'The Denominator Study':
sentinel surveillance of hepatitis testing in England

HEPATITIS C

Analysis of 2006 and cumulative (2002-2006) data

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1. Key points

Annual data for 2006

Routine testing

- 132,764 people were tested for anti-HCV as part of routine testing in 21 participating centres, of whom 5% (n=6,569) were positive.
- The ratio of men to women tested was 1.1:1, while the ratio of men to women testing positive was 2.0:1
- The majority of people were tested in hospital departments, though people tested in general practice accounted for 21% of the total. The proportion positive was highest in specialist services for drug users (34% positive) and prison services (23% positive).
- 74% of anti-HCV positive individuals tested by PCR were positive for HCV RNA.
- There were considerable differences in testing and positivity rates between sentinel centres.

Reference testing

- Samples from 10,675 individuals were sent to participating centres for reference testing for anti-HCV, of whom 43% (n=4,572) were positive.

All positive individuals identified

- 11,141 anti-HCV positive individuals over 1 year of age were identified through sentinel surveillance during 2006, of a total of 143,439 individuals tested.

Cumulative data (2002-2006)

Routine testing

- 494,370 individuals were tested in five years in 23 participating centres, of whom 5% (n=25,888) were positive.
- The demographics of people tested over the four years are similar to that reported for 2006 alone.

Trends in routine testing

- 2006 is the first year that has seen a decrease in the number of people tested since the sentinel surveillance study began. Most of this decline can be explained by testing previously provided by sentinel centres now being referred to other hospitals in their area.

- The proportion of people tested in sentinel centres who were anti-HCV positive declined between 2002 and 2005 but remained steady between 2005 and 2006.

Reference testing

- Samples from 69,251 individuals were sent for reference testing in participating centres between 2002 and 2006, of whom 32% (n=21,890) were positive.

Trends in reference testing

- The number of people undergoing reference testing increased each year between 2002 and 2004, but has been decreasing since 2005. This may reflect changes in patterns of reference testing, with testing taking place outside the sentinel centres.

All positive individuals identified

- 47,778 anti-HCV positive individuals over 1 year of age were identified through sentinel surveillance between 2002 and 2006, of a total of 563,621 individuals tested.

Comparison between routine and sentinel surveillance

- A comparison between routine and sentinel surveillance suggested that approximately half of positive cases identified through sentinel surveillance between 2002 and 2006 were not known to national surveillance.

2. Introduction

This is the fifth report on hepatitis C testing from the sentinel surveillance study of hepatitis testing in England.

The study monitors hepatitis testing in participating sentinel laboratories in England. The three main aims of the study are:

1. to describe who is being tested for hepatitis C virus (HCV) and hepatitis B virus (HBV)
2. to describe the people who test positive
3. to inform established national surveillance of HCV and HBV

Data gathered through this enhanced surveillance study will supplement data from routine national surveillance and can be used to inform the Hepatitis C Strategy and Action Plan for England. The study can also be used as a sampling frame to select samples for additional testing to estimate the incidence of HCV and describe circulating genotypes in HCV and acute HBV infections.

This report contains national analyses of HCV testing data. Some regional data are presented, where appropriate. Data are presented in a slightly different format to previous years; tests have been divided into routine testing (initial or first-line anti-HCV testing) and reference testing. Analyses of 2006 data are presented in Section 4.1, while cumulative data for 2002-2006 are presented in Section 4.2. Summaries of all positive individuals identified through the study for 2006 alone and 2002-2006 as a whole can be found at the end of each section.

3. Methods

Laboratory test results, clinical details and demographic information (such as age and sex) for all individuals tested for hepatitis C (or hepatitis B) in participating centres were extracted electronically from laboratory information systems on a monthly or three-monthly schedule. These data were sent to the project co-ordinator in Leeds, where they were collated, cleaned and checked for consistency. Patient names were replaced by pseudononymised soundex codes and individuals identified using a unique unnamed reference number. A collated dataset was then periodically forwarded to HPA Centre for Infections for analysis, where it was stored in ORACLE (Oracle Corporation, 2001: Oracle9i Enterprise Edition Release, Redwood Shores, CA, USA).

Age at first test was calculated for each individual, with children aged less than 1 identified separately. Anti-HCV and HCV RNA test results for each individual were reviewed and shown as positive, negative or equivocal. Where an individual had been tested for a specific marker on more than one occasion, tests were reviewed in date tested order. Any positive result was classified as positive; negative followed by equivocal as equivocal; equivocal followed by negative as negative; and all negatives classified as negative. As ethnicity was not routinely available, names were provided temporarily and NamPehchan software was used to identify individuals with names of South Asian (Indian subcontinent) origin.

Prospective data collection ran from February 2002 to September 2003 in eight pilot sites. The second phase of prospective data collection has been ongoing since September 2004, with 24 currently active sentinel sites (as of December 2007; see Appendix 1). Complete data for 2002-2005 were gathered for some centres retrospectively in early 2006. When a new centre joins the study, an attempt is made to collect as much retrospective data as possible. Additional epidemiological data were gathered via questionnaires sent to the requesting clinician between September 2004 and September 2006 for all people who were anti-HCV positive (and/or anti-HBc IgM positive). In the pilot phase, questionnaires were also sent to a random sample of anti-HCV negative individuals. Since March 2007, questionnaires have only been sent to clinicians for anti-HCV positive (and/or anti-HBc IgM positive) individuals identified at the Leeds General Infirmary laboratory, via the local Health Protection Units, as part of a pilot scheme to increase local involvement. Since this pilot is still ongoing, additional epidemiological data from questionnaires are not presented in this report.

The test request location was identified from the address of the clinician requesting the test and was used to define service types, such as GP surgeries, GUM clinics, Accident & Emergency departments and various hospital specialties.

In addition to the routine testing of samples for anti-HCV, each sentinel centre can also provide reference testing for other laboratories or hospitals in their area (who refer a proportion of samples for confirmatory anti-HCV testing). These samples were identified and classified as reference testing (because it is unknown what proportion of positive or negative samples are referred). In this report, data from routine testing and reference testing are first presented separately, with data on individuals testing positive from both sources then considered together. Data on those individuals whose samples were sent to sentinel centres for reference testing (hereafter referred to as individuals undergoing reference testing) are presented in order to illustrate the considerable differences between those tested through routine testing and through reference testing, a highly selected subgroup of people being tested.

Where local laboratories or hospitals send ***all*** their samples to the sentinel centre for testing (i.e. 100% of samples are referred but where specific ward or service types could not be identified) samples were classed as 'Hospitals referring all samples'.

Limited data on risk factors and reasons for testing were obtained from a freetext clinical details field accompanying the test request. A hierarchical coding scheme was employed to allocate risk exposures for each patient according to the relative risk of acquiring HCV via that route, with IDU as the greatest risk. Additional risk factor data from clinician-completed questionnaires for HCV-positive individuals and a sample of HCV-negative individuals was also used, where available, to identify IDUs.

Data from sentinel surveillance can be used to investigate the extent of under-reporting in national surveillance, since test results on all individuals tested for hepatitis in participating sentinel centres were extracted electronically from laboratory records, providing a complete data set for comparison. In order to calculate the proportion of confirmed positive hepatitis C tests from laboratories participating in the sentinel surveillance study which were also reported to the national surveillance scheme, a process of matching between the two data sets was undertaken. Individuals were matched on laboratory number, hospital number, date of birth, soundex, sex, region, date of test, and a combination of these variables. Matching analyses were completed on an earlier dataset that also included individuals who were HCV RNA positive by PCR where no anti-HCV test results were available. Therefore numbers in Tables 6 and 11 do not match exactly to those presented in the main report. A more detailed report on the matching process and results has been circulated to all participants and is available on request.

When interpreting the data on matching, it should be remembered that laboratories are responsible for reporting cases identified as part of routine testing within their laboratory to the national surveillance scheme. Laboratories testing samples for reference purposes are not responsible for

reporting these cases to national surveillance; it is the responsibility of the original testing laboratory. Therefore the amount of reference work undertaken by individual laboratories may affect the level of matching in that sentinel centre. For example, detailed analyses suggest that, in some centres with a high reference workload, matching of positives identified through routine testing (i.e. cases which that laboratory is responsible for reporting) is much greater than the overall figure. Conversely, analysis of results from other centres suggests that their level of matching can be accounted for by reporting by other, referring laboratories and that the level of reporting at the sentinel laboratory is relatively low.

The data presented here are as of 1st October 2007. Please note that some data presented in previous reports may have changed due to addition of new participating centres to the study and recoding of data (e.g. re-classification of the service types of some testing locations). All data are provisional and subject to revision as the study continues.

Data were managed in MS Access and ORACLE and analysed in STATA (version 8) and MS Excel.

Ethical approval was obtained from the Northern & Yorkshire Multi-Centre Research Ethics Committee and the Public Health Laboratory Service (PHLS) ethics committee.

The study is funded by the English Department of Health (study ref: GHP/003/002/02, previous ref: AIDB 2/28).

4. Results

4.1 Annual data (2006)

In 2006, 144,199 individuals were tested for anti-HCV in 21 participating centres (see Appendix 1): 133,443 came from routine testing and 10,756 from reference testing.

Routine testing (2006)

After excluding 679 children aged less than 1 year, in whom anti-HCV results may reflect maternal antibody levels rather than true infection, from the total number of individuals tested (n=133,443):

- 132,764 individuals were tested and included in the routine testing analysis;
- 5% (n=6,569) of people tested as part of routine testing were positive.

Demographics

- 51% of people tested were male; the ratio of men to women tested was 1.1:1. Sex was not reported for 3% of people tested (Table 1).
- Twice as many men tested positive than women.
- Males tested were 86% more likely to be anti-HCV positive than women after adjusting for age group and South Asian ethnicity (OR=1.86, 95% CI=1.76-1.96, p<0.001).
- 48% of people tested were aged between 25 and 44 years. Age was not reported for 1% of people tested.
- Most of the positives (62%) were aged between 25 and 44 years.

Table 1: Age and sex of people tested, and testing positive, for anti-HCV (routine testing, all centres combined), 2006

	Male		Female		Sex not reported		Total	
	Tested	Positive (%)	Tested	Positive (%)	Tested	Positive (%)	Tested	Positive (%)
1-14	1,088	19 (1.7)	1,013	20 (2.0)	55	4 (7.3)	2,156	43 (2.0)
15-24	7,916	245 (3.1)	10,124	203 (2.0)	476	8 (1.7)	18,516	456 (2.5)
25-34	16,194	1,221 (7.5)	16,258	684 (4.2)	1,138	42 (3.7)	33,590	1,947 (5.8)
35-44	16,245	1,531 (9.4)	12,657	569 (4.5)	779	44 (5.6)	29,681	2,144 (7.2)
45-54	9,557	841 (8.8)	7,061	376 (5.3)	367	27 (7.4)	16,985	1,244 (7.3)
55-64	7,101	290 (4.1)	5,760	125 (2.2)	182	16 (8.8)	13,043	431 (3.3)
65 plus	9,478	125 (1.3)	8,199	117 (1.4)	195	7 (3.6)	17,872	249 (1.4)
Unknown	307	36 (11.73)	227	9 (4.0)	387	10 (2.6)	921	55 (6.0)
TOTAL	**67,886**	**4,308 (6.3)**	**61,299**	**2,103 (3.4)**	**3,579**	**158 (4.4)**	**132,764**	**6,569 (5.0)**

- Names were temporarily supplied for 117,179 (88%) individuals.
- The majority of people tested for whom names were available were not South Asian (Table 2).

- Initial analysis suggested that there was no significant difference in anti-HCV status between South Asians and non South Asians (OR=0.96, 95% CI=0.88-1.04, p=0.321). However, after adjusting for age group and sex, South Asians were 13% less likely to be anti-HCV positive than non South Asians (OR=0.87, 95% CI=0.80-0.95, p=0.003).
- Names were less frequently available among people tested in GUM clinics (22% named), prison services (69% named) and specialist services for drug users (80% named).

Table 2: Ethnicity of people tested for anti-HCV (routine testing, all centres combined), 2006.

	Tested	Positive	% positive
South Asian	12,570	611	4.9
Not South Asian	104,609	5,248	5.0
No name	15,585	710	4.6
Total	132,764	6,569	4.9

Geography

- The number of tests and proportion positive differed markedly between sentinel centres (Table 3).
- The greatest number of anti-HCV tests were performed by St Bartholomew's Hospital and the smallest number by Chester HPA laboratory.
- The highest proportion of positive people tested came from Bristol laboratory (9%); the lowest from Ashford (2%).
- In multivariable logistic regression individuals tested in the South West region were twice as likely to be positive as individuals tested in London, after adjusting for sex and age-group (OR=2.01, 95% CI=1.84-2.21, p<0.001), whereas individuals tested in the East Midlands region were 20% less likely to be positive than individuals tested in London (OR=0.80, 95% CI=0.72-0.89, p<0.001). These differences may reflect variation in testing patterns and/or prevalence between regions. For example, it is recognised that there is a high prevalence of injecting drug use in the South West region and initiatives are underway to target IDUs for testing. These factors, together with the possibility of reduced testing of individuals at low risk, could explain the increased likelihood of being positive if tested in the South West.

Table 3: Anti-HCV testing by centre, 2006 (routine testing only)

	Anti-HCV	
	Number tested	**Number positive (%)**
Ashford	6,561	141 (2.1)
Bristol*	8,987	781 (8.7)
Birmingham	3,223	161 (5.0)
Cambridge	5,055	211 (4.2)
Chester	2,639	116 (4.4)
Dulwich	5,586	286 (5.1)
Grimsby	8,026	305 (3.8)
Hull#	3,500	282 (8.1)
Leeds General Infirmary	12,492	594 (4.8)
Liverpool HPA	6,374	373 (5.9)
Manchester	15,884	814 (5.1)
Newcastle	3,532	111 (3.1)
North Middlesex Hospital	2,767	137 (4.9)
Nottingham	7,078	263 (3.7)
Portsmouth	2,864	87 (3.0)
Preston	4,916	317 (6.4)
Royal Liverpool University Hospital	3,771	263 (7.0)
St Bartholomew's Hospital	16,689	574 (3.4)
St George's Hospital	5,556	334 (6.0)
University College Hospital London	7,264	419 (5.8)
TOTAL	**132,764**	**6,569 (5.0)**

*Data from Bristol only available from 1st April 2006 onwards

Does not include data from December 2006 from Hull, which was not available in October 2007

- Most people were tested in hospital departments (Table 4).
- 21% of individuals tested in 2006 were tested in general practice.
- Relatively few people were tested in specialist services for drug users or in prison services (1.5% and 1.6% of individuals tested, respectively).
- One third of individuals tested for anti-HCV at specialist services for drug users were positive; almost one quarter of people tested by prison services were positive.
- Few people tested in occupational health departments were positive.

Table 4: Service where test was requested, (routine testing, all centres combined) 2006

	Number of individuals tested	Number of individuals testing positive (%)	Percentage of total tests represented by this service (%)
Community care			
GP	28,019	1,470 (5.2)	21.1
GUM clinic	14,483	466 (3.2)	10.9
Specialist drug services	2,004	690 (34.4)	1.5
Prison	2,153	497 (23.1)	1.6
Accident & Emergency	1,300	86 (6.6)	1.0
Occupational health	10,290	68 (0.66)	7.7
Secondary care			
Specialist liver services*	4,355	581 (13.3)	3.3
Antenatal/ obstetrics & gynaecology	3,506	177 (5.0)	2.6
Fertility units	10,076	34 (0.3)	7.6
Renal units	6,531	95 (1.4)	4.9
General medical/surgical departments	5,707	328 (5.7)	4.3
Other hospital services**	20,428	937 (4.6)	15.4
Unknown hospital services§	2,033	96 (4.7)	1.5
Hospitals referring all samples†	20,447	899 (4.4)	15.4
Unknown service type#	1,432	145 (10.1)	1.1
TOTAL	132,764	6,569 (5.0)	100

* This refers to infectious disease, hepatology and gastroenterology services.
** This refers to all other hospital services not specified here: for example, it may include respiratory medicine, orthopaedics, care of the elderly, dermatology or cardiology departments.
§ These are hospital services which are currently being investigated to identify specific service type, and may include any of the secondary care services mentioned above.
† This refers to hospitals that send all samples for testing to the sentinel centre, but where specific service type cannot be identified.
# These services are currently being investigated to try to identify specific service type. This category may include specialist services for drug users, GPs, infectious disease departments or other hospital departments.

Risk factors and reasons for testing (freetext fields)

- 1,521 (1%) of individuals tested were reported to have a history of injecting drug use; of these, 43% tested positive for anti-HCV.
- Information on risk factors and/or reason for testing was available from the freetext clinical details field accompanying the test request for 29% of people tested. Routine screening was the most commonly reported reason for testing (10% of all people tested), followed by abnormal liver function tests (LFTs; 4%), testing prior to fertility treatment (3%) and testing of patients undergoing haemodialysis (2%).
- Among those for whom information on risk factors and/or reason for testing was available, the percentage positive was highest among those tested to confirm a previous result (though not necessarily an anti-HCV result; 52%), IDU (above), where there was potential for vertical transmission (7%) and where there were other risk factors reported such as HIV infection, haemophilia or incarceration (6%).
- Reporting of injecting drug use and completion of the clinical details field were poor and vary greatly by sentinel centre. No additional clinical details (risk factor/reason for testing) were

available for patients tested in 4 sentinel centres and less than 10% of patients had details in a further 5 centres.

HCV PCR testing for RNA

- 56% of anti-HCV positive individuals identified through routine testing in 2006 were tested for HCV RNA (n=3,704).
- 74% of those tested were anti-HCV and HCV RNA positive.
- 1,547 anti-HCV negative individuals were also tested for HCV RNA, 5% of whom (n=77) were positive. Of these 77 individuals; 25 were tested in an HIV clinic, 10 in a hepatology department, 9 in a GUM clinic, 5 in an infectious disease unit, 7 in a renal unit, 2 in a haematology department and the remaining 19 in a range of community and hospital services (including general practice, specialist drug services, occupational health and general medical hospital departments). Some of these may represent incident infections detected in the anti-HCV negative, HCV RNA positive window period before seroconversion, while others may reflect impaired antibody responses in immunocompromised patients.

Reference testing (2006)

Samples from 10,756 individuals were sent to participating sentinel centres for reference testing. After excluding 81 children aged under 1 year:

- 10,675 individuals were included in this analysis;
- 4,572 (43%) were positive for anti-HCV.

Data on those individuals undergoing reference testing are presented in order to illustrate the considerable differences between those undergoing routine testing and those undergoing reference testing, a highly selected subgroup of people being tested.

Demographics

- 47% of people undergoing reference testing were male; the ratio of men to women tested was 1:1. Sex was not reported for 6% of people tested (Table 5).
- There was no significant difference in likelihood of testing positive between men and women after adjusting for age group and South Asian ethnicity (OR=1.09, 95% CI=0.99-1.19, p=0.07).
- 48% of people tested were aged between 25 and 44 years. Age was not reported for 7% of people tested.
- Most of the positives (59%) were aged between 25 and 44 years.

Table 5: Age and sex of people undergoing reference testing (all centres combined), 2006

	Male		Female		Sex not reported		Total	
	Tested	Positive (%)	Tested	Positive (%)	Tested	Positive (%)	Tested	Positive (%)
1-14	39	5 (12.8)	46	8 (17.4)	4	1 (25.0)	89	14 (15.7)
15-24	448	130 (29.0)	586	195 (33.3)	53	21 (39.6)	1,087	346 (31.8)
25-34	1,173	637 (54.3)	1,230	554 (45.0)	121	67 (55.4)	2,524	1,258 (49.8)
35-44	1,370	795 (58.0)	1,150	593 (51.6)	119	68 (57.1)	2,639	1,456 (55.2)
45-54	771	431 (55.9)	784	390 (49.7)	51	33 (64.7)	1,606	854 (53.2)
55-64	402	130 (32.3)	463	156 (33.7)	20	12 (60.0)	885	298 (33.7)
65 plus	496	85 (17.1)	522	120 (23.0)	30	17 (56.7)	1,048	222 (21.2)
Unknown	364	34 (9.3)	147	58 (39.5)	286	32 (11.2)	797	124 (15.6)
TOTAL	**5,063**	**2,247 (44.4)**	**4,928**	**2,074 (42.1)**	**684**	**251 (36.7)**	**10,675**	**4,572 (42.8)**

- Names were available for 8,873 (83%) individuals.
- The majority of people for whom names were available were not South Asian (n=8,001, 90%).
- Of 872 people classified as South Asian, 52.5% (n=458) were positive for anti-HCV. Among non South Asians and people without names available this was 44.0% (3,522/8,001) and 32.9% (n=592/1,802) respectively.

- Of individuals undergoing reference testing, South Asians were 53% more likely to be positive than non South Asians, after adjusting for sex and age-group (OR=1.53, 95% CI=1.31-1.78, p<0.001). This is in contrast to the finding for 2006 routine testing data (see above).
- The original source of the request was not available, so we can not comment on the types of services from which these samples were referred.
- The number of people undergoing reference testing in 2006 varied greatly by sentinel centre, reflecting local referral patterns and services provided. Overall 7.4% of individuals tested in sentinel centres were tested through reference testing in 2006. This ranged from 0% in Hull to 100% at HPA CfI (data not shown): the median was 2%.

Risk factors and reasons for testing

- Information on risk exposure or reason for testing was available for 25% of individuals undergoing reference testing in 2006. The most commonly reported reason was injecting drug use (6% of all individuals tested), followed by routine screening (5%), confirmatory testing (5%) and liver disease (3%).

HCV PCR testing for RNA

- 37% of anti-HCV positive individuals identified through reference testing were tested for HCV RNA (n=1,690).
- 71% of those tested were anti-HCV and HCV RNA positive.

Comparison of routine and reference testing (2006)

- Individuals undergoing reference testing were
    - 17 times more likely to be anti-HCV positive than individuals undergoing routine testing after adjusting for sex and age-group (OR=17.1, 95% CI=16.3-17.9, p<0.001).
    - 1.7 times more likely to be reported with a risk exposure of IDU than individuals undergoing routine testing, after adjusting for sex and age-group (OR=1.79, 95% CI=1.60-2.00, p<0.001). (Unadjusted this was five times more likely (OR=5.45, 95% CI=4.96-5.99, p<0.001).

All positive individuals identified (2006)

- In total, 11,141 anti-HCV positive individuals over 1 year of age were identified through sentinel surveillance during 2006, of a total of 143,439 individuals tested: 6,569 through routine testing and 4,572 through reference testing.
- 61% of individuals testing positive were male; the mean age was 40 years.
- Names were available for 88% of positive individuals, of whom 11% were of South Asian origin.
- 1,180 (11%) of positive individuals were reported to be current or former injecting drug users.
- 5,394 (48%) of anti-HCV positive individuals were also tested for HCV RNA by PCR; of those, 73% were anti-HCV and HCV RNA positive.

Comparison with routine surveillance (2006)

- A total of 13,999 anti-HCV and/or HCV PCR positive individuals identified through the sentinel surveillance study during 2006 (from both routine testing and reference testing) were available for the matching analysis.
- 6,152 (44%) of these individuals could be matched to reports from routine surveillance of hepatitis C, suggesting that these individuals had been reported to this scheme.
- There was considerable variation in reporting between participating laboratories and by region (Table 6).
- A more detailed report on this analysis is available.

Table 6: Number and percentage of individuals reported as hepatitis C positive through sentinel surveillance during 2006 who could be matched to reports from routine surveillance, by participating laboratory

Participating laboratory	Number of individuals matched	Total number of individuals (sentinel surveillance)	% matched
Ashford	105	193	54.4
Birmingham	733	1,540	47.6
Cambridge	363	830	43.7
CFI	489	2,458	19.9
Chester	69	195	35.4
Dulwich	151	402	37.6
Grimsby	275	376	73.1
Leeds General Infirmary	1,140	1,693	67.3
Liverpool HPA	340	559	60.8
Manchester	850	1543	55.1
Newcastle	101	235	43.0
North Middlesex	100	143	69.9
Nottingham	95	667	14.2
Portsmouth	70	157	44.6
Preston	479	656	73.0
Royal Liverpool Hospital	92	383	24.0
St Bartholomew's Hospital	70	944	7.4
St George's Hospital	324	407	79.6
University College Hospital	306	618	49.5
Total, all centres	**6,152**	**13,999**	**43.9**

N.B. The number of hepatitis C positive individuals presented here does not match the numbers presented in the rest of the report because the matching analysis includes all individuals testing positive for anti-HCV and/or HCV PCR, and because the matching analysis was undertaken on an earlier extract of data than that used for this report.
Bristol is not included in the matching analysis as it was undertaken prior to this centre joining the study.

4.2 Cumulative data (2002-2006)

Between 2002 and 2006, 566,957 individuals were tested for anti-HCV from 23 participating centres (see Appendix 1): 497,147 from routine testing and 69,810 from reference testing. Complete data for all years was available for 11 centres; therefore a smaller subset of data was used for trend analysis.

Routine testing (2002-2006)

After excluding 2,777 children aged less than 1 year:

- 494,370 individuals were tested in five years in 23 participating centres;
- 5% of people tested were positive (n=25,888).

Demographics

- The demographics of people tested over the four years are similar to that reported for 2006 alone:
    - 51% of people tested were male (male to female ratio = 1.1:1). Sex was not reported for 4% of people tested (Table 7).
    - 46% of people tested were aged 25-44 years. Age was not reported for 1% of people tested.
    - Males tested were 85% more likely to be anti-HCV positive than women after adjusting for age group and South Asian ethnicity (OR=1.85, 95% CI=1.79-1.90, p<0.001).
    - Most of the positives (64%) were aged between 25 and 44 years.

Table 7: Age and sex of individuals tested, and testing positive, between 2002 and 2006 (routine testing, all centres combined)

	Male		Female		Sex not reported		Total	
	Tested	Positive (%)	Tested	Positive (%)	Tested	Positive (%)	Tested	Positive (%)
1-14	4,362	95 (2.2)	3,985	87 (2.2)	346	16 (4.6)	8,693	198 (2.3)
15-24	29,703	1,100 (3.7)	37,479	922 (2.5)	2,894	95 (3.3)	70,076	2,117 (3.0)
25-34	59,323	5,280 (8.9)	57,818	2,820 (4.9)	5,402	278 (5.1)	122,543	8,378 (6.8)
35-44	57,046	5,774 (10.1)	43,695	2,219 (5.1)	3,904	239 (6.1)	104,645	8,232 (7.9)
45-54	35,200	2,983 (8.5)	26,350	1,208 (4.6)	2,268	112 (4.9)	63,818	4,303 (6.7)
55-64	26,708	888 (3.3)	22,404	460 (2.1)	1,577	47 (3.0)	50,689	1,395 (2.8)
65 plus	35,829	549 (1.5)	31,871	432 (1.4)	2,245	37 (1.6)	69,945	1,018 (1.5)
Unknown	1,596	157 (9.8)	1,240	69 (5.6)	1,125	21 (1.9)	3,961	247 (6.2)
TOTAL	**249,767**	**16,826 (6.7)**	**224,842**	**8,217 (3.7)**	**19,761**	**845 (4.3)**	**494,370**	**25,888 (5.2)**

- Names were available for 86% individuals (n=423,465) overall. However, this varied by service type, and the availability of names from different service types differed over time.

Overall between 2002 and 2006, names were only available for 33% people tested in GUM clinics, 66% people tested in prison and 69% people tested in specialist drug services.

- Where names were available, the majority of people tested (90%) were not South Asian.
- Initial analysis suggested that there was no significant difference in anti-HCV status between South Asians and non South Asians (OR=1.01, 95% CI=0.97-1.06, p=0.591). However, after adjusting for age group and sex, South Asians were 9% less likely to be anti-HCV positive than non South Asians (OR=0.91, 95% CI=0.87-0.96, p<0.001).

Geography

- The number of people tested and proportion positive differed markedly between sentinel centres (Table 8). Manchester tested the greatest number of people and Ealing the smallest. However, centres have contributed data for differing periods of time (Appendix 1); therefore the data in Table 8 should be interpreted with caution. For example, Ealing contributed data to the pilot study only, and data for Bristol is only available from April 2006.
- Liverpool HPA had the highest proportion positive of people tested (9%); the lowest proportion positive was in Ashford (3%).

Table 8: Number of people tested for anti-HCV and proportion positive, all centres, 2002 – 2006

Sentinel centre name	Number people tested	Number positive (%)
Ashford*	30,745	805 (2.6)
Birmingham*	17,884	791 (4.4)
Bristol	8,987	781 (8.7)
Cambridge*	31,081	1,509 (4.9)
Chester*	13,537	833 (6.2)
Dulwich	12,607	581 (4.6)
Ealing	1,497	69 (4.6)
Grimsby	22,210	760 (3.4)
Hull	14,777	1,126 (7.6)
Leeds General Infirmary	27,486	1,313 (4.8)
Leeds HPA	13,515	679 (5.0)
Liverpool HPA*	27,244	2,468 (9.1)
Manchester*	70,573	4,264 (6.0)
Newcastle*	30,547	1,222 (4.0)
North Middlesex	10,219	559 (5.5)
Nottingham	29,908	1,081 (3.6)
Portsmouth*	16,350	590 (3.6)
Preston*	22,483	1,730 (7.7)
Royal Liverpool Hospital*	13,360	912 (6.8)
St Bartholomew's Hospital	41,648	1,670 (4.0)
St George's Hospital	18,791	1,015 (5.4)
University College Hospital	18,921	1,130 (6.0)
Total, all centres	**494,370**	**25,888 (5.2)**

* Centres for which full data on anti-HCV testing between 2002-2006 are available: see Appendix 1.

- Patterns of testing in different areas of the health service during the overall period 2002 to 2006 were similar to those observed for 2006 (Table 9):
    - Hospital departments accounted for the largest share of testing in all service types (38%).
    - 17% of individuals were tested in general practice.
    - For each year of the study, the highest proportion of positive people was observed among attendees at specialist services for drug users and prisons.

Table 9: Service where test was requested, (routine testing, all centres combined) 2002-2006

	Number of individuals tested	Number of individuals testing positive (%)	Percentage of total tests represented by this service (%)
Community care			
GP	85,796	4,631 (5.4)	17.4
GUM clinic	58,578	2,198 (3.8)	11.8
Specialist drug services	6,626	2,533 (38.2)	1.3
Prison	7,732	1,968 (25.5)	1.6
Accident & Emergency	5,609	369 (6.6)	1.1
Occupational health	35,572	194 (0.5)	7.2
Secondary care			
Specialist liver services*	18,650	2,094 (11.2)	3.8
Antenatal/ obstetrics & gynaecology	12,716	628 (4.9)	2.6
Fertility units	25,601	96 (0.4)	5.2
Renal units	21,724	355 (1.6)	4.4
General medical/surgical departments	23,268	1,345 (5.8)	4.7
Other hospital services**	78,998	4,033 (5.1)	16.0
Unknown hospital services§	6,291	263 (4.2)	1.3
Hospitals referring all samples†	104,706	4,972 (4.7)	21.2
Unknown service type#	2,503	209 (8.3)	0.5
TOTAL	494,370	25,888 (5.2)	100

* This refers to infectious disease services, hepatology departments and gastroenterology departments.
** This refers to all other hospital services not specified here: for example, it may include respiratory medicine, orthopaedics, care of the elderly, dermatology or cardiology departments.
§ These are hospital services which are currently being investigated to identify specific service type, and may include any of the secondary care services mentioned above.
† This refers to hospitals that send all samples for testing to the sentinel centre, but where specific service type cannot be identified.
# These services are currently being investigated to try to identify specific service type. This category may include specialist services for drug users, GPs, specialist infectious disease departments or other hospital departments.

Risk factors and reasons for testing (freetext fields)

- Between 2002 and 2006, 7,876 (2%) of individuals tested were reported to have a history of injecting drug use; of these, 47% tested positive for anti-HCV.
- Information on risk factors and/or reason for testing was available from the freetext clinical details field accompanying the test request for 38% of people tested between 2002 and 2006. Routine screening was the most commonly reported reason for testing (13% of all people

tested), followed by abnormal LFTs (6%), screening of patients undergoing haemodialysis (3%) and presence or suspicion of liver disease (3%).

- Among those for whom information on risk factors and/or reason for testing was available, the percentage positive was highest among people tested to confirm a previous result (though not necessarily an anti-HCV result; 52%), IDU (as above), people tested in an antenatal setting (8%) and people with other reported risk factors such as HIV infection, haemophilia or incarceration (7%).
- Reporting of injecting drug use and completion of the clinical details field were poor and have varied at sentinel centres over time, hence this data should be interpreted with caution.

HCV PCR testing for RNA

- Over the four years 14,253 of 25,888 (55%) anti-HCV positive individuals were tested by PCR for HCV RNA.
- 72% were anti-HCV and HCV RNA positive.

Trends in routine testing (2002-2006)

At the 11 participating centres for which complete data between 2002 and 2006 are available (see Appendix 1);

- 275,497 people were tested through routine testing over the five year period. After excluding 1,693 children aged under 1, a total of 273,804 individuals were included in this trend analysis.
- The number of people tested increased each year between 2002 and 2005, but decreased slightly in 2006 (Figure 1).
- The largest increase (approximately 20%) occurred between 2002 and 2003. Between 2003 and 2005 the number of people tested increased by around 10% each year, then declined 7% between 2005 and 2006.
- A more detailed analysis of service type of the original test request shows that much of this decrease can be explained by a decline in the number of individuals tested by sentinel centres for other hospitals in their area ('hospitals referring all samples'; see Figure 9). This decline is particularly noticeable in certain sentinel centres. Some participating sentinel centres have commented that local testing patterns have changed as an increasing number of local laboratories have started to carry out anti-HCV testing in-house and were therefore no longer sending samples to the sentinel centre for testing.

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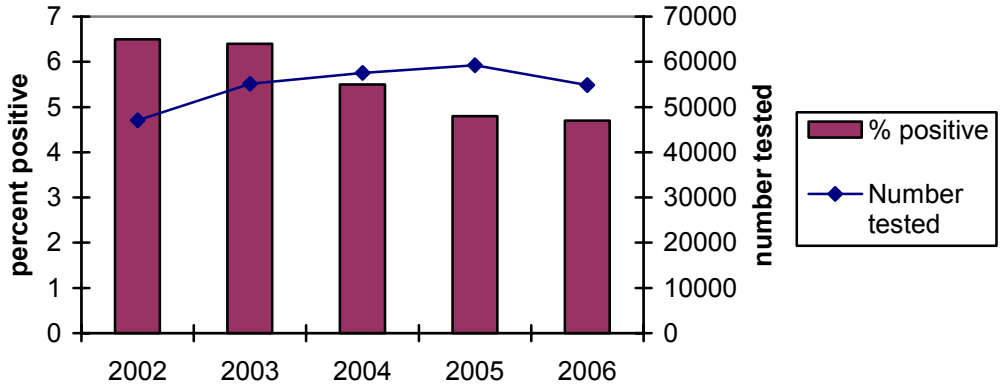
- A total of 15,124 (5.5%) people were positive.
- The proportion of people tested who were anti-HCV positive declined between 2002 and 2005 but remained steady between 2005 and 2006.

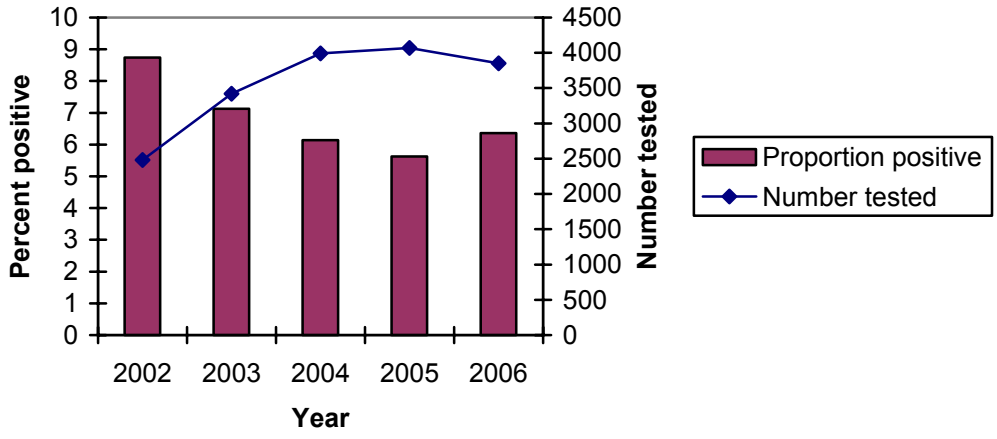
Figure 1: Number of people tested and proportion positive by year, 2002-2006*



*At the 11 centres for which complete data between 2002 and 2006 are available.
N.B. Differences in the number tested and proportion positive between annual reports may occur due to reclassification of service types (for example reclassification to reference testing, which are excluded from this data).

- For those centres where full data between 2002 and 2006 were available, names were available for 86% of people tested.
- In these centres, the number of South Asian people tested increased between 2002 and 2005 and has subsequently declined slightly, while the proportion positive declined between 2002 and 2005 and slightly increased slightly in 2006. (Figure 2).

Figure 2: Testing and proportion positive among South Asians over time*



*At the 11 centres for which complete data between 2002 and 2006 are available.

- The proportion of people tested for whom information on risk factors and reasons for testing was available (in freetext fields) declined overall between 2002 and 2006, from 48% in 2002 to 25% in 2006. The reasons for this decline are currently being investigated. In Manchester, for example, the codes used for clinical details have changed, preventing interpretation during data processing: the study co-ordinator is currently working to obtain a

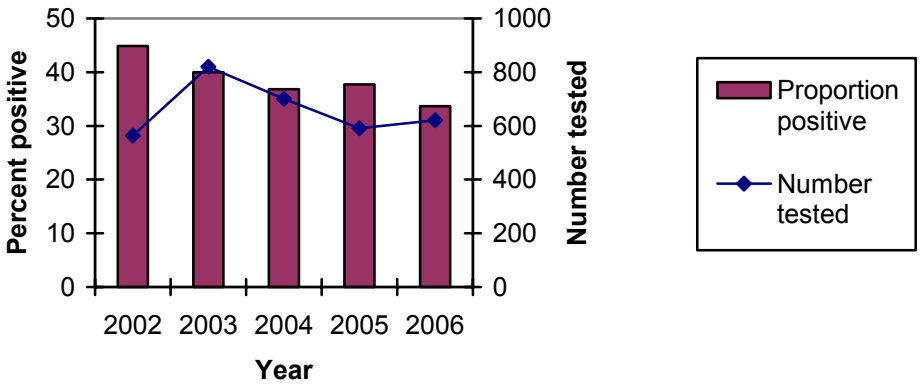
list of new codes. Given the overall decline in availability of data in freetext fields, care should be taken when interpreting data presented on trends.

- However, among people being tested for whom information on risk factors and reasons for testing was available, the data suggests that:
    - The proportion of people reported to be IDU declined each year (from 3% of people for whom this data was available in 2002 to 1% in 2006), as did the proportion of people tested because of presence or suspicion of liver disease (from 10% in 2002 to 6% in 2006).
    - The proportion of people tested for whom sex was the main risk factor increased overall (from 1% in 2002 to 3% in 2006), as did the proportion of people tested as part of a routine screen (from 23% in 2002 to 36% in 2006).
    - The proportion positive among people with other reported risks (e.g. HIV infection, haemophilia) and people tested as part of a routine screen declined overall between 2002 and 2006.

Testing in specialist services for drug users

- The number of people tested in specialist services for drug users increased between 2002 and 2003, decreased between 2003 and 2005 and then showed a slight increase again in 2006 (Figure 3).
- Individuals tested in specialist services for drug users were 47% less likely to be positive in 2006 compared to 2002 after adjusting for sex and age-group (OR=0.53, 95% CI=0.41-0.68, p<0.001).

Figure 3: Testing in specialist services for drug users, 2002-2006*



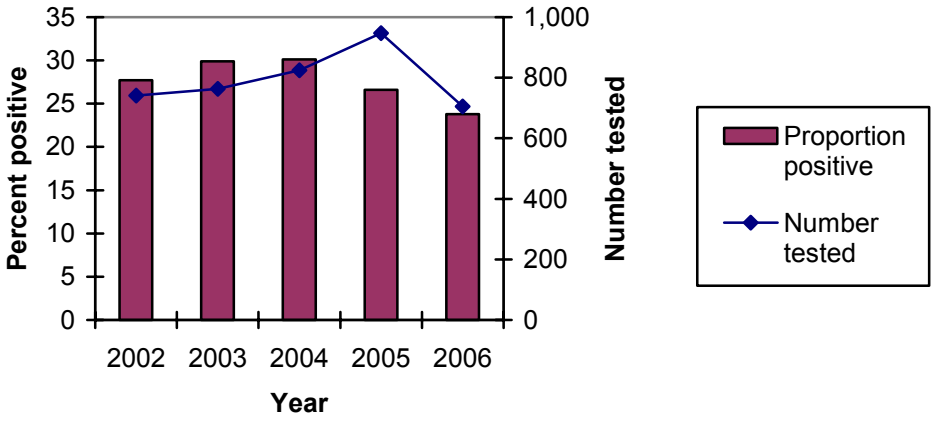
*At the 11 centres for which complete data between 2002 and 2006 are available.

Testing in prison services

- The number of people tested within the prison services increased each year by approximately 20% between 2002 and 2005, but declined in 2006 (Figure 4).

- Individuals tested by prison services were 29% less likely to be positive in 2006 compared to 2002 after adjusting for sex and age-group (OR=0.71, 95% CI=0.55-0.91, p=0.007).

Figure 4: Testing in prison services, 2002-2006* (note change in scale)

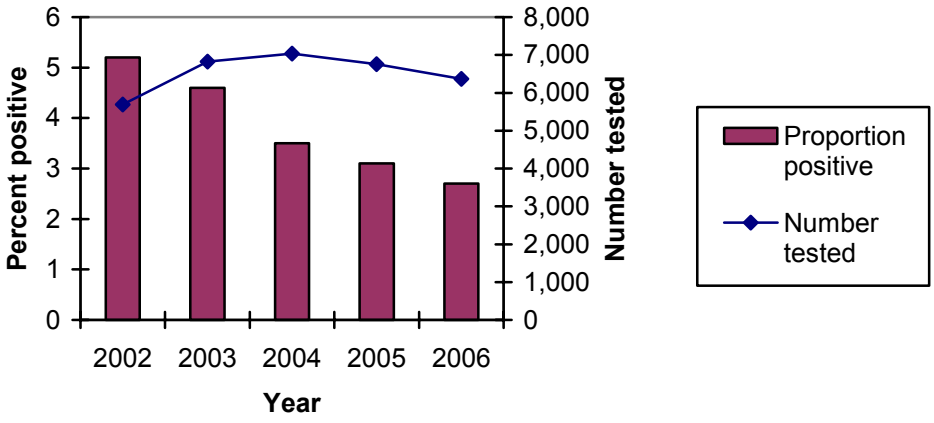


*At the 11 centres for which complete data between 2002 and 2006 are available.

Testing in GUM clinics

- The number of people tested in GUM clinics increased between 2002 and 2004 but has since decreased slightly (Figure 5).
- Individuals tested in GUM clinics were 50% less likely to be positive in 2006 compared to 2002 after adjusting for sex and age-group (OR=0.50, 95% CI=0.41-0.60, p<0.001).

Figure 5: Testing in GUM clinics, 2002-2006* (note change in scale)



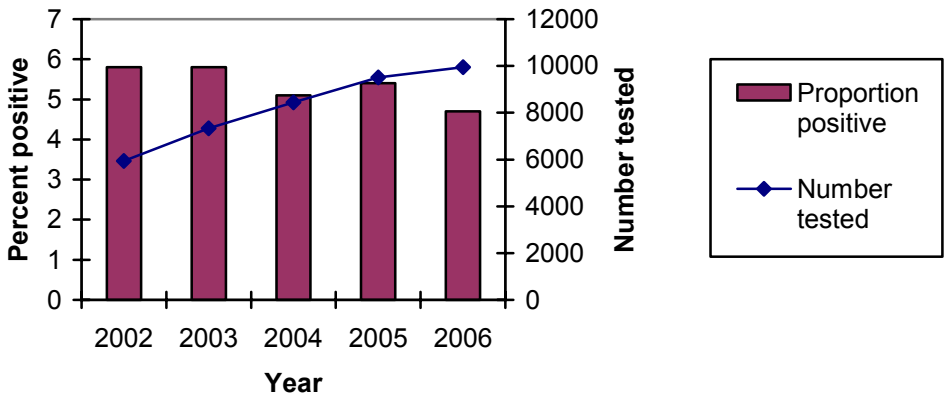
*At the 11 centres for which complete data between 2002 and 2006 are available.

Testing in GP surgeries

- The number of people tested in GP surgeries increased each year between 2002 and 2006 (Figure 6).

- Individuals tested in general practice in 2006 were 15% less likely to be positive than in 2002 after adjusting for age group and sex (OR=0.85, 95% CI=0.74-0.98, p=0.02).

Figure 6: Testing in GP surgeries, 2002-2006* (note change in scale)

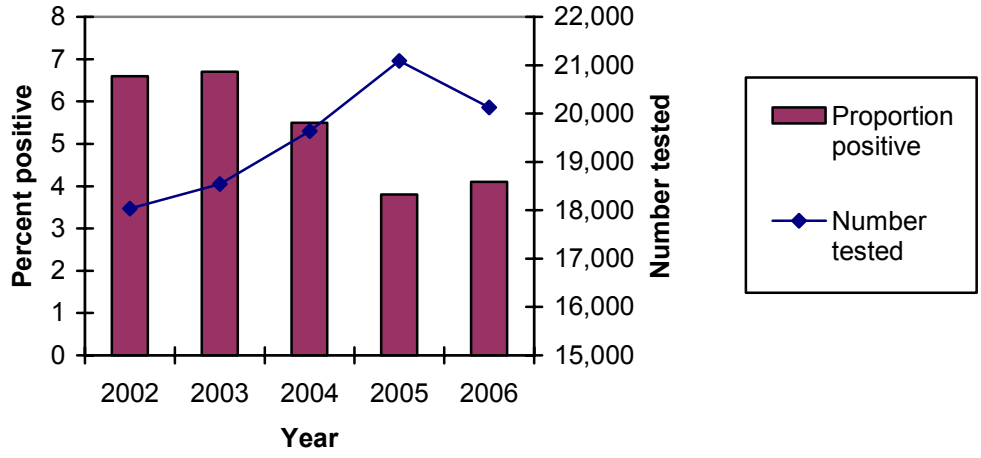


*At the 11 centres for which complete data between 2002 and 2006 are available.

Testing in hospitals

- The number of people tested in hospitals (excluding hospitals referring all samples) increased each year between 2002 and 2005 but has since decreased slightly (Figure 7).
- Individuals tested in hospitals in 2006 were 40% less likely to test positive than in 2002 after adjusting for age and sex (OR=0.60, 95% CI=0.55-0.65, P<0.001).

Figure 7: Testing in hospitals, 2002-2006* (note change in scale)



*At the 11 centres for which complete data between 2002 and 2006 are available.
Excludes hospitals referring all samples.

Reference testing (2002-2006)

Between 2002 and 2006, samples from 69,810 individuals were tested in 23 participating centres through reference testing. After excluding 559 children aged less than 1 year, a total of 69,251 individuals were included in the analysis.

- 21,890 (32%) of 69,251 individuals undergoing reference testing in participating centres between 2002 and 2006 were positive for anti-HCV.

Demographics

- The demographics of people undergoing reference testing over the four years are similar to those reported for 2006 reference testing alone:
    - 54% people tested were male (male to female ratio = 1.3:1) Sex was not reported for 5% of people tested (Table 10).
    - 46% of people tested were aged 25-44 years. Age was not reported for 5% of people tested.
    - More men (35%) who were tested were positive than women (27%).
    - Males tested were 55% more likely to be anti-HCV positive than women after adjusting for age group and South Asian ethnicity (OR=1.55, 95% CI=1.49-1.60, p<0.001).
    - Most of the positives (58%) were aged between 25 and 44 years.

Table 10: Age and sex of individuals tested between 2002 and 2006 (reference testing, all centres combined)

	Male		Female		Sex not reported		Total	
	Tested	Positive (%)	Tested	Positive (%)	Tested	Positive (%)	Tested	Positive (%)
1-14	391	29 (7.4)	394	34 (8.6)	46	5 (10.9)	831	68 (8.2)
15-24	3,689	929 (25.2)	4,090	864 (21.1)	352	102 (29.0)	8,131	1,895 (23.3)
25-34	8,651	3,659 (42.3)	6,724	2,033 (30.2)	839	297 (35.4)	16,214	5,989 (36.9)
35-44	9,235	4,344 (47.0)	5,762	2,056 (35.7)	692	304 (43.9)	15,689	6,704 (42.7)
45-54	5,800	2,524 (43.5)	3,837	1,249 (32.6)	315	161 (51.1)	9,952	3,934 (39.5)
55-64	3,310	704 (21.3)	2,714	470 (17.3)	181	75 (41.4)	6,205	1,249 (20.1)
65 plus	4,488	579 (12.9)	4,053	554 (13.7)	275	88 (32.0)	8,816	1,221(13.8)
Unknown	1,688	372 (22.0)	676	229 (33.9)	1,049	229 (21.8)	3,413	830 (24.3)
TOTAL	**37,252**	**13,140 (35.3)**	**28,250**	**7,489 (26.5)**	**3,749**	**1,261 (33.6)**	**69,251**	**21,890 (31.6)**

- Names were available for 80% individuals (n=55,468) undergoing reference testing.
- Where names were available, the majority of people tested (91%) were not South Asian.
- The proportion positive among South Asians undergoing reference testing was higher than non South Asians (44% compared to 33%).

- After adjusting for age group and sex, South Asians undergoing reference testing were 77% more likely to be positive than non South Asians (OR=1.77, 95% CI=1.65-1.89, p<0.001).
- The number of samples referred to participating laboratories for reference testing varied greatly by sentinel centre, reflecting local referral patterns and laboratory services.

Risk factors and reasons for testing (freetext fields)

- Information on risk exposure or reason for testing was available for 23% (n=16,094) of individuals undergoing reference testing in sentinel laboratories between 2002 and 2006.
- The most commonly reported reasons were routine screening (5%), injecting drug use (4%) and liver disease (3%).
- Reporting of injecting drug use and completion of the clinical details field were poor and have varied at sentinel centres over time, hence this data should be interpreted with caution.

HCV PCR testing for RNA

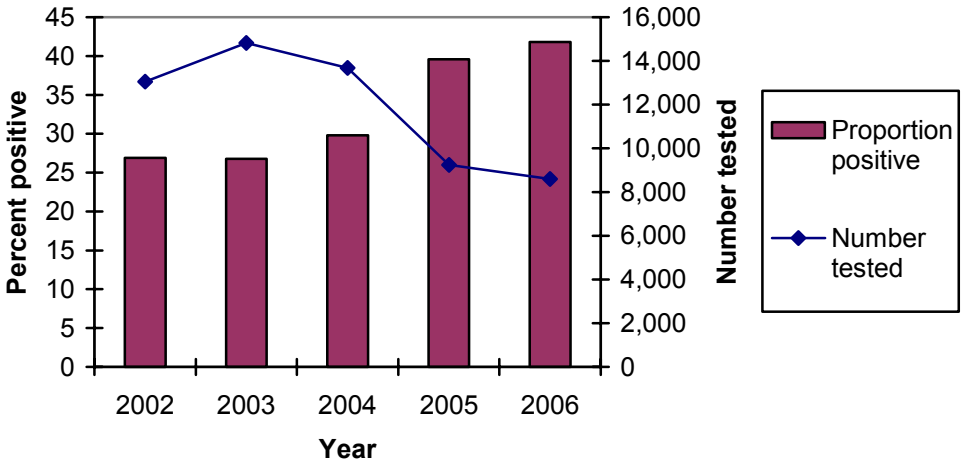
- Between 2002 and 2006, 8,408 of 21,890 (38%) anti-HCV positive people undergoing reference testing were also tested for HCV RNA by PCR.
- 70% were anti-HCV and RNA positive.

Trends in reference testing (2002-2006)

At the 11 centres for which complete 2002 to 2006 data are available (see Appendix 1);

- 59,813 people underwent reference testing over the five year period. After excluding 428 children aged under 1 year, a total of 59,385 individuals were included in this trend analysis.
- The number of people undergoing reference testing increased each year between 2002 and 2004, but has been decreasing since 2005 (Figure 8). This may reflect a change in patterns of reference testing within local areas, with testing moving away from the sentinel centres. All laboratory test results should be confirmed, and for many laboratories this was done by sending samples to a different laboratory, such as the sentinel centres participating in this study. As noted above, there has been a change in routine testing, as more laboratories start to test samples in-house. More work is needed to confirm that the decline in reference testing reflects a parallel change and to ensure that all test results are still being confirmed according to national standards(1).
- Overall, 33% of people undergoing reference testing were positive. The proportion of people who were anti-HCV positive increased over the period 2002 to 2006.
- The decline in the number of samples and increase in the proportion positive suggest that there has been a change in reference testing, whereby positive samples were more likely to be referred.

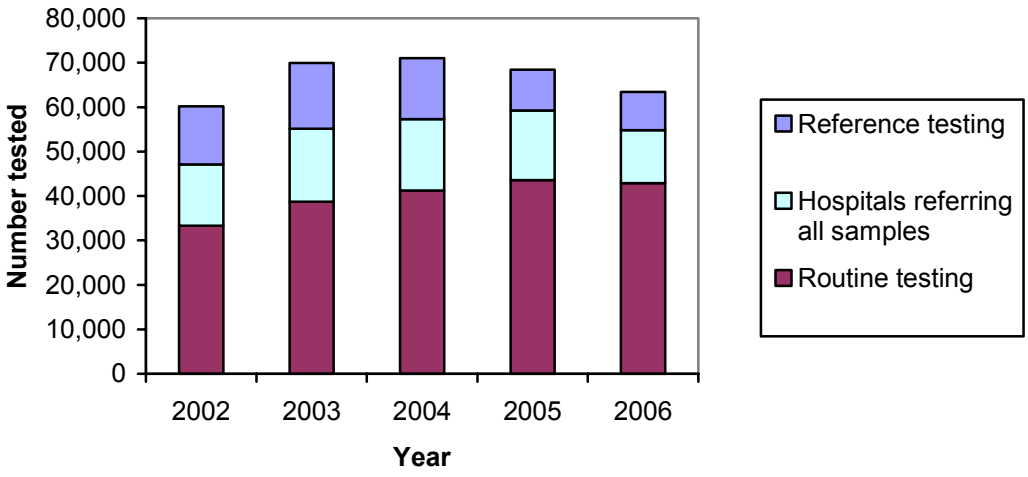
Figure 8: Testing and proportion positive over time: reference testing, 2002-2006*



*At the 11 centres for which complete data between 2002 and 2006 are available.

Figure 9 shows testing over time for routine testing (excluding hospitals referring all samples), hospitals referring all samples and reference testing between 2002 and 2006, from the 11 centres for which data are available.

Figure 9. Trends in routine testing, hospitals referring all samples and reference testing, 2002 to 2006*



*At the 11 centres for which complete data between 2002 and 2006 are available.

- Information on risk factors and reasons for testing was available for 18% people whose samples were referred for testing overall. This proportion varied greatly between 2002 and 2006, the reasons for which are currently being investigated.

All positive individuals identified (2002-2006)

- In total, 47,778 anti-HCV positive individuals over 1 year of age were identified through sentinel surveillance between 2002 and 2006, of a total of 563,621 individuals tested: 25,888 through routine testing and 21,890 through reference testing in 23 sentinel laboratories.
- 66% of individuals testing positive were male; the mean age was 40 years.
- Names were available for 85% of positive individuals, of whom 11% were of South Asian origin.
- 7,104 (15%) of positive individuals were reported to be current or former injecting drug users.
- 22,661 (47%) of anti-HCV positive individuals were also tested for HCV RNA by PCR; of those, 16,202 (71%) were anti-HCV and HCV RNA positive.

Comparison with routine surveillance (2002-2006)

- 27,063 (44%) of 61,800 anti-HCV and/or HCV PCR positive individuals identified through the sentinel surveillance study (routine testing or reference testing) between January 2002 and December 2006 could be matched to reports from routine surveillance of hepatitis C, suggesting that these individuals had been reported to this scheme.
- There was considerable variation in matching between participating laboratories (table 11).
- A more detailed report on this analysis is available.

Table 11: Number and percentage of individuals reported as hepatitis C positive in sentinel surveillance during 2002-2006 who could be matched to reports from routine surveillance, by participating laboratory.

Participating laboratory	Number of individuals matched	Total number of individuals (sentinel surveillance)	% matched (this analysis)	% matched (pilot study)
Ashford	662	1,144	57.9	-
Birmingham	3,952	7,215	54.8	80.2
Cambridge	2,135	5,287	40.4	-
Centre for Infections (CFI)	1,930	10,581	18.2	
Chester	730	1,202	60.7	-
Dulwich	289	788	36.7	-
Ealing	1	87	1.1	0.0
Grimsby	669	1,001	66.8	-
Hull	103	314	32.8	21.4
Leeds General Infirmary	1,775	3,313	53.6	-
Leeds HPA	1,015	3,412	29.7	0.0
Liverpool HPA	2,202	3,248	67.8	-
Manchester	5,441	7,834	69.5	75.5
Newcastle	1,200	3,173	37.8	23.7
North Middlesex	210	578	36.3	19.4
Nottingham	697	2,927	23.8	2.4
Portsmouth	413	970	42.6	-
Preston	2,169	2,896	74.9	-
Royal Liverpool Hospital	264	1,252	21.1	-
St Bartholomew's Hospital	148	2,656	5.6	-
St George's Hospital	324	407	79.6	-
University College Hospital	734	1,515	48.4	-
Total, all centres	27,063	61,800	43.8	53.5

N.B. The number of hepatitis C positive individuals presented here does not match the numbers presented in the rest of the report because the matching analysis includes all individuals testing positive for anti-HCV and/or HCV PCR, and because the matching analysis was undertaken on an earlier extract of data than that used for this report.
Bristol is not included in the matching analysis as it was undertaken prior to this centre joining the study.

4.3 Discussion

This report presents analyses of five years of hepatitis C testing data, consisting of test results for over 500,000 people. This is the first time data on reference testing has been included, enabling a complete picture of all the positive people identified through the study to be presented.

The demographics of people tested during 2006 were similar to that presented in previous reports: a slightly larger number of males were tested than females and males were more likely to be positive. People aged 25-44 years were still the most commonly tested age groups, and those aged 35-54 years were the age groups with the highest proportion of positive people.

There were several differences between people tested in 2006 and in previous years worth highlighting. For example, in 2006, South Asians were 13% less likely to be positive than non South Asians after adjusting for sex and age group; this contrasts to 2005, when data suggested that South Asians were 25% more likely to be positive. 2006 saw an increase in the availability of patient names (held temporarily to assign ethnicity using the NamPehchan programme) from specialist drug and prison services (from 49% and 51% respectively in 2005 to 80% and 69% in 2006), which meant that ethnicity could be assigned for more people from these services, allowing them to be included in ethnicity analyses. This increase in patient name availability from services with a higher prevalence of HCV infection may have led to the change in the difference in positivity by South Asian ethnicity. The trend analysis suggests that there was a decline in the number of South Asians tested in 2006, with a slight rise in the proportion positive. It is therefore unlikely that the above change in positivity was due to a wider range of South Asians at lower risk to those tested in previous years being tested. During 2008, we would like to include ethnicity data as entered in laboratory information systems at sentinel centres, where available. This would facilitate more detailed investigation of ethnic differences in HCV infection.

One important facility of the sentinel surveillance study is the ability to monitor trends in testing over time and, as the study continues, the volume of data available to do so will continue to increase. Testing increased again in 2006 in GP surgeries, but declined in specialist services for drug users, prison services and GUM clinics. We are currently investigating HCV testing in GUM clinics in more detail. A key point to note from the trend analysis for 2002 to 2006 is the decline, particularly in 2006, in samples referred from other laboratories for testing (the ‘Hospital referring all samples’ category). A few sentinel centres have raised this issue with the study team, indicating that some laboratories in their areas have decided to provide HCV testing locally rather than referring all samples to the sentinel laboratory. Whether positive samples have been or will be sent in the future for reference testing to the participating sentinel centres is unclear. Analysis of trends in reference testing show that the number of patients tested declined in 2006 for the second year running, whilst

the proportion positive increased again. This does suggest that more confirmatory testing is also being performed in-house, rather than being referred. Future trend analyses should routinely exclude the 'hospital referring all samples' category; Figure 9 shows the proportion of testing represented by routine testing, hospitals referring all samples and reference testing. More work is also required from the study team in conjunction with participants from the sentinel centres, to identify which laboratories are involved in these changes and to confirm referral patterns.

There has been a disappointing decline in the availability of data in the freetext fields over the years; this field is used to identify injecting drug users in the absence of further epidemiological data. This means that analyses of risk factors and/or reason for testing were limited. Data appear to be more complete for patient samples sent as part of reference testing. We would encourage people completing test request forms to add available information about risk exposures to the form and for this data to be entered into the laboratory system.

There are a number of additional applications of the data collected as part of this study. One example is the matching analysis between sentinel and routine national surveillance. This analysis suggests that approximately half of all cases known to sentinel surveillance were not known to routine surveillance. We are currently working on a process of notification from the sentinel study to routine surveillance. However, given the possible changes in laboratory testing discussed above, it is still important to remind local laboratories not currently part of this study to report all the positive individuals identified to routine national surveillance.

A number of individuals who were negative for anti-HCV and positive for HCV RNA were identified during 2006, representing possible acute HCV infections. Twenty-five were tested in an HIV clinic. We also have the facility to monitor seroconversions – individuals with a negative anti-HCV test followed in time by a positive anti-HCV test (data not presented). More work is required to confirm that these were true acute infections, rather than impaired antibody responses in immunocompromised patients. In 2008 we will pilot a programme focusing on possible acute infections in which patients will be identified, results checked with the sentinel laboratory and the local Health Protection Units notified where appropriate. We are also working alongside colleagues in the HIV department to develop a new surveillance scheme to investigate acute HCV in men who have sex with men (MSM).

The study website is being redeveloped: by early 2008, participants from each sentinel centre and local Health Protection Units will be able to analyse data from their own area in real time. As the study continues, data on the number of people tested for hepatitis C increases providing a rich and increasingly valuable resource for local and national users alike.

Acknowledgements

We would like to thank all the GPs and clinicians whose hepatitis C test requests have contributed to this study, and all the laboratory staff who have undertaken HCV testing and data entry of tests. We would also like to thank all the information technology and other staff within each of the participating centres for helping the project coordinator to establish the study procedures and extract the data. Finally, we would like to thank the lead contact in each of the centres for their ongoing support and involvement in the study.

Reference List

(1) Health Protection Agency. Investigation of Hepatitis C infection. National Standard Method VSOP 5. Issue 5. 2005.
Ref Type: Report

Appendix 1: List of participating centres and periods of data collection

	Participating sentinel centre	HPA Region	Dates for which data are available		Included in analysis		
					2006	Cumulative 2002-2006	Trends*
1.	Ashford laboratory	South East	01/01/2002	31/12/2006	✓	✓	✓
2.	Birmingham laboratory	West Midlands	01/01/2002	31/12/2006	✓	✓	✓
3.	Bristol laboratory	South West	01/04/2006	31/12/2006	✓	✓	X
4.	Cambridge HPA laboratory	Eastern	01/01/2002	31/12/2006	✓	✓	✓
5.	Centre for Infections	London	01/01/2002	31/12/2006	✓	✓	✓
6.	Chester HPA laboratory (via Manchester)	North West	01/01/2002	31/12/2006	✓	✓	✓
7.	Dulwich laboratory	London	01/09/2004	31/12/2006	✓	✓	X
8.	Ealing Hospital	London	16/11/2002	15/10/2003	X	✓	X
9.	Grimsby laboratory	East Midlands	01/04/2002	31/12/2006	✓	✓	X
10.	Hull laboratory	Yorkshire and Humberside	01/04/2002	30/11/2006	✓	✓	X
11.	Leeds General Infirmary	Yorkshire and Humberside	01/09/2004	31/12/2006	✓	✓	X
12.	Leeds HPA laboratory	Yorkshire and Humberside	01/01/2002	29/07/2005	X	✓	X
13.	Liverpool HPA laboratory (via Manchester)	North West	01/01/2002	31/12/2006	✓	✓	✓
14.	Manchester HPA laboratory	North West	01/01/2002	31/12/2006	✓	✓	✓
15.	Newcastle laboratory	North East	01/01/2002	31/12/2006	✓	✓	✓

16.	North Middlesex Hospital	London	29/07/2002	31/12/2006	✓	✓	X
17.	Nottingham laboratory	East Midlands	02/09/2002	31/12/2006	✓	✓	X
18.	Portsmouth laboratory	South East	01/01/2002	31/12/2006	✓	✓	✓
19.	Preston HPA laboratory (via Manchester)	North West	01/01/2002	31/12/2006	✓	✓	✓
20.	Royal Liverpool Hospital	North West	01/01/2002	31/12/2006	✓	✓	✓
21.	St Bartholomew's Hospital	London	01/08/2004	31/12/2006	✓	✓	X
22.	St Georges Hospital	London	01/01/2006	31/12/2006	✓	✓	X
23.	University College Hospital	London	01/09/2004	31/12/2006	✓	✓	X
Centres joining the study in 2007							
24.	Chelsea and Westminster Hospital	London	Data not yet available		X	X	X
25.	Northwick Park Hospital	London	Data not yet available		X	X	X

*Trend data are based on the following centres for which complete 2002-2006 data were available: Ashford, Birmingham, Cambridge, Centre for Infections, Chester, Liverpool HPA, Manchester, Newcastle, Portsmouth, Preston and Royal Liverpool University Hospital.

The following centres, for which complete 2002-2006 data were not available, were not included in trends analysis but are included elsewhere: Bristol, Dulwich, Ealing, Grimsby, Hull, Leeds General Infirmary, Leeds HPA, North Middlesex Hospital, Nottingham, St Bartholomew's Hospital, St George's Hospital and University College Hospital

Appendix 2: Sentinel surveillance study participants

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