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## Analyzing sleep patterns of shift workers via Phillips-Chen-Robinson model (PCR-model)

Increments in around-the-clock service in modern society yield increments in shift work. As a result, nowadays more than 20% of population in the world work in shifts. As shift work schedules inevitably have increased, the risks of shift work are also presenting including the increment of risk for disease, such as cardiovascular-disease and cancer. There have been several approaches to analyze effect of shift work through mathematical modeling, however few studies have applied mathematical modelling to actual data. Here, we applied the Phillips-Chen-Robinson model (PCR model), one of the human sleep process models, to analyze actual data of nurses who work in Samsung-hospital. We modify the PCR model with light actigraphy of nurses who work shifts to fit irregular and personal sleep/wake timing. As a result we find a critical factor which has strong correlation with sleep quality. By using this factor we find a new sleep model which provides best sleep time to achieve the best sleep quality.

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