Research and Statistics: Case Reports, Anecdotal Evidence, and Descriptive Epidemiologic Studies in Pediatric Practice
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Case Reports, Anecdotal Evidence, and Descriptive Epidemiologic Studies in Pediatric Practice

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Case Study

A worried mother calls your office because she heard of a young woman who developed multiple sclerosis (MS) after receiving the human papillomavirus (HPV) vaccine. She is wondering if her 11-year-old daughter should receive the vaccine. What do you tell the mother?

Case Reports and Anecdotal Evidence

Case reports play a key role in advancing many aspects of medical understanding. They are helpful in recognizing and describing new disease processes or rare manifestations and in identifying drug adverse effects. (1) Compared with controlled clinical trials that examine a disease in isolation, case reports describe the disease in the context of comorbidities and individual characteristics. Case reports also are important in medical education by illustrating the diagnostic process and helping students apply the literature to an individual patient.

Case reports also can help identify emerging health conditions. Astute observation and reporting of the cases can provide clues into how exposures and disease outcomes are related. For example, acquired immunodeficiency syndrome (AIDS) began as a few cases among male homosexuals in San Francisco and New York City, alerting health departments to the possibility of the association of AIDS with sexual activity. Severe acute respiratory syndrome and West Nile virus also began as just a few cases, and additional investigation led to public health interventions to prevent the spread of these diseases.

Despite their important role, case reports are purely descriptive and, therefore, generally are considered one of the weakest forms of evidence. They cannot be used to make inferences about the broader population. Although they can stimulate important research questions and help guide hypotheses, case reports cannot prove causality. They may show an association between two events, but cannot support that one event causes the other.

Case reports can be misleading because they may suggest a plausible casual relationship where none exists. For example, a group of people who are sick with Salmonella gastroenteritis and all consumed tomatoes does not prove that the source of illness was the tomatoes. In fact, a 2008 epidemic of Salmonella originally blamed on contaminated tomatoes turned out to be caused by jalapeno and serrano peppers, which also were consumed by those affected. To find the source, epidemiologists had to use information about individuals who did not eat tomatoes. (2)

Anecdotal evidence shares some characteristics with case reports. This type of evidence lacks the strength of data collected via rigorous methodology that also involves significant numbers, although anecdotal evidence can suggest hypotheses and lead to the creation of credible studies. Anecdotal evidence that is part of a clinician’s personal experience can be influential but needs to be viewed in the broader context of valid studies.

Continuing Case Study

In an effort to respond to this mother’s concerns about the HPV vaccine and MS, you search the medical literature. You find an article describing five cases of demyelinating central nervous system diseases that developed shortly after the person received the HPV vaccine. The article’s authors hypothesize that an immune response may have initiated the development of demyelination. (3) However, because MS often is diagnosed initially in adolescence and young adulthood, the case reports cannot help resolve whether these cases were simply coincidental.
Study frequently is used to develop hypotheses for subsequent analytic studies. Descriptive epidemiologic studies can use a variety of tools, including surveillance reports, cross-sectional analyses, and surveys. These studies often are used to estimate the prevalence (total number of cases at any one point in time) and incidence (number of new cases) of disease. This information can help determine the magnitude of the problem and the level of resources required to address it. Such studies also can help describe the natural history of disease if they follow individuals over time.

A descriptive epidemiologic study of HPV can aid in understanding who gets HPV. It can find associations between HPV and selected factors such as age, race, ethnicity, and sexual behaviors. Such a study cannot prove what causes HPV; other types of studies are needed to investigate cause. A descriptive epidemiologic study also cannot predict the chance that this woman’s daughter will acquire HPV because many factors beyond those studied influence that outcome. However, the results of this type of study can be used to tell the mother about the risk for disease in a population of adolescent girls who have certain characteristics. In addition, the data can generate hypotheses that can be tested with other types of research (eg, controlled studies).

When evaluating the results of descriptive epidemiologic studies, it is important to consider how the population was selected. Studies that use nationally representative samples are constructed to provide an estimate of the population as a whole. In contrast, prevalence studies in a specific population may not be generalizable to other populations. For example, the rate of HPV infection is higher in a sexually transmitted infections clinic-based sample compared with a nationally representative sample. A nationally representative sample includes women who are not sexually active as well as women who are having sex; the clinic population would not include women who have never had sex.

The method of identifying cases in surveillance studies also is important. Relying on physician reporting can underestimate the number of people affected with the disease. Cases may be unidentified because of few symptoms or lack of access to care, and physicians may fail to report cases to a central database. On the other hand, actively collecting the number of people affected from multiple sources is more accurate. Active collection can identify up to twice the number of cases compared with passive reporting.

Case Study Conclusion

You find a descriptive epidemiologic study you believe is relevant to your patient. It is a nationally representative epidemiologic study suggesting that 50% of women acquire HPV at some point in their lives. (5) Based on this study, you tell your patient’s mother that the lifetime prevalence of HPV, the virus that causes cervical cancer, in the general population is about 50%. The mother tells you that she had an abnormal Pap smear and would like to avoid that outcome for her daughter. She decides to make an appointment for her daughter to receive the vaccine series.

References
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