Update in hepatitis C virus infection

Eoin Feeney

Consultant in Infectious Diseases

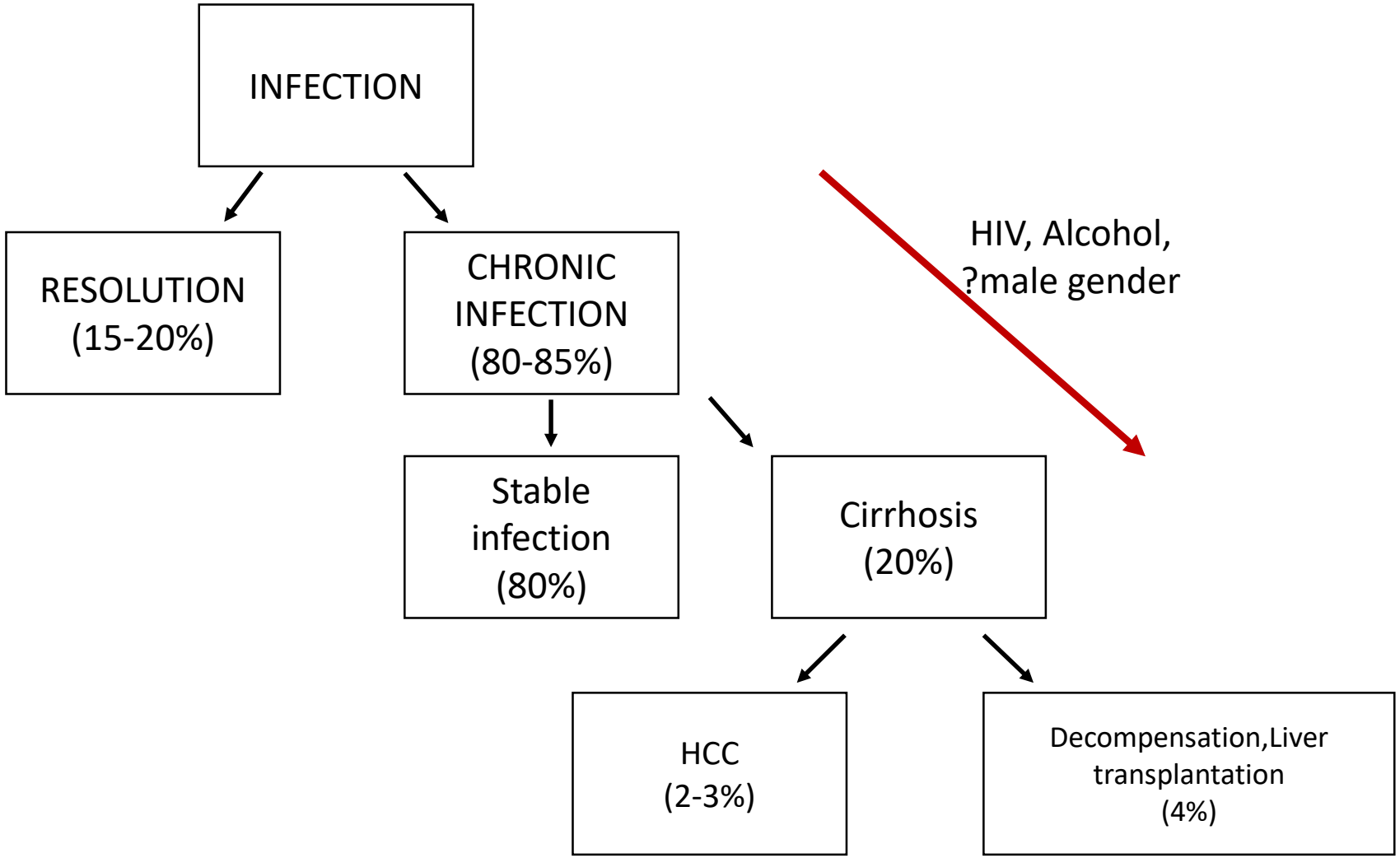
St. Vincent’s University Hospital

Overview

- Natural history
- Diagnosis, screening, staging
- Management
- Barriers going forward

Natural History, Diagnosis and Staging

Natural history



Diagnosis

- HCV antibody – Serum sample
  - Positive in almost everyone infected
  - Positive after successful treatment or spontaneous clearance
- HCV antigen – Serum sample
  - Confirms ongoing infection
- HCV viral load
  - Detects HCV RNA in the blood. Confirms ongoing infection. Allows genotype to be determined

- Those who have ever injected drugs
- Those who have used unprescribed or illicit drugs by a route other than injecting (non-injecting drug use (NIDU)), if there is a possibility of transmission of infection by the route of administration
- Prisoners or former prisoners
- Homeless people who have a history of engaging in risk behaviours associated with HCV transmission, or who have had a potential HCV risk exposure
- Migrants from a country with an intermediate and high prevalence of HCV (anti-HCV ≥ 2%*)
- People who are HIV positive
- Infants of HCV-RNA positive women
- Men who have sex with men
- People on renal dialysis or who have had a kidney transplant
- Recipients of blood or blood components in Ireland prior to October 1991 who have not yet been tested
- Recipients of anti-D immunoglobulin in Ireland between 1st May 1977 and the end of July 1979, and 1st March 1991 to 18th February 1994 who have not yet been tested
- Recipients of plasma derived clotting factor concentrates in Ireland prior to 1992 who have not yet been tested

Strong recommendation – Screening should be offered

- Those with a tattoo, particularly those who received tattoos a number of decades ago, in non-professional settings, prisons, countries with a high prevalence of HCV, or in circumstances where infection control was poor
- Household contacts of a person who is HCV positive in circumstances where household transmission is more likely to have occurred
- Recipients of solid organ transplants in Ireland prior to the introduction of routine screening
- Recipients of blood components and blood products overseas in any country where a quality assured blood donor screening programme may not have been in place
- People who have received medical or dental treatment in countries where HCV is common (anti-HCV prevalence ≥ 2%*) and infection control may be poor
- Sexual partners of known HCV cases:
  - If the case or contact is also HIV positive
  - If the HCV-infected case is an injecting drug user
- Sexual contacts of persons who inject drugs, but where HCV status is unknown or where there is evidence of resolved infection
- Commercial sex workers

Weak recommendation – Screening should be considered

Rapid screening

OraQuick® Rapid Antibody Test HCV

Oral Fluid | Fingerstick | Venipuncture Whole Blood | Serum/Plasma

Simple Testing Procedure

Oral Fluid

Step 1 - Collect sample.

Swab between the teeth and upper and lower gum once.

Step 2 - Insert the device into the buffer.

Step 3 - Read between 20 and 40 minutes.

Non-Reactive
Line in the C Zone

Reactive
Line in the C and T Zones

WP 7 - HEPCHECK- OVERVIEW

	DUBLIN	LONDON	BUCHAREST	SEVILLE	TOTAL
1. No. of individuals offered/screened	712/569	-/310	-/469	657/401	1,749
2. Proportion of individuals with positive HCV antibody on screening	137/569 24%	123/310 39%	166/469 35%	133/401 33%	559
3. No. of individuals screened (Ab only, bloods only, both Ab and bloods)	Pending	Pending	Ab + bloods 104 365 Ab	Ab + bloods: 21 Ab: 264 Bloods:116	-
6. No. of HCV Ab+ individuals (either new or previously diagnosed) attending specialist appointment for HCV assessment.	Pending	106	65	51	

HEPCARE EUROPE

Recommendation 24

24.1. Serum and plasma are the preferred specimen types for screening and diagnostic testing for HCV infection using quality assured assays.

24.2. Screening and diagnostic testing for HCV infection should not be performed on oral fluid samples due to the low sensitivity and low positive predictive value.

24.3. Dried blood spot testing can be considered for screening for HCV in special circumstances, such as mass screening initiatives e.g. in prisons.

Quality/level of evidence: *moderate; good consistency between existing high quality guidelines*
Strength of recommendation: *strong*

Staging

- Bloods
  - Screening for HIV, hepatitis B
  - FBC, U&E, LFTs (including AST), INR
- HCV Genotype
  - Currently required for treatment decisions
  - 6 genotypes, predominantly 1 and 3 in Ireland
- Fibrosis assessment

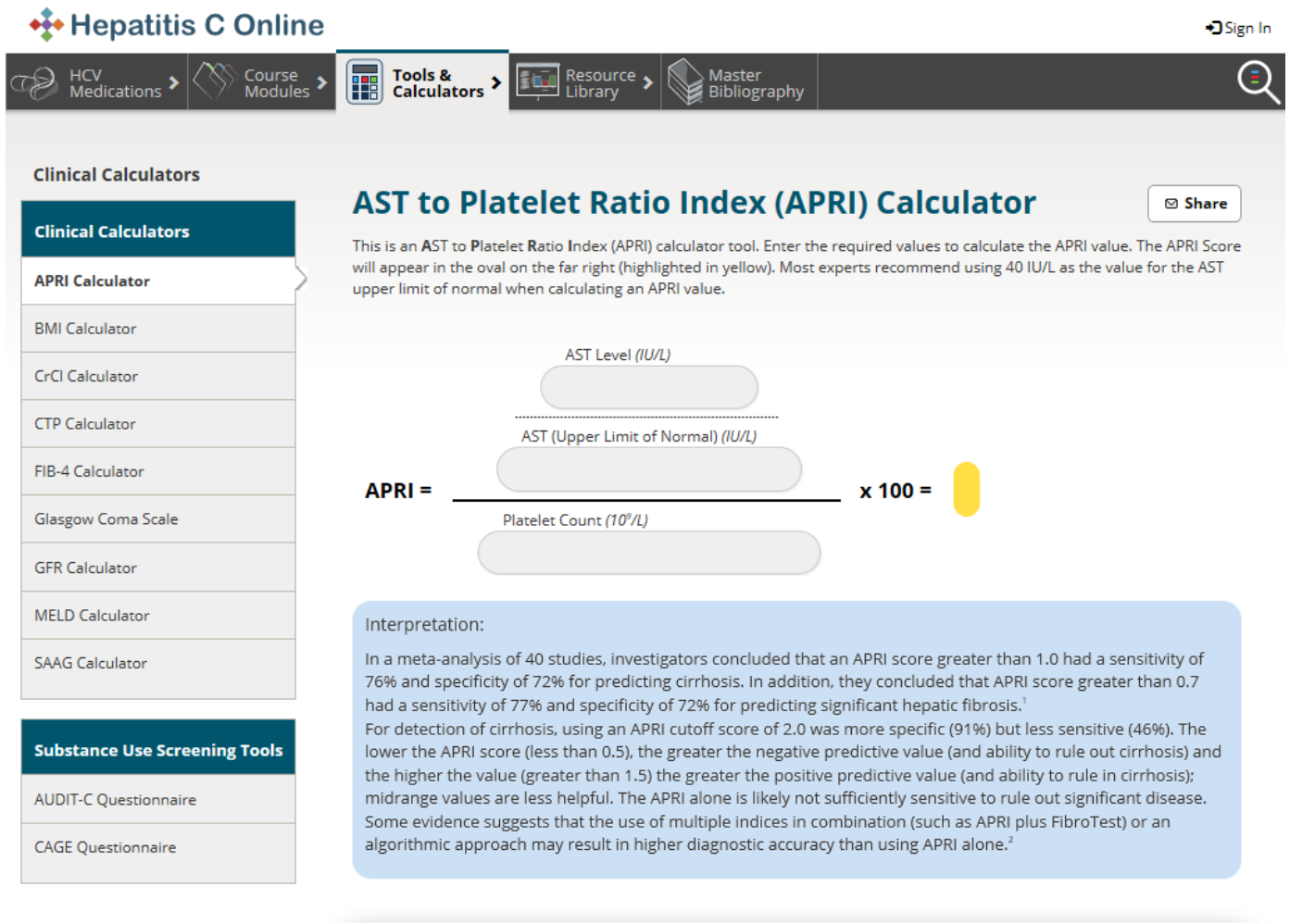
Fibrosis Assessment

- Clinical exam
  - Signs of cirrhosis
  - Highly specific (75-98%), low sensitivity (15-68%)

- Liver biopsy
  - Gold standard
  - Highest risk
  - Takes long
  - Patient fear +++

BMC Med Inform Decis Mak 2001;1:6

Non invasive



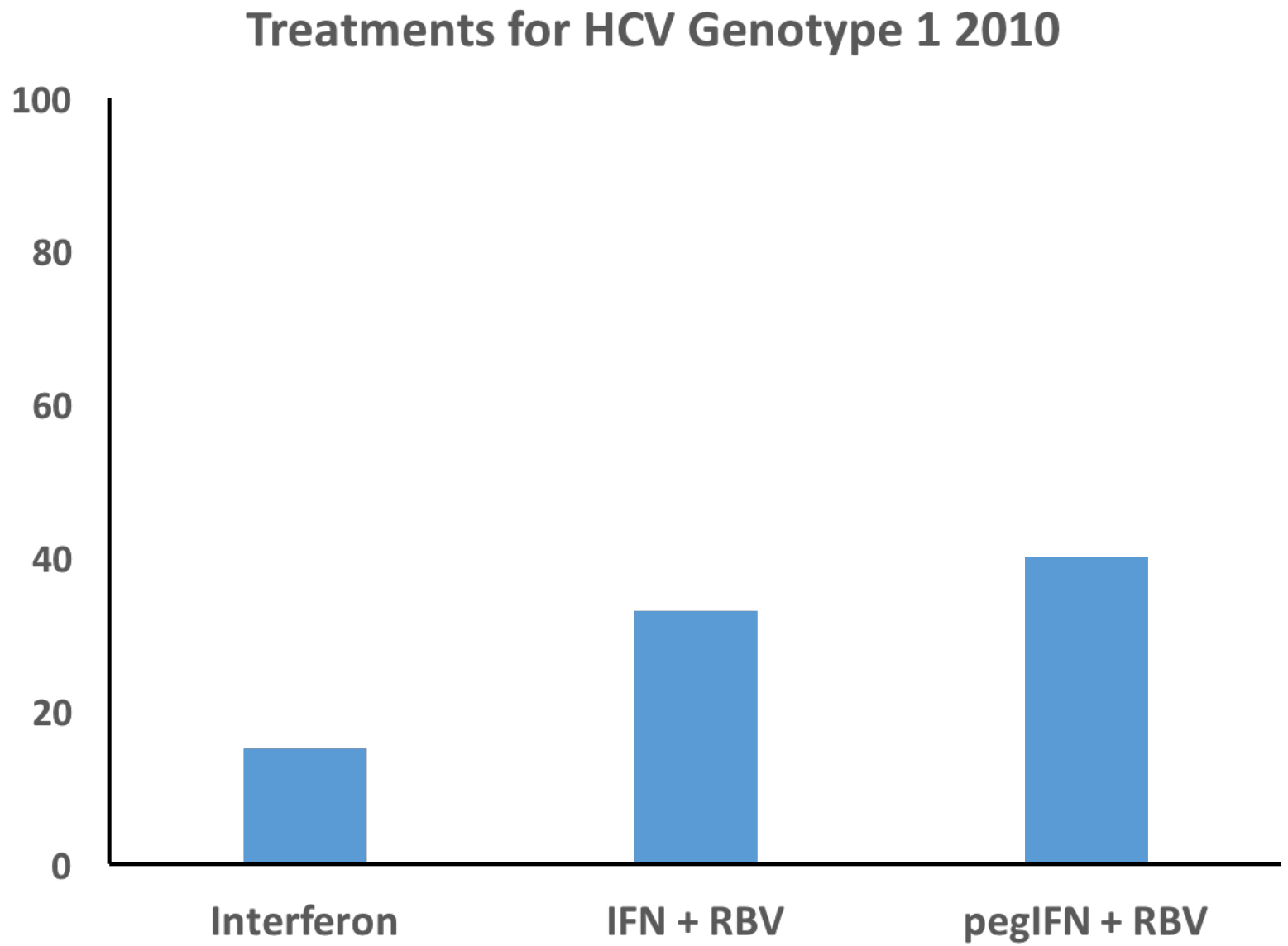
Fibroscan

Table 1 Recommended values for different stage of fibrosis

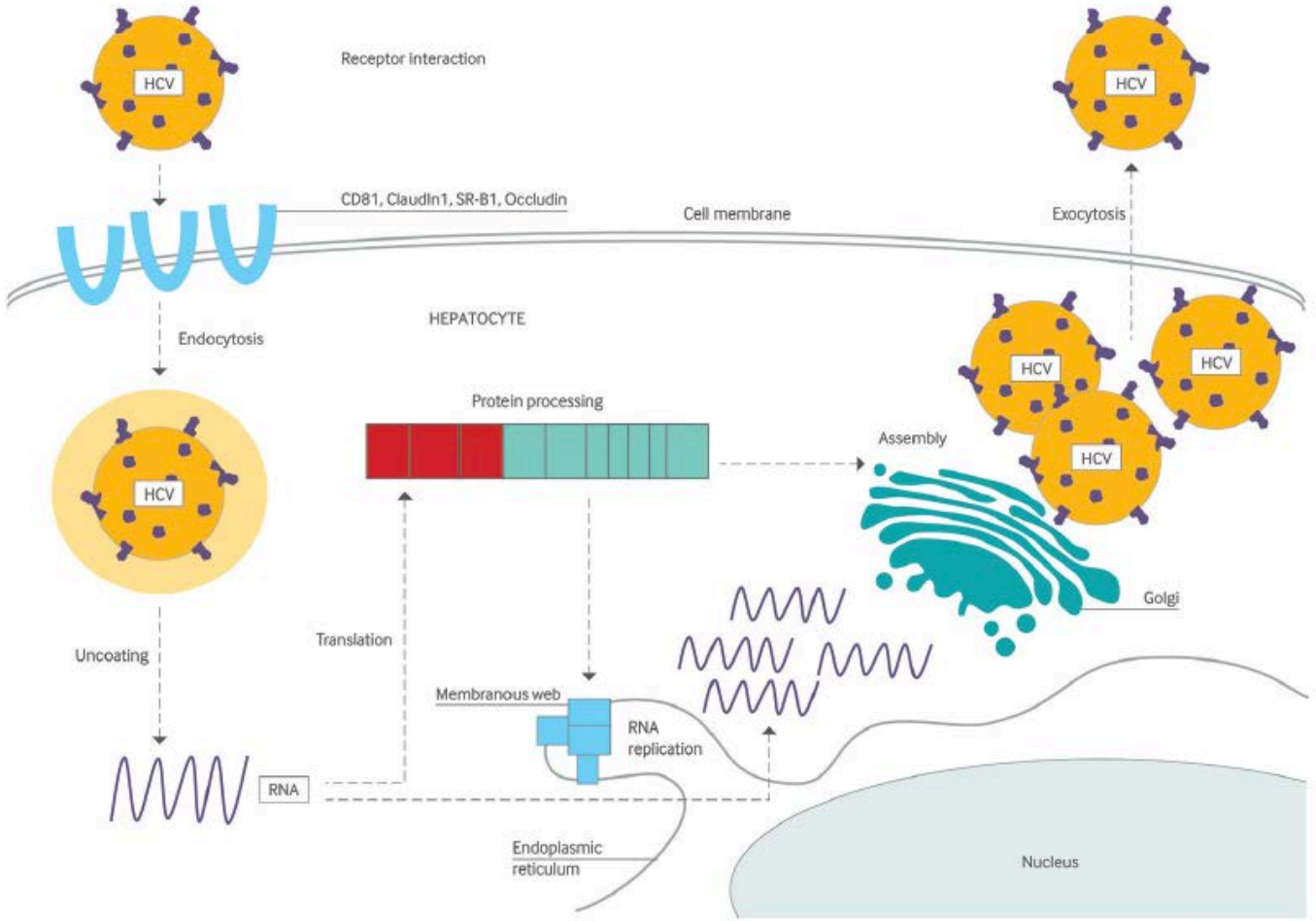
Disease	F0–F1 (Kpa)	F2 (Kpa)	F3 (kpa)	F4 (kpa)
Hepatitis B	≤6.0	≥6.0	≥9.0	≥12.0
Hepatitis C	≤7.0	≥7.0	≥9.5	≥12.0
HCV–HIV coinfection	≤7.0	≤10	≥11.0	≥14.0
Cholestatic liver disease	≤7.0	≥7.5	≥10.0	≥17.0
NAFLD/NASH	≤7.0	≥7.5	≤10	≥14.0

Treatment – “Interferon Era”

- Pegylated interferon
  - Weekly subcutaneous injection
  - ”Flu-like” side effects
- Ribavirin
  - Oral medication, twice daily
  - Marrow suppression, sleep disturbances, teratogenic
- Combined for 24-48 weeks


Treatments for HCV Genotype 1 2010
100
80
60
40
20
0
Interferon
IFN + RBV
pegIFN + RBV

Direct acting antivirals



BMJ 2014;349:g3308

Current 1st line regimens for HCV Ireland

	GENOTYPE 1	GENOTYPE 2	GENOTYPE 3	GENOTYPE 4
Non cirrhotic	Viekirax ii OD Exviera i BD GT1a + RBV - 12 weeks GT1b 8 weeks	Sofosbuvir+ Daclatasvir 12 weeks	Sofosbuvir+ Daclatasvir 12 weeks	Viekirax ii OD RBV 12 weeks
Cirrhotic	Viekirax ii OD Exviera GT1a +RBV 12-24 weeks GT1b 12 weeks	Sofosbuvir/Velpatasvir 12 weeks	Sofosbuvir/Velpatas vir+RBV 12 weeks	Viekirax ii OD RBV 12 weeks

HCV DAA treatment landscape Ireland

- 2014 – Early access programme – Cirrhosis, decompensated
- 2015 – Cirrhosis (Fibroscan >12.5kPa), State-infected, Liver transplants
- 2016 – Fibrosis (Fibroscan >8.5kPa), all the above
- 2017 – Open access (up until June)

Hepatitis C patients unable to get drugs due to funding problems

Funding freeze blamed on ‘significantly increased and unpredicted’ number of claims

Mon, Jul 31, 2017, 01:00

Paul Cullen

SVUH Data

DAA tx 8/10/2017	Nos completed	Cirrhotics completed tx	Nos SVR 12 data available	No of Cirrhotics (>12kPa) with SVR 12 data (%)	Relapsed	SVR 12 results (%)
Total completed	**351** **Excludes 7 who didn't complete; see table below**	**154**	**259**	**140 (54.0)**	**9** **8 cirrhotic**	**250 (96.5)**
G1a	117	55	81	46 (56.7)	1 Non cirrhotic OLT	80 (98.7)
G1b	112	40	92	37 (40.2)	1 cirrhotic	36 (98.9)
G1 no subtype	3	3	3	3 (100)	0	3 (100)
Geno 2	11	5	6	4 (66.6)	0	6 (100)
Geno 3	97	53	70	44 (62.8)	6	64 (91.5)
Geno 4	12	7	9	6 (66.6)	1 After SVR 12	8 (89.9)
Transplants treated	65	??40	61		2 1 cirrhotic G3 1 non cirrhotic 1a	96.7

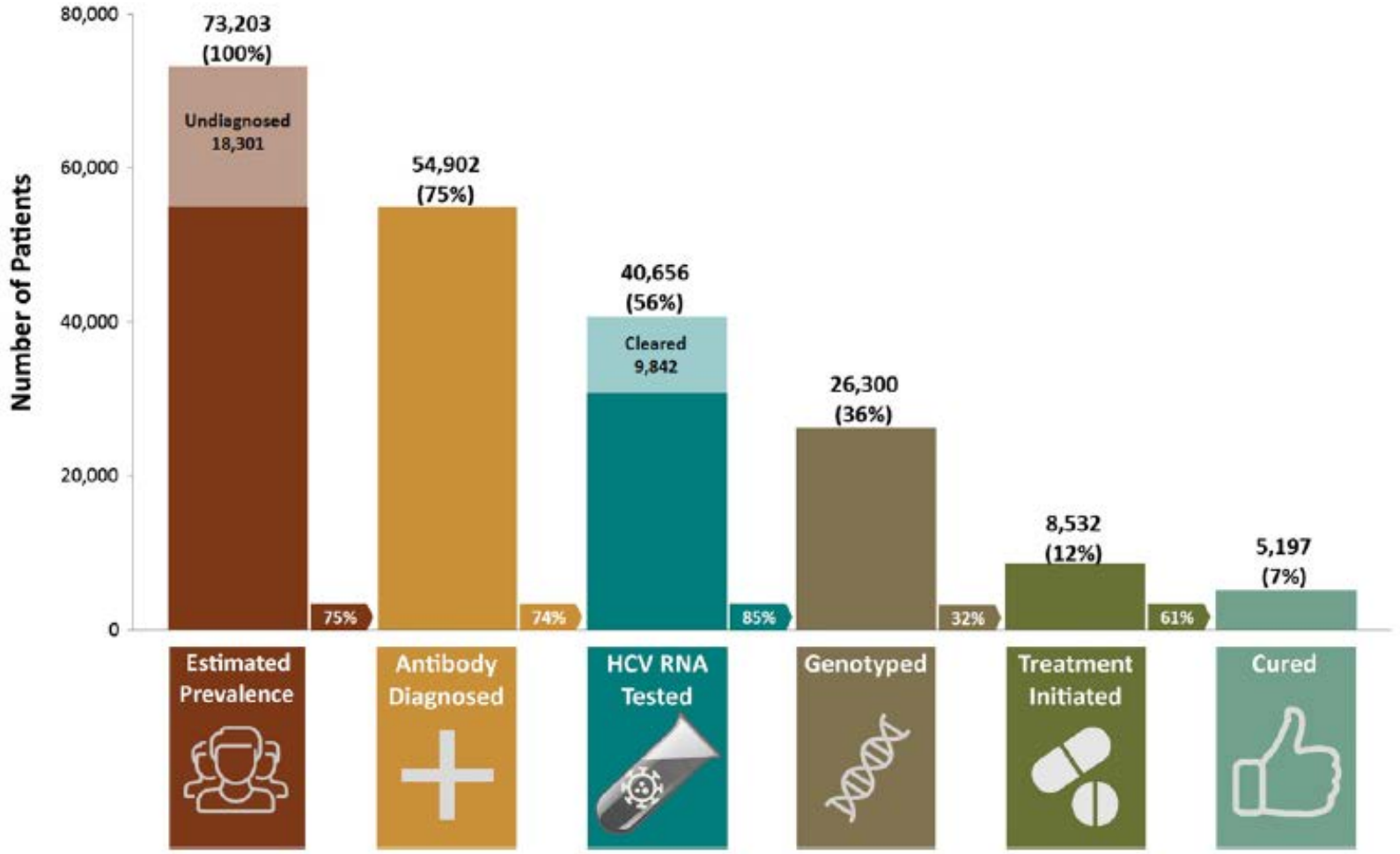
The Problem

The numbers

- 2006 – estimated 20,790 heroin users in Ireland
- August 2016 – 9,652 patients receiving OST (not including prisons)
- HCV prevalence in PWID reported as 62-81% ~ 2003
- Globally 5.6 million HCV infections related to PWID

http://www.hrb.ie

The cascade of care – HCV (BC, Canada)

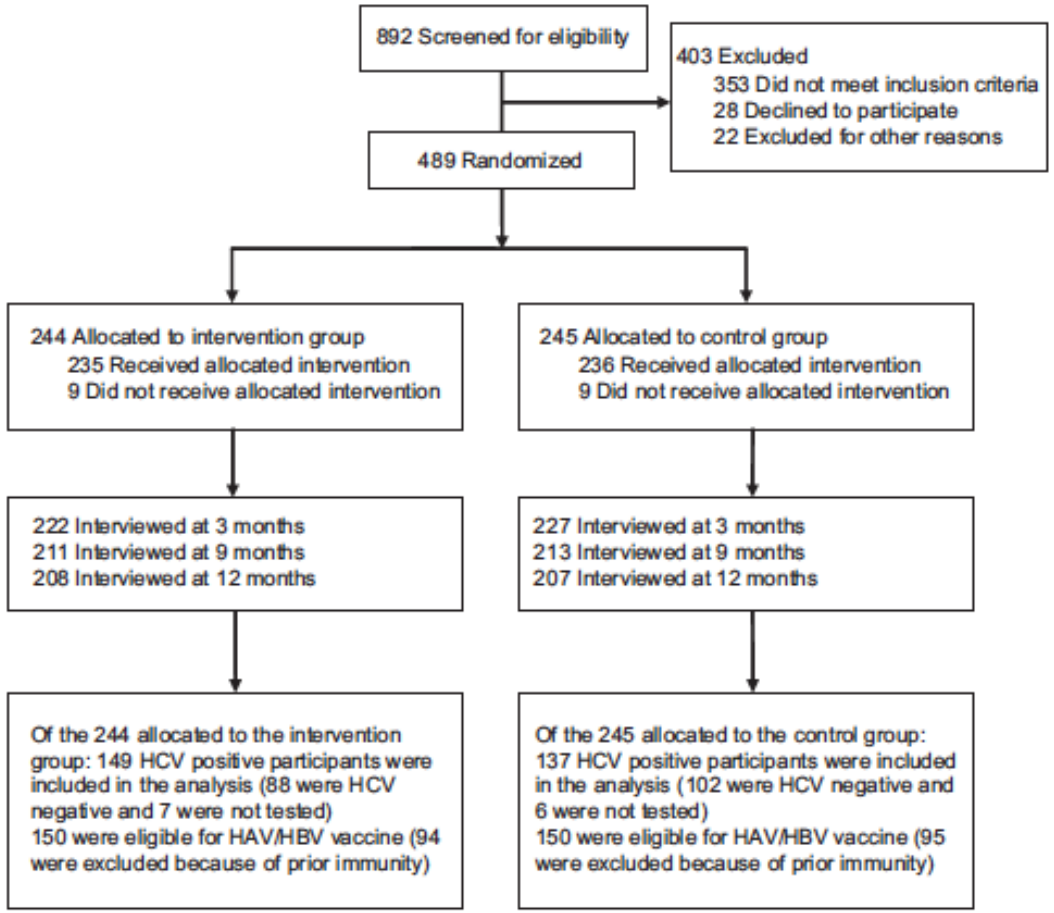


Janjua EBioMedicine 2016;12:189-95

Why don’t PWID attend for treatment?

- Alcohol and drug use
- Fear of HCV treatment
- Fear of liver biopsy
- Distance to hospital
- Early morning appointments

Crowley J Transl Int Med 2017;5:112-9



Note. HAV = hepatitis A virus; HBA = hepatitis B virus; HCV = hepatitis C virus.

FIGURE 1—Allocation of participants in study to promote linkage to hepatitis services: San Francisco, CA, and New York City, February 2008–June 2011.

TABLE 3—Effects of Intervention Condition on Adherence to HCV Clinical Evaluation in Study to Promote Linkage to Hepatitis Services: San Francisco, CA, and New York City, February 2008–June 2011

Variable	OR (95% CI)
Intervention condition	
Hepatitis care coordination	4.10** (2.35, 7.17)
Control (Ref)	1.00
Recruitment location	
San Francisco	3.21** (1.73, 5.95)
New York City (Ref)	1.00
Gender	
Female	0.83 (0.46, 1.49)
Male (Ref)	1.00
Race/ethnicity	
White (Ref)	1.00
African American	0.93 (0.46, 1.86)
Hispanic	0.79 (0.40, 1.57)
Other	2.33 (0.65, 8.33)
Education, y	
≥ 12	1.10 (0.64, 1.91)
< 12 (Ref)	1.00
HIV status	
Positive	8.02** (2.81, 22.95)
Negative (Ref)	1.00
Homeless past 6 mo	
No	2.28* (1.25, 3.33)
Yes (Ref)	1.00

Note. CI = confidence interval; HCV = hepatitis C virus; OR = odds ratio.
*P < .01; **P < .001.

Masson Am J Public Health 2013;103:e81-88

ECHO study

Table 2. Sustained Virologic Response According to Genotype and Site of Treatment.*

HCV Genotype	ECHO Sites	UNM HCV Clinic	Difference between ECHO Sites and UNM HCV Clinic	P Value
	no. of patients with response/total no. (%)		*percentage points (95% CI)*	
All genotypes	152/261 (58.2)	84/146 (57.5)	0.7 (–9.2 to 10.7)	0.89
Genotype 1	73/147 (49.7)	38/83 (45.8)	3.9 (–9.5 to 17.0)	0.57
Genotype 2 or 3	78/112 (69.6)	42/59 (71.2)	–1.5 (–15.2 to 13.3)	0.83

* The rates of sustained virologic response are not reported separately for six patients with genotype 4 or genotype 6. ECHO denotes Extension for Community Healthcare Outcomes, HCV hepatitis C virus, and UNM University of New Mexico.

NEJM 2011;364:2199-2207

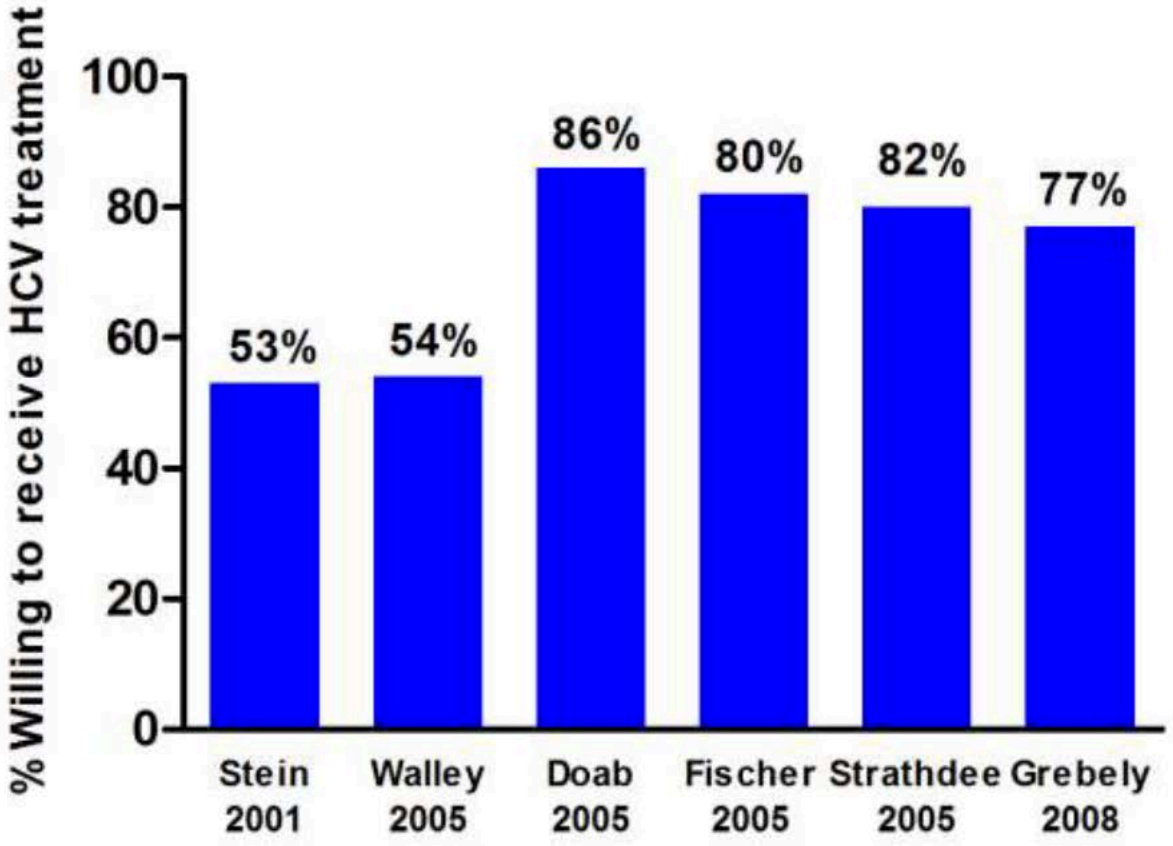
Why don’t doctors treat PWID?

- They don’t want it
- They’re not going to take it
- It’s not going to work
- They’re just going to reinfect again afterwards
- It will have no benefit

Substance Use and Misuse 2016;51:1218-23

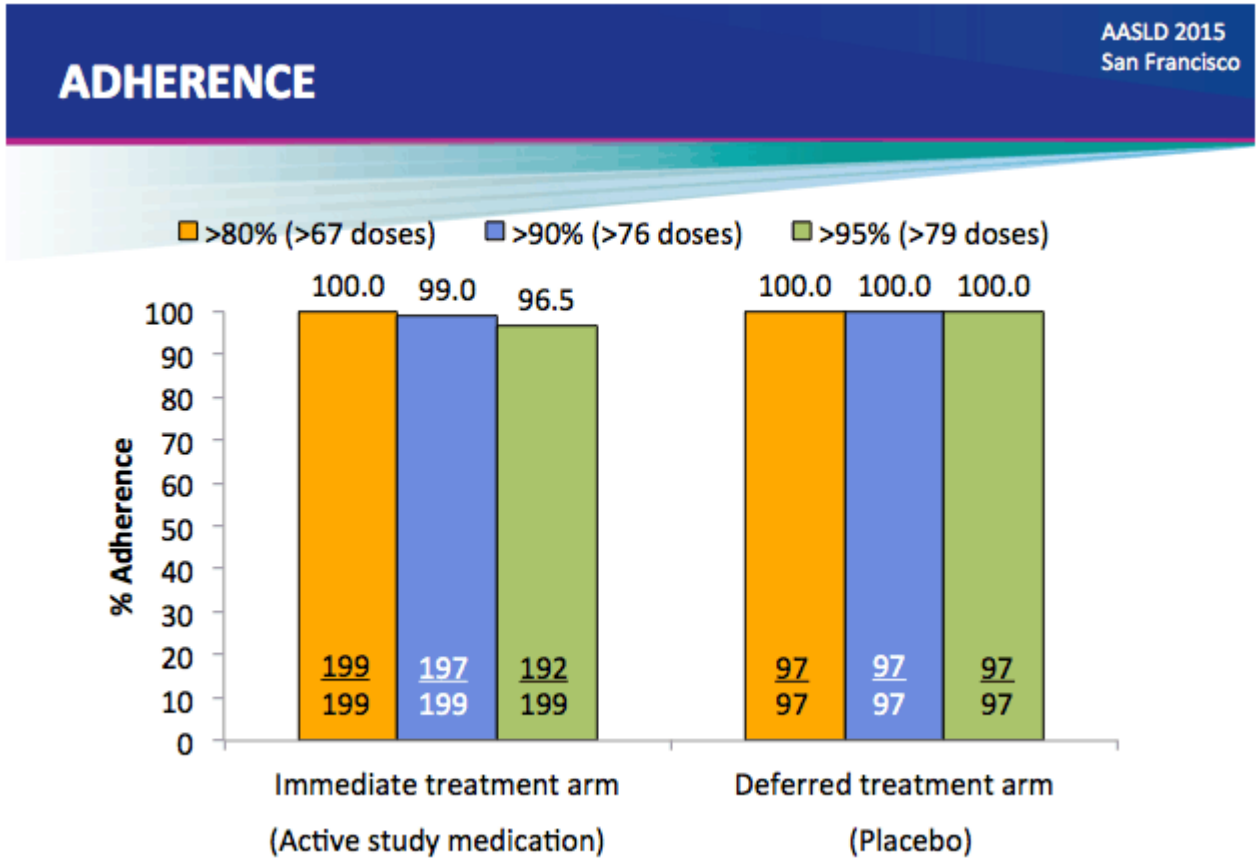
They don’t want it

“They don’t want it” – IFN era data



They’re not going to take it

C-EDGE CO STAR



Dore AASLD 2015

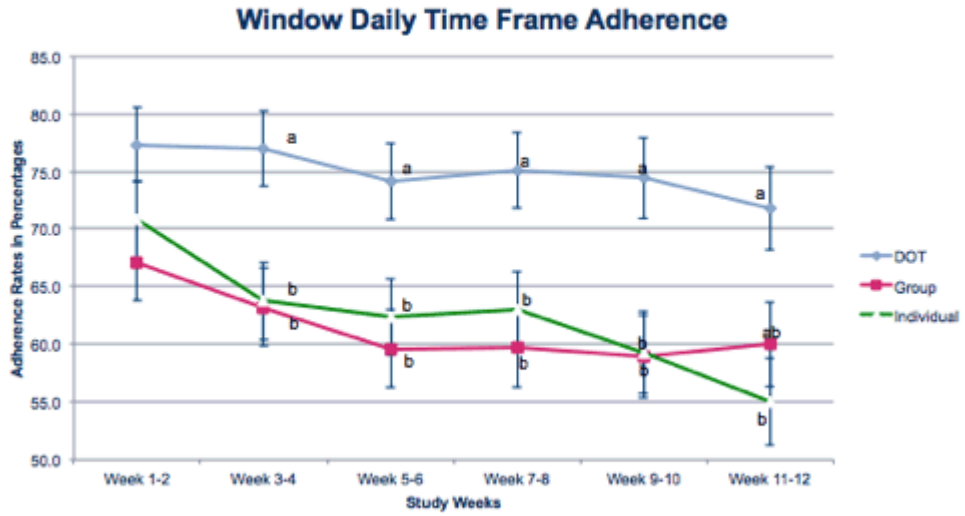
PREVAIL study

Randomized, controlled trial

- Individual arm (control arm): subjects self-administer all HCV medications.
- DOT arm: subjects receive observed oral doses by nursing staff at same time as receive methadone or buprenorphine. Weekly directly administered IFN injections (if applicable).
- Group arm: subjects attend weekly treatment group. Weekly directly administered IFN injections (if applicable).

Montefiore

Adherence higher in DOT vs. both Individual (p=0.0008) and Group (p=0.0003)



Overall adherence: DOT (75.0%) vs. Group (61.4%) vs. Individual (62.4%)

Montefiore

Litwin EASL 2017

PREVAIL study

SVR12 high in all 3 arms (p=0.24)

Study Arm	ETR	SVR12
DOT	98.0% (50/51)	98.0% (50/51)
Group	93.8% (48/51)	93.8% (48/51)
Individual	96.1% (49/51)	90.2% (46/51)
Total	**96.0% (144/150)** (95% CI 92% - 99%)	**94.0% (141/150)** (95% CI 89% - 97%)

Litwin EASL 2017

It’s not going to work

Interferon era

Pegylated IFN plus RBV					
Mauss et al (2004) [41]	Prospective enrollment of IDUs in a stable methadone maintenance program; for each IDU, a control patient was matched for sex, age, HCV genotype, and HCV RNA level	Treatment IDUs (receiving stable substitution therapy and abstained from drug use for at least 6 months before treatment initiation)	50	21 (42.0)	No
		Non-IDUs (no IDU or substitution therapy for at least 5 years before initiation of treatment)	50	28 (56.0)	
Schaefer et al (2007) [42]	Prospective enrollment; recruitment source not clear	Treatment IDUs (currently receiving substitution therapy; ongoing users excluded)	18	13 (72.2)	No
		Former IDUs (history of addiction; ongoing users excluded)	13	7 (53.8)	
		Non-IDUs	39	21 (53.8)	
Seal et al (2007) [43][d]	Prospective enrollment through multiple veterans' health care medical centers	Former IDUs (history of IDU; IDU within 6 months before enrollment was usually considered to be an exclusion criterion, although this could be overruled by individual doctors)	447	81 (18.1)	No
		Non-IDUs	345	62 (18.0)	
Neri et al (2007) [44]	Prospective enrollment; IDUs enrolled through hospital detoxification department	Treatment IDUs (former heroin users without history of alcoholism or abuse of other drugs; currently receiving substitution therapy)	107	67 (62.6)	Not tested
		Non-IDUs	52	40 (76.9)	
Thomson et al (2008) [45]	Prospective enrollment through multiple clinics	IDUs (IDU probably risk factor for acquisition of hepatitis C)	205	120 (58.5)	No
		Non-IDUs	142	86 (60.6)	

Hellard, CID 2009;49:561-73

PrOD

- Post-hoc analysis of 12 phase 2/3/3b studies of PrOD
- 4747 GT1 patients, 149 (3%) were on OST
- Measured adherence and SVR12

Grebely EASL 2017

PrOD

HCV TREATMENT ADHERENCE AND COMPLETION

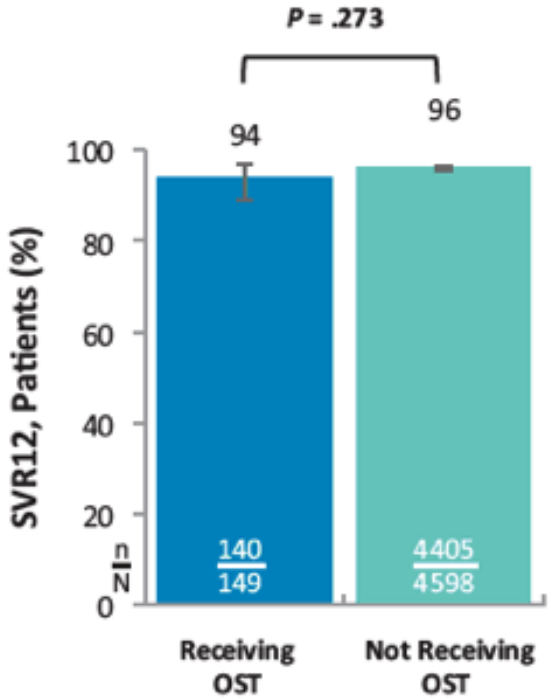
- Adherence to overall HCV treatment was lower in patients receiving OST vs those not receiving OST **(Table 2)**
  - Adherence to both OBV/PTV/r + DSV and RBV was lower in patients receiving OST vs those not receiving OST
  - In both patient groups, adherence to RBV was lower than adherence to OBV/PTV/r + DSV
- The proportion of patients completing HCV treatment was similar between those receiving OST and those not receiving OST **(Table 2)**

Table 2. HCV Treatment Completion and Adherence

	Receiving OST	Not receiving OST	*P*-value
Treatment completion, n/N (%)	144/149 (97)	4510/4598 (98)	.211
Treatment adherence, n/N (%)			
Overall treatment	105/149 (70)	4057/4598 (88)	<.001
DAA + RBV			
DAA	114/138 (83)	2855/3071 (93)	
RBV	101/138 (73)	2699/3071 (88)	
DAA only			
DAA	11/11 (100)	1437/1527 (94)	

DAA, direct-acting antiviral (ombitasvir/paritaprevir/ritonavir and dasabuvir); OST, opioid substitution therapy.

Figure 1. SVR12 by Receipt of OST

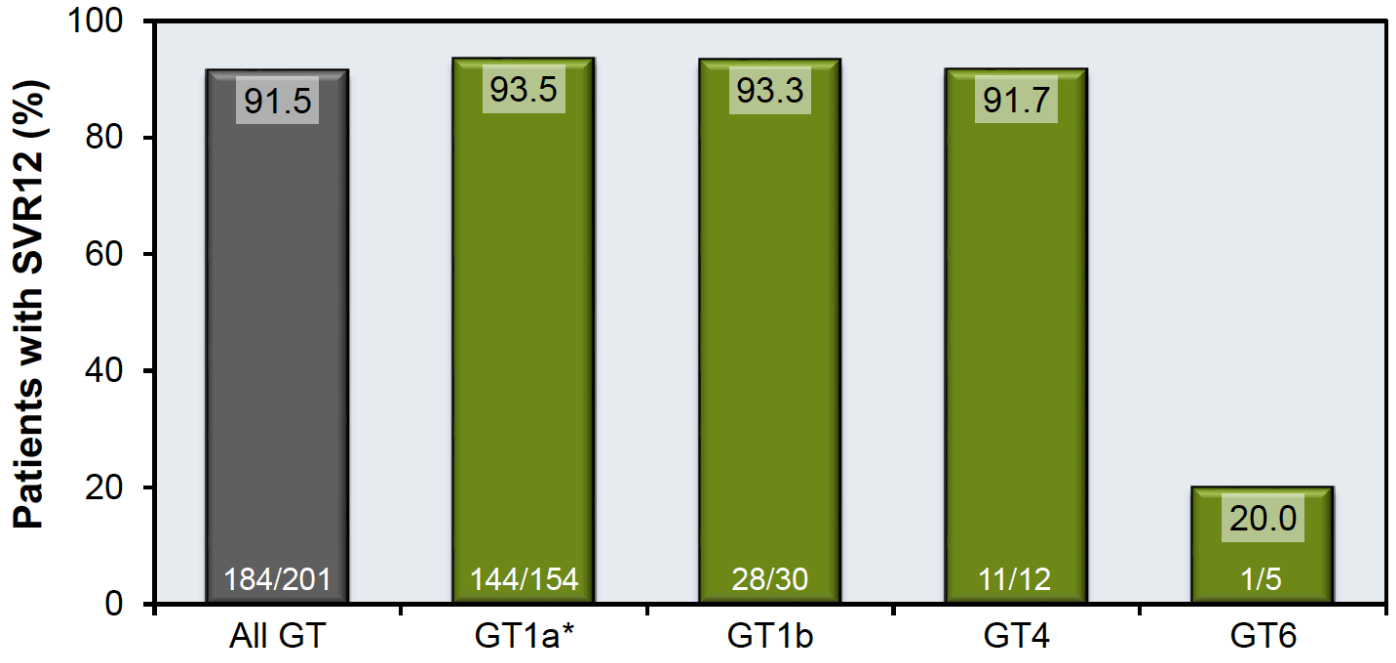


OST, opioid substitution therapy; SVR12, sustained virologic response at post-treatment Week 12.

Grebely EASL 2017

C-EDGE CO-STAR

- HCV GT1, 4 or 6, receiving OST for >3 months and keeping >80% of appointments
- Allowed cirrhosis (20%) and HIV (8%)
- 12 weeks EBV/GZP
- 5 reinfections



Dore AASLD 2015

ASTRAL

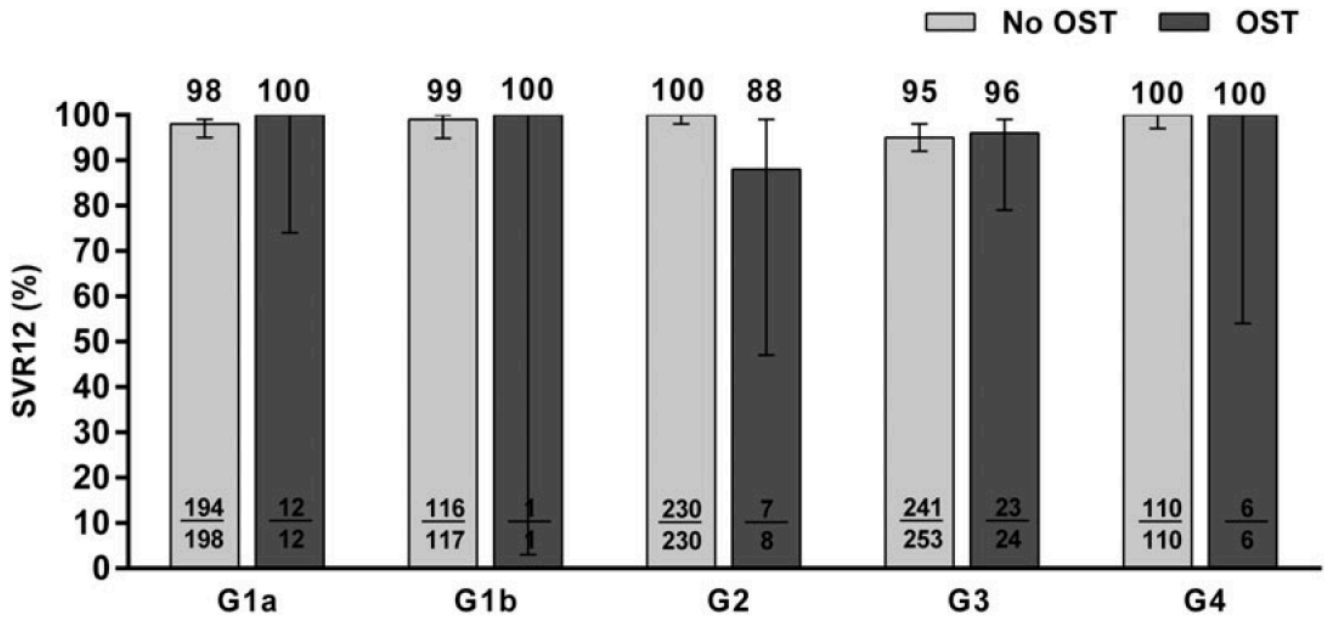


Figure 1. Sustained virologic response (SVR) in patients with chronic hepatitis C virus genotypes 1–4 receiving and not receiving opioid substitution therapy (OST) and sofosbuvir/velpatasvir in the ASTRAL 1–3 studies.

Grebely CID 2016;63:1479-81

SIMPLIFY

- HCV infection, recent injecting drug use (last 6 months)
- 12 weeks of SOF/VEL

Table 1: Baseline characteristics (n=103)

	SOF/VEL (12 weeks) n=103, n (%)
Age <40 years	25 (24)
Female sex	29 (28)
OST and injecting drug use (in the last month)*	
No OST, no injecting	12 (12)
No OST, injecting	33 (32)
OST, no injecting	15 (15)
OST, injecting	43 (42)
HCV genotype	
1	36 (35)
2	5 (5)
3	60 (58)
4	2 (2)
Fibrosis stage (METAVIR)**	
F0-F1	59 (62)
F2-F3	27 (28)
F4	9 (9)

*At study screening; **Missing data in eight participants

Grebely EASL 2017

SIMPLIFY

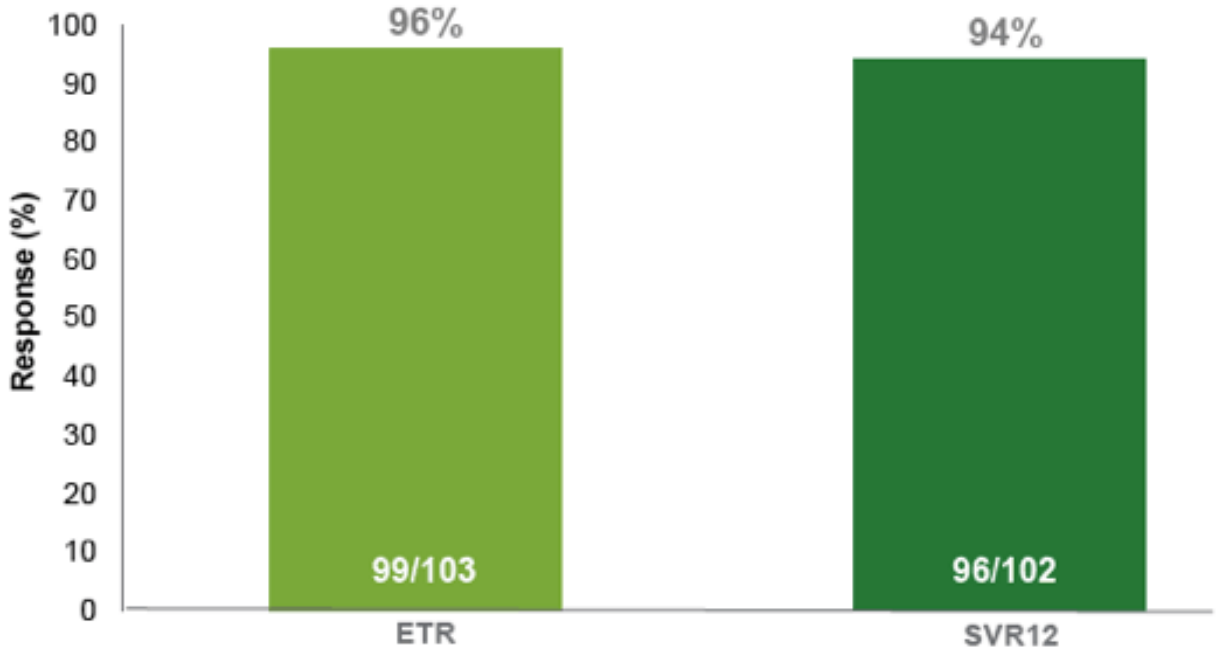


Figure 2: Proportion of the study population who achieved ETR and SVR12. ITT analysis includes all patients who should have reached the SVR12 time-point by data extraction (n=102).

- No cases of virological failure and one case of virological relapse/reinfection has been observed to date (undergoing sequencing to confirm)

Grebely EASL 2017

They’re going to reinfect

Table 1. Overview of Studies on Hepatitis C Virus Reinfection Following Treatment Among People Who Inject Drugs

Study	Country	Study Design	Geno-typing	Sequence Analysis	No.	Median Age at Treatment Start, y	% Male	IDU Pretreatment <6 mo	IDU Post treatment	Follow-up, Median (IQR)	PY Ever PWID/ PWID Who Continue	No. of Re-infections	Reinfection Rate (95% CI) per 100 PY Ever PWID/PWID Who Continue
Backmund et al, 2004 [8]	Germany	Pros	Yes	No	18	32	61	NA	9	Mean 2.8 (SD 0.8–5.1)	50.8/23.8	2	3.94 (0.48–14.22)/ 8.4 (1.02–30.36)
Dalgard et al, 2002 [11]	Norway	Pros	Yes	No	27	30	66	0	9	5.4 (1.1–6.8)	125.0/40.0	1	0.8 (0–5)/2.5 (0–14)
Currie et al, 2008 [10]	US	Pros	No	No	9	46 (mean)	88	NA	2	3.6 (3.2–6.0)	38.0/3.5	1	2.63 (0.07–14.66) 28.57 (0.72–159.19)
Grebely et al, 2010 [13]	Canada	Pros	Yes	Yes	35	44 (mean)	86	19	16	2.0 (0.4–5.0)	62.5/37.7	2	3.20 (0.39–11.56)/ 5.30 (0.64–19.16)
Bate et al, 2010 [9]	Australia	Pros	Yes	No	57	NA	NA	NA	NA	NA	NA	5	NA
Grady et al, 2012 [12]	Netherlands	Pros	Yes	Yes	42	51	73	5[a]	11	2.5 (1.6–3.7)[b]	131.6/32.3	1	0.76 (0.04–3.73)/ 3.42 (0.17–16.90)
Grebely, 2012 [14]	Australia	Pros	Yes	Yes	88	36	72	33[a]	NA	1.2 (0.1–3.0)[b]	108	5	4.7 (1.9–11.2)

Abbreviations: CI, confidence interval; IDU, injection drug use; IQR, interquartile range; NA, specific information was not available; Pros, prospective; PWID, people who inject drugs; PY, person-years.

[a] During treatment.

[b] Follow-up from end of treatment.

Grady CID 2013;57:S105-110

Table 2. Incidence estimates of hepatitis C virus reinfection after sustained virological response and applied methods in studies among people who inject drugs and men who have sex with men.

Study	Population	SVR	FU, mean yr	PYFU/PYFU post-SVR risk	Method	Testing interval, yr	Reinfections	Incidence (overall/post-SVR risk), per 100 PY
Dalgard *et al.* 2002 [118]	PWID	27	5.4	118/40	Genotyping Risk factors	1-7	1	0.8/2.5
Backmund *et al.* 2004 [119]	PWID	18	2.8	51/24	Genotyping Risk factors	1	2	3.9/8.4
Currie *et al.* 2008 [120]	PWID	9	3.6	38/3.5	HCV RNA Risk factors	0.5	1	0.56/1.89
Grebely *et al.* 2010 [121]	PWID	35	2.0	63/38	Genotyping Risk factors	1	2	3.2/5.3
Grady *et al.* 2012 [122]	PWID	42	2.5	132/32	Sequencing	0.5-1	1	0.8/3.4
Grebely *et al.* 2012 [123]	PWID	67	1.1	140/56	Sequencing Risk factors	0-2	5	12.3/7.3
Hilsden *et al.* 2013 [124]	PWID	23	1.8	36/n.r.	HCV RNA	n.r.	1	2.8/n.r.
Pineda *et al.* 2015 [125]	PWID	84	2.8	330/n.r.	Sequencing Risk factors	0.5	4	1.2/8.7
Midgard *et al.* 2016 [126]	PWID	94	7.1	593/206	Sequencing Risk factors	0.5-8	10*	1.7/4.9
Weir *et al.* 2016 [127]	PWID	277	4.5	410/n.r.	Genotyping Risk factors	n.r.	7	1.7/5.7
Bate *et al.* 2010 [128]	Prisoners	53	3.4	n.r.	Genotyping	n.r.	5	n.r.
Marco *et al.* 2013 [129]	Prisoners	119	1.4	171/n.r.	Genotyping Risk factors	1	9	5.3/n.r.
Lambers *et al.* 2011 [98]	MSM	55	1.3	72/n.r.	Sequencing Risk factors	0.25	11	15.2/n.r.
Martin *et al.* 2013 [7]	MSM	114	1.6	224/n.r.	HCV RNA	n.r.	27	9.6/n.r.
Vanhommerig *et al.* 2014 [130]	MSM	31	4.0	n.r.	Sequencing	0.5	8	n.r.

*Persistent reinfections.
PWID, people who inject drugs; MSM, men who have sex with men; SVR, sustained virological response; FU, follow-up; PYFU, person-years of follow-up; PY, person-years; n.r., not reported.

Midgard J Hep 2016;65:S33-45

Table 3. Differences in hepatitis C epidemiology among people who inject drugs and men who have sex with men.

	PWID	MSM
HCV prevalence	High	Low*
Proportion of total HCV population	Large	Small
Access to HCV care	Poor	Good
Treatment of acute HCV infection	Rare	Common
Risk behaviours post-SVR	Variable	Prevalent
Transmission networks	Local	International
Reinfection rates	2-6/100 PY	10-15/100 PY

*Mainly limited to HIV-infected.
PWID, people who inject drugs; MSM, men who have sex with men; SVR, sustained virological response; PY, person-years.

Midgard J Hep 2016;65:S33-45

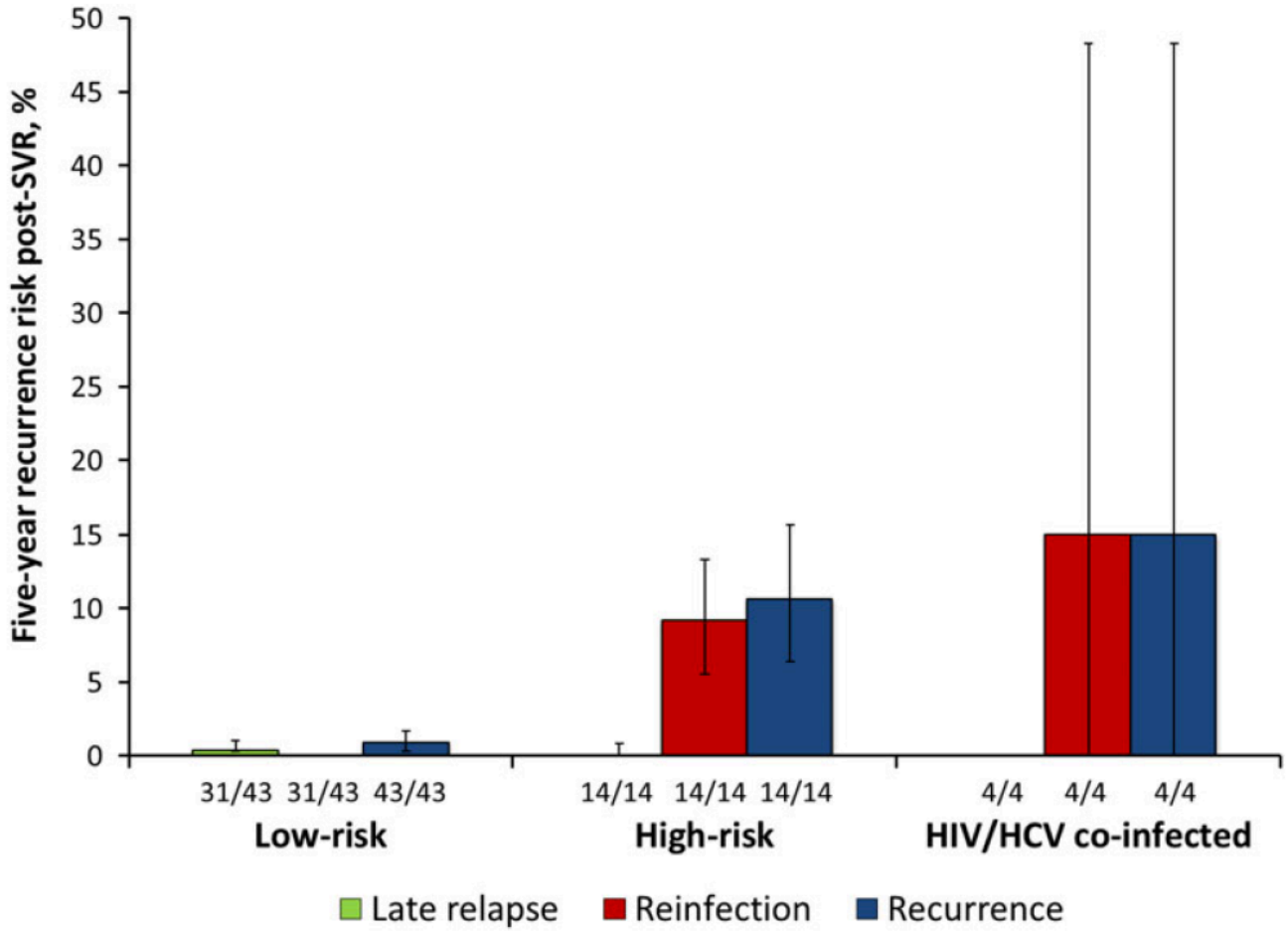
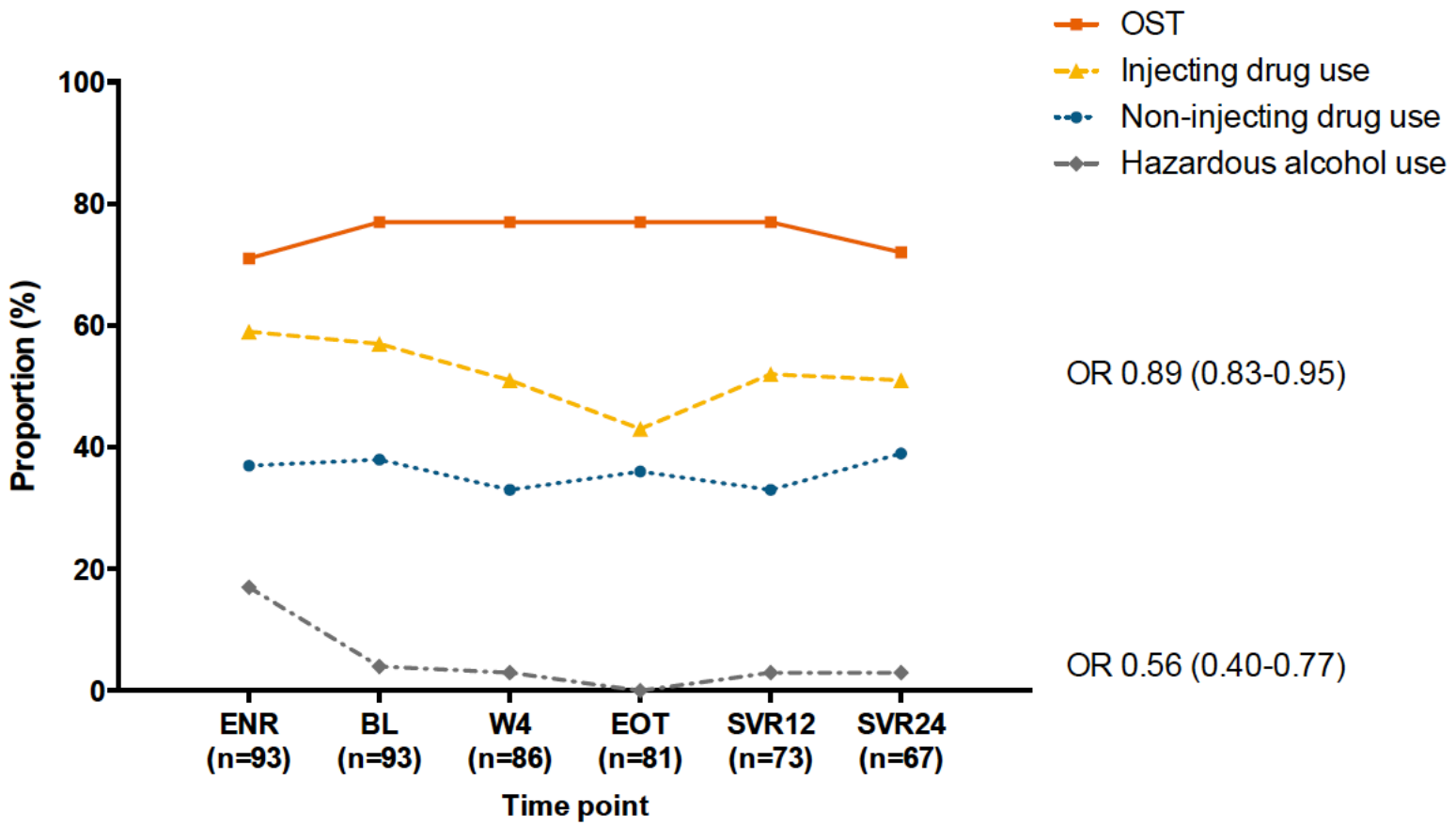


Figure 2. Summary 5-year risk (95% confidence interval) of recurrence post-sustained virological response (SVR), by risk group. Presented are the pooled estimates for the 5-year risk of recurrence after achieving an SVR. Also shown are the number of studies that were included to derive each estimate. Abbreviations: HCV, hepatitis C virus; HIV, human immunodeficiency virus.

Simmons CID 2016;62:683-694

It will have no benefit



ENR, enrolment; BL, baseline; W4, treatment week 4; EOT, end of treatment;
SVR12,12 weeks post-treatment follow-up; SVR24, 24 weeks post-treatment follow-up.

Midgard Int J Drug Policy 2017;47:230-8

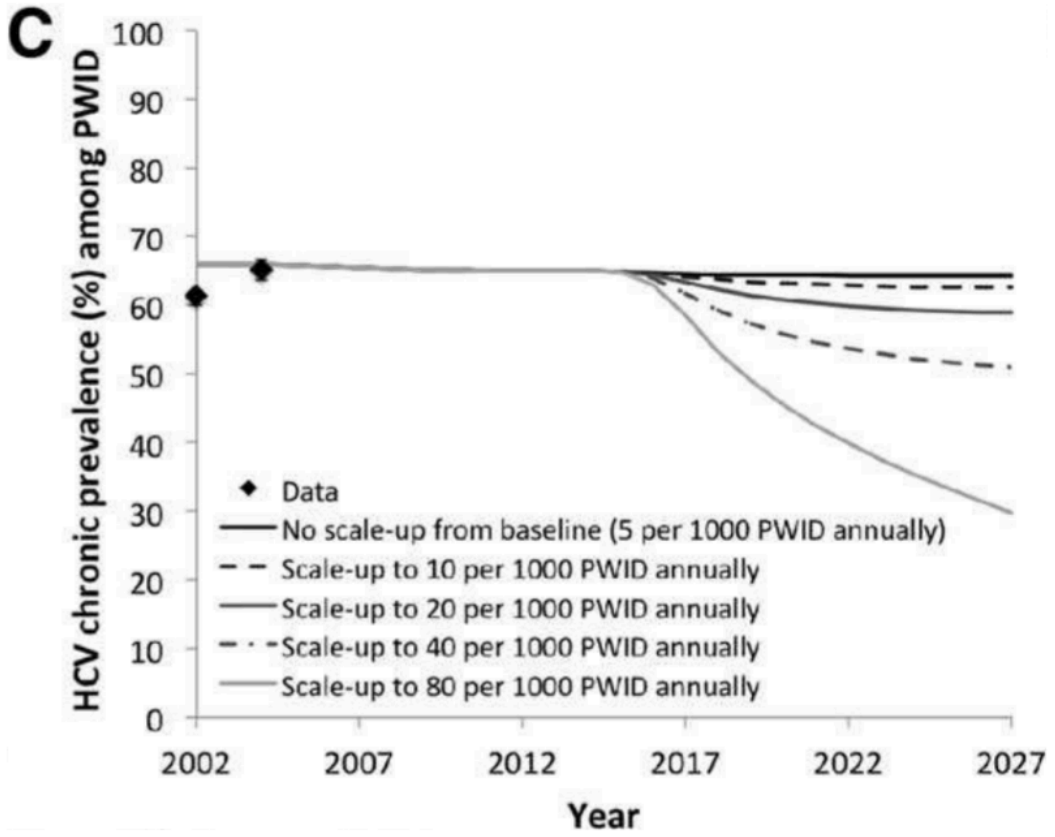


Fig. 2. Chronic prevalence over time in (A) Edinburgh, (B) Melbourne, and (C) Vancouver. Simulations show no scale-up from baseline, or scale-up to 10, 20, 40, or 80 per 1,000 PWID treated annually. We assume no treatment prior to 2002, a linear scale-up to baseline treatment rates during 2002-2007, and baseline treatment rates during 2007-2012. A linear scale-up from baseline to scaled-up rate during 2015-2017 was modeled. HCV prevalence data points shown for comparison with 95% confidence intervals.

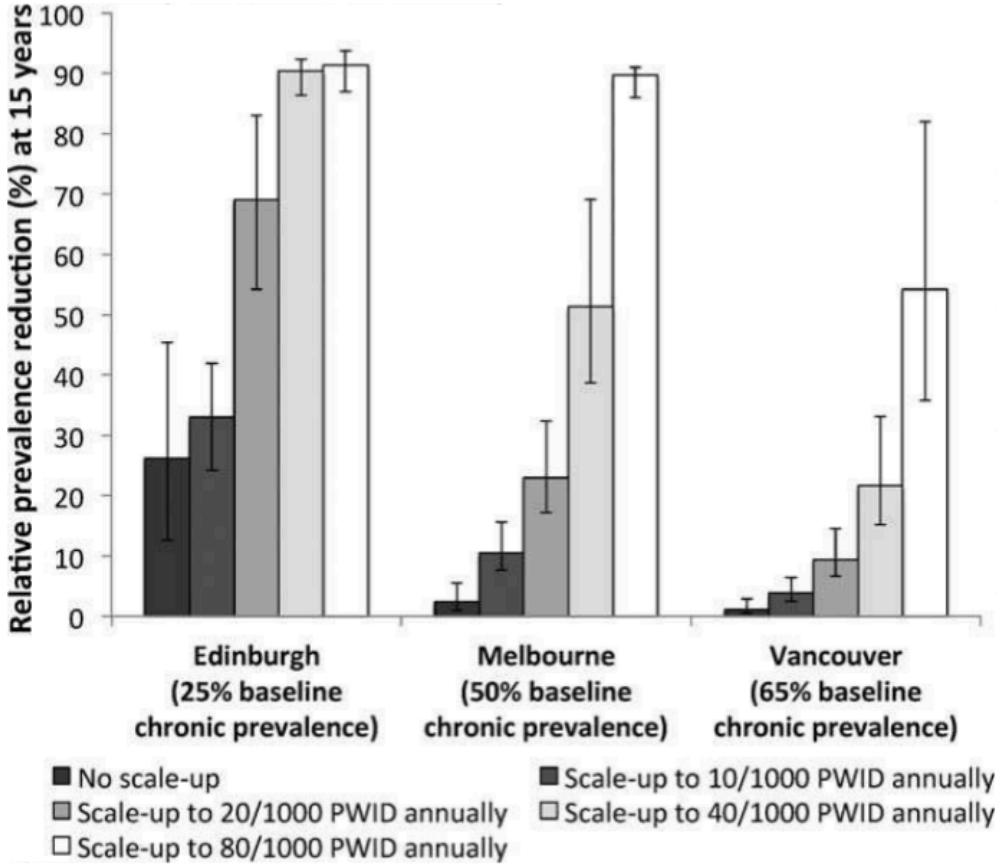


Fig. 3. Relative prevalence reductions at 15 years (by 2027) with no treatment scale-up (8 per 1,000 PWID annually in Edinburgh, 3 per 1,000 PWID annually in Melbourne, and 5 per 1,000 PWID annually in Vancouver) and four treatment rate scenarios (10, 20, 40, and 80 per 1,000 PWID annually). Bars indicate the mean relative prevalence reductions, with whiskers representing the 95% CrI for the simulations.

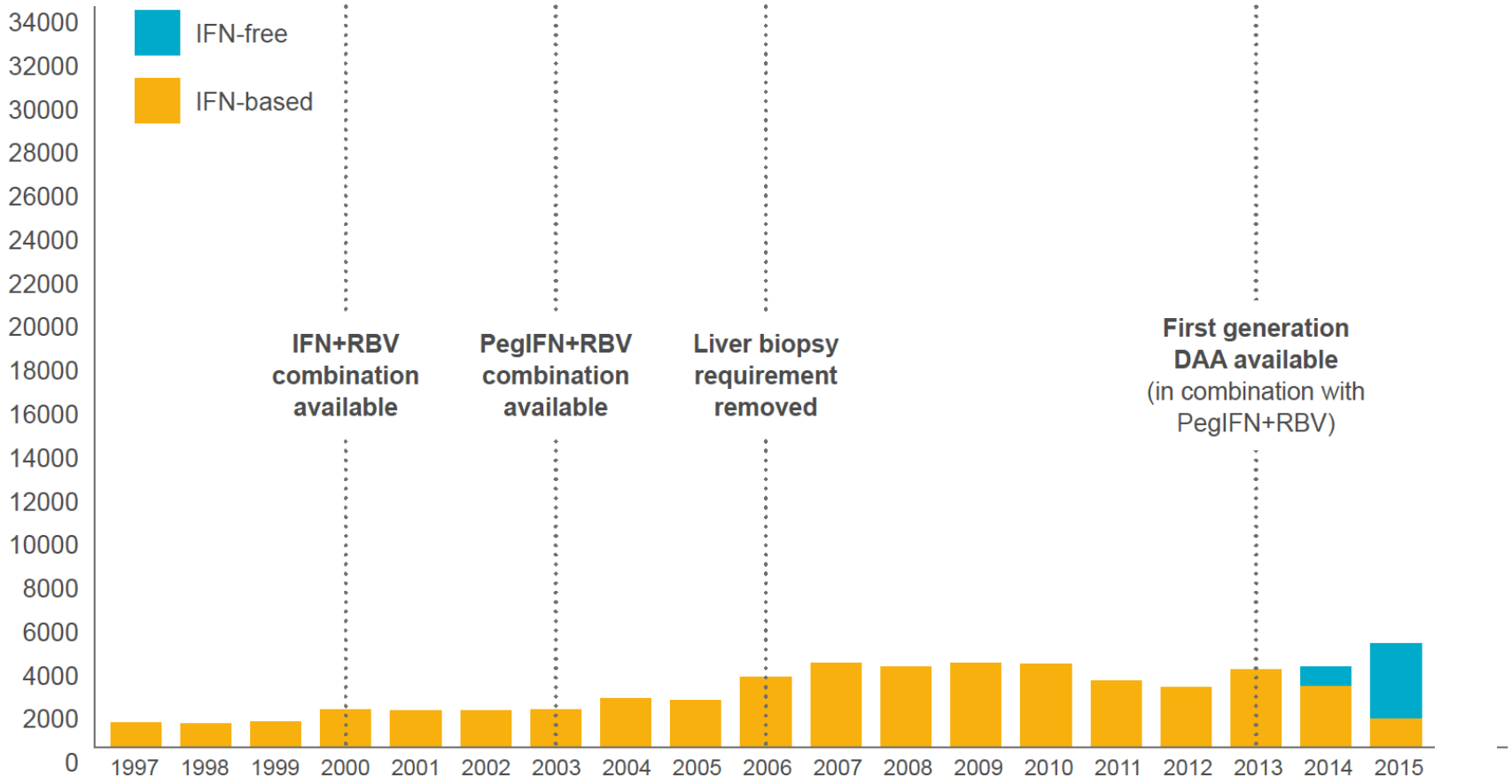
Martin, Hepatology 2013;58:1598-1609

SVUH Data

DAA treatments completed By year	Nos completed total 351	Cirrhotics completed tx Total 154	Relapsed Total 9	Attending Addiction Centres Patrick St/Bray/Baggot St
Nov 2014 to Dec 2015	113	91	7	1 (0.8%)
2016	100	36	2	3 (3.0%)
2017 Jan to June	138	27	0	32 (23.0%)

The Australian experience -2016

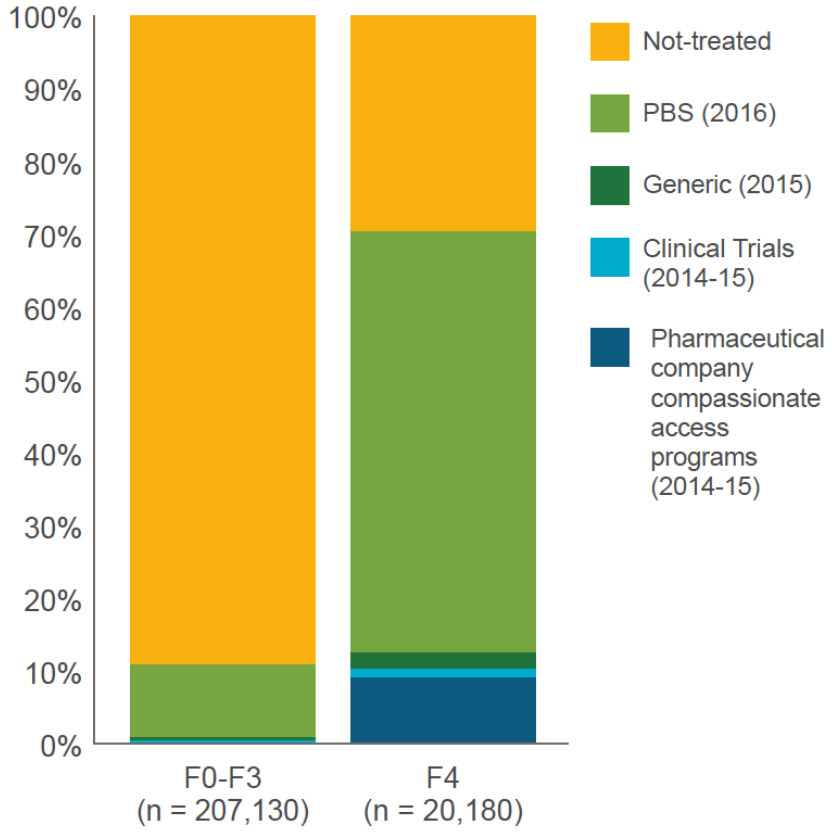
Figure 1: Estimated annual number of individuals with chronic HCV infection initiating HCV treatment from 1997 to 2016 in Australia.



IFN: interferon; PegIFN: pegylated interferon; RBV: ribavirin; DAA: Direct acting antiviral

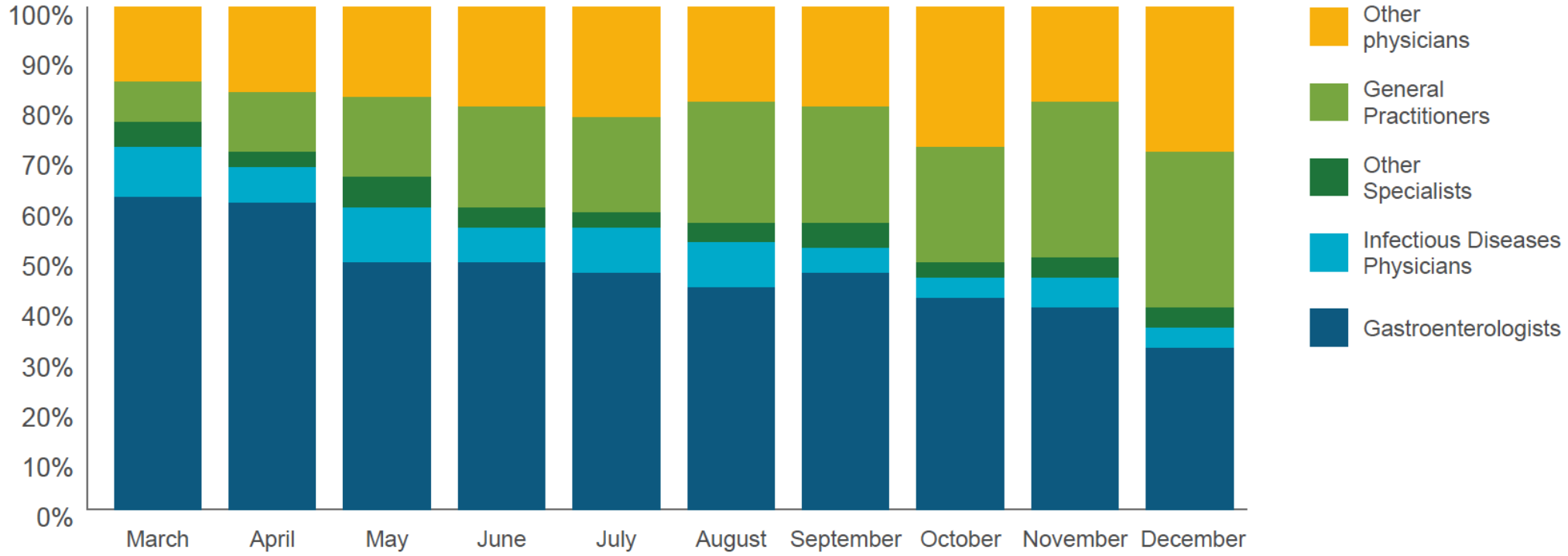
The Australian experience - 2016

Figure 2: The estimated proportion of individuals living with chronic HCV infection in Australia who initiated DAA treatment between 2014 and 2016, by liver fibrosis stage



The Australian experience - 2016

Figure 10: Distribution of prescriber types in each month for individuals initiating DAA treatment in 2016 in Australia



Other physicians included supervised medical officers (e.g., interns, resident medical officers, and registrars), public health physicians, temporary resident doctors, and non-vocationally registered doctors.

Discussion

- Screening/ diagnosis and staging
- Referral
- Treatment