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2009 : December 2009 - Emerging Research Fronts : GuangYong Zou Describes New Method for Quantitative Research

EMERGING RESEARCH FRONTS - 2009

December 2009



Guangyong Zou talks with ScienceWatch.com and answers a few questions about this month's Emerging Research Front Paper in the field of Materials Science.

Guangyong Zou

Article: A modified Poisson regression approach to prospective studies with binary data

Authors: **Zou, GY**

Journal: AMER J EPIDEMIOL, 159 (7): 702-706 APR 1 2004

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SW: Why do you think your paper is highly cited?

This paper provides a simple statistical method that can be used to more precisely estimate effect size. The ratio of risks is a key parameter in epidemiological and clinical research, but conventional logistic regression models can only provide estimates of the ratios of odds, which can be misleading.

For example, a controversy in the US mass media in 1999 was created by odds ratio estimates in a study published in the February 25, 1999 issue of the *New England Journal of Medicine*. This otherwise well-conducted study falsely concluded, as a result of odds ratio estimates, that race and gender influence how physicians manage patients with chest pain. The method presented in my paper could have prevented the controversy.

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

The paper describes a new method that is broadly applicable to quantitative research. Although it has been known for decades that the ratio of odds was created to approximate the ratio of risks when the latter was not estimable (for example, in case-control studies), researchers continue to use odds ratio based methods to estimate risk ratio in prospective studies. This is due largely to the lack of simple statistical methods.

SW: Would you summarize the significance of your paper in layman's terms?

Scientists in clinical and epidemiological research usually speak of risks or benefits in relative terms. For example, if a healthy diet reduces the risk of a disease from 30% to 10%, then the ratio of risks is 3. In this case it is also mathematically correct to say that the diet reduces the odds of disease from 3/7 to 1/9, which results in an odds ratio of 3.86.

An intrepid investigator would interpret the odds ratio as a risk ratio and thus unknowingly exaggerate the effect of the diet by 30%. Although such numerical discrepancies are well-known in epidemiology, statistical textbooks continue to provide methods for obtaining ratios of odds. My paper provides a simple approach to directly estimate ratios of risks.

"The method described in the paper may be extended to studies with more complex designs and to the meta-analysis of clinical trials and epidemiological studies."

SW: How did you become involved in this research and were any particular problems encountered along the way?

This is the first article I wrote after I graduated with a Ph.D. in Biostatistics from the Department of Epidemiology and Biostatistics at the University of Western Ontario under the supervision of Professor Allan Donner, Ph.D.

I was intrigued by the unnecessary controversy created by the aforementioned study on the role of race and gender in influencing how physicians manage patients with chest pain. I encountered no problems along the way, owing to the excellent advice provided by my colleagues in Robarts Clinical Trials of Robarts Research Institute and in the Department of Epidemiology and Biostatistics.

Furthermore, in addition to the encouragement and generous help from Professor Allan Donner, I received constructive comments from the editor of the *American Journal of Epidemiology*, Professor Donna Spiegelman, Ph.D., who decided to publish the paper without an external review.

SW: Where do you see your research leading in the future?

The method described in the paper may be extended to studies with more complex designs and to the meta-analysis of clinical trials and epidemiological studies. This paper also provides a relevant example of how biostatistical research can change the interpretation of research data.

SW: Do you foresee any social or political implications for your research?

Yes. Data with high quality are expensive to acquire. But data cannot speak well for themselves without the help of good statistical methods. As a biostatistician, my aim is to provide investigators with useful tools for their research, thus helping them draw more valid conclusions.

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KEYWORDS: CLINICALLY USEFUL MEASURES; GENERALIZED LINEAR-MODELS; CROSS-SECTIONAL DATA; RISK DIFFERENCES; ODDS RATIOS; EPIDEMIOLOGIC ANALYSES; CONFIDENCE-INTERVALS; COMMON OUTCOMES; RELATIVE RISK; TRIALS.



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