Evaluation of Hepatitis C antigen testing among a Homeless cohort

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Introduction

Hepatitis C virus (HCV) is a RNA virus that primarily infects the liver. Patients with acute Hepatitis C infection are usually asymptomatic, whereas chronic carriers may display symptoms associated with liver disease such as jaundice.

4,751 people are estimated to be sleeping rough on any one night in the UK. There is an increased likelihood of blood borne viruses like Hepatitis C in homeless populations due to substance use, such as the injection of drugs. In a cross-sectional survey conducted by Aldridge et al. (2018), the prevalence of recent HCV infection was 10.4% in an urban homeless population of 500 in the UK.

Hepatitis C antibody testing is the current approach to screening. Detection of HCV core antigen is used to detect acute HCV infection and to confirm chronic HCV infection.

Homelessness in the England

![Graph 1 - a snapshot of the numbers of people likely to be sleeping rough each night during a given period each year](image)

Aims and Objective

• To produce a retrospective case review of a specific population i.e. homeless cohort from The VirAEmic study of A&E attenders at St Thomas’ Hospital being screened for Hepatitis C, Hepatitis B and HIV.

• To analyse the prevalence of HCV antigen positive patients from a homeless cohort from 2016 to 2018, initially screened for HCV using HCV antibody testing.

• To assess the clinical utility of HCV antigen testing as a screening tool for high risk groups such as the homeless.

Chemiluminescent microparticle immunoassay (CMIA)Technology

The quantitative determination of HCV core antigen (6L47-29) involves a two step immunoassay using CMIA technology on the Architect i200SR.

First step: Pre-treatment of the patient’s serum sample occurs to decolourise the sample and prevent foaming. The pre-treated sample is combined with assay specific diluent and anti-HCV coated microparticles in a new reaction vessel. The HCV antigen present in the pre-treated sample binds to the anti-HCV coated microparticles. Any unbound materials are washed and acridinium-labelled anti-HCV conjugated is added.

Second step: The introduction of pre-trigger and trigger solutions into the reaction mixture results in a chemiluminescent reaction. This is measured as relative light units (RLU) which is detected by the Architect optical system. RLU is directly proportionate to the amount of HCV antigen present in the sample. Calibration curve is used to determine the concentration of HCV core antigen in fmol/L.

Analytical Method

This is a retrospective case review of this homelessness cohort, who were previously screened for HCV via HCV antibody testing as part of The VirAEmic study.

Stored serum samples were collected from patients with a post code indicative of homelessness who attended Guy’s and St Thomas’ Trusts and associated clinics in London, UK from October 2016 to May 2018.

Hepatitis C core antigen testing was performed using the Abbott Architect i200SR immunoassay analyser.

The selected serum samples were thawed and centrifuged at 3000 rpm for 10 minutes. A volume of 160μl was aliquoted into a sample cup for each patient to ensure sampling adequacy.

Specimens are considered reactive for HCV core antigen, if the concentration is greater than or equal to 3.00 fmol/L. Results stating a concentration of <3.00 fmol were interpreted as non-reactive. Specimens with concentration values of ≥ 3.00 fmol/L were retested.

Positive samples were insufficient for further analysis.

Results

The patients were categorised into 3 cohorts: 2016, 2017 and 2018 based on the year their samples were taken.

The number and prevalence of HCV core antigen positivity for each cohort is shown in table 1. Overall, there was a prevalence of 2.1% in the tested homeless population of 238.

The HCV core positive results ranged from 3.95 to 835.77 fmol/L, with a mean concentration of 173.5 fmol/L.

Conclusion

• The transient nature and chaotic lifestyle of the homeless cohort makes the diagnosis and clinical management of HCV antibody positive individuals difficult. Such individuals would be unlikely to return for appointments to confirm their HCV status.

• Hepatitis C antigen testing could allow clinicians to provide a care pathway more rapidly for the acute/chronically infected homeless population. This approach would reduce the transmission into the community and provide a more effective way of diagnosis and treatment.

Acknowledgments

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References:


Story, A. “High prevalence of latent tuberculosis and hepatitis in homeless individuals.” Tuberculosis 78.6 (2018), pp. 647-651


Summary Data

<table>
<thead>
<tr>
<th>Table 1: Number of HCV antigen positive samples</th>
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<tr>
<td><strong>Cohort</strong></td>
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<td>2016</td>
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Table 1: Number of HCV antigen positive samples. Percentages show the overall prevalence in each cohort.