

IMPLEMENTATION OF GHOST FOR DETECTION OF HCV TRANSMISSION NETWORK BY TENNESSEE DEPARTMENT OF HEALTH

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Background:

States along the Appalachian region face a growing hepatitis C virus (HCV) epidemic associated with injection drug use. To scale up the HCV surveillance capacity in the state of Tennessee, a pilot project was launched in collaboration between the Division of Viral Hepatitis (CDC) and Tennessee Department of Health (TDH) with an objective to improve HCV molecular surveillance by utilizing Global Hepatitis Outbreak and Surveillance Technology (GHOST), a new cloud-based system that integrates laboratory, information technology, and state public health laboratory resources to gather molecular data and distill public health relevant information to guide intervention measures.

Methods:

The GHOST HCV transmission analysis pipeline uses a novel amplicon-based Illumina Miseq sequencing protocol that targets the hypervariable region 1 (HVR1) of the HCV genome. CDC provided GHOST protocol-associated Lab-Aid encompassing on-site and off-site trainings, technical assistance and proficiency panels testing. At the end of the competency testing, HCV surveillance samples collected from STD and Family Planning Clinics in Tennessee between June - October 2016 were analyzed by TDH.

Results:

Of 4,753 persons tested for HCV, 397 (8.4%) were HCV-antibody positive (Ab+). Of these, 294 (74.1%) were HCV RNA positive and 85% produced sequences. Raw MiSeq files generated by TDH were submitted to the GHOST portal, which automatically delivered results for genotype and transmission network inference. CDC confirmed the validity of these results by random testing of 25% of the total samples. Genotype 1a (n=178) was the most common, followed by 3a (n=49), 1b (n=13), 2b (n=13), 2a (n=1), 4a (n=1), and mixed genotypes (n=6). Transmission network analysis showed that 21 cases were linked into 9 clusters (8%), with 6 of them being infected by HCV genotype 1a, and 3 with 3A. Identification of mixed-genotype infections and transmission clusters strongly indicates detection of cases from a transmission network associated with high-risk acquisition of HCV infection, most probably via injection drug use.

Conclusions:

Establishment of GHOST at TDH allowed for the detection of cases from a high-risk transmission network, demonstrating local capacity to independently conduct GHOST-assisted

HCV outbreak investigations, and molecular surveillance to assist in implementation of evidence-based HCV elimination strategies.