| 연구방법론 | | | 번호: I - B - 3 | |
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| 제 목 | 국문 | 건강근로자 효과를 통제하기 위한 새로운 통계적 방법 | | |
| | 영문 | Statistical modelling for controlling the healthy worker effect | | |
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## 1. Purpose

The healthy worker effect is an important issue in occupational epidemiology. We propose a new statitical method to test the relationship between exposure and time to death in the presence of the healthy worker effect.

## 2. Methods

In this study, the healthy worker hire effect was assumed to operate as a confounding variable of health status at the beginning of employment and healthy worker survival effect as a confounding and intermediate variable of employment status. The basic idea of the proposed method reflects the length bias sampling caused by changing of an employment status. In order to remove the bias caused by length biased sampling, which comes from the stratification of a changed and unchanged group of the employmend status, we introduced three conceptual survival times, such as the waiting time for the change of employment status to occur and survival times depending on whether or not an individual experiences a job changes. Then, expericing a change of employment status was modelled as a phenomenon arising from competing relation between waiting time for the change of employment status and the survival time without expericing a change of employment status. Simulation studies were also carried out to compare the proposed method with Cox's time dependent covariates models .

## 3. Results

We found from simulations that upper 5% Type I error was well controlled for both our proposed test and the Wald test based on the Cox model with covariates such as time-dependent exposure amount, health status at initial employment, and time-dependent employment status. In power comparison, however, when there was no relation between exposure and survival after the employment status has been changed, the proposed test was more powerful then the Wald test based on Cox model. This came from difference in definition of risk set between proposed test and Wald test based on Cox model. Also, it implied that our risk set is more likely to effectively control the bias owing to length biased sampling. Furthermore, when there was no relation between the exposure and survival time without experiencing a change of the employment status, the proposed test was also superior to the Wald test.

## 4. Conclusions

The healthy worker effect may not be controlled by classical Cox's proportional hazards models. The proposed method performed well in the presence of healthy worker effect in terms of level and power.