

A Method for Estimating Occupational Radiation Doses Subject to Minimum Detection Levels

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ABSTRACT

Occupational radiation exposure is often coded as zero when the exposure dose is below the minimum detection level. This leads to an underestimation of the doses received by individuals and can lead to overestimates of risk in occupational epidemiologic studies. The extent of the dose underestimation is increased with the magnitude of the minimum detection level (MDL) and the frequency of monitoring. The paper proposes a Bayesian approach to estimate the actual dose and the dose distribution parameter when the observed dose is subject to censoring due to MDL. A Gibbs sampling algorithm is developed to implement the method. Simulation studies are used to evaluate the performance of the estimators. The method is applied to a sample of historical occupational radiation exposure data from the Oak Ridge National Laboratory.

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