A survey of hepatitis C prevalence amongst the homeless community of Oxford


Summary

Hepatitis C (HCV) is an emerging health concern across the world, with 170 million people chronically infected and at risk of liver cancer, cirrhosis or liver failure. There is no vaccination and so it is important to learn as much as possible about how to prevent future infection. Modes of transmission include intravenous drug use (IDU), blood products, tattooing and, to a lesser extent, sexual intercourse. Homelessness is a risk factor of HCV because of the environments and behaviours associated with homeless communities such as poor hygiene, poor nutrition and high levels of IDU. The aim of this project was to determine the prevalence of HCV and its risk factors amongst the homeless community of Oxford, which is the second largest in the country. Ninety-eight individuals of the Oxford homeless community were interviewed and tested for HCV. The results gave an estimated HCV prevalence of 26.5 per cent. The major risk factors in this population were IDU (past and present), age (over 20 years old) and sharing the paraphernalia used by i.v. drug users (e.g. spoons, foil and filters). With the exception of age, these risk factors could all be targeted in an attempt to reduce this prevalence and combat the major public health concern that HCV poses to the homeless community of Oxford.

Keywords: hepatitis C (HCV), homelessness, intravenous drug use (IDU)

Background

The World Health Organization (WHO) currently estimates that there are 170 million people chronically infected with HCV and 3–4 million people newly infected each year. Many people with HCV were infected by blood transfusions in the 1970s and 1980s. Since 1990, all blood products have been screened for HCV and this directly resulted in the reduction of post-transfusion hepatitis by more than 5 per cent between 1990 and 1993. Since then, further improvements in testing have further reduced the risk but, in more than 40 per cent of cases, the infected individuals cannot identify a time or source for their infection. It is believed that most of these are due to such other modes of transmission as the passing of infection from mother to child at birth and the use of shared needles by injecting drug users.

Individuals infected with HCV can remain asymptomatic for decades. However, more than 80 per cent of infected people become chronic carriers, with a resultant risk of liver cirrhosis, liver cancer and liver failure, 20–30 years later. There is at present no vaccination for HCV, and treatment with interferon and ribovirin is less than 50 per cent effective as well as being very expensive. As prevention is the most effective method of combating this epidemic, it is important to target those individuals and populations that are at the highest risk of infection.

The homeless population

The suspected high prevalence of HCV amongst the homeless was demonstrated by a study of homeless veterans admitted to a domiciliary programme in California between May 1995 and March 2000. In the programme, 597 individuals were screened and 41.7 per cent were found to have anti-HCV antibodies. Other studies of homeless populations in Canada and France found a lower prevalence of HCV than the California study, but this may have been because the surveys were in younger adults (under 25 years old).

We decided that the homeless community of Oxford would be a suitable group to study to find out how much of a public health problem HCV is in this community and, from this, potential ways to reduce infections in the future. Oxford has the second highest proportion of homeless individuals outside London. This is due to the large student population and others willing to give money to homeless people and the good facilities that Oxford provides them. These include the Gap Project, the Nightshelter, the Luther Street Medical Centre and the Salvation Army. From discussions with the managers of these shelters it was estimated that the homeless population of Oxford was between 250 and 300 individuals and that the good facilities meant that only five of these individuals at any one time slept on the street because most used the various shelters. This made it a good population to study not only because it was very accessible but also because there was a network in place throughout Oxford that would allow change to be effected more efficiently.


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Methods

The homeless community of Oxford was defined for the purpose of this study as those individuals who use sheltered accommodation within Oxford City, at the Gap Project or the Nightshelter, or use the Luther Street Medical Centre. The study aimed to recruit between 80 and 100 volunteers, by posters, through the managers of the three facilities and by word of mouth. We also offered a £5 shopping voucher as an incentive for participants. Recruitment took place in July 2002, and 98 homeless individuals took part.

An oral fluid sample was collected using a sampling kit from Altrix Healthcare plc, which collects a sample of oral fluid from a 2 minute swab that is then tested for the HCV antibodies. The HCV antigen tests were performed by Altrix Healthcare. Personal information was collected using a questionnaire administered by interviews. The questionnaire asked about

- injecting drug use, and if so, sharing needles and paraphernalia;
- sexual intercourse, number and sex of partners, and whether or not condoms were used;
- alcohol consumption and sharing of drinking vessels;
- vaccination against hepatitis A and B;
- previous tests for hepatitis A, B and C;
- family history of hepatitis;
- blood transfusion;
- tattoos, ear and body piercings.

The data on HCV status and characteristics of the homeless population were subjectively separated into 35 variables, including age, sex, length of homelessness, number of tattoos, amount of alcohol use and intravenous drug use (IDU), as well as information relating to other known risk factors for HCV. These data were analysed using SPSS version 10.0.

Ethical approval was given from the Oxfordshire Research Ethics Committee. For ethical reasons individuals would not be able to find out their own results from this study but those who were interested were directed to the Luther Street Medical Centre for further information.

Results

Twenty-six people (26.5 per cent) had HCV detected by oral fluid test; 24 men and 2 women. There was no difference between the sexes in the proportions of HCV positive because the ratio of males to females in this community was 9:1. The average age of this population was calculated at around 30 years old. Most (89.2 per cent) of the participants were registered with a doctor, with half of these being registered with the Luther Street Medical Centre. The youngest person who was HCV positive was 21 years old, but the prevalence of positivity did not increase with age beyond the age of 21 years (see Table 2, below). Comparing the HCV positivity in those aged less than 21 (prevalence 0 per cent) with those aged 21 and older (prevalence 30 per cent), the difference is statistical significant (Fisher’s exact test, \( p = 0.034 \)). However, the odds ratio for age, whether treated as a continuous variable or as binary variable less than/not less than 21 years in multivariate analysis, did not have confidence intervals that excluded unity.

With respect to IDU, 56 people (57 per cent of the participants) admitted to being i.v. drug users on a daily basis either now or in the past, with 34 per cent admitting to injecting drugs daily at the time of the interviews. Of those injecting drugs, 41 per cent said that they had shared needles whereas 67 per cent had shared other paraphernalia (equipment used in the preparation of drugs for injection, e.g. spoons, filters and foil).

Analysis identified four factors that showed a positive association with HCV (Table 1). Data for ‘IDU in the past’ (>6 months) and ‘IDU in the present’ (<6 months) were collapsed into three categories: no IDU, occasional IDU and daily IDU. ‘Sharing of paraphernalia’ was split into two categories relating to those who had and those who had not shared. ‘Needle sharing’ did not appear to be significantly associated with HCV infection, with or without stratification according to sharing of other paraphernalia (Table 3). HCV infection was not found to be associated with any of the other variables investigated (sexual activity, alcohol use, family or personal history of hepatitis, tattooing and body piercing, blood transfusion).

Discussion

Cheung et al. estimated the prevalence of HCV amongst homeless veterans in California to be 41.7 per cent. Roy et al. estimated a prevalence for HCV amongst street youths in
Canada of 12.7 per cent. Those studies were carried out amongst the homeless communities of countries whose general populations suffered an HCV burden similar to that in England and so are useful for putting our results in context. An HCV prevalence of 26.5 per cent lies in the middle of these two earlier studies’ results, suggesting that a quarter of the homeless population in Oxford are infected with HCV, making this a serious public health concern.

To try to combat this problem it is necessary to look at the risk factors that are responsible for this situation, so that a framework can be established to reduce this problem. As expected, the main risk factor for HCV amongst the homeless community in Oxford was IDU. The results from this study suggest that a daily i.v. drug user is 14 times more likely to contract HCV than a non-i.v. drug user. Although this result is to be expected, there seems to be no association between HCV and needle-sharing in this population.

This lack of an association with needle sharing was the biggest surprise, as in the general population it is considered to be the most important risk factor. Three reasons account for this lack of association:

(1) the positive impact of the needle-exchange scheme at the Luther Street Medical Centre has meant that fewer i.v. drug users were actually sharing needles;
(2) this risk factor is limited to only the proportion of the participants who are i.v. drug users. This smaller sample size reduces the chance of a significant result (although association was found for paraphernalia);
(3) as mentioned below, paraphernalia may be the main source of transmission in i.v. drug users in the homeless community of Oxford, which would statistically reduce the effect of needle sharing in this study.

With 67.2 per cent of the i.v. drug users interviewed sharing paraphernalia it seems that the last of these reasons is plausible. It may be that this knowledge could be used by the homeless facilities in Oxford to target the HCV problem. Ironically, the success of the needle-exchange programme has misled i.v. drug users that needle sharing is the only important risk factor.

However, it was encouraging that needle-exchange programmes can be effective. Moreover, with 9 out of 10 homeless people in Oxford having access to a general practitioner and half of these being registered at the Luther Street Medical Centre, there is certainly an easy and effective method of transferring this important information to those individuals who will benefit from it.

The other risk factor identified by this project was age. The significance of this finding is uncertain, because the outcome of statistical tests depended on the method used and the age chosen to divide the groups. Nevertheless, we found that, by logistic regression, the risk of HCV to those over 21 years old was seven times that of those younger than this. Again, this is most likely to relate to IDU and the increased chance of people over 21 either injecting drugs or being in close and frequent contact with i.v. drug users.

This study was interesting because of the effective method of recruitment, which may benefit future studies carried out among other homeless populations. Initial advice suggested that recruitment might be problematic and a 6 week period was left open for interviewing and sampling. In reality, it only took 3 weeks to interview and sample the 98 volunteers. We attribute the success to the £5 shopping voucher that each participant received, the oral method that was used for sampling, and the support given by the managers of the homeless facilities.

Many of those interviewed made it clear that if a blood sample had been required they would have refused the opportunity. Those who were i.v. drug users were unwilling to allow their veins to be used to obtain a blood sample, and those who were not were wary of needles of any sort. Both groups also associated blood sampling with the possibility of DNA testing and would not have been keen to give such a sample. The Oral Fluid Sampling method, created by Altrix Healthcare, which involves

### Table 3 HCV status, sharing needles and other paraphernalia

<table>
<thead>
<tr>
<th></th>
<th>Shared needles</th>
<th>Had not shared needles</th>
<th>Totals</th>
<th>Odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCV positive</td>
<td>11</td>
<td>10</td>
<td>21</td>
<td>0.88 (0.21–3.75)</td>
</tr>
<tr>
<td>HCV negative</td>
<td>10</td>
<td>8</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Subtotals</td>
<td>21</td>
<td>18</td>
<td>39</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Shared needles</th>
<th>Had not shared needles</th>
<th>Totals</th>
<th>Odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCV positive</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>0 (0.0–18.33)</td>
</tr>
<tr>
<td>HCV negative</td>
<td>2</td>
<td>11</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Subtotals</td>
<td>2</td>
<td>15</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

taking a sample of oral fluid by placing a swab in a patient’s mouth for 2 minutes, did not invoke any of these concerns in the participants. This test is as accurate as a blood test for detecting HCV antibodies\textsuperscript{8,9} and was extremely useful for sampling a community such as the homeless of Oxford.

**Acknowledgements**

We would like to thank the volunteers who participated with such willingness and interest; the managers and staff of the Gap Project, the Nightshelter and the Luther Street Medical Centre for their help; Ros Harding for her statistical support; and also the Oxfordshire NHS Charitable Foundation for funding this study. We give special recognition for the guidance of Ryk Ward, who sadly died shortly after the study was completed.

**References**


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