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The possibilities of a Universal computer model in the readiness assessment of the Russian regions resource to epidemics of especially dangerous infectious diseases

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Motivation and Aim: Since it is impossible to perform epidemiological experiments in human populations, mathematical modeling is the very important tool for studying the effects of particular factors on the dynamics of epidemics. Mathematic approaches can be especially useful to estimate the level of biological safety of the territories.
Methods and Algorithms: The tool, developed in the SRC VB Vector, is based on the model simulating epidemics of acute infectious diseases, where the main modes of transmission are from an external source or by casual contact between people. Detailed description is done in [1].
Results: The model provides a number of anti-epidemic activities: isolation of the infected persons, contacts, and suspects, vaccination, quarantine, treatment. But a certain amount of resources is needed for their implementation. This feature allows us to use the model to assess the resource preparedness of Russian regions for epidemics of especially dangerous infectious diseases. Of particular relevance is the assessment of the most "expensive" resources, which must be constantly maintained at a certain level, to consider the region prepared for the epidemic, although the epidemic, may be, never begin. Namely: health workers trained to work with quarantine infections; places for strict isolation (for confirmed cases); places in provisional hospitals (for suspects) and places in quarantine departments for contacts.
To assess the level of resource readiness, the model provides the following opportunities:
Computation of the epidemic dynamics, depending on the number of people initially infected.
If it turns out that there are not enough resources, it is possible to optimize their reserve. This function allows by repeatedly automatic calculations in accordance with a certain algorithm to select the minimum necessary costs to maximally mitigate the consequences of the epidemic.
Computation "typical" scenarios for epidemic development in the case of a mass infection in real subjects of the Russian Federation. The effect of delay with countermeasures is assessed here in addition to resources.
Conclusion: A Universal model of epidemics can be recommended as a tool for assessing of regions preparedness for epidemics of especially dangerous infections.
Availability: http://vector-epimod.ru

References

1. Bachinsky A.G., Nizolenko L.P. (2013) A universal model for predicting dynamics of the epidemics caused by special pathogens. BioMed Research International. 2013(467078):7.