

## ABSTRACT

The thesis is presented in 55 pages. It contains 3 appendixes and bibliography of 23 references. 23 figures and 3 tables are given in the thesis.

The goal of the thesis is to develop mathematical and software tools for the modeling of outbreaks of infectious diseases and to determine the methods of prevention and management of outbreaks of the disease.

In the thesis, existing solutions are analyzed, such as analytical deterministic and stochastic simulation methods, simulation methods based on cellular automata, network models and agent modeling. They are compared in terms of the accuracy of obtained simulated data and accounting transmission parameters of infectious diseases. In the thesis, simulation methods based on agent modeling is used to solve the task.

The mathematical model of the spread of an outbreak of an infectious disease is constructed, which involves the following stages: simulation of the local area of the network of contacts in the population, using the Binomial Distribution; simulation of the spread of an outbreak of an infectious disease with the use of the SIR model; calibration model; analysis of the influence of control and prevention on the simulation of the outbreak of an infectious disease.

The developed software model of the spread of an outbreak of an infectious disease was introduced into the scientific Department of Virology of the P.L. Shupyk National Medical Academy of Postgraduate Education as an element of the research department of the department "Optimization of diagnostic strategies, prevention and treatment of topical viral infections based on clinical, laboratory, pharmacoeconomic and pharmacoepidemiological studies".

The automated system implementing the chosen method is developed. The developed system is tested.

Keywords: modeling, infectious diseases, model calibration, main reproduction number, model parameters.