Adherence to HIV treatment among IDUs and the role of opioid substitution treatment (OST)

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Abstract

In the era of highly effective anti-retroviral therapy (ART), data show a significant difference in treatment outcomes between injecting drug users (IDUs) and non-IDUs. Factors that may contribute to suboptimal treatment outcomes in IDUs include delayed access to ART, competing comorbid diseases, psychosocial barriers and poor long-term adherence to ART.

This review describes and compares several studies on adherence to ART and its correlates in HIV-infected individuals in general, then IDUs and finally those IDUs on opioid substitution treatment (OST). It highlights how ongoing drug use or OST can modify the pattern of these correlates.

The aim is to extend all the experience acquired from these studies in order to optimise both access to care and adherence in those countries where HIV infection is mainly driven by IDUs and where ART and OST are only starting to be scaled up. The role of OST in fostering access to care and adherence to ART together with the promising results achieved to date using modified directly observed therapy (DOT) programs for patients taking methadone, allow us to emphasize the efficacy of a comprehensive care model which integrates substance dependence treatment, psychiatric treatment, social services, and medical treatment. The review concludes by suggesting areas of future research targeted at improving the understanding of both the role of perceived toxicity and patient-provider relationship for patients on ART and OST.

Keywords: Adherence; Anti-retroviral treatment; HIV; Substitution treatment; Injecting drug users

Background

To date, at least 10 per cent of all new HIV infections can be attributed to injecting drug use (IDU). Relatively recent HIV epidemics in many eastern European and central Asian countries have been largely driven by IDUs. In Eastern Europe, the states of the ex-Soviet Union – Estonia, the Russian Federation and Ukraine – appear to have the largest and most widespread epidemics. HIV prevalence related to IDU has also risen dramatically in China, Indonesia, Iran; Myanmar, Malaysia, Lybia, the southern cone of Latin America and Viet Nam. These epidemics in IDUs are characterised by an explosive growth as documented in some studies showing that HIV prevalence among IDUs has risen considerably in the last few years (Aceijas, Stimson, Hickman, & Rhodes, 2004). In addition, in many eastern European countries, such as Russia (Shakarishvili et al., 2005) the high prevalence of HIV among IDUs and of sexually transmitted infections in young sexually active populations can constitute risky conditions for a rapid spread of HIV from IDUs to the general populations.

Highly active anti-retroviral treatment (HAART) was first introduced in 1996 in western countries and has revolutionized the course of HIV disease, with dramatic reductions in the occurrence of opportunistic infections and mortality. HAART efficacy, however, requires a high level of adherence to anti-retroviral therapy for life. In addition, these treatments are often accompanied by a considerable number of...
side effects that can compromise the patient’s quality of life (Carrieri, Spire, et al., 2003).

Most long-term studies of HIV-positive people in the pre-HAART era found no difference in the progression of HIV to AIDS and death between those who use illicit drugs, including the injection of heroin and cocaine, and non-drug users (Chaisson, Keruly, & Moore, 1995; Lyles et al., 1997). In the era of increasingly effective HAART however, reports are mixed as to whether injection drug use is associated with clinical disease progression (Kapadia, Vlahov, Donahoe, & Friedland, 2005). A study published by Rompalo et al. (2004) including 640 women, shows that, over a 7-year period fell mostly within the pre-HAART era, there was no difference in progression between the women who had past, current, or no history of injection drug use. While most cohort studies have found HAART to be associated with substantial declines in morbidity and mortality for all transmission categories, there is growing evidence that IDUs have not benefitted to the same degree as other risk groups (Lloyd-Smith et al., 2006; Lucas et al., 2006; Moore, Keruly, & Chaisson, 2004). One large urban cohort found that the risk of developing a new AIDS defining condition was similar in IDUs and non-IDUs prior to 1998, but was 45 per cent (95 per cent CI, 21–75 per cent) higher in IDUs after 1998 (Moore et al., 2004). A recent report from the same cohort also found that self-reported heroin and cocaine use were temporally associated with the development of new AIDS defining conditions in a longitudinal HAART-era study (Lucas et al., 2006). The observation that HIV disease progression is more rapid in IDUs than in other HIV transmission risk groups (Moore et al., 2004) may be related to a constellation of factors including a higher prevalence of other co-morbidities (such as hepatitis C, bacterial infections, etc.), delayed access to HAART, or adherence difficulties once HAART has been started in IDUs.

Access to HAART for IDUs

Active IDUs have often had a delay in access to treatment especially in the early phase of HAART (Carrieri et al., 1999); in some cases this delay was mainly due to the physician’s perception about how IDU patients would follow prescriptions (Bassetti et al., 1999; Maisels, Steinberg, & Tobias, 2001) but also to guidelines for treatment provision which suggested starting treatment only when a patient has entered a “routine” where his/her opioid dependence is also treated (Carpenter et al., 1998). Little is known about drug users’ refusal to take medication and whether this is related to fear about dangerous interactions between HIV medications and illicit drugs and alcohol. Given equal access to care, IDUs are less likely to have undetectable viral loads, suggesting other barriers exist to successful treatment. When IDUs are successful in achieving durable undetectable viral loads, they experience the same positive clinical impact as non-users (Wood et al., 2003).

A Canadian study has also reported that methadone use is associated with HAART receipt (Wood et al., 2005) and confirms the role that expanded access to methadone may play in improving access to HIV care and reducing mortality rates.

Adherence and HIV progression

While during the pre-HAART era, socio-behavioural studies were mainly focused on behaviours which risked HIV transmission (injection and sexual behaviours). The introduction of HAART has given rise to new socio-behavioural focal points, the most crucial of which is “adherence” to the prescribed regimen.

Poor adherence may lead to virological failure and the emergence of resistance that may require a change of the regimen and the reduction of the number of treatment strategies potentially available. Lack of adherence is also associated with clinical progression (Bangsberg et al., 2001; Bouhnik et al., 2005; Wood et al., 2004) and mortality (Hogg, Yip, Chan, O’Shaughnessy, & Montaner, 2000). In addition, optimising adherence in the early months of HAART (4–6 months) is crucial to ensure long-term immuno-virological success. Moderate deviations from high adherence (88–99 per cent) during follow-up (maintenance phase after 6 months) have less negative impact on viral replication (Carrieri, Raffi, et al., 2003).

It has been speculated since the beginning of the HAART era that non-adherence was the major cause of viral resistance (Chesney, Morin, & Sherr, 2000; Katzenstein, 1997); however, this relationship more complicated that previously imagined. The adherence-resistance relationship can be modified by whether or not viral suppression has been achieved. Among treated patients who remain viremic despite HAART, highly adherent patients are actually more likely to develop drug resistance than very non-adherent patients (Bangsberg et al., 2003; Walsh, Pozniak, Nelson, Mandalia, & Gazzard, 2002). However, among those who are fully suppressed by HAART, adherent patients are less likely to develop virological failure associated with viral resistance (Bangsberg et al., 2006; Sethi, Celentano, Gange, Moore, & Gallant, 2003). Additionally, different drug classes (i.e., protease inhibitors and non-nucleoside reverse transcriptase inhibitors) appear to have different adherence-resistance relationships (Bangsberg et al., 2006).

For all these reasons, the identification of factors able to predict adherence especially among IDUs may be crucial not only for HIV providers but also for all health care providers of HIV + IDUs. The literature in this field is extremely rich, but we can classify major results as follows according to a modified version of Ickovics classification (Ickovics & Meade, 2002):

- Pre-treatment characteristics: age, gender, current IDU status, injection career, opioid substitution treatment (OST), alcohol consumption, substance dependence or misuse;
- Psychosocial factors: patient-provider relationship, depression, anxiety, social support, self-efficacy and body image;
Patients’ experience during treatment: self-reported side effects, change in substance or alcohol use during treatment, incarceration;

Treatment related characteristics (medication regimen complexity, pill burden, dosing frequency, dietary instructions, type of combination, medication side-effects and its management);

Opioid substitution treatment (OST), treatment for depression.

Factors associated with adherence in the general population of HIV-infected patients

Among fixed determinants, high social status (expressed by income, education, history of drug dependence, comfortable housing or other social vulnerability indices) (Bouhnik et al., 2002; Kalichman, Ramachandran, & Catz, 1999; Kleeberger et al., 2001; Singh et al., 1996) has been reported to be related to high adherence to anti-retroviral treatment. The pattern of factors associated with adherence also varies according to gender (Berg et al., 2004). Among psychosocial factors, it has been found that specific aspects of the patient-provider relationship such as patients’ perceptions of the providers’ competence, trust, open communication, willingness to include the patient in treatment decisions and overall satisfaction (Russell, Krantz, & Neville, 2004; Stone et al., 1998); are all significantly related to high adherence and that improving the different aspects of this relationship may enhance adherence.

Adherence to treatment is a dynamic process, varying widely over time (Carriero et al., 2001; Kleeberger et al., 2001), which suggests that its determinants may also vary over time and cannot be merely predicted by “a priori” measurable factors.

The “Predictive Approach” to identifying adherent patients is still predominant among health care professionals. This approach may lead to various interventions for “correcting” non-adherent behaviour or, in some cases, may provide justification for denying treatment to certain patients. An alternative “empathic” approach aims instead to support patients in their treatment, according to what experiences and perceptions they have. This approach is more open to learning from previous research which attributed a major role to the patient’s subjective experience. A study was carried out using data from the APROCO cohort aimed at understanding the validity of predicting non-adherent behaviour and identifying “high risk” patients on the sole basis of simple socio-demographic characteristics. This study demonstrated that pre-treatment factors, patients’ experience during treatment, self-reported side effects, changes in psychosocial factors (depression, support, addictive behaviours, and opinions about efficacy) play a major role in determining longitudinal adherence behaviours (Spire et al., in press). The role of self-reported side-effects on medication adherence has been confirmed by several studies (Duran, Spire, et al., 2001). Another study based on APROCO longitudinal data has shown that patients’ perceptions of body modification (self-reported lipodystrophy) is associated with adherence failure (Duran, Saves, et al., 2001).

Another field that has started to be explored is self-efficacy outcome expectations. Pre-treatment beliefs are found to be weaker predictors than change in beliefs, that is to say patients who have negative perceptions about HAART prior to treatment that are confirmed after treatment is started are as likely to be non-adherent as those who have positive expectations of HAART, but develop negative perceptions after several months of treatment. Conversely, patients with negative perceptions of HAART that became more favourable following initiation of treatment tended to be as adherent as those with positive pre-treatment perceptions of HAART that were maintained after treatment was started (Spire et al., 2002). Other studies have consistently confirmed the major role that self-efficacy has in determining adherence (Kerr et al., 2004; Pinheiro, de-Carvalho-Leite, Druchler, & Silveira, 2002).

Depressive symptoms constitute an important barrier to adherence to HAART. Several studies have demonstrated that depression is associated with reduced adherence in the general HIV population (Ammassari et al., 2004; Spire et al., 2002; Tucker, Burnam, Sherbourne, Kung, & Gifford, 2003) and that it is a significant predictor of HIV clinical progression (Cruess et al., 2003; Golub et al., 2003; Ickovics et al., 2001), even during the maintenance phase of HAART when a routine approach to take medication should have already been adopted (Carriero et al., 2006).

The influence of social support on adherence has been investigated in several studies, adopting different definitions of social support. Berg et al. (2004) has found that social support is associated with increased levels of adherence but only in men. In a recent study from 5 years of adherence evaluation, Carriero et al. (2006) demonstrated how adherence behaviours may improve by receiving strong support from the main partner, even during the maintenance phase of HAART. A study from Gonzalez et al. in individuals living with HIV has highlighted that greater social support and a positive state of mind are both related to better adherence and that a positive state of mind mediates the relationship between social support and adherence in HIV positive populations (Gonzalez et al., 2004).

The pill burden and the dosing frequency of HAART have been substantially reduced in recent years, both of which may facilitate adherence. While the results of studies have been inconsistent as to whether a larger number of pills taken each day is associated with poorer adherence (as few studies have documented this relationship (Brook et al., 2001; Chesney, 2000; Gifford et al., 2000)), it is clear that regimens requiring administration three or more times per day are associated with lower levels of adherence (Andreozzi et al., 2001; Claxton, Cramer, & Pierce, 2001; Stone, 2001).

A recent study however, did not provide evidence that “Once a day” regimens were associated with better adherence than daily regimen (Carriero et al., 2006).
On the whole, these results pertaining to general HIV-infected population confirm that it is difficult to predict adherence “a priori” and that time-varying factors, mainly related to patients’ experience during treatment are the best predictors of patients’ adherence to HAART.

**Factors associated with adherence in IDUs**

Ongoing drug injection has consistently been found to be associated with non-adherence (Bouhnik et al., 2004; Palepu, Horton, Tibbetts, Meli, & Samet, 2004; Stein et al., 2000; Tucker et al., 2003) or with adherence failure (Carrieri, Chesney, et al., 2003), as well as other addictive behaviours such as elevated alcohol consumption (Lucas, Gebo, Chaisson, & Moore, 2002; Palepu et al., 2004) or cocaine use (Arnsten et al., 2002). More specifically, Bouhnik et al. (2002) has shown that for individuals who remain opioid dependent, ongoing drug injection is predictive of non-adherence. By contrast, among those who are no longer opioid dependent (i.e., ex-IDUs not on opioid substitution treatment), social vulnerability is the only factor explaining non-adherence. This last result confirms that the common perception that “drug users do not adhere to HAART” may hide the confounding effects of poverty, psychiatric morbidity, and poor patient-physician relationship that characterise many drug users’ lives. Like the general population, physicians often have negative attitudes about substance users, making it difficult to develop deep, beneficial patient-provider relationships (Gerbert, Maguire, Bleecker, Coates, & McPhee, 1991).

These perceptions have probably contributed to delaying the access to treatment in this population, until patients demonstrate lifestyle stability and adherence with clinic appointments and other medications (Chesney, 2000; Wagner & Ryan, 2004). HIV and non-HIV healthcare providers are inadequately equipped to care for substance users as medical schools provide little education about drug use and addiction, and more vulnerable patients have a higher propensity to use the emergency department rather primary care (Gifford et al., 2000).

A longitudinal analysis using data from MANIF 2000 cohort (Carrieri, Chesney, et al., 2003) focused on the identification of factors associated with adherence failure occurring within the first 18 months of HAART among patients who were initially adherent. Each episode of non-adherence during follow-up was defined as an “adherence failure” event. Adherence evaluation at follow-up visits revealed that that a quarter of patients experienced adherence failure over the first 18 months. Adherence failure was mainly explained by the lack of a stable relationship, depression, and self-reported drug injection. Ongoing injection (whether continued or relapsed) is a strong predictor of adherence failure. These results underline the need for closer and more adequate monitoring of injection practices in patients enrolled in substitution programs, adequate substitution doses of opioid replacement therapy, and reinforcement using other psychocognitive approaches.

IDUs have a high prevalence of psychiatric co-morbidities and depressive symptoms. It has been shown that depressive symptoms represent the second most common cause of hospitalisation, after opportunistic infections in HAART-era HIV-infected IDUs (Marimoutou et al., 2003). Together with ongoing injection, the lack of a stable relationship and depression are associated with an increased risk of adherence failure. In HIV-infected IDUs, other studies have confirmed that depression may increase the risk of poor adherence to treatment (Kleeberger et al., 2004; Turner, Laine, Cosler, & Hauck, 2003). Depression, which is frequent among IDUs, needs to be diagnosed in timely fashion and properly treated in order to maintain adherence to HAART.

A recent approach that is being promoted is to screen patients for depression and to provide adequate treatment when needed at HAART initiation. This strategy could have a major impact, not only on adherence, since treating depression in HIV-infected individuals may enhance adherence (Angelino & Treisman, 2001; Yun, Maravi, Kobayashi, Barton, & Davidson, 2005), but also on clinical progression, as depression in IDUs is associated with clinical progression independent of medication adherence (Bouhnik et al., 2005).

A group in the U.S. found, among HIV-infected IDU Medicaid recipients in New Jersey, that consistent participation in a methadone program was associated both with uptake of HAART and with more consistent use of HAART when it had been prescribed (measured by pharmacy refill data), compared to non-participation or inconsistent participation in methadone treatment (Sambamoorthi, Warner, Crystal, & Walkup, 2000). However levels of non-adherence while on methadone treatment are comparable to estimates from other chronic diseases (Stein et al., 2000). Such results were confirmed by a recent paper (Palepu et al., 2006) showing that engagement in methadone programs in HIV/HCV co-infected IDUs on HAART was associated with a reduction of drug use sufficient to allow for adequate HAART adherence and favourable HIV treatment outcomes. This sequence of effects may also be imputable to the fact that access to a comprehensive system of care gives the patient more opportunities to face other obstacles leading to non-adherence behaviours.

Because of the complex needs of HIV-infected IDUs, a comprehensive care model, which integrates substance dependence treatment, psychiatric treatment, social services, and medical treatment, may be the most effective (McLellan, Arndt, Metzger, Woody, & O’Brien, 1993).

On the other hand, some interactions between methadone and some anti-retroviral treatments, particularly those including non-nucleoside reverse transcriptase inhibitors, such as nevirapine and efavirenz, may require increased doses of methadone to prevent opioid withdrawal symptoms form the accelerated metabolism of methadone (Alltice, Friedland, & Cooney, 1999; Gourevitch & Friedland, 2000; Marzolini et al., 2000; McCance-Katz et al., 2004).

Moatti et al. (2000) studied the influence of buprenorphine substitution treatment on adherence to HAART. Multivari-
ate analysis indicated that active IDUs were about five times more likely to be non-adherent than individuals on buprenorphine and ex-IDUs. Furthermore, patients on buprenorphine had higher levels of adherence than ex-IDUs, a difference that approached statistical significance after adjustment of other cofactors.

Several hypotheses can be proposed to explain the success of OST in achieving a better adherence to HAART. Firstly, OST stabilises the social situation of opioid dependent individuals. In addition, the prescribing OST in primary care settings may facilitate regular access to general care. Indeed, the physicians who are involved in OST and work in networks with social workers, pharmacists and other health care workers can better provide comprehensive care. A second interpretation is that IDUs who have become accustomed to taking medication chronically for OST may be less reluctant to accept other drugs, such as anti-retroviral regimens. Finally, OST may reinforce patients’ social support networks, an additional determinant of adherence that is often a factor for IDUs.

These studies highlight the need to identify interventions that improve adherence among IDUs. When engaged in stable care with an experienced staff and adequate support, IDUs can adhere to HAART and have clinical outcomes that are similar to non-IDU patients (Wood et al., 2003). Ongoing drug use is therefore not a valid criterion for denying active IDUs access to HAART. Substitution therapy provided with DOT may definitely enhance adherence.

To date, few studies has addressed the issue about whether engaging in an OST in HIV-infected patients (also on HAART) can modify the pattern of correlates of adherence.

Table 1 summarizes the status of knowledge about the role of known correlates of adherence in IDUs and whether OST may modify the relationship between such correlates and adherence to HAART. This table, also suggests areas in which future research is needed, such as the influence of OST on the patient-provider relationship (especially if OST is provided in the primary care setting), or that of HAART related side effects in patients on OST.

### How to promote adherence?

OST, such as the provision of methadone or buprenorphine can constitute an important tool in promoting adherence among IDUs. However, when OST is available only in specialised clinics, the risk of stigmatisation may make some patients reluctant to access or to continue using OST. From another point of view, centres dispensing OST daily may be important entry points for access to HAART for IDUs, as HAART (for instance once a day intake) may potentially be combined with OST, to be dispensed and taken under the surveillance of patient’s provider. In this case only OST interruption may be responsible of poor adherence to HAART.

When OST is prescribed in a primary care setting, for instance by general practitioners, stigmatisation problems are less present and the role of GPs on OST success and HAART adherence then becomes crucial. Creating a link between HAART and OST intakes (prescribing a twice daily regimen if OST is prescribed twice a day) may be beneficial for adherence to both treatments. In countries where GPs do not yet prescribe HAART, GPs should be properly educated about the possible interactions between HAART, OST and other drugs frequently used by IDUs, trained how to properly manage HAART-related side effects and pain, how to create liaisons with HIV-specialists and drug dependence centres and how to better manage or orient the most difficult patients.

While on the one hand, it may be important to start HAART when a patient seems “stabilised” to be sure that he can adhere to treatment, on the other hand, delaying HAART to a still active IDU who is often affected by other co-morbidities (such as hepatitis B, C or tuberculosis) may have serious implications for his/her health as all other treat-

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**Table 1**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Effect of opioid substitution therapy (OST) on factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor patient-provider relationship/communication</td>
<td>Still unknown, though this issue may be particularly relevant for primary care-based OST, where a single provider may manage both substance and HIV treatment</td>
</tr>
<tr>
<td>Depression</td>
<td>Depression remains very common in IDUs receiving OST (Brooner, King, Kidorf, Schmidt, &amp; Bigelow, 1997; Gerra et al., 2004); suggests need for better integration of mental health services in OST settings (McLellan et al., 1993)</td>
</tr>
<tr>
<td>ART side effects</td>
<td>Still unknown</td>
</tr>
<tr>
<td>Self-efficacy outcome expectations</td>
<td>Still unknown</td>
</tr>
<tr>
<td>Social support</td>
<td>Family and other support networks likely to improve with effective OST (Gibson, Sorensen, Wermuth, &amp; Bernal, 1992; Reno &amp; Aiken, 1993)</td>
</tr>
</tbody>
</table>
ments especially those for hepatitis C will be further delayed as well.

It is important to remember that OST also plays an essential role in HIV prevention. It has been shown that heroin users on methadone treatment are four to six times less likely to become infected with HIV (Metzger et al., 1993), either because they stop injecting heroin completely or use heroin under more controlled circumstances because they are less subject to withdrawal symptoms. Similarly, in a cohort of HIV-infected IDUs on buprenorphine substitution treatment in France (Carrieri, Rey, et al., 2003), a reduction of injecting behaviours was observed over time among the individuals who remained on OST, while buprenorphine injection was associated with severe opioid dependence, polydrug use, and depressive symptoms. A clinical trial based on buprenorphine treatment is ongoing in China and Thailand with the aim of comparing the efficacy of two treatment approaches for opioid-dependent IDUs in reducing HIV transmission (HPTN 058) (“HIV Prevention Trials Network HPTN 058: A phase III randomized controlled trial to evaluate the efficacy of buprenorphine/naloxone drug treatment in prevention of HIV infection among opioid dependent injectors”).

In spite of the difficult organisation of intervention in patients on OST, an economic analysis has demonstrated that the cost of the HIV risk reduction intervention in out of treatment substance users is lower than the projected lifetime HIV treatment costs (Richter & Loomis, 2005).

In selected individuals, interventions for improving adherence can be a useful adjunct. Two interesting reviews (Simoni, Frick, Pantalone, & Turner, 2003; Wu, Ammassari, & Antinori, 2002) report the efficacy of different studies of interventions for improving adherence. However, studies which have shown a significant effect of such interventions on virological response are sparse (Pradier et al., 2003).

An appropriate management of perceived side effects, which in the case of opioid users are also related to pain sensitivity (Celerier, Laulin, Corcuff, Le Moal, & Simonnet, 2001; Compton, Charuvastra, & Ling, 2001), could improve adherence and reinforce patient-provider relationship. A recent paper has reported how cannabis can reduce some HAART related symptoms (Woolridge et al., 2005) and may suggest alternative approaches to manage perceived toxicity in these populations.

There are several studies reporting encouraging results using modified directly observed therapy (DOT) programs, in which dosed of anti-retroviral therapy are administered daily or less frequently in methadone maintenance treatment clinics (Clarke, Keenan, Ryan, Barry, & Mulcahy, 2002; Conway et al., 2004; Lucas, Weidle, Hader, & Moore, 2004). It is worth noting that DOT has been successful even for cocaine users on methadone.

As already stated, interventions are crucial in the initial phase of treatment as a high level of adherence is required to assure long term virological and immunological success. During the maintenance phase, substantial episodes of non-adherence are detrimental for long-term virological response, and interventions should be planned to regularly avoid extreme episodes of non-adherence.

Conclusions

HIV-infected IDUs do not appear to have a more rapidly progressive natural history of disease than non-IDUs. However, in the era of highly effective therapy, data increasingly show a gap in treatment outcomes between IDUs and non-IDUs. Factors that may contribute to suboptimal treatment outcomes in IDUs include delayed access to HAART, competing comorbid diseases, psychosocial barriers, and poorer long-term adherence to HAART.

Though in some cases it may be worthwhile delaying HAART initiation strategically, until the stabilisation of patients’ lives, a delay in HAART initiation may be critical in HCV co-infected patients.

However, it is evident that active drug use should not be considered an absolute contraindication to HAART. Comprehensive care for these patients should be adequately supplied firstly, by better co-ordination between the different care providers; secondly, by improving patient-provider relationships by overcoming stereotypes about drug use and finally, by supplying adherence support to IDUs starting HAART. All three can contribute to erase differences in clinical outcomes in these more vulnerable populations.

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References


