The Mathematical Analysis of Transmission Dynamics of Varicella

Rita Csuma-Kovács, Gergely Röst
University of Szeged, Szeged, Hungary

Varicella (chickenpox) remains one of the most transmissible childhood infections, with annual case numbers historically comparable to the number of births. The causative agent, the varicella-zoster virus (VZV), is also responsible for herpes zoster later in life. In Hungary, the varicella vaccine has been available for many years and was incorporated into the national routine immunization schedule in September 2019. In this work, we analyse the transmission dynamics of VZV using a compartmental modelling framework extended with a detailed 66-age-group realistic age structure (RAS). We evaluate the effects of the implemented two-dose vaccination programme and explore how the emergence of the COVID-19 pandemic—occurring only a few months after the introduction of routine varicella vaccination—may have influenced VZV circulation. Our results provide insight into the interplay between vaccination, demographic structure, and pandemic-related behavioural changes.