in the United States were living with or had a history of ovarian cancer.

Prevalence rates are 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 121. This means, in 2012, almost 121 of every 100,000 women were living with or had a history of ovarian cancer.

Like incidence, researchers can also use prevalence for:

- Large populations
- Specific population groups
- Several cancers combined
- Specific types of cancer
- Specific stages of a type of cancer
- Cancer risk factors

Example: A woman with genetic mutations in either her *BRCA1* and *BRCA2* genes have a higher risk of breast cancer. The prevalence of mutations of 1 of these 2 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 around 5% to 10%.

This means that out of all women who have breast cancer, 5% to 10% have a *BRCA* gene mutation.

Calculating how many people die from cancer

In cancer statistics, **mortality** describes 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. That time period is usually 1 year. Researchers can calculate mortality rates for specific types of cancer and subsets of the population. Examples are children under 12, smokers, or women with the *BRCA1* gene mutation. Like incidence rates, researchers can give mortality rates as **age-adjusted mortality rates**.

Mortality rates can change greatly 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. That means there were 1.55 deaths per 100,000 people. Then doctors introduced combination chemotherapy in the late 1960s. As a result, the age-adjusted mortality rate dropped to 0.4, based on deaths between 2008 and 2012.

Estimating a person's risk of cancer to recommend screening

Researchers can estimate which groups of people may have an increased risk of developing certain types of cancer. To do so, they look at the incidence and prevalence statistics for different types of cancer in various groups. For example, 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.
- People who drink alcohol often are at higher risk for liver cancer than people who don't drink alcohol.

Some of the basis for cancer screening recommendations comes from combining incidence and prevalence statistics with mortality statistics.

Example: Prevalence and incidence statistics show that colorectal cancer is one of 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 treatment is much more successful when doctors find it early. Combing this information, doctors recommend that, for people of average risk, routine screening for colorectal cancer start at age 50. The goal is to increase the likelihood of prevention or early detection.

Doctors also consider other risk factors when recommending screening for a specific individual. Those can include family history, presence of other illnesses, and various lifestyle factors.

Points to remember

- Statistics are estimates that describe trends in large numbers of people. Doctors *can't* use statistics to predict what will actually happen to an individual.
- Incidence, prevalence, and mortality statistics for different cancer stages, age groups, or time periods can vary greatly. Ask your doctor for the most appropriate statistics based on your individual medical condition.
- Ask your doctor to explain cancer-related statistics that are unclear.

Statistics adapted from the American Cancer Society's publications, Cancer Facts & Figures 2016 and Breast Cancer Facts and Figures 2015-2016, and the National Cancer Institute Surveillance Epidemiology and End Results (SEER) database.

More Information

Understanding Statistics Used to Guide Prognosis and Evaluate Treatment [3]

Cancer Screening [4]

Understanding Cancer Risk [5]

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/24961

[4] http://www.cancer.net/node/24972

[5] http://www.cancer.net/node/25007