

## **Pertussis in Belgium - The challenge of using historical serial serological survey data**

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### **Background**

Pertussis or whooping cough is a highly contagious vaccine preventable disease. Incidence of pertussis, has known a steady decline after the introduction of pertussis vaccination nevertheless pertussis incidence increased over the past two decades in many countries. The analysis of serial serological survey data can improve our understanding about the dynamics of pertussis. However, the development of assays for the detection of IgG antibodies in sera entails that various assays have been used for different survey years. We need comparable sero-epidemiological results for statistical and mathematical models to estimate time-varying epidemiological parameters.

### **Aim**

To investigate the consequences of the uncertainty related to the standardization of pertussis toxin IgG antibodies results from three serological surveys conducted in Belgium (2002, 2006, 2013).

### **Method**

In each survey, 150 samples were selected such that the range of the original values for IgG antibodies against pertussis toxin was as best as possible covered. All 450 samples were then tested using a magnetic bead-based multiplex immunoassay (MIA).<sup>[1]</sup> We investigated different models for the log-transformed values and considered also different strategies for outliers and censored data.

### **Results**

The model choice for the standardization can be sensitive to the strategy applied for outliers and censored data. The survey 2013 was originally already tested using MIA but at different concentrations as the current study. The comparison with the re-tested 150 samples from 2013 together with validation data can be used to investigate intra-assay variability.

### **Conclusions**

The uncertainty in the standardization of antibody titres needs to be reflected in models aimed at estimating time-varying epidemiological parameters, such as the force of infection, from serial serological survey data.

### **Keywords**

sero-epidemiology, pertussis, assay comparison

### **References**

<sup>[1]</sup> R. N. Caboré, D. Piérard, K. Huygen, *Vaccines*, 4 **2016**, 1-13.