SIMULATION OF THE SPREAD OF HEPATITIS DURING COMBAT

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Hepatitis is a liver disease of viral origin. The most dangerous are hepatitis B and C, which lead to the development of chronic inflammation and are often the cause of the development of cirrhosis and liver cancer (96% of all deaths related to hepatitis) [1]. Lack of timely treatment poses a health hazard not only to patients but also to people with whom they come into contact [2]. Since the beginning of the hostilities, additional difficulties have arisen, one of them is rather scanty official information on the spread of the disease. The reason for this is the closing, evacuation or repurposing of hospitals for other needs. An important role is also played by the departure/evacuation of the population, the difficulty of getting to medical facilities due to hostilities. All this can lead to the illusion of a decrease in morbidity. Without appropriate control, the infection can begin to spread uncontrollably.

Bio-mathematical compartmental models, such as AOM or the family of SIR models, are most often used to predict the spread of epidemics.

By applying the SIR model, a good forecasting quality was obtained, for example, for March 2023, the model expected an increase in new patients in the number of 84.73, and the actual number was 78 people. In an attempt to improve the quality of forecasting, more complex models were applied: SEIR [3] and SEIRD [4]. They complicate the model due to additional parameters that estimate the number of patients without symptoms and mortality from the disease (it is quite difficult to estimate these values due to the fact that the disease can develop asymptomatically for decades and is still incurable), but despite this, the complication of the model did not lead to significantly improved the quality of forecasting and showed the following results: 84.65 and 84.82, respectively.

After that, there was an attempt to apply another, but more complex model – AOM [5], it has a larger number of parameters and can take into account such components as the topology of social relations and others, as a result of which it is more resource-intensive from the point of view of calculations. An attempt to apply this model led to an improvement in the quality of forecasting to almost 12% (83.95), which is due to the greater complexity of the model and the absence of shortcomings related to SIR models.

References (translated):

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