Space-time clustering of ampicillin resistant Escherichia coli isolated from Danish pigs at slaughter between 1997 and 2005

In Denmark, antimicrobial resistance in bacteria in animals, animal products and humans, is routinely monitored. This study aimed at determining whether the observed variations in the prevalence of ampicillin resistant Escherichia coli isolated from healthy pigs at slaughter were random or clustered in space and time. Data on E. coli isolates between 1997 and 2005 were obtained from the Danish Integrated Antimicrobial Resistance Monitoring and Research Programme (DANMAP) whereas data on the quantity of ampicillin consumed was obtained from the Danish Register of Veterinary Medicines (VetStat). Space-time interaction was assessed using the space-time K-function and detection and location of significant space-time clusters was done using the space-time scan statistic. The space-time K-function analysis provided evidence of space-time interactions in ampicillin resistant E. coli (AREC) isolates in both Funen and Jutland, and Zealand. Significant space-time clusters of resistant E. coli isolates were found in the north eastern part of Jutland and Funen and in the southern part of Zealand. Seasonality was found to have a highly significant effect on space-time clustering in Funen and Jutland. The clusters of ampicillin resistant E. coli appeared at the same time as the national consumption of ampicillin in pigs increased, however antimicrobial consumption at the herd level did not appear to have any effects on space-time clustering in this study. The results could serve as a platform to highlight areas where more investigations on the occurrence and spread of ampicillin resistant E. coli in pig herds should be initiated.

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