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How to help homeless youth suffering from first episode psychosis and substance use disorders? The creation of a new intensive outreach intervention team



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ABSTRACT

In Canada, about 6,000 youth are homeless every night, many of whom suffer from addiction and psychotic disorders. To facilitate the exit out of homelessness, access to care and to improve psychosis and addiction outcomes, a new intensive outreach intervention team (EQIIP SOL) was created in Montreal (2012). It offers intensive outreach services dedicated to homeless youth suffering from first episode psychosis and addiction (HYFEPA) in addition to an early psychosis intervention service (EIS) in collaboration with the Addiction Psychiatry Unit. Our aim is to describe the characteristics, clinical, functional and housing outcomes of HYFEPA followed by EQIIP SOL. This two years long prospective longitudinal study with all HYFEPA ($n = 42$) admitted to EQIIP SOL between 2012–2015 reports at multiple time points, clinical (CGI, GAF), functional (SOFAS, work/study, housing autonomy) and substance use disorder (DUS, AUS) outcomes and acute services use (hospitalizations, emergency room visits). We observed that, at baseline, HYFEPA showed poor prognostic factors (eg. cluster B personality, substance use disorders, legal problems, childhood trauma and lower education level). The majority reached housing stability after 6 months and their functioning and illness severity improved with time. This suggests that HYFEPA improve with an intensive outreach intervention team integrated to an EIS.

1. Introduction

Every night in Canada, nearly 6000 youth between the ages of 15 and 25 are homeless (Gaetz et al., 2014). Homelessness refers to unsheltered housing (living on the streets), but also to emergency sheltered, provisionally accommodated (e.g. couch surfing, temporary accommodation) and at risk of homelessness situations (“people whose current economic and/or housing situation is precarious or does not meet public health and safety standards”) (Gaetz et al., 2012). Youth who become homeless often have very few assets and resources to find and maintain stable housing (American Psychiatric Association, 2013). Homelessness in youth is associated with numerous short and long-term deleterious consequences, including worsening physical health, academic derailment, sexual exploitation and involvement in crime (Gaetz et al., 2013). Homelessness can also trigger severe mental illness, the opposite being also true (Folsom et al., 2005; Martijn and Sharpe, 2006). Among homeless youth (HY), more than 30% suffer from

psychosis and 75% from substance use disorder (SUD) (Gaetz et al., 2014). Suicidality in HY also far exceeds that of other youth (Edidin et al., 2012; Kidd, 2006).

Psychosis emerges mostly in late adolescence or at the beginning of adulthood and 59% of youth with first episode psychosis (FEP) have comorbid SUD (Abdel-Baki et al., 2017). Previous studies on FEP patients have reported prevalence rates of 5 to 15% of homelessness at admission, 10 to 17% at 1-year follow-up (Ouellet-Plamondon et al., 2015; Petersen et al., 2005) and 26% either before or during their 2 years treatment in an early intervention for psychosis service (Levesque and Abdel-Baki, 2014). Homelessness is associated with persistence of SUD in FEP, which in turn is linked to poor symptomatic and functional outcomes (Abdel-Baki et al., 2017). Homeless youth with first episode psychosis show characteristics that differ from their non-homeless peers (eg. lower education, more SUD, more legal problems) and poor treatment outcomes (Abdel-Baki et al., 2014), suggesting they might need different interventions.

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A careful review of the literature exploring the different approaches developed for Homeless youth with first episode psychosis and addiction (HYFEPA) concludes that there is no published intervention designed specifically for this population. However, several potentially relevant approaches for related populations have been studied. First, studies examining interventions based on various cognitive behavioral approaches (Slesnick et al., 2013b; Slesnick and Kang, 2008; Slesnick and Prestopnik, 2005; Slesnick et al., 2007b) and case management (Wagner et al., 1994) among HY without a diagnosed psychiatric disorder show positive outcomes for substance misuse (Coren et al., 2013; Milburn et al., 2012; Rotheram-Borus et al., 2003; Slesnick et al., 2013a, Slesnick et al., 2007a; Slesnick and Prestopnik, 2005), mood and anxiety symptoms (Slesnick et al., 2013b; Slesnick and Kang, 2008; Slesnick et al., 2007a; Slesnick and Prestopnik, 2005)) and delinquent behavior (Milburn et al., 2012; Wagner et al., 1994). Family involvement seems to have longer-lasting benefits on drug misuse than treatment as usual (Milburn et al., 2012; Slesnick et al., 2013b; Slesnick and Prestopnik, 2005).

Assertive Community Treatment (ACT) has been also shown to decrease psychiatric symptoms and facilitate exit of homelessness in adults with severe psychiatric conditions (psychotic or affective disorders), with or without comorbid addiction (Calsyn et al., 1998; Calsyn et al., 2000; Coldwell and Bender, 2007; Dixon et al., 1997; Korr and Joseph, 1996; Shern et al., 2000). *Housing First* approaches, in combination with psychosocial and medical monitoring (Clark and Rich, 2003; Forchuk et al., 2008; Goering et al., 2014; Greenwood et al., 2005; McHugo et al., 2004; Padgett, 2006; Tsemberis et al., 2003), as well as the critical time intervention (CTI) approach (Herman, 2011; Susser et al., 1997), contribute to reduce homelessness, negative symptoms, alcohol misuse and improve housing stability.

Finally, a number of studies comparing an integrated approach for addiction in addition to psychiatric treatment (mental health treatment, substance abuse counseling and housing services obtained through a single organization) to standard treatment have demonstrated the superiority of the integrated approach. It has been associated, for instance, with improvement in housing stability and decreased alcohol use (Drake et al., 1997).

On another note, an increasing number of studies demonstrating the negative impact of a long duration of untreated psychosis on short-term and long-term outcomes (Boonstra et al., 2012; Marshall et al., 2005; Perkins et al., 2005), led, since the early 1990s, to the development of an early psychosis intervention model (Early Psychosis Guidelines Writing Group, 2016). Early intervention for psychosis emphasizes the importance of engaging young people in early treatment through youth friendly, community outreach approaches and vocational rehabilitation (Iyer and Malla, 2014). A recent meta-analysis of ten randomized clinical trials analyzing the impact of Early psychosis Intervention Services (EIS) (vs treatment as usual) on youth with first episode psychosis showed improvement on all outcomes, including all-cause treatment discontinuation, at least one psychiatric hospitalization, involvement in work or school, total symptom severity, positive symptom severity and negative symptom severity (Correll et al., 2018).

The aforementioned literature on the treatment of patients with psychotic disorders and different comorbid conditions leads to the hypothesis that an integrated and adapted approach for HYFEPA could be more efficient than regular EIS alone. In fact, models of complex patient care, integrating specialized approaches within the same team, have been shown to be effective in the treatment of addiction comorbidity with psychosis (Barrowclough et al., 2010), and to facilitate the return to work and school for youth with FEP (Catty et al., 2011; Killackey et al., 2008). Thus, this literature review highlights essential elements to be integrated into an intervention dedicated to HYFEPA to improve their symptomatic and functional outcomes, principally their housing autonomy. These would be:

- Integrated specialized mental health and addiction treatments into a

single team

- Integrated specialized housing support (for finding and maintaining housing) allowing a rapid exit from homelessness
- High intensity of service provided early when discharged from hospital or during crisis period to avoid homelessness
- Outreach interventions in the community
- Experienced team in modified case management approach for FEP with inclusion of families throughout the treatment

In that context, an intensive outreach team (Équipe d'intervention intensive de proximité (EQIIP SOL)) was created in February 2012 at the Centre Hospitalier Universitaire de Montréal (CHUM). Despite the enthusiasm of the community towards such an intervention considering the high needs of this population, the effectiveness of such a team remains to be studied.

1.1. Objectives

- 1 To describe the characteristics at admission of the population of all HYFEPA admitted to EQIIP SOL from 2012 until October 2015.
- 2 To describe the evolution of the housing stability of HYFEPA followed by EQIIP SOL over 2 years of follow-up.
- 3 To describe the evolution of the SUD, functional and clinical outcomes of HYFEPA followed by EQIIP SOL over 2 years of follow-up.

1.2. Hypotheses

Based on our literature review:

- 1 HYFEPA followed by EQIIP SOL will improve their housing stability over the 2 years follow-up period.
- 2 HYFEPA followed by EQIIP SOL will show a reduction of SUD and will show improvement on functional and clinical outcomes over the 2 years follow-up period.

2. Method

A longitudinal prospective open study was conducted to describe the baseline characteristics and the clinical, functional and housing outcomes of all HYFEPA admitted to an intensive outreach team (EQIIP SOL) from its creation in February 2012 until October 2015.

2.1. Description of intervention

2.1.1. EQIIP SOL characteristics

EQIIP SOL team is the result of a collaboration between two CHUM's specialized services: 1) the EIS Clinic JAP, and 2) the Addiction Psychiatry Clinic (Unité de Psychiatrie des Toxicomanies (UPT)), which integrates services for individuals with comorbid severe psychiatric illnesses and severe substance use disorders. The aim of EQIIP SOL is to improve accessibility to appropriate psychiatric (EIS) and addiction services, to facilitate the exit of homelessness and to promote social integration through return to work or studies for HYFEPA. It combines early intervention for psychosis services following international guidelines, and addiction services (mainly harm reduction and motivational interventions); both these approaches are recommended in many international guidelines for the treatment of psychosis, namely those of the Canadian Psychiatric Association (Crockford and Addington, 2017). The clinical criteria for EQIIP SOL are: 1) homeless or at risk of homelessness; 2) 18–30 years of age; 3) FEP (untreated or treated for less than 1 year); 4) comorbid problematic substance use.

Five psychiatrists (part-time) contribute to EQIIP SOL as well as three social workers. Twice weekly multidisciplinary team meetings allow for rapid information exchange and adjustment of the treatment plans. EQIIP SOL offers adapted intensive case management for FEP and HY and integrates the "active/essential elements" of the various

approaches described as effective in the literature and summarized above. The case managers and psychiatrists are aware and familiar with problems, challenges, resources and possible solutions encountered with this population.

Outreach interventions are offered to facilitate access to social services in the community and during intensive follow-up in periods at risk of a return to homelessness (eg: recent discharge from hospitalization, loss of housing). These are achieved through a partnership developed with the community and institutional organizations working with HY: emergency shelters (Refuge des Jeunes, Bunker-Dans la rue), drop-in day centers (Dans la rue), the Clinique des Jeunes de la rue of the CLSC des Faubourgs (CIUSSS Centre-Sud de Montréal), supported housing organizations for HY (Auberges du Coeur, etc.) or for people with mental illnesses (eg. Maison St-Dominique), community organizations offering 'Housing first programs' (eg. Diogene) and organizations offering addiction services (Portage, Cactus, Pharillon, Centre de Réadaptation en Dépendance de Montréal (CRDM), etc.). The low patients to case manager ratio (10 HYFEPAs for 1 case manager) allows great availability in case of an urgent event or crisis, flexibility for outreach and high intensity/frequency of follow-up. Youth and community workers can therefore have a direct and rapid access to EQIIP SOL to avoid psychosis relapse or a slip into homelessness.

In addition, the functioning of the team promotes the development of strong therapeutic relationship built on trust between EQIIP SOL, youth and community organizations workers. EQIIP SOL professionals are present on a regular basis (eg, daily or weekly) in the main community organizations for HY and, as needed, in other organizations. Training on early psychosis and its comorbidities, the importance of early intervention as well as the impact of homelessness on health and legal and ethical aspects of intervention, etc. are offered by EQIIP SOL to the organizations which also contribute to knowledge transfer by sharing their experiences and expertise (in working with HY).

Finally, regular meetings (at least monthly) for sharing administrative and clinical information (with the youth permission) with the various organizations working with HY allows the establishment of a community of practice sharing a common philosophy and a better knowledge of the partner organizations. These elements of collaboration between EQIIP SOL and the network of organizations working with HY (Réseau d'intervention de proximité auprès des jeunes de la rue (RIPAJ)) is a key element of this approach.

2.2. Recruitment

All 42 patients referred to the EIS or directly to EQIIP SOL from its creation in February 2012 until October 2015, were assessed by a multidisciplinary team (including at least one psychiatrist and another mental health professional: social worker, occupational therapist or nurse) to determine whether they met the admission criteria of the EQIIP SOL. If so, as soon as their mental state allowed, participants were met by our research assistant to obtain informed written consent if they were capable of doing so.

To ensure that the sample represents the range of all the HYFEPAs, permission was obtained from the CHUM Professional Services Direction and its Research Ethics Board to conduct an anonymized data collection on the records of patients refusing to participate in the research (potentially representing a different sub-group (eg. more suspicious of services), or of patients who could not be recruited for different reasons (eg. lost to follow-up too quickly or before their condition was stable enough to be approached for recruitment).

2.3. Outcome measures

Our primary outcome is the measure of housing stability. Stable housing refers to an autonomous or supervised housing where the participant has been for at least a month and wishes to stay at least 6 months to a year (Frederick et al., 2014; Godley, 1987).

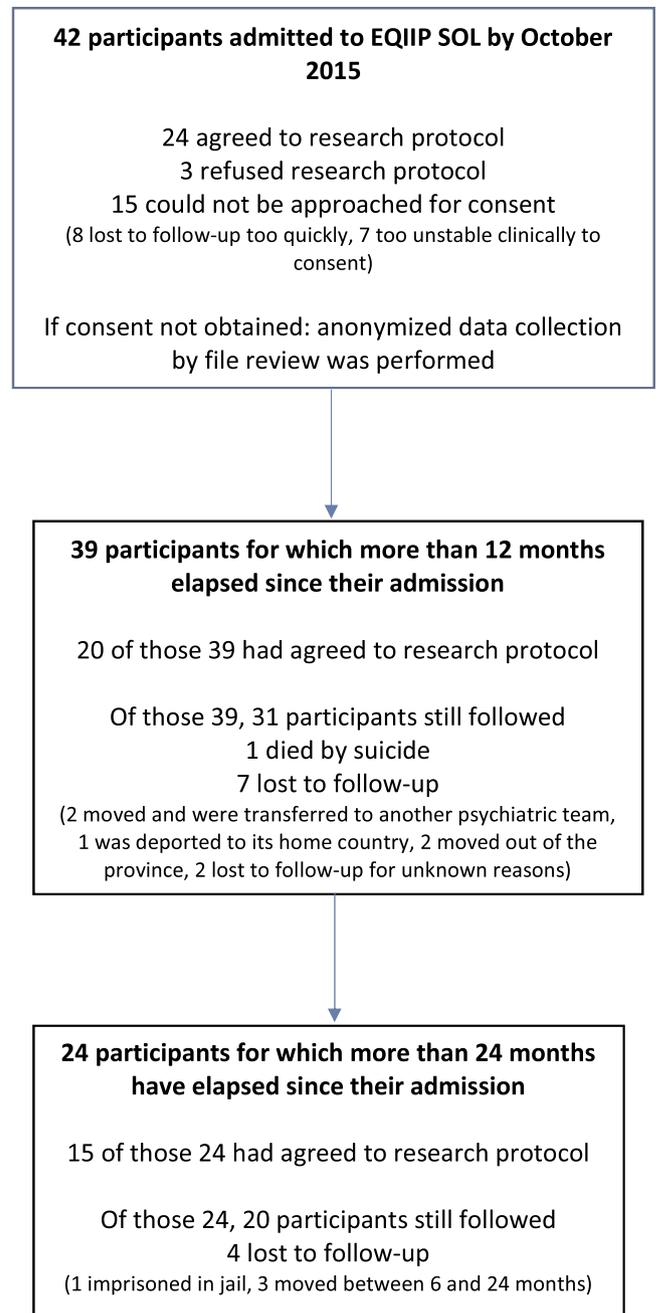


Fig. 1. Flowchart.

Secondary outcomes measures include: for SUD (AUS and DUS > 3), functional outcome (SOFAS and GAF scales and of their vocational status: employment or study) and clinical outcome (CGI).

2.4. Data collection and information sources

Data were collected through research interviews conducted by a research assistant. Data collection was completed by electronic medical records review (including inpatient and outpatient observation notes by nurses, psychiatrist, occupational therapist, social workers and peer support worker, encompassing individual, family and group meetings, medical prescriptions notes, street drug screening, etc.). If data was still missing, or patient refused to participate in the interview, discussions with case managers and treating psychiatrists filled data gaps.

The following data were collected by the research assistants: socio-demographic data, childhood trauma (including abuse, neglect,

Table 1
Baseline characteristics of HYFEPA.

	Patients admitted to EQIIP SOL between 2012 and 2015 (n = 42)
Age (mean) (years)	23.4
Gender (male) (%)	39 (92.9)
Visible minority (%)	14 (33.3)
Education level (mean) (years)	9.1
Unemployed at admission (%)	40 (95.1)
Marital status (% single)	39 (92.9)
Homeless at admission ^a (%)	30 (71.0)
Childhood abuse ^b (%)	33 (79.4)
Total childhood trauma ^c (%)	37 (88.1)
Legal problems (%)	26 (61.9)
Diagnosis (non affective psychosis) (%)	26 (61.9)
Cluster B personality traits or disorder (%)	25 (58.5)
GAF admission (mean)	26.4
SOFAS admission (mean)	27.1
CGI admission (mean)	4.9
Alcohol SUD (%)	22 (51.2)
Cannabis SUD (%)	34 (81.0)
Amphetamines SUD (%)	15 (36.6)
Cocaine SUD (%)	10 (24.4)
Any SUD (% yes)	37 (88.1)

^a refers to individuals living on the street, without any kind of accommodation.

^b including neglect, psychological, physical and sexual abuse.

^c including neglect, psychological, physical and sexual abuse, placement, intimidation, death of a parent or separation from an attachment figure .

intimidation, death or separation of an attachment figure/parent, placement), autonomy in living arrangements (type of accommodation), acute psychiatric services use (number and duration of hospitalization and number of emergency room visits) and the Quality of Life Scale (QLS). The following ratings were conducted at the time of assessment considering the last month situation by consensus with the "best estimate" method from all available sources of information (Kosten and

Rounsaville, 1992) by a senior resident in psychiatry (VDG- master's student, senior resident in psychiatry, not involved in care) and a psychiatrist (AAB-often the treating psychiatrist and researcher): (1) the Social functioning scale (SOFAS) to measure social functioning without consideration of the symptoms and the Global assessment of functioning scale (GAF) considering both the severity of functioning disability and symptoms (2) the Global clinical impression (CGI-S) for the global severity of illness (3) Alcohol Use Scale(AUS), Drug Use Scale (DUS) to measure the proportion of those presenting a substance use disorder (4) the housing stability evolution (using the definition described before) and (5) psychiatric diagnosis according to the DSM-IV-TR.

Housing stability (main outcome) definition was adapted from Frederick et al. (2014) and Godley (1987) reports. Stable housing measured in categories (stable, unstable) is an autonomous or supervised housing where the participant has been for at least a month and wishes to stay at least 6 months to a year (evidence such as a lease should be available). As defined by the Canadian Homelessness Research Network (Gaetz et al., 2012), stable housing for at least 1 month is considered as an exit from homelessness.

Homelessness describes a range of housing and shelter circumstances, with people being without any shelter at one end, and being insecurely housed at the other. That is, homelessness encompasses a range of physical living situations, (...) including 1) Unsheltered, or absolutely homeless and living on the streets or in places not intended for human habitation; 2) Emergency Sheltered, including those staying in overnight shelters for people who are homeless, as well as shelters for those impacted by family violence; 3) Provisionally Accommodated, referring to those whose accommodation is temporary or lacks security of tenure, and finally, 4) At Risk of Homelessness, referring to people who are not homeless, but whose current economic and/ or housing situation is precarious or does not meet public health and safety standards"(Gaetz et al., 2012). The housing autonomy, estimated by the type of accommodation, was measured according to a scale adapted for HYFEPA from Ciompi's scale (Alcoholism Treatment QuarterlyAmerican Journal of Community PsychologyCiompi, 1980).

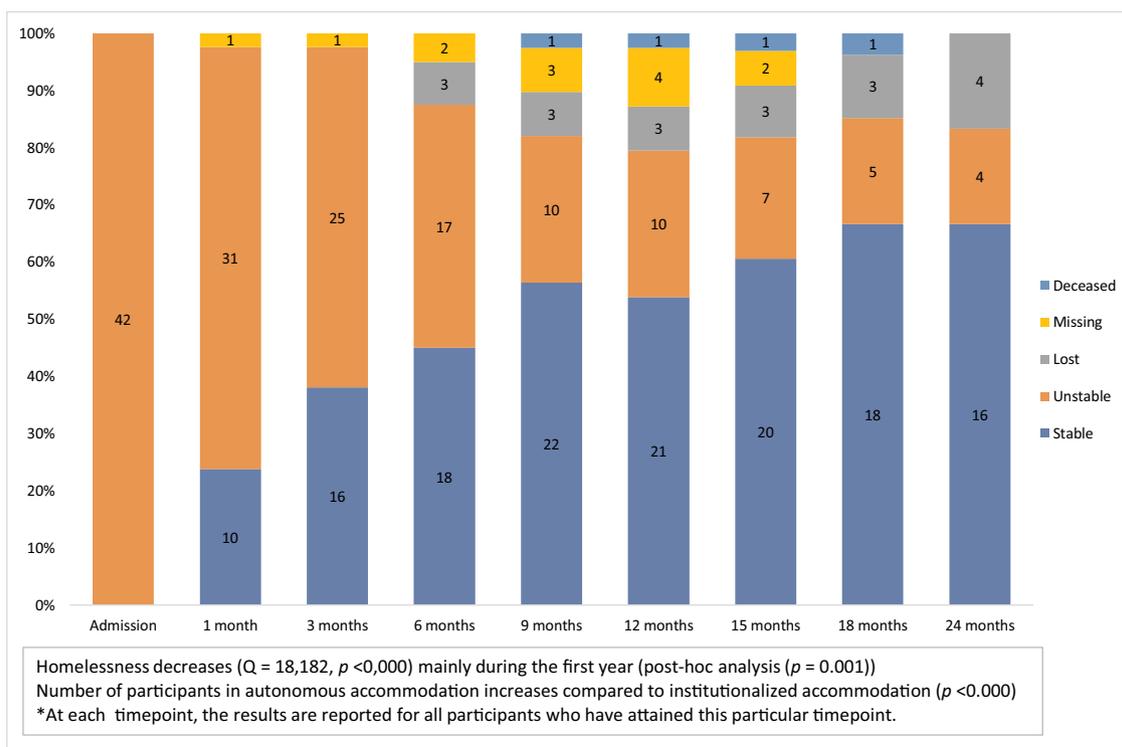
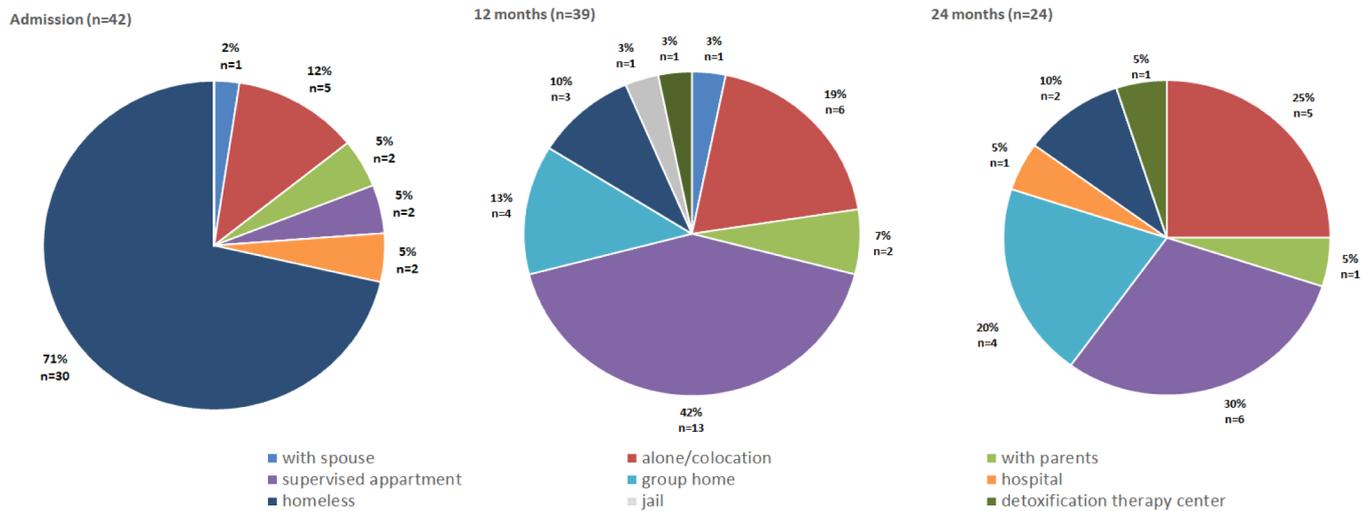


Fig. 2. Proportion of HYFEPA having achieved housing stability.



Homelessness decreases ($Q = 18,182, p < 0,000$) mainly during the first year as demonstrated by the post-hoc analysis ($p = 0,001$)
 *At each timepoint, the results are reported for all participants who have attained this particular timepoint

Fig. 3. Description of the evolution of autonomy in living arrangements.

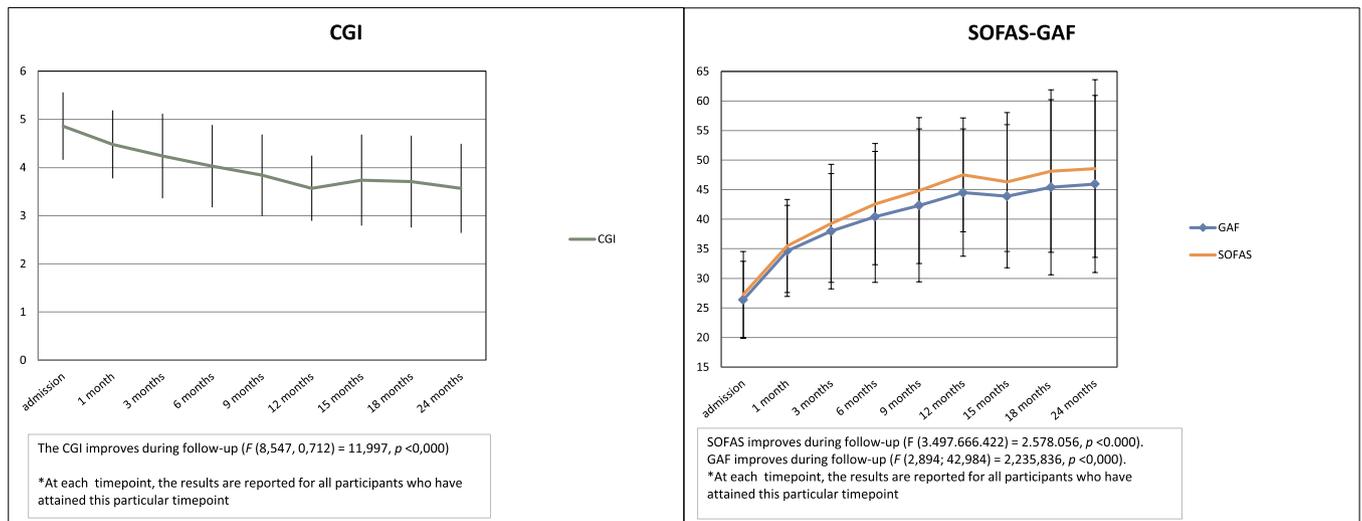


Fig. 4. Clinical global impression and global and social functioning evolution over 24 months.

To allow for comparative analysis and as a result of the small numbers, the different types of accommodation were regrouped into three categories: 1) autonomous accommodation (alone, shared with flatmate, with family); 2) supervised housing (eg. supervised apartment, group home); 3) homelessness, institution (addiction treatment center, hospital) and prison.

All variables were collected annually, except for the housing autonomy and stability, which was collected at admission and at 1, 3, 6, 9, 12, 15, 18, and 24 months.

2.5. Statistical analysis

Statistical analyzes were done using SPSS v20 software (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, version 20.0. IBM Corp., Armonk, NY, USA). The representativeness of the sample was tested by comparing the participants lost to follow-up at 24 months to those who maintained their follow-up at 24 months, on all variables (factors known to be associated with outcome) measured at admission.

Descriptive analyses were performed on sociodemographic variables at admission. Continuous variables were analyzed with a T-test and categorical variables with a Chi-square test (or a Fisher exact test if

$n < 5$ in a group). Outcome measures were analyzed on the sample available at each time points between admission and 24. To see if the evolution over time was significant, these variables were analyzed with the appropriate tests according to their type, (i.e. a repeated measures ANOVA for the continuous variables (GAF, SOFAS, CGI) and a McNemar test for the categorical variables). In post-hoc analyzes to analyze where the difference was located across the different times (T-test for continuous variables), a Bonferonni correction was applied to avoid an α -type error.

3. Results

3.1. Sample description

Of the 42 participants admitted to EQIP SOL by October 2015, 24 agreed to participate in the research protocol, 3 refused, and 15 could not be approached for consent (8 of which were lost to follow-up too quickly, and the others were considered to be too unstable clinically to consent and participate in the study). The data collection was completed in October 2015. At that time point, some participants had just been recruited while others had integrated the program at different

moments since its creation in February 2012. Thus, the majority had attained the 1 year of follow-up timepoint ($n = 39$), but only 24 had attained the 2 years of follow-up timepoint. Of those who reached the measurement timepoint of 24 months, 20 (83,3%) were still followed and 4 (16,7%) were lost to follow-up (1 was imprisoned and 3 moved between 6 and 24 months) (Fig. 1). All the participants (both the 20 patients followed for 24 months and the 4 lost to follow up) were recruited during the same 2 years period (2012–2014), in the same geographical area. No major social or political change which could influence the sample composition was recorded during the recruitment period. The characteristics of the participants are described in Table 1. One participant died by suicide before 9 months of follow-up. There is no significant baseline difference between the two groups (lost to follow-up at 24 months ($n = 4$) vs those still followed at 24-month ($n = 20$)) for those who reached the 24-months timepoint ($n = 24$).

3.2. Accommodation

Housing stability improves throughout the follow-up (Mc Nemar: $Q = 70,027, p < 0.0001$).

Of the participants who completed 24 months of follow-up ($n = 24$), 2 participants never attained stability (12%) and 4 were lost to follow-up (16%) and were excluded from this calculation (2 were stable in housing and 2 were unstable at the last time point before the time of their loss to follow-up). For those who gained stable accommodation during follow-up, the time to first housing stability was reached after an average of 5.37 weeks ($n = 18$) (Fig. 2).

The autonomy in living arrangements is described in Fig. 3. Homelessness decreases ($Q = 18,182, p < 0,000$) mainly during the first year as demonstrated by the post-hoc analysis ($p = 0.001$) towards more stable accommodations such as group homes or supervised apartments (52.7%), autonomous apartments (21.1%) or parental residence (5.3%). Between admission and 24 months, the number of participants in autonomous accommodation (alone, flatmate, with parents, group home, or supervised apartment) increases significantly compared to institutionalized accommodation (such as hospitals, therapy for drug addiction and prison or homelessness) (autonomous

accommodation: 23.8% at admission vs. 78.9% at 24 months, institutionalized accommodation or homelessness 76.2% on admission vs 21.1% at 24 months: $p < 0.000$). A post-hoc analysis shows that significant improvement in autonomy in living arrangements occurs between admission and 12 months of follow-up. Improvements are maintained between 12 and 24 months.

3.3. Overall clinical and functional outcome

The CGI improves during follow-up ($F(8.547, 0.712) = 11.997, p < 0.000$). Post-hoc analysis shows that improvement in CGI occurs between admission and 9 months ($p < 0.013$). However, after this period, differences in CGI between subsequent time points are no longer statistically significant ($p > 0.05$) (Fig. 4).

Although the impairment in global functioning remained severe throughout the study, GAF (measuring both symptoms and functioning) improves during follow-up ($F(2.894; 42.984) = 2.235.836, p < 0.000$) mainly between admission and 3 months as shown by the post-hoc analysis $p < 0.013$). However, after this period, GAF improvement fades between subsequent times points ($p > 0.05$). (Fig. 4)

SOFAS (which measures functioning only) improves similarly to GAF ($F(3.497.666.422) = 2.578.056, p < 0.000$), mainly between admission and 3 months as shown by post-hoc analysis ($p < 0.002$) but the improvement diminishes after the 6th month ($p > 0.05$) (Fig. 4).

3.4. Vocational outcome (employment and study)

The proportion of participants who work or study at admission (4.9% work, 7.3% study) and 24 months of follow-up (5.9% work, 13.3% return to school) remains very low. There is no statistical difference between time points.

3.5. Substance use disorder (SUD)

There is a significant reduction over time for alcohol use disorder and any SUD (at least one substance) ($Q = 6.00, p = 0.05$). However, there are no substance specific differences ($p > 0.05$) (Fig. 5).

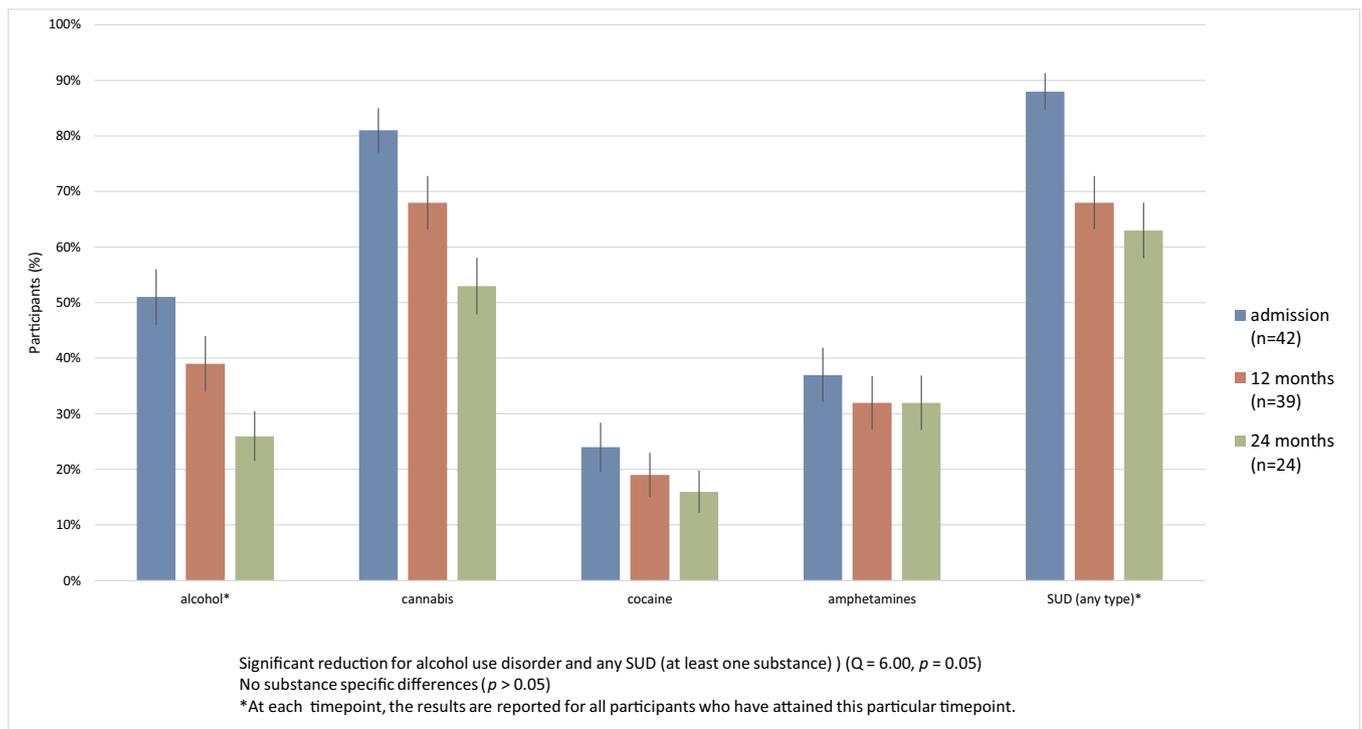


Fig. 5. Evolution of the proportion of HYFEPA with SUD (AUS and DUS ≥ 3).

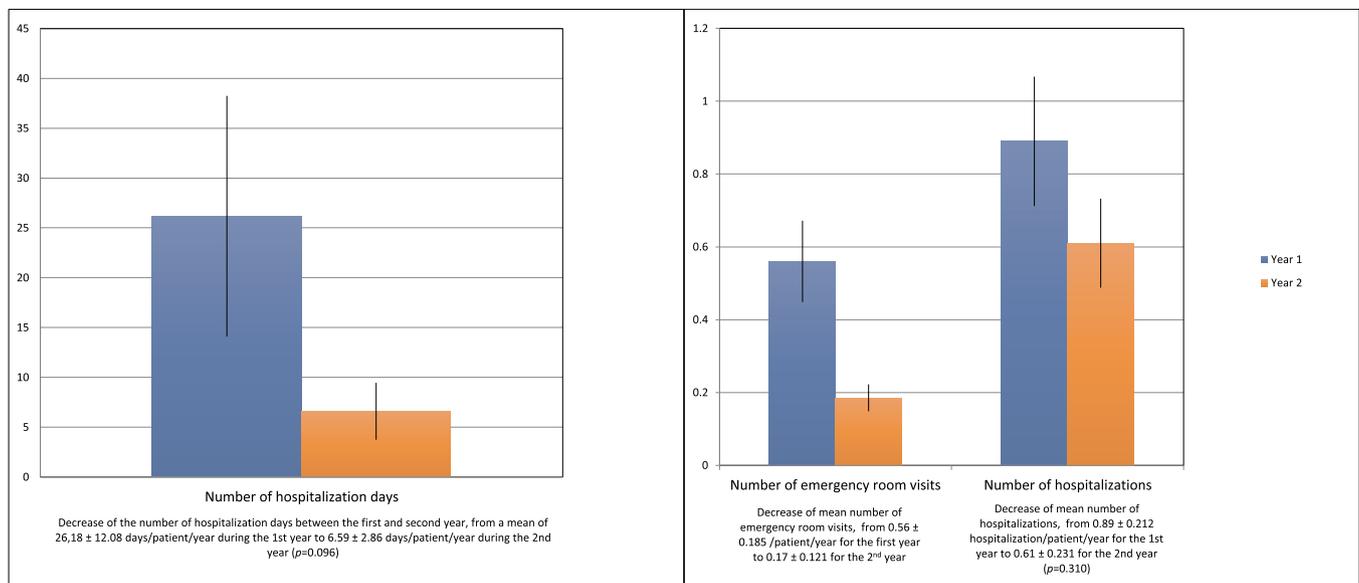


Fig. 6. Average number of hospitalization days, of emergency room visits and hospitalizations per patient per year of follow-up.

3.6. Acute psychiatric services use

The average number of hospitalization days, emergency room visits and hospitalizations per patient per year of follow-up decrease between year 1 and year 2. However, none of these differences reach statistical significance. The number of days of hospitalization decrease between the first and second year, from a mean of 26,18 ± 12.08 days / patient / year during the 1st year to 6.59 ± 2.86 days / patient / year during the 2nd year ($p = 0.096$). The mean number of hospitalizations also decreased from 0.89 ± 0.212 hospitalization/ patient / year for the 1st year to 0.61 ± 0.231 for the 2nd year ($p = 0.310$). The number of emergency room visits evolves similarly (0.56 ± 0.185 / patient / year for the first year to 0.17 ± 0.121 for the 2nd year ($p = 0.069$) (Fig. 6).

4. Discussion

This project is, to our knowledge, the first to focus on a specific intervention for HYFEPA aiming to reduce homelessness and to improve clinical outcomes as well as functioning. The majority of the HYFEPA (80%) who participated in the outreach interventions offered by EQIIP SOL, as well as the partnerships developed with community organizations offering supervised housing and Housing First support, achieved housing stability early in follow-up. Indeed, this collaboration has enabled the creation of different opportunities, including emergency supervised apartments for the HYFEPA, greatly facilitating the work of EQIIP SOL and possibly the attainment of early housing stability. These findings are consistent with our hypotheses on expected outcomes based on the literature review, who showed that the outreach approaches that focus on housing (including critical time intervention) and ACT team are associated with an increase in housing stability (Coldwell and Bender, 2007; Susser et al., 1997; Tomita et al., 2014). In addition, the fact that the main objective of the intervention is the exit from homelessness suggests that targeting homelessness specifically with a dedicated intervention contributes to a relatively rapid achievement of housing stability (Forchuk et al., 2008). However, the open design of the present study doesn't allow to draw conclusions regarding the efficacy of EQIIP SOL on housing stability in HYFEPA, for which a study with a control group and ideally a randomized controlled trial would be needed.

The need for supervised housing (both within community organizations or associated with the Quebec Health and Social Services system (supervised apartments, group homes)) rather than autonomous living

arrangements (private market apartment, parental home) seems quite common in HYFEPA. It is likely that the great social disaffiliation, the weak family support (nearly 50% of these young people were placed by the Youth Protection in foster care before 18 years), the low level of functional autonomy, the high prevalence of moderate-to-severe SUDs, as well as a legal history and aggressivity make living autonomously difficult (Ferguson et al., 2015; Gabrielian et al., 2015; McQuistion et al., 2014; Odell and Commander, 2000; Saddichha et al., 2014). The low level of functional autonomy may also be associated with different causes, such as cognitive impairments (executive functions, judgment impairment and problem-solving difficulties) related to psychotic illness (Chang et al., 2014). These difficulties are likely exacerbated by drug use but could also origin from the lack of previous learning of abilities necessary for activities of daily living and instrumental activities of daily living that can be observed among young deprived people (Patterson et al., 2015).

The clinical and functional level as measured by the CGI, GAF, and SOFAS scales improve during follow-up, particularly during the first 3 months. This improvement may be largely attributable to antipsychotic medication whose main effect on symptomatic remission is in the first few weeks/months (Schwartz and Brotman, 1992). It is also possible that the improvement in functioning is largely linked to the end of homelessness, since being homeless causes a great deal of stress (thus possibly exacerbating symptoms). It should be noted that homelessness itself, on the scales of SOFAS and GAF, correspond to a very low level of functioning (less than 30): the end of homelessness itself raises the SOFAS and GAF ratings considerably. The main criticism of global rating scales such as the GAF, SOFAS and CGI is that it is difficult to identify the main influencing factor to the rating (eg, symptoms, social or occupational functioning) since the dimensions that are the most deficient (in GAF and SOFAS) will be those that determine the rating score (Aas, 2011). Thus, two individuals with very different profiles can obtain a similar score. Furthermore, these global scales do not allow to measure more subtle change in functioning or changes that occur only on one dimension (eg. improvement in vocational status but not in work could keep the score at the same low level).

After the first 3 months, there is no statistically significant difference in clinical scales of overall functioning, which may be due to the achievement of a symptomatic plateau. As demonstrated in other studies, this can be explained by the fact that the HYFEPA have more risk factors of poor prognosis than young people with non-homeless psychotic disorders (Abdel-Baki et al., 2014) such as being a male, single,

low education level, and a poor pre-morbid functional level, etc., which may explain a poorer progression despite the treatment offered (Odell and Commander, 2000). However, other FEP studies have shown that the greater improvements arise in the first 3–12 months of treatment after which stabilization occurs (Friis, 2014; Hegelstad et al., 2012; Petersen et al., 2005).

Nevertheless, it is also possible, that since the intervention specifically targets homelessness in HYFEPA, that its effect on other outcomes might be limited, explaining the lack of statistically significant improvement on functioning scales.

Alcohol and drug use disorders remain prevalent throughout the study. SUDs may take longer to improve given the severity of the substance use problem among these youth, as demonstrated in the addiction field (Colizzi et al., 2016) and previous studies in FEP (Abdel-Baki et al., 2017). Also, it is possible that the treatment of EQIIP SOL does not specifically target SUDs enough, at least at the beginning of follow-up, since the focus is on housing stabilization. As opposed to most addiction treatment programs, patients admitted to EQIIP SOL were not required to have any objective pertaining to their substance use (for example to decrease or stop using). A significant number of them might have been in a pre-contemplation or contemplation motivational phase regarding their substance use disorder, thus not interested in any specific addiction treatments. We used general measure of substance use disorder which did not allow to detect subtle, but still significant improvements in substance use patterns. For example, risky drug use behaviors (i.e. syringe sharing, binge drug use) may have improved over the observation period even if overall severity of addiction did not change.

Although homelessness is a risk factor for service disengagement or loss to follow-up in research protocols, one of the strengths of this study is the relatively high retention rate (83% at 2 years), which is similar to other studies of non-homeless FEP (Abdel-Baki et al., 2014; Marshall and Rathbone, 2006). The intensity of the follow-up, outreach interventions, efforts to engage HYFEPA, the reminders to avoid the loss of follow-up and the importance of the links created between EQIIP SOL professionals, HYFEPA, and community-based organizations are probably significant elements explaining this high retention rate.

Since there is no control group, one of the main limitations of the present descriptive study, is that it does not allow to evaluate whether EQIIP SOL has any specific impact on the outcome (compared to the natural evolution of FEP or to the effect of the EIS alone). The available data also does not allow to determine which components of this complex intervention may have an impact on the evolution of HYFEPA. The construction of the data is another limitation of this study since the quality and sources of data varied for some patients. Indeed, a high number of EQIIP SOL patients, were unable to consent to the research protocol and some refused to participate when approached while fit to consent. Although full data collected by interview of patients by the research assistant was not available for all participants, to avoid too many missing data, with permission of the research ethics committee, most data gaps were filled by reviewing the electronic medical records and through discussions with case managers and treating psychiatrists.

Moreover, the involvement of clinician-researchers (who offer the treatment), not only in the development of this study, but also in the evaluation of the participants can be a source of bias, especially since many of the measures of evolution are scales based on the clinicians' judgment. However, in order to limit this bias, the evaluations were done separately by 2 investigators, one of whom was not involved in the treatment of the patients. A consensus was then reached during a discussion between them if the rating differed. Nevertheless, most scale scoring used observations noted in clinical records and therefore based on assessments made by non-blind clinicians. Although GAF and SOFAS, as well as CGI, are commonly used scales in this type of study, they remain strongly influenced by the clinician's judgment

(Aas, 2014). Moreover, although the GAF and the CGI scales aim to take into account symptom severity, they do not differentiate between positive, negative or cognitive symptoms of psychosis. In subsequent studies, it would be interesting to use a scale such as PANSS that allows this differentiation, and scales should ideally administered by a raters blind to treatment condition in the context of a controlled study.

5. Conclusion

To our knowledge, no published study has focused on specific treatments for HYFEPA. This study suggests that HYFEPA who received a tailored intervention offering high intensity outpatient treatment with outreach interventions in the community improve over the first 24 months of follow-up. Integrated addiction interventions as well as the development of a specific case management approach adapted to HYFEPA could have been beneficial even though this study does not allow to conclude on whether nor how the interventions was possibly effective.

HYFEPA represent a vulnerable population featuring many complex factors such as low levels of education and high rates of childhood trauma and legal problems. The HYFEPA followed by EQIIP SOL improved rapidly and sustainably during a follow-up of 24 months both clinically and functionally, especially regarding the exit of homelessness, which occurred very quickly at the beginning of the follow-up. A study comparing a cohort followed by EQIIP SOL + EIS to a cohort followed by EIS only would better determine if there is a specific impact of EQIIP SOL. Longer term studies and larger samples will allow to determine whether the effectiveness of this intervention persists or even improves over time, particularly in regard to SUDs and vocational rehabilitation.

This study brings a new vision toward the challenges encountered in the recovery of HYFEPA. Despite its limitations, it highlights a type of intervention that has the potential to improve care for a very vulnerable population, and that deserves to be studied in larger, longer term studies.

Finally, this study highlights the need for greater resources and attention by clinical researchers to promote retention in care as well as to reduce morbidity and mortality in HYFEPA.

Conflicts of interest

The corresponding author states on behalf of all authors that there are no conflicts of interest

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Supplementary materials

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