Targets for Hepatitis C virus test uptake and case-finding among injecting drug users: in prisons and general practice.

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ABSTRACT

We re-analyse data on new diagnoses of Hepatitis C virus (HCV) for injectors in prison or attending general practices which were relied on for the cost-effectiveness of HCV testing in injectors. We use these revised estimates to suggest readily-achievable targets in Scottish general practices on HCV diagnoses for injectors born in 1956-75. Using audit data from general practices around Edinburgh, we confirm that, with effort, the suggested targets are achievable.

On re-analysis, we found that over 20% of HCV-undiagnosed injectors in English prisons accepted HCV testing, and half the injectors aged 30-54 years who attended a Glasgow general practice. On the basis of 30% HCV test uptake and 80% of ever-injectors having self-identified, a target of 2,500 HCV diagnoses within a year in known ever-injectors born in 1956-75 attending Scottish general practices is feasible. Its target of five new HCV diagnoses was achieved during an HCV testing intervention by Muirhouse Practice, Edinburgh.

During a 2-year audit period, 86 other general practices around Edinburgh providing enhanced services for drug users increased HCV test uptake by known ever-injectors from 43%% (314/727) to 62%% (655/1,062) in the 1956-75 birth-cohort. Their new HCV diagnoses in ever-injectors were 171 over two years against a target of 166 within 1 year. [204 words]

Key words: injectors, Hepatitis C virus (HCV), HCV test uptake, HCV diagnoses, birth-cohort.

Key-points: General practices should establish if patients have ever injected drugs. Ever-injectors, particularly those born in 1956-75, who have never been HCV-tested or who have continued to inject since their most recent HCV antibody negative test should be offered an HCV test. High acceptance rates by patients are achievable when general practitioners focus on establishing, first, ever-injector-status and, secondly, the current HCV-status of known ever-injectors, especially those born in 1956-75.

BACKGROUND

Among injecting drug users (IDUs), the expected yield from targeted testing for Hepatitis C virus (HCV) - in terms of HCV carriage and moderately-progressed liver fibrosis - was quantified by Hutchinson et al. (2005) for Glasgow, and throughout Scotland. As a consequence, general practitioners were recommended to focus their HCV case-finding on patients born in 1956 – 75 who had ever injected (ever-IDUs); and former IDUs were advised to seek HCV testing. Through its awareness campaign and other resources, Scotland's Hepatitis C Action Plan Phase II for 2008-11 has endorsed these recommendations (http://www.scotland.gov.uk/Resource/Doc/222750/0059978.pdf).

Key features of Scotland's HCV diagnoses prior to 2007 (see McLeod et al., 2006) are summarised in **Table 1**. The proportion who declared "ever-IDU" as a risk factor was 24% (se 0.8%) for those born pre-1956, 57% (se 0.7%) in the 1956-65 birth-cohort, but 70% (se 0.5%) for those born in 1966-75 or later. Across Scotland, the 1956-65 and 1966-75 birth-cohorts accounted for 71% (se 0.4%) of HCV diagnoses in surviving declared ever-IDUs, but for a significantly higher proportion, 76% (se 1.1%), in Lothian region, which was at the centre of Scotland's HIV epidemic in IDUs in Edinburgh in 1983-85 (Copeland et al., 2004). Unsurprisingly, therefore, Lothian's proportion surviving was very significantly lower at 78% (se 1.5%) for 746 HCV-diagnosed 1956-65 born ever-IDUs than elsewhere in Scotland of whom 85% (2,107/2,489; se 0.7%) had survived. Scotland's proportion of HCV diagnoses with "ever-IDU" as a declared risk factor has decreased since its peak of 65% in 1996-2002.

In their Health Technology Assessment (HTA) on the cost-effectiveness of HCV testing, Castelnuovo et al. (2006) considered both prison and general-practice based strategies, with drug treatment services as a third venue for HCV case-finding. When costs and benefits were both discounted at 3.5% (rather than at 6% and 1.5%, see National Institute for Health and Clinical Excellence (NICE), 2006), the headline cost-effectiveness for HCV case-finding doubled alarmingly to around the critical threshold of £30,000. Castelnuovo et al. (2006) confirmed the recommendation by Hutchinson et al. (2005) that it was more cost-effective for HCV case-finding to target older former IDUs. Key strategies considered in the HTA report ranged from targeting: a) all clients, b) only those with a prison or practice-documented history of IDU to c) relying on self-identified HCV risk. Self-identification could be because of ever-IDU, impending cirrhosis, deterioration in quality of life, or because prison (or drug treatment centre) offered the opportunity to check-up on blood-borne virus status (Bird et al., 1993; Gore et al., 1999; Hutchinson et al., 2004).

In this paper, we first re-analyse the HCV test uptake(s) and HCV prevalence(s) used in the above HTA report. Castelnuovo et al. (2006) relied on published data on HCV case-finding from studies in English prisons (Skipper et al., 2003; Horne et al., 2004) and the personally-communicated data from a still-unpublished general practice study in a very deprived area of Glasgow, Possil Park (Anderson et al., 2009).

Next, we extrapolate from our revised figures to propose targets on HCV test uptake and case-finding for general practices. We then use six-monthly Scottish audit data from

Lothian region's National Enhanced Service (NES) for Drug Users in 86 unnamed participating practices and audit data from the Muirhouse Practice, Edinburgh (over 10,000 patients) to confirm whether our targets are realistic and achievable. An initial audit at Muirhouse Practice, which has a long-standing interest in the welfare of IDUs, see Copeland et al. (2004), was followed-up by targeted offering of HCV testing to ever-IDUs whose HCV status was uncertain.

METHODS

Our initial step was to re-assess the English prisons' data on HCV case-finding by Skipper et al. (2003) and Horne et al. (2004) and the Possil Park Practice data from Glasgow, as cited by Castelnuovo et al.(2006). We did so in the light of: a) revised estimates by Bird (2000) for adult injector-inmates' prevalence and HCV prevalence in English prisons, and b) estimates of HCV prevalence and HCV test uptake for Scotland prior to 2001 by Bird et al. (2001).

For its known ever-IDU patients aged 30-39, 40-49, or 50+ years in 2005, the Muirhouse Practice, Edinburgh conducted an initial audit to abstract the following data:

Whether patient was ever HCV-tested?

If tested and HCV antibody positive, whether Polymerase Chain Reaction (PCR) tested?

If PCR positive, whether referred?

If referred, whether the patient ever attended?

If PCR positive, number who received HCV antiviral treatment.

For those who had tested HCV antibody negative, it matters additionally whether the date of their last HCV test was *after* the cessation of their injecting career. If not, HCV re-testing is prudent because HCV infection may have occurred subsequent to their most recent HCV test. In a follow-up to its initial audit, the Muirhouse Practice therefore intervened to offer HCV tests to known ever-IDUs whose HCV status was uncertain.

For the April to September semester of 2004 and 2006, basic data were also available on IDU status together with HCV test uptake and HCV prevalence for 1956-75 born ever-IDUs at 86 other general practices which contributed to Lothian region's audit of a National Enhanced Service for drug users.

RESULTS

Re-assessment of English prison-based strategies: All prisoners new to three prisons on the Isle of Wight got an hour's health awareness lecture and could attend a health-watch clinic which offered confidential testing for blood-borne viruses and access to a care pathway leading to HCV treatment, see Skipper et al. (2003). During one year (2000/01), 137/1,618 (8.5%) new receptions into these Isle of Wight prisons accepted HCV testing, of whom 58 (42%) were HCV antibody positive, and 41/58 (71%) had chronic HCV disease. All but two HCV antibody positives were ever-IDUs (56/58).

In English prisons around that time, 29% of adult male inmates, not 24% as citied in HTA report by Castelnuovo et al. (2006), were estimated to have a history of IDU (Gore,

2000) and their HCV prevalence was 30% to 50% (Health Protection Agency et al., 2006; Gore et al., 2001). We may therefore infer that *at least* 112 ever-IDU HCV-testees (namely: 56/0.5) came forward from the Isle of Wight prisons' estimated 470 adult ever-IDUs (that is: 1,618 * 0.29). A third of those who were HCV-infected would have been expected to have had a prior HCV diagnosis (78/235), see Health Protection Agency et al. (2006). Thus, undiagnosed ever-IDUs' HCV test uptake may also have been nearly one-third, namely: 112/392 (29%). Test uptake by never-IDUs would appear to have been appropriately low at 25/1,226 (2%).

Separately, Horne et al. (2004) described the uptake of HCV screening by 3,034 entrants to Dartmoor prison in the 3.5 years from 1 January 1998. Since HCV test uptake was reported in the abstract as 12%, we assumed 364 testees (confirmed in later text as: 376). Moreover, 16% of testees were HCV antibody positive: we assumed 58 (actually: 60). The number of ever-IDUs among those who tested HCV antibody positive was not stated. Hutchinson (2004) has shown by capture-recapture techniques that 88% of *all* HCV diagnoses in Scotland are ever-IDUs. The proportion is likely to be higher in prisons and so, assuming that 95% of the HCV antibody positives in prisons were ever-IDUs, we may impute that 55/58 (or 57/60) HCV diagnoses were ever-IDUs, and thereby deduce, as in **Table 2**, that HCV test uptake may have been around 18% by HCV undiagnosed ever-IDUs in Dartmoor prison.

In summary, the two English prison studies cited by Castelnuovo et al. (2006) had HCV test uptakes by ever-IDUs of between 15 - 35%. Appropriately low (under 5%) HCV test

uptake by prisoners who had never injected was also apparent. Ever-IDUs in prison had HCV prevalence of 30-50%, as in Castelnuovo's prison scenario 2 (p31), but their HCV test uptake was higher than the 12% postulated in the HTA assessment.

General practice-based strategies in Scotland: 30-54 year olds attending Possil Park Practice, Glasgow during a 6-month period (November 2003 to April 2004): Current and former IDUs visit their general practitioner more often than do sex and age-matched peers. The Possil Park general practice in a deprived area of Glasgow, for which Castelnuovo et al. (2006) cited results, had offered HCV counselling and testing to *all patients aged 30-54 years* attending for a non-urgent appointment during a 6 months' study (Alexander et al., 2009: under review).

Half of the target population (584/1,165) actually attended the practice during the 6 month period, but only 421 were offered an HCV test.

HCV test uptake was 28% by those to whom a test was offered (117/421, 95% CI from 23% to 32%). Fifteen out of 117 tested patients were HCV antibody positive, all were ever-IDUs bar one, and 11 of the 15 were aged 30-39 years. HCV test uptake was actually 20% by attendees (117/584: 95% CI from 17% to 23%), substantially higher than the 10% portrayed by Castelnuovo et al. (2006).

We infer that this Glasgow practice's HCV testees included 19 ever-IDUs in line with an assumed 75% HCV prevalence, as in Bird et al. (2001). Plausibly*, we also assume that

the prevalence of HCV-undiagnosed ever-IDUs among those attending for non-urgent appointments was 6% of 6-month-attenders in this practice (35), so that HCV-undiagnosed ever-IDUs' HCV test uptake would have been, encouragingly, 19/35 (54%: 95% CI from 38% to 71%), as at drug treatment services (Castelnuovo et al., 2006).

{*Scotland had an estimated 80,000 ever-IDUs in 2000, see Hutchinson (2004): more by 2004, most aged 30-54 years, and 30% to 45% are undiagnosed HCV carriers. We assume 20,000 HCV-undiagnosed ever-IDUs aged 30-54 years, and so around 1.3% of the Scottish population aged 30-54 years. Prevalence may be two to four times greater in Possil Park, and ever-IDUs 50% more likely to attend their general practice than age-matched peers: hence the above 6% prevalence. Even if, rather implausibly, HCV-undiagnosed ever-IDUs had been 12% of 6-month attenders, their HCV test uptake would still have been 19/70 (27%: 95% CI from 17% to 38%).}

Never-IDUs' test uptake should then have been (117-35)/(421-35) = 82/386, or 21%, and their HCV prevalence 1/82 (about 1%). Thus, HCV test uptake was around 2.5 times more likely by ever-IDUs. Both uptakes were substantially higher in the Possil Park Practice in a deprived area of Glasgow than in the English prisons studied. In those prisons, there was appropriately-counselled low HCV test uptake by men who had never injected. By contrast, the Glasgow study had promoted HCV test uptake by never-IDUs because it set out specifically to elucidate if there were unsuspected household or other routes for HCV transmission. This background rationale was not fully conveyed by Castelnuovo et al. (2006).

Extrapolated targets for new HCV diagnoses by general practices in Scotland: General practices in less deprived areas of Glasgow, or indeed elsewhere in Scotland, will of course have a much lower prevalence, only 2% say*, of HCV-undiagnosed 30-54 year

old ever-IDU attendees than the Possil Park Practice. However, their HCV test uptake may be similar to that achieved for ever-IDUs in the Glasgow study, around 50%, and their tested HCV prevalence only moderately lower, say 67% rather than 75%.

HCV test uptake by never-IDUs should revert to an appropriately-counselled low level, as in prisons, of under 5%, but HCV prevalence would be expected to be even lower than for prisoners, say less than 1%.

On the preceding bases, the HCV antibody positive yield from unselected, similarly-sized general practices may be around 0.67 * 0.50 * 12 (ever-IDU testees: one third the number at Possil Park) + 0.01 * 0.05 * 549 (never-IDUs: as at Possil Park) = 4.0 + 0.3 = 4.3 HCV antibody positive results from 6.0 + 27.5 = 33.5 agreed-to HCV tests out of around 1,140 listed patients aged 30-54 years, or a new HCV diagnosis rate in six months of 3.8 per 1,000 patients aged 30-54 years.

Transferring the above diagnosis rate to Scotland's population aged 30-49 years (1,501,565 in 2001, see Leyland et al., 2007) would yield 5,660 new HCV antibody positive diagnoses in six months, *of whom 70% (around 3,960) could be expected to be chronically HCV-infected.* Since attending one's general practice for a non-urgent appointment during a 6-month period picked up only half of those who were eligible by age, case-note review would, of course, identify additional ever-IDUs for whom HCV testing could be appropriate.

Even if we assume *both* that only 80% of ever-IDUs have self-identified to their general practitioner *and* that HCV test uptake is only 30% by known ever-IDUs, then targeted testing in Scotland's general practices of age-eligible known ever-IDUs who attend during a 6-month period would yield, per average practice, 0.67 * 0.30 * 0.80 * 12 (ever-IDU testees) = 1.9 HCV antibody positive results, or 1.3 HCV chronic infections, from 2.9 agreed-to HCV tests. Across Scotland's general practices, such targeting could yield 2,500 HCV antibody positive tests, or *1,750 diagnoses of chronic HCV in six months*.

Since there may be 1,300 practices of similar size to the Possil Park Practice (about 4,000 patients, but injector prevalence only one third of Possil Park's), within six months to a year, at least 2,500 HCV diagnoses in known ever-IDUs born in 1956-75 should be feasible in general practices in Scotland (30% uptake, no case reviews). In the selected birth-cohorts, most will be former IDUs. This new target is about three times Scotland's estimated 850 HCV diagnoses in 2006 for *all* persons born in 1956-75, see **Table 1**.

New data from Muirhouse Practice's audit of HCV test and treatment status for known ever-IDUs: **Table 3** summarises, essentially for patients born in 1956-75, results from Muirhouse Practice's audit of known ever-IDU patients' HCV test and treatment status to May 2007. With a special interest in the healthcare of IDUs, Muirhouse Practice is located in a deprived area of Edinburgh, and serves about 10,000 patients.

Muirhouse Practice had both a high prevalence of ever-IDUs who are 30 years of age or older and a moderately high achievement of HCV test uptake by them: 63% of known

ever-IDUs had been HCV tested by May 2007. Nonetheless, there were 73 known ever-IDUs aged 30-39 years who had never been HCV tested, and a further 17 who were HCV antibody negative at their last HCV test but their injecting may have continued.

Of those who were HCV tested, the proportion who were HCV antibody positive was 53% (95% CI: 42% to 65%) for the 30-39 year old cohort but 83% (95% CI: 74% to 91%) for older IDUs. Almost all who were HCV antibody positive had undergone PCR testing, of whom 66% were chronically infected (95% CI: 57% to 75%). Referral rate for ever-IDUs who tested PCR positive was high, and 73% had attended at least once (95% CI: 63% to 84%). Ten out of 47 PCR positive patients (21%) who attended a specialist clinic had been initiated on HCV antiviral treatment (95% CI: 10% to 33%).

At Muirhouse Practice, an HCV testing intervention for ever-IDUs had two clear consequences by February 2008, see **Table 4**. Firstly, the proportion of known ever-IDUs aged 30+ years who had undergone HCV-testing increased from 156/246 (63%) to 203/264 (77%); and at under 30 years of age from 30/77 (39%) to 56/87 (64%). Secondly, at 30-49 years of age, HCV-tested injectors' HCV prevalence decreased by a fifth from 89/134 (66%) to 95/180 (53%) for the combined age-group ($p < 0.02$). The latter observation reflects either the pre-intervention acumen of the Muirhouse Practice in targeting their offers of HCV testing or their patients' adroit HCV-test uptake. Six HCV diagnoses were achieved in ever-IDUs aged 30-49 years, and twelve in total.

New data from other general practices in Lothian: **Table 5** summarises injector status, HCV test uptake and outcomes for 86 other general practices in Lothian region which both offer treatment to drug users and participate in Lothian's NES audit. The 1956-75 birth-cohorts accounted for 60% of all NES clients, and for nearly 80% of HCV diagnoses in known ever-IDUs.

In numerical terms, the NES and Muirhouse practices together accounted for over two-fifths of surviving 1956-75 born, HCV-diagnosed, declared ever-IDUs who were registered to Lothian region by Health Protection Scotland: see **Table 1**.

Between semesters in 2004 and 2006, NES clients increased by 24% from 2,705 to 3,363, but HCV diagnoses in NES practices almost doubled from 234 to 431, including 171 HCV diagnoses in the ever-IDUs born in 1956-75. Between 2004 and 2006, HCV test rate increased from 50% to 70% for known ever-IDUs born in 1956-65 and from 40% to 59% for known ever-IDUs born in 1966-75.

HCV test rate in NES clients who were *not known* as ever-IDUs also increased dramatically from 188/1,531 (12%) in 2004 (April to September semester) to 570/1,585 (36%) in 2006. But, HCV diagnosis rate in testees who were not known to have injected decreased: from 40/188 in 2004 (21%) to 76/570 (13%) in 2006 ($p < 0.02$). Higher HCV prevalence does not necessarily follow from a higher HCV-test rate.

Projections for Glasgow gave the prevalent number of ever-IDUs aged 30-39 years in 2005 as 2.8 times those aged 40-49 (Hutchinson et al., 2005). We note that the corresponding ratio for Lothian's NES practices was 780:282 (2.8:1) or 929:358 (2.6: 1) with Muirhouse Practice added.

DISCUSSION

By under-estimating HCV test uptakes by undiagnosed ever-IDUs in English prisons (around 20%, and so higher than 12% postulated in HTA report) and by undiagnosed ever-IDUs attending a general practice in a deprived area of Glasgow (95% CI from 38% to 71%: much higher than the 10% postulated in HTA report), Castelnuovo et al. (2006) have under-estimated the cost-effectiveness of HCV testing in undiagnosed ever-IDUs, including former IDUs.

Lothian's NES clients increased in number by 24% over two years but HCV diagnoses increased by 84%, a pro rata increase in the efficiency of HCV case-finding of around 20% per annum. The Lothian audit also showed that 80% to 90% of drug using clients had been asked about injecting. The increase over two years in HCV diagnoses in 1956-75 born ever-IDUs was 171, against a proposed target of 166 HCV diagnoses = 1.93 * 86 in 6 months to one year. There is additional scope for intervention, as the target is clearly stretching.

HCV diagnosis rates in excess of 10% for NES clients not known to have injected were sufficiently high that their HCV test uptake was clearly prudent. Careful inquiry is warranted into the HCV risk factors for NES clients who, prior to testing, had not declared a history of IDU and continued to deny injecting despite testing HCV antibody positive. Maternal transmission, tattooing, sexual or nosocomial HCV transmission are possible explanations.

The HCV testing intervention with ever-IDUs at Muirhouse Practice had a paradoxical effect in the 30-49 year age-group. HCV prevalence was significantly lower in the combined group of "previously-tested plus intervention-tested" ever-IDUs than in the "previously-tested" ever-IDUs alone. Either prior HCV test uptake at Muirhouse Practice had been astutely non-random or HCV-undiagnosed IDUs had been relatively protected: perhaps as a consequence of the former. Indeed, Scotland's Needle Exchange Surveillance Initiative (Palmateer et al., 2008), which interviews ever-IDUs who attend needle exchanges and conducts linked anonymous HCV testing, has reported that 435/535 respondents (81%) claimed *never* to have shared injecting equipment with a *known* HCV-positive person. If more HCV diagnoses are made, and IDUs disclose their HCV-infection, then IDUs can better protect themselves from becoming newly HCV-infected. See also NICE guidance in 2009 on needle and syringe programmes and their likely impact on Hepatitis C incidence (see http://www.nice.org.uk/Guidance/PH18). The testing intervention at Muirhouse Practice achieved six new HCV diagnoses in ever-IDUs aged 30-49 years (against a target of five when predicated on 30% HCV test uptake by HCV undiagnosed ever-IDUs born in 1956-75).

It was extrapolation from the Possil Park Practice study in Glasgow which suggested that even 30% HCV uptake by 1956-75 born known ever-IDUs who attend their general practitioner for a non-urgent appointment could yield 2,500 HCV diagnoses in a year in Scotland. By contrast, Scotland's actual HCV diagnoses in the 1956-75 birth-cohort, some on account of late liver sequelae (Fu et al., 2007), have decreased from 1202 per annum in 1996-2002 to 928 per annum in 2003-2005 with only 850 expected in 2006 across *all* risk-groups. Increase in Scotland's HCV diagnoses requires increased treatment capacity, which has been envisaged and resourced in Scotland's Hepatitis C Action Plan Phase II for 2008-11 (http://www.scotland.gov.uk/Resource/Doc/222750/0059978.pdf).

Part of the above decrease in actual HCV diagnoses may be attributable to a similar phenomenon as revealed by Muirhouse Practice's HCV-test-intervention with ever-IDUs, namely: in experienced practices, ever-IDUs who have, in the past, have been offered and accepted HCV-testing may have been an adroitly-selected, higher risk sample of their age-cohort.

By combining a) Lothian's low-key audit which effectively increased HCV diagnoses for drug service clients by around 20% per annum when, nationally, diagnoses had been decreasing and b) offering HCV tests to known ever-IDUs born in 1956-75 who attend their general practice for a non-urgent appointment, Scotland could both increase substantially its number of HCV diagnoses in ever-IDUs born in 1956-75 and increase ever-IDUs' attendances and treatment at specialist hepatitis clinics. The increase could be

over 900 (based only on NES-type audit) or over 2,000 (based on extrapolation from Possil Park; and corroborated by Muirhouse Practice's additional six HCV diagnoses).

In summary, we have shown that HCV test uptake by undiagnosed ever-IDUs in English prisons was around 20% (versus 12% postulated in a recent HTA report). Test uptake by undiagnosed ever-IDUs in the 1956-75 birth-cohort who attended a general practice in a deprived area of Glasgow was 30% to 50% (versus 10% in HTA report). We accessed audit data from general practices in Lothian region which corroborate the higher HCV test uptakes and, with additional effort, the feasibility of 2,500 IDU-related HCV diagnoses in a year by general practices in Scotland. By substantially under-estimating HCV test uptakes by undiagnosed ever-IDUs, Castelnuovo et al. (2006) have under-estimated the cost-effectiveness of their HCV testing, particularly for former IDUs.

When NICE revisits HCV testing, we suggest that, in addition to our revisions on HCV test uptakes, NICE should cost a PCR-based HCV test strategy for current IDUs (see Surveys, Design and Statistics Subcommittee, 2008). In public health terms, current IDUs include a key subgroup for HCV transmission, namely: HCV seroconverters. [3,692 words]

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featured in Table 5 on 1956-65 and 1966-75 born drug user clients' injector history, hepatitis C test uptake and prevalence.

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Table 1: Scotland's HCV diagnoses by birth-cohort, period and region of diagnosis, survival status; and, in brackets, ever-IDU as declared risk.

Birth cohort (ever-IDUs)	Pre 1996	1996-2002	2003-2005	2006 To end Sept.	SCOTLAND TOTAL (number; % ever-IDUs)	SCOTLAND Not known dead, **% surviving**	LOTHIAN only: Not known dead, **% surviving**
Pre 1956 (ever-IDUs)	935 (196)	1441 (375)	539 (126)	128 (21)	3043 (718: 23.6%)	2166, **71%** (526, **73%**)	500, **66%** (181, **69%**)
1956-65 (ever-IDUs)	1347 (724)	3117 (1926)	975 (486)	235 (99)	5674 (3235; 57.0%)	4882, **86%** (2689, **83%**)	914, **82%** (582, **78%**)
1966-75 (ever-IDUs)	1105 (753)	5294 (3849)	1809 (1164)	402 (240)	8610 (6006; 69.8%)	7855, **91%** (5422, **90%**)	861, **93%** (613, **91%**)
1976+ (ever-IDUs)	80 (24)	1999 (1534)	1565 (1036)	374 (205)	4018 (2799; 69.7%)	3864, **96%** (2686**, 96%**)	285, **98%** (184, **98%**)
Total (ever-IDUs) {both include age unknowns}	3554 (1728; 48.6% ever-IDUs)	12074 (7806; 64.7% ever-IDUs)	4908 (2818; 57.4% ever-IDUs)	1142 (565; 49.5% ever-IDUs)	21678 (12917; 59.6% ever-IDUs)	19100, **88%** (11482**, 89%**)	2587, **83%** (1568, **83%**)

Table 2: Deductions about results at Dartmoor prison

3034 Entrants to Dartmoor Prison	Ever-IDU (30%)		Never injected (70%)	
	HCV antibody Positive (50%)	HCV antibody negative	HCV antibody positive	HCV antibody negative
HCV status	455	455	85 (4%)	2039 (96%)
Prior diagnosis	152 (assumes one third)		5	
HCV test-eligible	303	455	80	2039
Tests of HCV test-eligibles	**55**	82.5	**3**	76.5
Imputed IDU-status for 58 HCV diagnoses	**55** (HCV prevalence is actually 40% {303/758} for HCV undiagnosed ever-IDUs. If self-selection for HCV testing is uninformative about HCV status, ever-IDU testees would equal 55/0.4 = 137.5 = 55 + 82.5)		**3** (since HCV prevalence is 3.8% {80/2119} among HCV test-eligibles, never-IDU testees = **3** * 2119/80 = 79.5 = 3 + 76.5)	
HCV test uptake by those HCV-undiagnosed	137.5/(303+455) = 18%		79.5/(2039+80) = 3.7%	

Table 3: Muirhouse General Practice's audit of HCV test uptake by and referrals (to May 2007) for ever-IDUs aged 30-39, 40-49 or 50+ years.

Subgroup	Aged 50+	Aged 40-49	Aged 30-39	Totals
Ever-IDUs	22	76	148	246
Never HCV tested + HCV antibody negative predates last IDU, or uncertain	***0 + 2 = 2 { 9%}***	***17 + 5 = 22 {29%}***	***73 + 17 = 90 {61%}***	***90 + 24 = 114 {46%}***
Ever HCV antibody tested	22 (all)	59 (78%)	75 (50%)	156 (63%)
HCV antibody positive	18/22 (82%)	49/59 (83%)	40/75 (53%)	107/156 (69%)
PCR tested	18/18 (all)	47/49 (96%)	39/40 (98%)	104/107 (97%)
PCR positive	12/18 (67%)	35/47 (74%)	22/39 (56%)	69/ 104 (66%)
Referred	12/12 (all)	33/35 (94%)	19/22 (86%)	64/ 69 (93%)
Attended	11/12 (92%)	23/33 (70%)	13/19 (68%)	47/ 64 (73%)
HCV antiviral treatment	3	4	3	10
HCV antibody predates last IDU, *or uncertain*	1 + *1*	4 + *1*	10 + *7*	15 + *9*

Table 4: Impact of HCV testing intervention for ever-IDUs at the Muirhouse Practice.

Age-group of ever-IDUs	HCV test uptake (%)		**HCV prevalence in HCV testees (%)**	
	To May 2007	To February 2008	To May 2007	To February 2008
Aged 50+years	22/ 22 (all)	23/ 23 (all)	18/ 22 **(82%)**	17/ 23 **(74%)***
Aged 40-49	59/ 76 (78%)	68/ 86 (79%)	49/ 59 **(83%)**	55/ 68 **(81%)**
Aged 30-39	75/148 (51%)	112/155 (72%)	40/ 75 **(53%)**	40/112 **(36%)**
Aged <30years	30/ 77 (39%)	56/ 87 (64%)	6/ 30 **(20%)**	13/ 56 **(23%)**
Total	186/323 (58%)	259/351 (74%)	113/186 **(61%)**	125/259 **(48%)**

** different patients may contribute to the two cross-sections.*

Table 5: Lothian's National Enhanced Service for drug users: audit results in initial semester, and two years later (excludes Muirhouse Practice)

Period	***April – Sept 2004***	***April – Sept 2006***	***April – Sept 2004***	***April – Sept 2006***	***April – Sept 2004***	***April – Sept 2006***
Subgroup	***All birth-cohorts***		***1956-65 birth-cohort***		***1966-1975 birth-cohort***	
Drug users treated	2,705	3,363	*452*	*525*	***1164***	***1458***
Asked about injecting	*2,258 (83%)*	*3,047 (91%)*	*387 (86%)*	*478 (91%)*	***975 (84%)***	***1330 (91%)***
Known ever-IDU	*1,174 (43%)*	*1,778 (53%)*	*226 (58%)*	*282 (59%)*	***501 (51%)***	***780 (59%)***
HCV tested (all patients)	656 (24%)	1,626 (48%)	*143 (32%)*	*287 (55%)*	***289 (25%)***	***723 (50%)***
HCV tested (known ever-IDUs)	*468 (40%)*	*1,056 (59%)*	*112 (50%)*	*197 (70%)*	***202 (40%)***	***458 (59%)***
Tested HCV positive *(all patients)*	*274/656 (42%)*	*507/1626 (31%)*	*101/143 (71%)*	*172/287 (60%)*	***112/289 (39%)***	***220/723 (30%)***
Tested HCV positive (known ever-IDUs)	*234/468 (50%)*	*431/1056 (41%)*	*92/112 (82%)*	*153/197 (78%)*	***92/202 (46%)***	***182/458 (40%)***