DISCUSSION OF "STATISTICAL METHODS FOR HEALTHCARE REGULATION: RATING, SCREENING AND SURVEILLANCE" BY SPIEGELHALTER ET. AL.

HANNA K. JANKOWSKI

This work deals with the difficult topic of statistical methods in healthcare regulation, and I would like to congratulate the authors on an interesting and thought-provoking paper.

One example given in the paper is that of performance monitoring for methicilin-resistant *Staphylococcus aureus* (MRSA) *bacteraemia* rates in trusts. With the desire of reducing the number of MRSA outbreaks, the objective was set of a 50% reduction in MRSA rates in three years, or a 20% reduction per year. The annual reduction was set as an absolute reduction relative to a single baseline rate. As mentioned by the authors, it is crucial that a robust baseline be established, and it is doubtful that the results of a single year would meet such a requirement for an individual trust. This issue was considered more extensively in a previous work of Spiegelhalter (2005).

A suggestion made by the authors is to consider instead an individual baseline using data from a number of periods. As a simplification of the problem consider the following set-up: the number of cases in an individual trust is Poisson process with constant rate λ in all previous years, $Y_{-1}, Y_{-2}, \ldots, Y_{-6}$. Under the null hypothesis that the trust has decreased their rate by 20%, the number of cases this year becomes Poisson with rate $\lambda_0 = 0.8\lambda$. We consider the probability that

$$P(Y > y^* | \lambda_0) \tag{1}$$

and compare it with the same probability when λ_0 is estimated as 80% of the previous years averages, considering anywhere from one to six years into the past. The value y^* is taken as the critical value for $p^* = 0.841$. When the baseline rate is estimated based on previous years, the probability (1) was estimated based on $B = 100000$ samples. The results are shown in Figure 1 for various values of λ. It seems that in this simplified setting, at least four years are appropriate to reduce the additional variability caused by estimation of the baseline rate.

References

Spiegelhalter, D. (2005). Problems in assessing rates of infection for methicilin resistant *Staphylococcus Aureus*. *Br. Med. J.* **331** 1013–1015.

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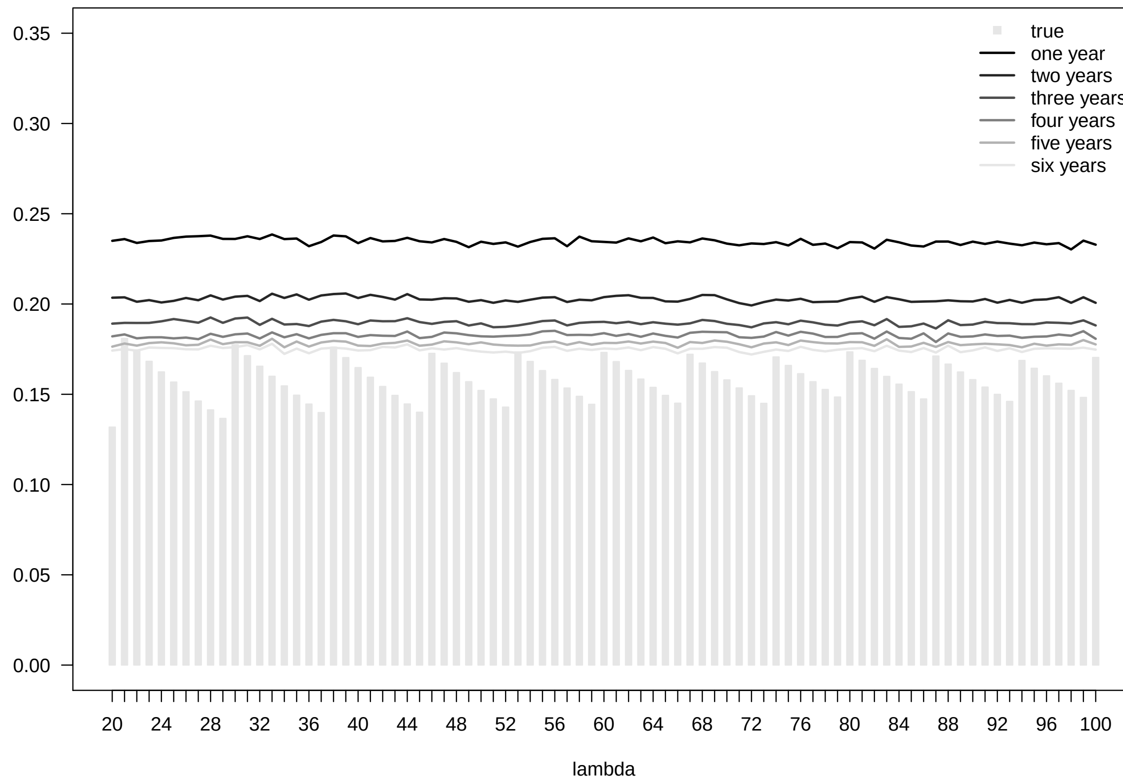

FIGURE 1. True values of the probability (1) for different values of λ along with the probabilities when the baseline rate is estimated using averages from previous years. The number of years in estimating the baseline is taken to be anywhere between one and six, as indicated in the legend.

DEPARTMENT OF MATHEMATICS AND STATISTICS, YORK UNIVERSITY
E-MAIL: hkj@mathstat.yorku.ca