
RAPHAEL XIMENES, University Health Network / THETA

Development and calibration of a dynamic microsimulation of a disease history model for Zika virus (ZIKV) infection

Purpose: While generally causing self-limited and mild illness, Zika virus (ZIKV) infection can cause significant morbidity including congenital Zika syndrome, newborn Zika syndrome, and Guillain-Barré syndrome (GBS). However, our understanding of the population-level impact of the disease on longer-term health outcomes is limited. This presentation describes the development and calibration of a ZIKV disease history model and quantifies the population-level burden of disease of ZIKV for Colombia.

Method: We developed a ZIKV disease history model using a stochastic, individual-level microsimulation approach. We simulate a dynamic cohort of uninfected individuals over one year using data from the published literature and local census data to parameterize the model and surveillance data from Colombia to calibrate the model. We calibrated five parameters: infection risk, and probabilities of: pregnancy, neurological complication, GBS, and CZS using the Nelder-Mead method and evaluated goodness of fit using the sum of squared differences between simulated proportions and desired proportions.

Result: For the best-fitting parameters the goodness of fit obtained was $6.79 \cdot 10^{-10}$, the incidence of ZIKV infection was 220 per 100,000 people (222 observed), CZS was 4 cases per 1,000 ZIKV infected people (6 observed), neurologic syndrome was 9 cases per 1,000 ZIKV infections (6 observed) and GBS was 9 per 1,000 ZIKV infections (4 expected).

Conclusion: Our model is well calibrated to predict the incidence of ZIKV infection, which will be helpful in understanding the long-term disease burden and cost-effectiveness of ZIKV interventions.