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Monitoring hepatitis C virus infection among injecting drug users in the European Union: a review of the literature

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SUMMARY

Hepatitis C virus (HCV) among injecting drug users (IDUs) is one of the European Union's (EU) major public health problems. This review examines the current state of knowledge regarding HCV among IDUs in EU countries. Studies published between January 1990 and December 2000, were identified through a computerized search (MEDLINE and EMBASE). Ninety-eight studies have reported prevalence for HCV among groups of IDUs in all EU countries except Luxembourg. The prevalence of anti-HCV ranged from 30 to 98%. Incidence rates ranged from 6·2 to 39·3 per 100 person years. This review provides a comprehensive examination of HCV infection among IDUs in the countries of the EU, and quite clearly demonstrates that the quality and epidemiological relevance of the studies published varies widely. Thus, the reported data may not reflect accurately the current or recent past prevalence of HCV among IDUs in the EU. A strategic approach to the surveillance of HCV among IDUs in the EU, utilizing robust and consistent methods, is required urgently.

INTRODUCTION

With the detection of the hepatitis B virus (HBV) in the 1960s and the hepatitis A virus in the 1970s, it became apparent that a considerable proportion of otherwise unexplained acute clinical hepatitis cases could not be classified as A or B. The great majority of blood/blood product transfusion related cases were identified as non-A, non-B hepatitis (NANBH). In 1989, investigators from the Chiron corporation identified the causative agent of these cases and named it hepatitis C virus (HCV) [1]. Since then, HCV infection has been recognized as a major health problem worldwide with an estimated 3% of the world population being infected [2].

HCV is transmitted primarily through the parenteral route. Well-recognized modes of transmission involve blood or blood product transfusions, the sharing of injecting equipment by drug users and the use of inadequately sterilized or unsterilized equipment in the healthcare setting [3, 4]. HCV is transmitted much less commonly through unprotected sexual intercourse and from mother to child [5].

In most developed countries, and in some developing countries, those at highest risk of acquiring HCV infection are injecting drug users (IDUs) who share equipment. In the European Union (EU), it is estimated that there are 1·5 million problem drug, mainly heroin, users [6]. If the spread of HCV among IDUs is to be prevented through the implementation of effective interventions, it is essential that the extent of the problem is gauged continuously. In this review, the authors report the current state of knowledge regarding the monitoring of the prevalence and incidence of HCV among IDUs in the EU.

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Table 1. *Prevalence of HCV antibody among populations of IDUs in Europe, 1985–97*

Country	Location	Recruitment site	Year(s) of specimen collection	HCV assay	Prevalence no. +ve (%)	Reference
Austria	Vienna	Laboratory*	NS†	ELISA 1 and 2	114 (75)	Acta Medica Austriacia 1992; **19**: 47–8
	Vienna	Prison	1985–90	ELISA 1	114 (75)	Infection 1991; **19**: 427–30
Belgium	Ghent	Laboratory*	1986	ELISA 1	38 (47)	Int J STD AIDS 1991; **2**: 185–7
Denmark	Copenhagen	STD clinic	1988–9	ELISA 2	123 (98)	Infection 1993; **21**: 115–7
Finland	NS	Laboratory*	NS	ELISA 2	28 (58)	Scand J Infect Dis 1991; **23**: 139–42
France	Lille	Prison	1995	ELISA 3	193 (80)	Gastroenterol Clin Biol 1998; **22**: 55–8
	Multi-centre	Laboratory*	1988–90	EIA 1 and Matrix	76 (78)	J Med Virol 1994; **42**: 29–32
	Paris	Hospital in-patients	NS	ELISA 2 and RIBA 2	75 (76)	Eur J Med 1993; **2**: 253
	Aquitane	Hospital out-patients	1991–4	ELISA 1 and 2	613 (90)	BMJ 1996; **313**: 461–4
	Moselle	Drug treatment centre	1990–2	ELISA 1	205 (63)	An Med Interna 1994; **145**: 7–12
	Paris	Hospital in-patients	NS	ELISA 1 and Matrix	59 (65)	Rev Med Interne 1991; **12**: S390
	Lille	Drug treatment centre	1991–2	ELISA 2	75 (72)	Gastroenterol Clin Biol 1994: **18**: 964–8
	Strasbourg	Laboratory*	1998	ELISA 1	29 (67)	Rev Med Suisse Rom 1999; **119**: 329–34
Germany	Hamburg	Laboratory*	1988–91	ELISA 1	113 (40)	Int J Leagal Med 1991; **104**: 251–4
	Lohr	Drug treatment centre	1995–6	ELISA 1	79 (66)	Sucht 1998; **44**: 398
	Berlin	Prison	1994	ELISA 1	186 (37)	Gesundheitswesen 1997; **59**: 409–12
	Vechta	Prison	1992–4	NS	160 (74)	Sucht 1996; **42**: 98–107
	Wolfenbuttel	Prison	1991–3	ELISA 2 and PCR	84 (80)‡	Gesundheitswesen 1993; **55**: 246–9
	Hamburg	Laboratory*	NS	ELISA 1	107 (41)	Infection 1991; **19**: 81–4
	Berlin	Drug treatment centre Needle exchange Hospital out-patients	1992–3	ELISA 2	334 (82)	Scand J Infect Dis 1995; **27**: 331–7
	Frankfurt	Laboratory*	1991–3	ELISA 2	73 (79)	Zentralbi Bakteriol 1995; **282**: 102–2
	Berlin	Drug treatment centre Needle exchange	1994	ELISA 2	279 (86)	AIDS 1996; **10**: 311–7
	Berlin	Drug treatment centre Needle exchange	1993–5	ELISA 2	483 (84)	Int J Epidemiol 1997; **26**: 1359–66
Greece	Patras	Prison	1995	ELISA 3	82 (77)	J Med Virol 1998; **56**: 246–52
	Patras & Athens	Prison	1994	ELISA 2	294 (81)	Addiction 1998; **93**: 243–51
	Thesaloniki	Prison	1996	NS	37 (68)	Acta Microbiologica Hell 1998; **143**: 271–5
	Athens	Hospital in-patients	1986–90	ELISA 2	163 (69)	Prog Clin Biol Res 1993; **382**: 221–7
	Athens	Hospital in-patients	NS	ELISA 3 and 1	7 (58)	J Infect 2000; **40**: 127–31
Ireland	Dublin	Hospital out-patients	1991–7	ELISA 2	5 (83)	In J STD AIDS 1998; **9**: 485–8
	Dublin	Drug treatment centre	1992–3	ELISA 2 and 1	229 (84)	Ir J Med Sci 1995; **164**: 267–8
	Dublin	Drug treatment centre	1993–6	ELISA 3 (×2)	184 (52)	J Epidemiol Community Health 1999; **53**: 434–5
	Dublin	Drug treatment centre	1992–7	ELISA 2 and 1	453 (62)	Addiction 1998; **93**: 1649–56
	Multi-centre	Prison	1998	Modified ELISA 3	414 (81)§	BMJ 2000; **321**: 78–82
Italy	Vasto	Prison	1990	NS	24 (33)	Giornali Mall Infett Parassit 1993; **45**: 780–4
	Ferrara	Hospital out-patients	1991	ELISA 2	246 (84)	Giornali Mall Infett Parassit 1993; **45**: 859–61

Italy (*cont.*)	Biella	Hospital out-patients	1989	ELISA 1 and 2 and RIBA	73 (81)	Giornali Mall Infett Parassit 1992; **44**: 387–9
	Naples	Hospital out-patients	1990	ELISA 1 (×2)	115 (62)	Boll Soc Ital Bio Sper 1991; **67**: 103–8
	Pavia	Laboratory*	NS	ELISA 3	321 (66)	Microbiologica 1993; **16**: 35–42
	Perugia	Hospital out-patients	1985–92	ELISA 2 and RIBA 2	252 (72)	Eur J Epidemiol 1995; **11**: 123–6
	Florence	Drug treatment centre	1990	ELISA 1	26 (63)	Arch Virol 1992; **S4**: 335–6
	Bassano	Hospital out-patients Laboratory*	1989	ELISA 1	2337 (70)	Ital J Gastroenterol 1991; **23**: 555–8
	Bassano	Drug treatment centre	1992–4	ELISA 2	171 (75)	Liver 1995; **15**: 209–12
	Cagliari	Drug treatment centre	1991–2	ELISA 2 and RIBA 2	206 (81)	Eur J Epidemiol 1994; **10**: 279–83
	Sicily	NS	NS	ELISA 1	102 (58)	Arch Virol 1992; **S4**: 333–4
	Florence	Hospital in-patients	1990	ELISA 1	80 (66)	Arch Virol 1992; **S4**: 329–32
	Multi-centre	Laboratory*	NS	ELISA 1 and RIBA 2	168 (60)	Giornali Mall Infett Parassit 1993; **45**: 863–5
	Parma	Prison	1988–91	ELISA 2	229 (81)	Ann Ig 1994; **6**: 13–7
	Calabria	Drug treatment centre	1991–2	ELISA 1 and 2	99 (68)	J Clin Lab Immunol 1995; **47**: 1–9
	Ravenna	Laboratory*	1985–1	ELISA 1	123 (56)	Giornali Mall Infett Parassit 1992; **44**: 705–8
	Spoleto	Drug treatment centre	1991–2	ELISA 2 and RIBA 2	298 (48)	Giornali Mall Infett Parassit 1994; **46**: 91–4
	Genova	Laboratory*	1985–90	ELISA 1	65 (59)	Ann Int Med 1990; **113**: 559–60
	Calabria	Laboratory*	1991–2	ELISA 1 and RIBA 1	195 (65)	Giornali Mall Infett Parassit 1993; **45**: 861–3
	Lucca	Drug treatment centre	NS	ELISA 1	119 (66)	Minerva Med 1992; **83**: 265–7
	Cagliari	Drug treatment centre	1992	ELISA 2 and RIBA 2	111 (81)	Eur J Epidemiol 1996; **12**: 429–35
	Naples	Prison Hospital out-patients	1990	ELISA 1	116 (64)	Boll Soc Ital Bio Sper 1990; **66**: 841–7
	Rome	Prison	1991	ELISA 1 and ELISA 2	25 (50)	Panminerva Med 1992; **34**: 185–6
	Rome	NS	NS	ELISA 1	14 (82)	Giornali Mall Infett Parassit 1990; **42**: 1070–2
	Rome	Drug treatment centre	1990–1	ELISA 2 and RIBA 2	409 (63)	Int J Epidemiol 1993; **22**: 135–9
	Naples	Drug treatment centre	1991–3	ELISA 2 and RIBA 2	450 (63)	Scan J Infect Dis 1996; **28**: 27–9
	Tivoli	Drug treatment centre	1992	ELISA 1	17 (81)	Clin Terapeutica 1994; **145**: 41–8
	Naples	Hospital out-patients	1992–3	RIBA 2	372 (59)	Minerva Med 1995; **86**: 89–91
	Rome	STD clinic	1992–3	ELISA 2 and RIBA 2	5 (42)	Sex Transm Dis 1997; **24**: 533–7
	Rome	Drug treatment centre	1989	ELISA 1	54 (68)	Scan J Infect Dis 1990; **22**: 751–2
Netherlands	Amsterdam	Drug treatment centre STD clinic	1985–9	ELISA 1	224 (84)	J Infect Dis 1990; **162**: 823–6
	NS	Laboratory*	NS	ELISA 1 and RIBA 1	4 (40)	Vox Sang 1991; **61**: 30–6
	Amsterdam	Drug treatment centre STD clinic	1985–99	ELISA 1	196 (73)	Eur J Epidemiol 1993; **9**: 255–62
Portugal	Lisbon	Hospital out-patients	1986–8	ELISA 1	83 (83)	Acta Med Port 1991; **5**: 263–7
Spain	Barcelona	NS	NS	ELISA 2	144 (92)	Med Clin (Barc) 1992; **99**: 25–6
	North East Spain	Prison	1994	ELISA 1 and RIBA 1	495 (89)	Rev Esp Salud Publica 1998; **72**: 43–51
	Majorca	Drug treatment centre	1990–1	ELISA 1 and RIBA 2	95 (86)	Rev Sandid Hig Publica (Madr) 1992; **66**: 233–7
	Madrid	Laboratory*	1990	ELISA 1 and 2	71 (76)	Enferm Infecc Microbiol Clin 1993; **11**: 8–13
	Valencia	Prison	1991	ELISA 1 and RIBA 2	282 (95)	Rev Esp Enferm Dig 1995; **87**: 505–8
	Badalona	NS	1993–7	PCR	28 (68)‡	J Med Virol 1998; **55**: 293–9
	Vizcaya	Hospital out-patients	1990	ELISA 1 and 2 and RIBA	40 (88)	Rev Clin Esp 1994; **194**: 897–900

[*continued overleaf*

Table 1 (*cont.*)

Country	Location	Recruitment site	Year(s) of specimen collection	HCV assay	Prevalence no. +ve (%)	Reference
Spain (*cont.*)	Valencia	AIDS information service	1990–3	ELISA 2	908 (86)	Int J Epidemiol 1996; **25**: 204–9
	Gran Canaria	Drug treatment centre	1993–4	ELISA 2 and RIBA 1	106 (88)	Eur J Epidemiol 1998; **14**: 555–61
	Cantabria	Prison	1991–5	ELISA 2 and RIBA 1	332 (92)	Eur J Epidemiol 1999; **15**: 699–704
	Seville	Drug treatment centre Hospital out-patients	NS	NS	789 (92)	Int J STD AIDS 1999; **10**: 69–70
	Barcelona	Drug treatment centre	1995	NS	124 (72)	Aten Primaria 1999; **24**: 368–71
	Barcelona	Hospital out-patients	1993	PCR	25 (66)‡	J AIDS 2000; **23**: 89–94
	Valencia	AIDS information and prevention centre	1995	NS	289 (81)	Gaceta Sanitaria 1999; **13**: 16–21
	Cantabria	Prison	1992	ELISA 2	216 (85)	Epidemiol Infect 1999; **123**: 95–102
Sweden	Stockholm	Hospital out-patients	1988–9	ELISA 1	122 (89)	Infection 1990; **18**: 347–51
	Stockholm	Laboratory*	1987	ELISA 1	138 (80)	Scand J Infect Dis 1991; **23**: 19–24
	Stockholm	Prison Hospital in-patients	1994–5	ELISA 2	833 (92)	J Acquir Immune Defic Syndr Hum Retrovirol 1997; **15**: 381–6
	Malmo	Needle exchange	1990–3	ELISA 2 and RIBA 2	631 (90)	Scand J Infect Dis 2000; **32**: 253–8
United Kingdom	Glasgow	Laboratory*	1985–92	ELISA 1, RIBA 1 and PCR	45 (93)	J Clin Pathol 1996; **49**: 552–5
	East Anglia	Needle exchange	NS	ELISA 1 and RIBA 2	51 (51)	J Med Virol 1995; **46**: 48–51
	England & Wales	Laboratory*	1990–3	NS	222 (67)	Commun Dis Pub Health 1998; **1**: 89–94
	London	Drug treatment centre STD clinic Laboratory*	NS	ELISA 1	16 (31)	Quant J Med 1990; **77**: 1009–12
	North East England	Laboratory*	NS	ELISA 1	38 (38)	J Med Virol 1990; **32**: 243–8
	Edinburgh	Laboratory*	NS	ELISA, RIBA and PCR	7 (26)‡	Lancet 1990; **336**: 1469–72
	Glasgow	Laboratory*	1990 and 1995	ELISA 1 and 2	552 (83)	Commun Dis Pub Health 1998; **1**: 95–7
	Glasgow	Community-wide¶	1990–4 and 1996	Modified ELISA 3	1189 (61)§	J Infect 2000; **40**: 176–83
	England & Wales	Prison	1997	Modified ELISA 3 (×2)	240 (30)§	Comm Dis Pub Health 2000; **3**: 121–6
	Liverpool	Laboratory*	1992–6	ELISA 2 (×2)	360 (68)	J Infect 1998; **37**: 260–9
	Scotland	Prison	1994–6	Modified ELISA 3	265 (49)§	Quant J Med 1999; **92**: 25–32
	Liverpool	Hospital in-patients Hospital out-patients	1995–6	ELISA 1 and ELISA 2	87 (67)	J Infect 1998; **37**: 140–7

* Residual sera from previous clinical investigation(s).
† NS, not specified.
‡ Prevalence of HCV RNA.
§ Saliva antibody testing using modified serum assays.
¶ Recruited from street sites, drug treatment and needle and syringe exchange centres.

METHODS

Literature review

Studies published between January 1990 and December 2000 were identified through a computerized search (MEDLINE® and EMBASE), using relevant keywords and MeSH headings. Searches were not limited to English language publications, and additional references were selected from the bibliographies of identified articles. The search strategy identified 1411 references, of which 98 contained HCV prevalence and/or incidence data for IDUs in EU countries.

Data were recorded from the articles by means of a proforma. This was derived from the form used for the collection of data on HIV prevalence by EuroHIV (the former European Centre for the Epidemiological Monitoring of AIDS) and comprised several parameters against which the design and quality of the studies were assessed; these included the target population, geographical coverage, recruitment site, sampling criteria and HCV testing methods.

RESULTS

Prevalence of HCV among European Union IDUs

Since the discovery of HCV, 98 published studies have examined the prevalence of the virus among groups of IDUs in all EU countries except Luxembourg (Table 1).

The earliest evidence of HCV among European IDUs stemmed from three studies, undertaken by researchers in Italy, The Netherlands and the UK [7–9]; all reported the presence of HCV antibody in more than 70% of their sample population. Since then, the published literature has reported HCV antibody and/or RNA positivity in 21 574 (71%) of 30 359 IDU specimens (serum or saliva) tested.

The majority of studies (93) report the prevalence of antibody to HCV (anti-HCV); positivity indicates previous infection. The prevalence ranged from 30 to 95% among males [10, 11], 48 to 94% among females [12, 13], and 33 to 98% among those whose gender was unspecified [14, 15]; few studies detected anti-HCV in less than 40% of their IDU population.

The detection of HCV RNA by molecular tests such as the polymerase chain reaction indicates the presence of acute or chronic infection. Five studies (5·2%) reported the prevalence of HCV RNA in serum; this ranged from 26 to 90% [8, 16–19].

Incidence of HCV infection among European Union IDUs

While HCV prevalence data are relatively easy to generate, the reverse applies to information about the incidence of infection. Consequently, there are few estimates of the incidence of HCV among IDUs in Europe. The first published report of HCV incidence arose from a cohort of IDUs from Amsterdam who participated in a study to assess their incidence of, and risk factors for, HIV infection. On the basis of 17 seroconvertors, observed during the period 1985–9, an incidence of 8·2 per 100 person years was reported [9]. Since then, the findings from a further five studies have been published [20–24]. Of the aggregated 337 IDUs who were initially HCV seronegative, 78 (23%) seroconverted on follow-up; incidence rates ranged from 6·2 to 39·3 per 100 person years (Table 2).

Five of the six studies were undertaken in a drug treatment environment which may have influenced the seroconversion rate. In such a setting, drug workers have an ethical obligation to provide IDUs, including study participants, with information and advice on how to prevent contracting bloodborne viruses. Accordingly, HCV incidences among IDUs in drug treatment centres may be lower than those among more representative population samples. Nonetheless, the data suggest that HCV continues to spread among Europe's IDUs despite the introduction of needle and syringe exchange schemes and other interventions.

Risk factors for incident HCV among European Union IDUs

The paucity of cohort studies and their small sample sizes precludes any in-depth discussion regarding risk factors associated with HCV seroconversion. In the study based in Bassano, Italy, only two individuals seroconverted; one had shared injecting equipment and the other had an anti-HCV positive partner [22]. Among IDUs who attended a drug treatment centre in Naples, older age and longer duration of drug use were associated with HCV seroconversion [21]. Among those who attended a needle exchange service in Malmo, Sweden, HCV seroconversion correlated with imprisonment, absence of drug-free periods and lack of needle/syringe availability [24]. Reports on the remaining three studies did not provide any information about risk factors and seroconversion.

Table 2. *Incidence of HCV antibody among populations of IDUs in Europe*

Country	No. IDUs followed	No. of sero-conversions	Follow-up time (person years)	Incidence rate (per 100 person years)	Reference
Germany	19	6	17·5	34·3	[20]
Italy	106	21	74·3	28·2	[21]
Italy	34	2	32·1	6·2	[22]
Italy	12	5	12·7	39·30	[23]
Netherlands	118	17	207·8	8·2	[9]
Sweden	48	27	103	26·3	[24]

Methodological issues

Ascertaining the prevalence and/or incidence of HCV among IDUs in the EU presents substantial methodological challenges. These include the recruitment of representative samples of an IDU population; only self-selected groups are relatively easy to access through, for example, drug treatment and needle and syringe exchange agencies. Accordingly, almost all the published studies, identified in this review, involved the adoption of a suboptimal recruitment strategy; 74% were based on either the testing of (i) residues of serum samples, originally taken from IDUs for other clinical purposes or (ii) samples given by consenting IDUs who had been recruited in drug treatment or prison settings (Table 3). Only one study, conducted in Glasgow during 1990–6, used the optimal community-wide sampling approach which involves recruiting quotas of injectors from street sites, drug treatment and needle and syringe exchange centres throughout the geographical area being studied.

The majority of published studies ($n=86$) were carried out at a local level, usually focusing on IDU populations in major cities; national or multiple-region studies were undertaken in nine EU countries. In most countries where more than one study was undertaken, wide variations in HCV prevalence were reported (Fig. 1). Thus, great caution is required if national prevalences are to be extrapolated from local ones and if inter-country comparisons in prevalence are to be made.

The laboratory diagnosis of HCV has evolved considerably since the introduction of the first serological tests in 1989 [1]; third-generation tests, which afford high sensitivity and specificity, are now available. In the studies reviewed, 22 different testing algorithms were employed (Table 4); screening enzyme immunoassays and confirmation immunoblot assays, of different generations, were used alone or together in various combinations. A single unconfirmed test, using a first-generation ELISA, was the most common strategy (26·5%), followed by testing using a single second-generation ELISA (17·3%); for seven studies, the testing algorithm was not specified. The lack of sensitivity and specificity, associated with first-generation assays, and the absence of confirmatory tests necessitates that the resulting data be interpreted with care. Furthermore, a reliable comparison of different study results should only be made if the strategy for testing is similar.

Table 3. *Frequency of recruitment sites used by the studies identified*

Recruitment site	Frequency
Laboratory	24
Drug treatment centre	27
Needle exchange	5
Prison	20
STD clinic	5
Hospital out-patients	16
Hospital in-patients	7
Other	3
Not specified	4

DISCUSSION

This review provides a comprehensive examination of HCV infection among selected populations of IDUs in the countries of the European Union. Several conclusions can be made. It is evident that the current state of knowledge about the prevalence and incidence of HCV among IDUs in the European Union is far from satisfactory. The quality and epidemiological relevance of the studies appraised varies widely. The results are derived primarily from studies of convenience samples that are unlikely to be representative

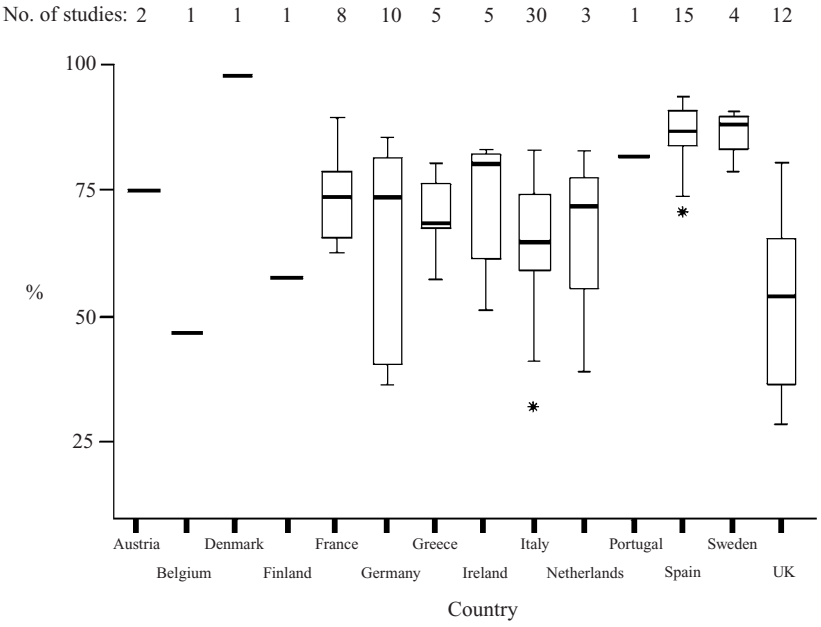

Fig. 1. Boxplot of hepatitis C virus prevalence by country of study.

Table 4. *Testing algorithms employed for HCV testing by identified studies*

Testing algorithm	Frequency
ELISApos/Matrix pos	2
ELISA1pos	26
ELISA1pos (× 2)	1
ELISA1pos/ELISA2pos	7
ELISA1pos/ELISA2pos/RIBApos	2
ELISA1pos/RIBA1pos	3
ELISA1pos/RIBA2pos	3
ELISA2pos	17
ELISA2pos/ELISA1pos	2
ELISA2pos (× 2)	1
ELISA2pos/RIBA1pos	2
ELISA2pos/RIBA2pos	9
ELISA2pos/PCRpos	1
ELISA3pos	3
ELISA3pos (× 2)	1
ELISA3pos/ELISA1pos	1
Modified ELISA3pos	2
Modified ELISA3pos (× 2)	2
ELISApos/RIBApos or indeterminate/PCRpos	3
PCRpos	2
RIBA2pos	1
Not specified	7

of total current, or past, IDU populations. Furthermore, information on the recent past prevalence of HCV is extremely scanty; this may be because, (i) few studies were conducted in the mid to late 1990s, (ii) of delays associated with the publication of results, or (iii) of a lack of interest, among study investigators and/or editors, in publishing the findings of studies that seemed to be repeating work carried out in the early 1990s. The reported data, thus, may not reflect accurately the current or recent past prevalence of HCV among European Union IDUs. Nonetheless – despite the above shortcomings – the results, which were generated through the study of different populations of IDUs, recruited using different strategies in different settings and tested for HCV using different assays, indicate consistently high prevalences; similar rates have been identified among IDUs from North America [25], Australia [26] and Asia [27]. It is possible, however, that published data are biased in favour of high prevalences since low prevalence findings might be considered relatively uninteresting and not worthy of publication.

Despite the existing data having many deficiencies, they suggest that most of the current IDU populations throughout the EU have HCV prevalences that lie within the 25–75% range. Accordingly, HCV among IDUs is one of the EU's major public health problems. With the ever-increasing mobility of populations, including those who inject drugs, the effectiveness of HCV prevention initiatives in one EU country is important to all EU countries. Intervention programmes, in terms of their type and scale, vary geographically, as do their effectiveness in preventing HCV transmission among IDUs because of regional variations in culture, deprivation, the environment

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and pre-existing HCV prevalence. If interventions are to be targeted, and evaluated effectively, both nationally and internationally, it is essential that they are aligned to surveys that monitor the incidence of HCV infection.

The serial cross-sectional prevalence survey – with IDUs recruited using a consistent quota sampling strategy from settings (including street sites) throughout a population – is considered, by many, to be the optimal approach to gauging HCV incidence among this group. It is appreciated, however, that major demographic changes – for example, the large-scale migration of IDUs to or from a city – can make the interpretation of data a complex exercise. An indirect measure of HCV incidence among IDUs can also be achieved through using the reported time of first injection to assess the individual's number of person years of injecting exposure; this approach is most valuable if the interval between reported injecting debut and time of sampling is short (1–2 years). Despite the benefits of the repeated cross-sectional survey approach, there are few publications to indicate that such surveillance is being conducted in the EU.

The longitudinal approach to measuring the incidence of HCV among IDUs is unpopular – as indicated by the small number of cohort studies reported in this review – because IDUs are difficult to follow-up and, almost invariably, such follow-up is conducted in a drug treatment/clinical setting where there is an ethical obligation for bloodborne virus prevention advice to be imparted to study participants. The only study, known to the authors, of HCV among IDUs that combines the scientific rigour of the community-wide sampling approach, with a longitudinal design, is currently being conducted in London (M. Hickman, personal communication).

Real-time prevalence data are also required to estimate the numbers of infected IDUs who may require anti-viral treatment and who will proceed, with or without treatment, to severe liver disease.

Accordingly, high quality information on the prevalence/incidence of HCV among IDUs is essential for those whose responsibility it is to deliver services to prevent, and care for persons with, HCV infection. Where possible, methods should be robust and consistent to enable both intra- and trans-city/region/country comparisons to be made. Geographically based analyses will help those responsible for delivering prevention programmes to understand the reasons for regional variations in HCV prevalence/incidence. A strategic approach to the surveillance of HCV among IDUs in the EU is required urgently.

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