

Research in Surgery

A Comprehensive Examination of Incidence and Its Calculation

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Abstract:

Within the domain of epidemiology, the term "incidence" denotes the number of newly diagnosed cases of a disease occurring within a defined population over a specified period.^{1,3,4,6}

Introduction

Incidence serves a pivotal role in epidemiology, as it quantitatively assesses the emergence of new cases of medical conditions within a defined population over a particular timeframe.

The incidence proportion (IP), commonly referred to as cumulative incidence or risk, signifies the probability of a specific disease or medical condition developing within a designated period.

Measuring Incidence

Typically, the calculation of incidence is derived from the ratio of new disease cases to the total population under observation. This can be represented by the following formula:

$$\text{Incidence} = \text{New Cases in a Specified Time Period} / \text{Total Cases Followed in that Time Period}$$

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For example, if the study population comprises 1,000 individuals and 30 new cases of a disease are identified, the incidence would be expressed as 3%.

This metric addresses the fundamental question of how many individuals are affected within a designated timeframe.^{1-3,5,8}

Furthermore, the incidence rate can be determined by dividing the number of new cases by the duration of time at risk for the entire population, as illustrated by the formula:

$$\text{Incidence Rate}^{2,6,8} = \text{Cases of Disease} / \text{Duration at Risk for the Entire Study Population}$$

Incidence can be calculated in two principal forms:

1- Cumulative Incidence (also referred to as risk)

This measure is defined as the number of new cases observed during a specific timeframe divided by the total population at risk. For instance, in a population of 3,000 individuals aged over 50, who have not previously developed colorectal cancer at the commencement of the year 1403, should 60 new cases of colorectal cancer be diagnosed during the course of the year, the cumulative incidence would be computed as follows: (Cumulative Incidence = $60/3000 = 0.02$)

2- Incidence Density Rate

In the context of cumulative incidence analyses, it is feasible that certain participants may exit the study while new participants enter during the specified period. To yield a more precise estimate of disease incidence based on participant involvement, the incidence density rate is employed. This is calculated by dividing the number of new cases occurring within a defined period by the total number of individuals present in the study during that time.

Given the distinctions between these two types of incidence, it is important to note that only the cumulative incidence can be appropriately described as a rate.^{2,3,5,7-9}

References:

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