EIDSS Application for CCHF Foci Activity Epi-Analysis and Prediction in Kazakhstan

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Objective

Test of the Electronic Integrated Disease Surveillance System (EIDSS) for epi-analysis and prediction of situation in CCHF foci in Kazakhstan.

Introduction

CCHF foci are reported in 3 southern regions of Kazakhstan with population of 1 million. The ixodic ticks in the area are CCHF carriers. Human infections (3 to 12 cases per year) occur through tick bites and contact with CCHF patient blood. CCHF epidemiological process in Kazakhstan has prominent seasonality (spring-summer period) and the rhythm of epidemic appearances (5-6-years). The rhythmical population incidence rate is associated with natural and climate factors, which govern the increase in the number of ixodic ticks, their infection rate (virus carrier state), and directly correlates with the population density and the livestock number that are the principal tick feeders in nature.

Methods

EIDSS version 4 provides capability to collect, share and process epidemiological, clinical and laboratory data on infectious diseases in medicine, veterinary and environment sectors. It is currently deployed in Kazakhstan at 150 sites of the Ministry of Agriculture (planned up to 271), and at 8 sites of the Ministry of Health (planned up to 23).

Three available indicators (for 2007-2011) were used for analysis: population; tick infection rate (relative density of CCHF seropositive tick samples per total number of tested laboratory samples); CCHF human case rate by districts per 10'000.

The following procedure was conducted:

1) Demographic information, diagnosis and location data entry into EIDSS
2) Tick collection location data, total number of tested samples (pools), and number of seropositive data entry into EIDSS
3) Correlation joint analysis of data on vectors and epidemiological surveillance in Analysis, Visualization and Reporting (AVR) module

Results

EIDSS generated 12 different maps filtered according to the selected regions, ticks, demographics and CCHF human incidence, aggregated by region, correlated by 3 indicators entered into the database. This allowed visualizing information to support epi-analysis. As a result, for each of the 3 regions specific districts with the highest risk of the CCHF epidemic outbreaks were identified. The resulting information was grouped into 3 clusters of risk with the following criteria: population density, tick infection rate and human cases for each of 25 CCHF-disadvantaged districts (see map). These results predict the epidemic situation in a particular area and support management decisions for planning and correction of preventive anti-tick and anti-epidemic measures and funding requirements.

Conclusions

EIDSS with Natural Vectors and the AVR modules has capabilities for analysis and prediction of epizootic and epidemic processes in vector-borne virus infections foci. It is an easy to use and free-of-charge tool that can become the basic instrument for especially dangerous diseases field epidemiologists as well as for the ministries and local governments for CCHF prophylaxis decision support.

Keywords

CCHF; one health; electronic disease surveillance; EIDSS; multi-factor analysis

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