**AN INNOVATIVE CASE-SPouse CONTROL DESIGN IN PRACTICE: AN EXPERIENCE IN ESTIMATING SMOKING AND ALL CAUSE DEATHS IN CHINESE ADULTS**

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Introduction We aimed to show that utilising information from a population-based, retrospective mortality survey for the main determinants of disease is feasible.

Methods During 1989–1991, a nationwide retrospective survey of mortality was conducted. To assess the effects of smoking on all cause mortality in Chinese adults, we used a new design within this survey. For all the deceased persons (cases) we sex-matched surviving spouses as controls. Smoking information for cases was provided by spouse or other informants, at the same time as providing their own smoking history.

Results For all cause mortality, the results revealed that tobacco use was associated with 11.2% of total deaths in 1987, and more than two-thirds of these excess deaths occurred between the ages of 30 and 74 years. Although life expectancies varied with region or sex, the years of life lost attributable to smoking was almost the same in each age group. Our study also confirmed that more than 50% of the sex difference in life expectancy was accounted for by smoking. With respect to the novel design, the results revealed consistency in the results using different control groups.

Conclusion This new case-spouse control design as an alternative for control selection in case-control studies is valid and feasible.

**MATHEMATICAL MODELS TO INFORM THE DESIGN, ANALYSIS AND INTERPRETATION OF VACCINE TRIALS**

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Background When planning vaccine trials or interpreting results, it is not always clear which outcome measure best estimates the effect of the vaccine and at which time point it should be measured. We used a mathematical model to explore questions arising from the analysis of pneumococcal nasopharyngeal carriage data from conjugate vaccine trials, in which the acquisition-rate ratio (ARR) is the desired effect measure. We determine the time at which the prevalence ratio (PR) or prevalence POR, which are usually available, provide the best approximation.

Methods We created a hypothetical randomised controlled trial using a dynamic compartmental model which incorporated carriage of vaccine-type Streptococcus pneumoniae in vaccinated and unvaccinated groups. ARR was incorporated explicitly, linking the acquisition rate in the vaccinated to the acquisition rate in the unvaccinated and was assumed not to change for 2 years. Prevalence ratios and prevalence ORs for carriage were plotted over time.

Results The PR approximates the ARR well, after an initial period in which the PR decreases from one and stabilises. The length of this period is determined by the duration of carriage. During the period when the PR approximates the ARR, the POR overestimates the effect of vaccination. This is less marked when carriage is rare.

Conclusions This model illustrates the behaviour of outcome measures for pneumococcal carriage in a simple setting and can be elaborated to explore more complex situations. Mathematical models provide opportunities to explore study designs and analysis methods for both planned and completed vaccine trials.