Making sense of statistics for family practitioners:

Prevalence or incidence - pedantic or important?

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Introduction

The most effective way to infuriate an epidemiologist is to call a "prevalence rate" an "incidence rate", or visa versa. Unfortunately, this diabolical practice remains a common feature in print, during presentations at medical conferences and in conversations between medical colleagues. You may ask whether this confusion of terminology deserves mention in this column. Our answer is an emphatic "yes"! An incorrect understanding of incidence and prevalence can have disastrous effects on planning, whether within an individual practice or a global public health programme.

It is appropriate that we start by providing some simple definitions. An incidence **rate** is the number of new cases of disease in a specific population within a specified time period, e.g. number of new Type 2 diabetes mellitus patients within the population served by your practice within a year. This is also known as a cumulative incidence rate, and because it reflects the proportion of people who become diseased during a specified period of time, it provides a measure of disease risk. A prevalence **rate**, on the other hand, quantifies the proportion of Type 2 diabetics (both new and old) within the population at a specific point in time. This is also termed the point prevalence.

Prevalence is clearly related to the incidence of new cases, but is not determined by incidence alone. The number of pre-existing cases and the duration of the disease have a major impact on the prevalence of a disease in a population. Thus for chronic diseases, like Type 2 diabetes, the annual point prevalence rate in a community exceeds the annual cumulative incidence rate. Generally the prevalence rate (P) is directly proportional to the product of the incidence rate (I) and duration (t) of the disease ($P \sim I*t$).

The prevalence of a condition in your practice is a very important measure to assist you in planning. If you are a dispensing doctor and you know what the prevalence rate of Type 2 diabetes is in your practice community, you are better able to plan the purchase of medication and other supplies. At population level, if a long-duration disease is curable and an effective treatment programme is implemented e.g. cataract surgery, you would expect the prevalence rate of that disease to decrease.

Incidence rates are more useful for recognising changes in disease risk. If, for example, you keep a record of the weekly incidence rate of severe respiratory tract infections in your practice, you will soon notice an increase in the rate. This may mean an epidemic of viral influenza or another infectious pathogen requiring a specific intervention, whether immunization of the remainder of the population to reduce the risk of infection, or the use of therapeutic agents to reduce the incidence of complications.

The distinctive value of the two types of rates should now be evident. However, as mentioned earlier, incorrect use has led to much confusion. Probably the most striking example of this is the ongoing use of a prevalence target (less than 1 case per 10,000 population) for defining elimination of leprosy as a public health problem.[1] Arguments initially offered to support its use were ease of measurement, greater difficulty in determining incidence, and the appropriateness of prevalence when considering a chronic disease like leprosy. The assumption was that if prevalence at this target level could be maintained, then the disease would naturally die out. For this to occur with leprosy, as with any other communicable disease, effective transmission would need to be interrupted. Thus it is essential to know whether multidrug therapy and the sustained leprosy elimination campaigns are having an impact on leprosy incidence rates.[2] It is not reassuring to note that despite a prevalence well below the global target in South Africa since 1921, new leprosy cases continue to occur, particularly clustered in southern Mpumalanga and northern KwaZulu-Natal.[3] At a global level, although prevalence rates have definitely declined over the past 20 years, incidence rates have not altered significantly. You may ask how this is possible? Leprosy prevalence is commonly calculated from the number of patients registered for treatment. Thus, if the number of people registered for treatment is halved, as was effectively done by the World Health Organization by halving the duration of therapy, then prevalence will decrease dramatically (remember $P \sim I*t$) without there necessarily being any change in incidence. Certainly other factors, like the ongoing detection of missed cases will also contribute to increasing incidence, however a basic understanding of prevalence and incidence should serve as a caution that leprosy may not yet be vanquished.❐

References

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