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LIFE AFTER HEPATITIS C CURE IN HIV-INFECTED PEOPLE WHO INJECT DRUGS AND MEN WHO HAVE SEX WITH MEN TREATED WITH DIRECT-ACTING ANTIVIRALS IN FRANCE: HEALTH PERCEPTIONS AND EXPERIENCES FROM QUALITATIVE AND QUANTITATIVE FINDINGS (ANRS CO13 HEPAVIH)

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CONFLICT OF INTEREST

All authors have no conflicts to declare.

ETHICAL APPROVAL

All patients who participated in the ANRS CO13 HEPAVIH cohort study provided written informed consent at enrolment. The study was designed and implemented in accordance with the Declaration of Helsinki, and the protocol was approved by the ethics committee of the Cochin University Hospital in Paris.

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Abstract

There remains a substantial gap in our understandings of the life experiences of patients following HCV cure among HIV-HCV-co-infected people who inject drugs (PWID) and men who have sex with men (MSM), two key populations targeted for HCV elimination. We described the experiences and perspectives of HIV-positive PWID and MSM, HCV-cured following treatment with direct-acting antivirals (DAA). We used an exploratory sequential mixed approach using both qualitative data (semi-structured interviews with 27 PWID and 20 MSM) and quantitative data (self-administered questionnaires with 89 PWID) via the prospective ANRS CO13 HEPAVIH cohort. PWID reported improvements in physical health-related quality of life (HRQL) and self-reported symptoms following treatment, but no significant change in mental HRQL. During interviews, several MSM, more recently diagnosed with HCV, expressed less concern regarding HCV than HIV infection and interpreted improvements in their overall well-being after HCV cure to be more related to a closer connection with healthcare providers than with viral elimination. By contrast, PWID, particularly those previously exposed to interferon-based treatments, described major improvements in their physical HRQL. Both MSM and PWID reported improvements in cognitive or psychological wellbeing, and a majority of them reported some degree of concern over potential HCV reinfection. To conclude, though health benefits of HCV cure concern both groups, HIV-infected PWID and MSM may have different representations and experiences following DAA treatment, related to their history with HCV. They are thus likely to benefit from holistic, post-treatment follow-up care that is responsive to their evolving health and social contexts.

Keywords

direct-acting antivirals; HIV-HCV co-infection; men who have sex with men; mixed methods; people who inject drugs

1. INTRODUCTION

In France, the prevalence of co-infection with hepatitis C virus (HCV) among those living with HIV is between 16% and 18%—an estimated 28 000 individuals.¹ Co-infection with HIV and HCV has many deleterious health-related effects, including the rapid progression of chronic HCV infection to cirrhosis, liver disease (fibrosis) and liver failure, particularly among patients with low CD4 counts (< 350 cells/mm³).^{2, 3} The health complications associated with advanced liver disease, including encephalopathy, variceal haemorrhage and ascites^{4, 5} greatly contribute to diminished quality of life (QoL). Even in the absence of liver disease, HIV-HCV co-infection can negatively influence QoL through various other

symptoms, including fatigue, persistent flu-like symptoms, joint pains, itching, sleep disturbance, appetite changes, nausea and depression.^{6, 7} As such, there is a strong public health and personal impetus to treat and cure HCV among people living with HIV-HCV co-infection.

In 2016, France introduced universal HCV treatment with direct-acting antivirals (DAA). Whereas previous interferon-based therapies required up to a one-year treatment duration and were associated with many side effects and a limited HCV sustained virologic response (SVR) rate, interferon-free DAA treatment regimens now include much shorter timelines, have better safety profiles and SVR rates as high as 90%–95%.⁸ The introduction of DAA has thus probably significantly transformed the health experiences, outcomes and trajectories of HIV-HCV–co-infected individuals. However, even if epidemiological data exist to describe global access to DAA and remaining barriers,^{9–11} experiences and trajectories of HIV-HCV–co-infected individuals after DAA treatment remain poorly documented in France. This knowledge gap is particularly present for HIV-HCV–co-infected people who inject drugs (PWID) (including both people with current injecting drug practices and people with a history of drug injection) and men who have sex with men (MSM), two populations with historically high rates of HIV-HCV co-infection and who also experience a variety of social and structural barriers to health care and treatment services.¹² Previous qualitative research conducted in Australia¹³ provided interesting insights into HCV risk perceptions and attitudes towards reinfection among HIV-diagnosed gay and bisexual men. The authors identified the complexity of the interplay between, on the one hand, individuals' motivations and ability to identify and reduce risks and, on the other hand, individuals' social environment, from which they may feel forced to disengage to reduce reinfection risks. In the present study, we analysed quantitative and qualitative data collected from PWID and MSM participating in a prospective multicenter cohort of people living with HIV and HCV in France. The aim of our study was to identify and describe the experiences and perspectives of HIV-positive PWID and MSM who have cleared HCV following DAA treatment.

2. METHODS

2.1 The ANRS CO13 HEPAVIH cohort

HEPAVIH (ANRS CO13) is an ongoing French nationwide prospective cohort of 1,859 HIV-HCV–co-infected patients, which started in 2005, and which includes collection of both clinical/biological data (from medical records updated during follow-up of patients) and socio-behavioural data (from self-administered questionnaires).¹⁴ Patient recruitment was scheduled in three consecutive phases, but our study only focused on the last one (June 2014 to November 2015), which enrolled patients who initiated treatment with DAA with or without ribavirin, with patient-reported outcomes assessed before and after treatment.

2.2 Ethics

All patients enrolled in the ANRS CO13 HEPAVIH cohort study provided written informed consent. The cohort was designed and implemented in accordance with the Declaration of Helsinki and was approved by the ethics committee of the Cochin University Hospital in

Paris. Our qualitative protocol was approved by an independent committee on the treatment of information for health research purposes (CEEI). All participants in the qualitative research provided written informed consent prior to beginning the interviews.

2.3 Study population, data collection and analysis

2.3.1 Qualitative study protocol—Qualitative data consisted of in-depth, semi-structured interviews that were collected between 2017 and 2018. Specifically, physicians invited patients to participate in the interviews during follow-up care visits in selected HIV hospital service centres (one in Marseille and three in Paris). Prospective participants were eligible for inclusion in the study if they were enrolled in the HEPAVIH cohort, were identified as MSM and/or PWID (both current and/or historic, using information on HIV and HCV transmission groups, which was collected from medical records at the time of enrolment in the cohort) and were HCV-cured following DAA treatment. All interviews were audio-recorded, lasted 30 to 60 minutes and were conducted in private clinic spaces by two experienced qualitative researchers. Participants were first asked to share their perceptions about their current living conditions, including their experiences with employment and their inter-personal relationships. Participants were then invited to describe issues pertaining to their health, including experiences with treatments side effects, physical and psychological impact of HCV cure, current alcohol and other substance use, as well as experiences and perceptions of QoL after HCV cure.

Interviews were audio-recorded, transcribed verbatim, accuracy checked and anonymized. Interpretation of the data followed an inductive thematic analysis approach and was further informed by aspects of social constructivist grounded theory (eg co-construction of findings based on participant experiences and researcher interpretations, attention to contextual features, open coding and constant comparison techniques).^{15, 16} At early stages of the analysis, the two lead and two senior authors read and re-read the transcripts, iteratively conceptualized the data into patterns and organized these interpretations into substantive open codes reflecting major categories of information related to the study (eg effects of HCV cure on: physical health, mental well-being, relationships). Discrepancies between these initial codes and emerging themes were resolved through debriefing processes at team meetings (led by authors TG and RK, with critical input from MM and PC). Throughout these processes, we matured the analysis by posing inductive analytic questions, including 1) How do participants describe their perceptions and experiences following HCV cure?; and 2) How are the impacts of HCV cure differentially characterized across and within participant interviews (eg immediacy, duration, 'type', and benefits/consequences of these impacts)? Emerging themes were further refined through a series of inductive approaches,¹⁵ wherein we frequently revisited the data for nuance and context, reviewed relevant literature bases to contrast our interpretations against what is already documented in this area and compared our findings against the interview questions and findings from our quantitative data. Findings from this thematic analysis were then stratified into key themes and corresponding sets of sub-themes, which we present below.

2.3.2 Quantitative study protocol—Within the ANRS CO13 HEPAVIH cohort, DAA-treated patients were proposed a self-administered socio-behavioural questionnaire at

initiation and at the end of DAA treatment. This questionnaire included sociodemographic information and patient-reported outcomes including health-related quality of life (HRQL) and self-reported symptoms. HRQL was assessed using the version 2 of the Medical Outcomes Study Short-Form 12-item scale (MOS SF-12 v2).¹⁷ Two aggregate HRQL scores—the physical component summary (PCS) and the mental component summary (MCS), for physical and mental HRQL respectively—were calculated from the SF12 v2 scale, along with scores for each of the following eight dimensions of HRQL: physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE) and mental health (MH). All SF-12 scores range from 0 to 100, with higher values denoting better HRQL. Self-reported symptoms were assessed using a 38-item standard scale developed by the French National Agency for Research on HIV/AIDS and viral hepatitis (ANRS),¹⁸ which listed symptoms experienced by the patients during the previous month. Significant changes in patient-reported outcomes after DAA treatment were assessed using McNemar tests for dichotomous variables or Wilcoxon signed-rank tests for continuous variables. Quantitative analyses were performed using the SAS version 9.4 statistical software for Windows (SAS Institute Inc, Cary, NC, USA).

3. RESULTS

3.1 Quantitative results

In total, 94 participants completed pre- and post-DAA treatment socio-behavioural questionnaires and had available data on HIV transmission group. Among these, 89 were identified as PWID and only 5 as MSM. As the small number of MSM did not provide the statistical power to draw comparisons with the PWID group, quantitative analyses were restricted to the 89 PWID. This sample comprised 76% of men, median age [interquartile range] was 52 [50–56] years at initiation of DAA treatment, 82% of patients were French native, and 77% had an educational level lower than baccalaureate.

As shown in Table 1, fatigue or loss of energy and sleep disturbance were the symptoms most often reported by PWID both at DAA treatment initiation (71.6% and 69.3%, respectively), and at treatment end (58.0% and 55.7%, respectively). The median number of self-reported symptoms decreased from 13 [IQR: 7, 17] at treatment initiation to 8 [4, 14] at treatment end ($P < .001$). Statistically, significant decreases ($P < .05$) were observed for specific psychological (eg sadness/gloominess/depression, nervousness, anxiety) and physical symptoms (eg fatigue or loss of energy, flu-like symptoms, articular pain, sleep disturbance, changes in smell perceptions, tooth problems, sexual problems and, for women, modification of the menstrual cycle) as well as cognitive functioning (eg problems with memory). Participants also experienced a significant improvement in physical HRQL during DAA treatment (median [IQR] PCS score: 46.5 [39.0–52.9] at treatment initiation, versus 50.1 [41.0–54.4] at treatment end, $P = .01$), though changes in mental HRQL were not statistically significant (43.1 [37.3–49.9] vs 45.0 [35.5–51.8], $P = .07$) (data on HRQL available for 57 PWID). More specifically, over the eight dimensions of the SF-12 scale, only three (limitations due to physical status, general health and social functioning) improved significantly during treatment (Table 2).

3.2 Qualitative results

3.2.1 Overview—Qualitative interviews were performed among 5 women and 45 men. All of the women reported a history of injection drug use. Among the men, 20 were classified as MSM and the remaining 25 as PWID. During interviews, the qualitative researcher noted evidence of erroneous inclusion for three participants: one female PWID HCV-cured following treatment with interferon and ribavirin, and two male PWID with haemophilia, who had likely acquired HCV during childhood. Data from these three individuals were thus excluded from the analysis, which drew on data from the remaining (N = 47) participants. Table 3 provides an overview of the main characteristics of eligible participants in the semi-structured interviews who provided complete data on the sociodemographic questionnaire (N = 41). These data show significant differences between interviewed MSM and PWID, such as a notably more recent HCV diagnosis among MSM compared with PWID. Below, we present qualitative findings in three thematic sections that supplement quantitative findings: HCV- and DAA-related perceptions, post-treatment experiences, and perceptions and attitudes towards the risk of HCV reinfection. We also present quotations from participant transcripts to highlight key features of these themes. Each quote is accompanied by the participant's age, gender and categorization as either MSM or PWID.

3.2.2 HCV- and DAA-related perceptions—As our interviews began, several participants described an awareness of the negative health outcomes associated with HCV and hepatitis C disease progression (eg cirrhosis, liver transplantation, death). For several participants, including among those who reported being asymptomatic while living with HCV, HCV status was perceived as a looming and chronic health concern prior to clearing. One participant described HCV as a 'sword [that hung] over my head' (50-year-old MSM). Despite their concerns about HCV, a subset of participants compared how their HCV-related concerns paled in comparison with those associated with HIV. For instance, one participant described:

[HCV] is not something heavy, as I already have HIV which I control. Compared to HIV, Hepatitis C is nothing, I would like to say "It is really nothing, it is temporary." [With HCV], I associate it to a flu, even though you can die from it. You wait for a treatment and you'll be cured. It is almost like a headache: you take a pill and then it is over. It can come back but you can be cured again!

(35-year-old MSM)

3.2.3 Post-treatment experiences—We asked participants to describe how their health status and experiences with HCV-related symptoms had changed following DAA treatment. Participants described how being cured of HCV had profoundly impacted their physical, psychological and sexual health.

3.3 Improved physical health

Participant experiences underscored how DAA treatment and HCV cure reduced the burden of pain and other HCV-related symptoms (eg nausea, lack of appetite). For example, participants reflected on how living with HCV was frequently accompanied by everyday

experiences of musculoskeletal pain and aches, which participants described as being partially or fully alleviated following DAA treatment. Participants also described how clearing HCV had improved their overall energy levels and capacity to participate in everyday activities. For example, two participants described how clearing HCV improved their physical health:

I no longer have this permanent fatigue that I had before. Now, I've been waking up early, I want to move, to do things. It's going a lot better.

(57-year-old, male PWID)

After DAA cure, it was just as I was younger of 20 years. It was clear, such a liberation, like as you get rid of a heavy backpack, and you feel so light. A huge physical weight has disappeared.

(61-year-old male PWID)

3.4 Enhanced cognitive and psychological wellbeing

Participants described a range of improvements in their cognitive and psychological well-being following DAA treatment. For example, most participants described improvement in their memory performance. Nevertheless, a small subset of participants described ongoing residual memory impairment which they attributed to previously having HCV. For instance, one participant described how:

I got a minimal hepatic encephalopathy, a part of your brain which is affected by hepatitis C. It damaged a part of my brain, the memory area, coordination, all that is close to the brain.

(57-year-old male PWID)

Moreover, several participants described how their mental health had improved following DAA treatment. These participants described positive changes in their sense of self-esteem after being cured of HCV, which contributed to improvements in anxiety and mood. Many described how these psychological changes were closely linked with the physical effects of being HCV cured. For example, one participant described how:

Frankly, it (DAA treatment) changed me. Even psychologically. Physically and psychologically. It is normal as you feel better and you're happy. You are better and it is normal the brain works better.

(54-year-old male PWID)

Some participants also described how their psychological well-being had improved because of the opportunities they had to connect with various facets of the health and social service delivery system during DAA treatment. These participants did not attribute these improved psychological effects to DAA or to being cured; rather, these participants described how improvements in their mental health were largely attributed to having routine opportunities to receive care from healthcare providers. For instance, one participant described how:

I think there was a general improvement of the relationship with myself, I don't know how to say that (laughing). It is not a relationship with the chemical drug [DAA], but in a way with the medical follow-up, meeting the psychologist

regularly every three weeks or every month. There is something therapeutic with follow-up and care, that society takes care of me.

(46-year-old MSM)

3.5 Sexual health and relationships

As our interviews progressed, participants described how their sexual health-related experiences had changed due to having cleared HCV with DAA. These participants described how the challenge of living with HCV and having previously undergone interferon-based therapies contributed to significant stress and burden across their relationships, which was perceived as contributing to specific adverse sequelae that impacted their relationships and sexual health, including unemployment, divorce, impaired peer relationships and stigma. A small subset of participants described how curing HCV allowed them to regain their sexual capital and to have ‘re-engaged’ in sexual activity and intimacy. However, the majority described long-lasting and enduring negative effects of having lived with HCV and HIV, including how they continued to experience a low libido and limited desire to engage in sexual relationships. For example, one participant described how:

In terms of sexual pleasure, everything is over I don't have any sexual encounter, I abandoned the idea of having sexual encounters with someone until the end of my life.

(58-year-old MSM)

3.5.1 Perceptions and attitudes about the risk of HCV reinfection—We asked participants to describe how their experiences having lived with and cleared HCV might have impacted their attitudes and perceptions about the risk of becoming reinfected with HCV. Although some participants—particularly, those who described no longer using drugs and not being sexually active—expressed little to no concern about the risk of re-acquiring HCV, the majority described at least some degree of anxiety and concern over the risk of reinfection. For example, one participant described how:

With HCV cure, I have totally recovered. But I have become very paranoid about HCV – a fear about the disease!

(50-year-old MSM)

Participants acknowledged that although they could re-acquire HCV, they could apply measures to protect themselves to reduce the risk of reinfection. For example, a subset of participants described how they employed a range of strategies to avoid exposing themselves to situations in which they could potentially re-acquire HCV, including abstinence-based approaches (eg the cessation of substance use and/or sexual activities) and harm reduction strategies (eg condom use, the use of sterile injection equipment). For example, one participant described:

I don't touch drugs anymore, since a long time! In terms of sex, I have sex now but with condoms.

(57-year-old male PWID)

4. DISCUSSION

Within the context of changing HCV-related healthcare landscapes, the implementation and scale-up of DAA have drastically revolutionized clinical care and outcomes for people living with HCV. This study is among the first to highlight the ‘real-world’ DAA-related care trajectories of HIV-HCV-co-infected MSM and PWID. The mixed-methods approach used, which combines quantitative and qualitative data, offers a deeper insight into individuals’ experiences with DAA and HCV cure. Quantitative findings highlight how DAA treatment can significantly improve the health and well-being of people living with HIV and HCV, with regard to several psychological and physical symptoms, such as anxiety or fatigue, and cognitive functioning (eg problems with memory). Quantitative findings also reveal key social considerations related to pre- and post-DAA treatment trajectories, notably with regard to overall symptoms pattern and QoL improvements. Interestingly, both quantitative and qualitative data illustrate greater improvements in physical symptoms post-HCV clearance among PWID, with persistence of some mental health symptoms, including depressive symptoms, feeling of loneliness, memory and orientation disorders. Furthermore, despite the physical health improvements post-clearance, several symptoms are still present (although at a lesser degree), including fatigue, sleep disturbance and energy loss. Our quantitative results also confirm the heterogeneity of DAA-treated patients’ experiences of changes in symptoms during treatment, as previously shown in other quantitative studies.^{19, 20} These findings warrant the need to continue to adequately screen and manage symptoms clinically, as fatigue and other related adverse symptoms can interfere with adherence to antiretroviral treatment.²¹ Our findings also reveal statistically significant improvements in HRQL scores post-HCV clearance, thereby illustrating the extent to which DAA treatments are effective in supporting those previously co-infected to attain an improved QoL post-SVR. Data on QoL after HCV cure remain scarce in HIV-HCV-co-infected patients followed-up in observational studies, and QoL improvements observed in such ‘real-life’ conditions have been shown to be more modest than those observed among patients enrolled in HCV clinical trials.²²

Our qualitative findings provide additional nuance into how some of these outcomes ‘play out’ in the everyday lives of those previously co-infected, including via improved overall health, enhanced cognitive and psychological wellbeing, as well as opportunities for new sexual and intimate relationships. For instance, participants described how clearing HCV provided new opportunities to engage in peer and sexual relationships. In the same way, in a qualitative study conducted after successful HCV treatment among 15 HIV-positive gay and bisexual men in Melbourne (Australia),¹³ engagement in HCV care was perceived as a catalyst for change, motivating for instance the adoption of harm reduction practices and the reduction of drug use in sexual contexts. Within this context, some participants in our study described the significant impact that DAA and achieving SVR had on their identities and relationships, including new relationships with care providers, thereby illustrating the transformative benefits of DAA-related care.²³ Nevertheless, despite having cleared HCV, many of the participants described lasting negative impacts of HCV following SVR. For example, one participant described having a brain injury (hepatic encephalopathy) from years of living with HCV. Furthermore, for some participants with many years of lived

experience with HIV-HCV co-infection, experiences with improvements in health post-clearance were at times subtle and, for a subset of them, not noticeable at all.

Amid calls for enhanced public health efforts to achieve HCV microelimination among key target populations disproportionately impacted by HCV,²⁴ our findings provide support for the ongoing scale-up and implementation of DAA among HIV-HCV-co-infected patients. In addition, within the context of an increasingly medicalized HCV-related healthcare landscape with expanded efforts to scale up efforts to eradicate HCV as a public health threat,²⁵ our findings surface implications for engaging HCV-cured patients in post-SVR follow-up care. Specifically, to both improve DAA treatment impact and promote opportunities to address the broader and seemingly unmet health and social needs of HIV-HCV-co-infected PWID and MSM after cure, existing HCV-related services should scale up efforts to provide holistic, person-centred and extended complex care during and post-treatment.^{26–28} Indeed, although the increasing availability and accessibility of DAA have resulted in an era in which HCV microelimination among key populations has become a pragmatic and attainable possibility,^{29, 30} there remains an important need to consider how the scale-up of DAA might have broader non-clinical and/or experiential (eg relationship-based) impacts.²³ In addition, to reduce the risk of HCV reinfection in these key populations over the long-term, post-SVR follow-up care should include sustained attention to these evolving contexts, including expanded access to pre-exposure prophylaxis (PrEP) for HIV-negative individuals.³¹ Follow-up care should also consider potential sexual and substance use-related risk compensation—for instance, DAA-related optimism and renewed social and sexual capital, along with risk-reduction practices.^{32, 33}

4.1 Strengths and limitations

This study is among the first to use both qualitative and quantitative data to identify the health experiences and perspectives after DAA treatment in PWID with a considerable convergence of the results with regard to improvements in psychological, physical and cognitive outcomes. There are also several limitations. First, social desirability and recall bias may have led to alterations in descriptions provided by participants, particularly given the stigma associated with the topics under study (eg substance use, sex, HCV, HIV) and their capacity to recall events that occurred in the past. Second, as participants were recruited from a hospital-based cohort, these findings are mainly representative of people living with HIV and HCV who receive care from hospital services. However, as access to general care (including HIV) is universal in France, this group includes diverse subgroups of people from a variety of backgrounds and experiences. In addition, our quantitative data rely on a sample of PWID, and we were unable to assess differences with MSM due to the small sample size. Thus, inferences from quantitative findings may not be applicable to MSM or other populations living with HIV-HCV. Nevertheless, our qualitative findings offer highly contextualized insights from the ‘real-world’ experiences of PWID and MSM curing HCV.

5. CONCLUSION

The widespread scale-up of DAA in France has resulted in a measurable improvement of QoL among patients previously co-infected with HIV and HCV. Among HCV-cured PWID,

mental health seems to remain a key clinical concern post-clearance—an issue that will require comprehensive referral and care strategies. For both MSM and PWID, long-term follow-up of hepatic function in patients with advanced liver disease, screening for hepatocellular carcinoma and individualized strategies to reduce HCV reinfection risk could contribute to the maintenance of HCV clearance and its corresponding benefits. Our study is among the first providing ‘real-life’ data (ie beyond the context of a clinical trial) on the HCV- and DAA-related perceptions and experiences of a diverse sample of PWID and MSM previously HIV-HCV co-infected. As our findings illustrate, the implementation and scale-up of DAA treatments offer opportunities to positively impact health and wellbeing for HIV-HCV-co-infected PWID and MSM—key populations who are likely to further benefit from holistic, post-treatment follow-up care that is responsive to their evolving health and social contexts.

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APPENDIX 1

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TABLE 1.

Self-reported symptoms before and after DAA treatment among PWID who participated in the quantitative study (n = 89, ANRS CO13 HEPAVIH cohort)

Type of symptom reported	Treatment initiation	End of treatment	<i>P</i> -value ^{a,d,d,d}
	% of patients reporting the symptom		
Flu-like symptoms	44.3	31.8	.04
Cough	45.5	37.5	.14
Breathlessness	55.7	51.1	.47
Articular pain	68.2	48.9	.002
Headache	48.9	38.6	.11
Dizziness	27.3	26.1	.82
Changes in heart rhythm, palpitations	26.1	22.7	.49
Problems concentrating	47.7	40.9	.29
Problems with memory	54.6	38.6	.008
Sleep disturbance	69.3	55.7	.045
Change in smell perception	26.1	15.9	.049
Change in the taste of food	13.6	12.5	.76
Loss of appetite	30.7	22.7	.13
Weight loss	26.1	19.3	.20
Nausea and/or vomiting	20.5	22.7	.64
Diarrhoea	38.6	28.4	.08
Skin disorders	37.5	27.3	.11
Skin rash	26.1	17.1	.09
Dry skin	45.5	44.3	.84
Mucosal dryness	25.0	27.3	.65
Itching	31.8	28.4	.55
Blurred vision	40.9	31.8	.10
Yellow eyes	9.1	12.5	.41
Hair loss	15.9	13.6	.59
Hearing problems	17.1	11.4	.10
Tooth problems	26.1	9.1	.001
Swarming around the mouth	10.2	6.8	.32
Sexual problems	44.3	29.6	.02
Modification of the menstrual cycle ^b	19.1	0	.046
Erection trouble ^c	31.8	19.7	.06
Nephritic colic (kidney stones)	2.3	1.1	.32
Pain when urinating	6.8	4.6	.53
Fatigue or loss of energy	71.6	58.0	.03
Sadness, depressive symptoms	56.8	44.3	.04

Type of symptom reported	Treatment initiation	End of treatment	<i>P</i> -value ^{a,d,d}
	% of patients reporting the symptom		
Anger	37.5	28.4	.13
Nervousness	59.1	39.8	.007
Anxiety	60.2	45.5	.02
Hallucination	3.4	1.1	.32

Abbreviations: DAA, direct-acting antivirals; PWID, people who inject drugs.

^a McNemar test for the before/after treatment comparison.

^b Among women.

^c Among men.

^d Symptoms with $P < .05$ are in written in bold.

TABLE 2.

Distribution of HRQL scores before and after DAA treatment among PWID who participated in the quantitative study (n = 89, ANRS CO13 HEPAVIH cohort)

HRQL dimensions ^a	Treatment initiation	End of treatment	P-value ^b
	Mean (SD) Median [IQR]		
Physical functioning (n = 80)	62.5 (34.9) 75 [50–100]	64.1 (33.9) 75 [50–100]	.48
Limitations due to physical status (role-physical) (n = 70)	61.6 (28.7) 62.5 [50–87.5]	67.3 (29.4) 75 [50–100]	.047
Bodily pain (n = 84)	66.1 (28.9) 75 [50–100]	72.9 (29.9) 75 [50–100]	.06
General health (n = 82)	53.4 (20.3) 60 [60–60]	57.3 (19.6) 60 [60–60]	.03
Vitality (n = 76)	39.1 (23.2) 50 [25–75]	41.4 (29.3) 50 [25–75]	.53
Social functioning (n = 82)	57.6 (28.8) 50 [50–75]	66.2 (26.2) 75 [50–100]	.005
Limitations due to psychological status (role-emotional) (n = 75)	63.2 (27.6) 62.5 [50–87.5]	68.5 (27.4) 75 [50–100]	.14
Mental health (n = 79)	57.6 (21.3) 50 [37.5–75]	60.0 (20.7) 62.5 [50–75]	.13

Abbreviations: DAA, direct-acting antivirals; HRQL, health-related quality of life; IQR, interquartile range; PWID = people who inject drugs; SD, standard deviation.

^aScores associated with the 8 dimensions of the MOS SF-12 v2 scale.

^bWilcoxon signed-rank test for the before-after comparisons of scores. HRQL dimensions with $P < .05$ are in written in bold.

TABLE 3.

Main characteristics at initiation of direct-acting antiviral treatment for patients interviewed in the qualitative study and with available socio-behavioural data in the quantitative questionnaire (ANRS CO13 HEPAVIH cohort, n = 41)

	MSM (n = 16)	PWID (n = 25)	<i>P</i> -value ^a
	Frequency (%) or median [IQR]		
City			
Paris	13 (81)	9 (36)	.01
Marseille	3 (19)	16 (64)	
Gender			
Male	15 (94)	21 (84)	.12
Female	0 (0)	4 (16)	
Transgender	1 (6)	0 (0)	
Age – in years	54 [49–64]	54 [53–59]	.97
Having children (n = 31)			
No	13 (93)	7 (41)	<.01
Yes	1 (7)	10 (59)	
Employment (n = 38)			
Employed	11 (69)	5 (23)	.01
Unemployed/disability	3 (19)	15 (68)	
Retired	2 (12)	2 (9)	
Marital status (n = 37)			
Single	8 (50)	9 (43)	.53
Couple	7 (44)	8 (38)	
Divorced	1 (6)	4 (19)	
Year of HCV diagnosis	2010 [1993–2014]	1988 [1985–1997]	<.01

Abbreviations: MSM, men who have sex with men; PWID, people who inject drugs.

^aComparison of characteristics between MSM and PWID (Chi-square test for categorical variables, Wilcoxon rank-sum test for continuous variables).