

## ABSTRACT

The thesis is presented in 74 pages. It contains 3 appendixes and bibliography of 45 references. 34 figures and 11 table are given in the thesis.

**Topic relevance.** Many years hospital-based surveillance of acute gastroenteritis in Indonesia demonstrated that rotaviruses were responsible for about 50-60% cases of acute diarrhea in children less than 5 years. Rotavirus positive children were more likely to experience severe clinical symptoms such as vomiting and dehydration. In addition, diarrhea outbreaks due to rotavirus have been reported. These studies underline the high burden of rotavirus disease in Indonesia.

Rotavirus has a special place in the structure of child morbidity and mortality, particularly among young children. This is an acute intestinal infection from fecal-oral transmission mechanism, accompanied by diarrhea syndrome. In children under 5 most rotaviruses cause severe dehydrating diarrhea. In Indonesia, the share of rotavirus infection accounts for 35 to 75% of all cases of acute intestinal infections.

Classic rotavirus gastroenteritis is more common in children aged 6-12 months, but have the ability to rotaviruses circulating in obstetric and neonatal departments maternity, intensive care for premature infants and children in pediatric wards, often causing nosocomial outbreak of intestinal infections. Often adults infected child during care. So prediction of rotavirus presence is important to detect it in time and prevent its spread in community and hospital ward.

**Thesis connection to scientific programs, plans, and topics.** The thesis was prepared according to the scientific research plan of the Applied Mathematics Department of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" and within retrieval research "Optimization strategies for diagnosis, prevention and treatment of topical viral infections based on clinical laboratory and pharmacoeconomic and pharmaco epidemiological studies " (№ state

registration 0115U002161) P.L. Shupyk National Medical Academy of Postgraduate Education.

**Research goal and objectives.** The aim of the thesis is to develop mathematical and software systems for the management strategy of treating patients with rotavirus infection.

To achieve the above stated goal was solved the following problems:

- format and organize clinical observations of patients;
- develop a clinical model forecasting system;
- develop analytical methods for solving the problem of predicting the presence or absence of rotavirus infection in patients with symptoms;
- develop a model of choice optimal strategies of terapia;
- conduct a pilot study using data on clinical observation of patients.

*Object of research* is a mathematical probability forecasting methods and methods for decision support.

*Subject of research* is the use of Bayesian networks and multiple linear and nonlinear regressions for predicting the presence or absence of rotavirus infection in patients with symptoms and use of decision-making tree to select the optimal treatment strategies for patients with rotavirus infection.

**Methods of research.** To solve the task, the following methods were used: probabilistic methods (to develop models of clinical prediction system); methods of decision-making (to build a mathematical model of selecting optimal treatment strategies); methods of statistical data processing (for formatting and systematization of clinical observations of patients); methods of the theory of algorithms and programming (for software implementation of the developed algorithms); methods of probability theory and mathematical statistics (for the experiments).

**Scientific contribution** consists of the following:

- in terms of sensitivity predictive model as its quality criteria, as its presence true prediction presence of rotavirus is more important than the prediction

of real cases of rotavirus absence, the estimated optimum threshold each prediction model;

– found that non-linear regression can be used for prognostication mouth virus infection based on large clinical data. If only a small set of clinical data prediction based on Bayesian network is more reliable.

**Practical value of obtained results.** The system, which can be used in the diagnosis of patients with certain symptoms to support medical decision about the presence or absence of viral infection of the mouth of the patient. The methods, mathematical and software for prognostication mouth virus infection in patients with symptoms.

**Approbation of the thesis results.** Basic ideas and results of the research were presented at 3rd International Conference “Approximation Methods for Molecular Modelling and Diagnosis Tools” (2017).

**Publications.** The results of the thesis set out in the article in the scientific journal “International journal of pediatric infectious diseases“. Thesis “Prognostic models available rotavirus infection in patients with clinical symptoms“ IX scientific conference of graduate and post-graduate ПМК-2017 “Applied mathematics and computing. “

**Keywords:** rotavirus, diarrhea, symptoms, modelling, prediction.