Research Report

European Addiction Research

Eur Addict Res 2011;17:154–163
DOI: 10.1159/000324480

Received: July 27, 2010
Accepted: January 17, 2011
Published online: March 29, 2011

Treatment Outcomes of an Integrated Residential Programme for Patients with Schizophrenia and Substance Use Disorder

Manuel Morrens[a–c] Bieke Dewilde[a, d] Bernard Sabbe[a, e] Geert Dom[a, c]
Raoul De Cuyper[f] Franz Moggi[g, h]

[a]Collaborative Antwerp Psychiatric Research Institute, Antwerp, Belgium; [b]Psychiatric Hospital GGZWNB, Halsteren, The Netherlands; [c]Psychiatric Centre Broeders Alexianen, Boechout, [d]Stuivenberg Hospital, Antwerp, [e]Psychiatric Centre St Norbertushuis, Duffel, and [f]Psychiatric Centre Sleidinge, Sleidinge-Evergem, Belgium; [g]University Hospital of Psychiatry Bern, Bern, and [h]Department of Psychology, University of Fribourg, Fribourg, Switzerland

Key Words
Schizophrenia · Substance use disorder · Dual diagnosis · Addiction · Community functioning · Quality of life

Abstract
Background: About half of all schizophrenic patients have a co-occurring substance use disorder, leading to poorer social and functional outcomes than obtained in non-abusing patients. To improve outcomes, integrated treatments have been designed that address the two conditions simultaneously. Results are, however, conflicting because the available effect studies are hampered by various methodological issues, among which are heterogeneous patient samples. ***Methods:*** In this comparative study, two well-described patient samples diagnosed with schizophrenia and co-morbid substance abuse disorders either received an integrated treatment (IDDT) or treatment as usual (TAU). ***Results:*** Patients in the IDDT condition showed significant reductions in illicit drug and alcohol use, improvements on all psychiatric symptom domains, reported higher quality of life and improved on social and community functioning. In contrast, patients' improvements in the TAU group were moderate and limited to a few substance use and psychiatric outcomes. The TAU group had significantly higher dropout rates 6 and 12 months after baseline, suggesting that the IDDT programme was more successful in committing patients. ***Conclusions:*** Our results suggest that an integrated approach to schizophrenic patients and co-morbid substance use disorders is superior to standard treatment and may be considered as the treatment of choice for this patient group.

Introduction

There is ample evidence that 40–70% of all patients suffering from schizophrenia have a co-occurring substance abuse disorder [1–3]. More specifically, about 35% have a concomitant alcohol abuse disorder and 31% an illicit drug use disorder [4]. Such co-morbid substance abuse in schizophrenia is associated with poor social and clinical outcomes: patients afflicted with both conditions are more frequently hospitalised than patients with only one disorder, have more severe psychotic symptoms and have higher relapse rates [5, 6]. They also display more auto-destructive behaviours and have more legal problems, as well as housing, financial and employment issues and family problems [7–10].

KARGER

Fax +41 61 306 12 34
E-Mail karger@karger.ch
www.karger.com

1022–6877/11/0173–0154$38.00/0

Accessible online at:
www.karger.com/ear

Manuel Morrens
Collaborative Antwerp Psychiatric Research Institute
R3.22, Campus Drie Eiken, Universiteitsplein 1
BE–2650 Antwerp (Belgium)
Tel. +32 3820 2415, E-Mail manuel.morrens@ua.ac.be

From a therapeutic perspective, these 'dual diagnosis' (DD) patients command special attention due to their complex set of intertwined problems. Given that this population generally responds poorly to treatment programmes that do not take their co-morbidity into consideration [11], integrated approaches combining mental health and substance abuse treatments have been developed to improve treatment outcome, with the same team simultaneously addressing both the psychiatric and the co-morbid substance use disorder (SUD) [12–15]. Despite the high prevalence of dual diagnoses and the poor prognoses, few studies were dedicated to the effects of integrated treatments in this patient group [16, 17].

Several studies with DD patients demonstrated high dropout rates [18–20], which is a typical problem with these patients and which is in line with the findings that patients with schizophrenia and co-morbid substance abuse have lower motivational levels than other DD patients [21]. This suggests that it is difficult to involve these DD patients in treatment. It is necessary to investigate whether integrated treatments result in a superior commitment in these patients compared to other treatment programmes, especially in the follow-up treatment after discharge.

Some studies showed that integrated treatment is effective in improving clinical symptoms as well as reducing substance abuse [22–27] and is associated with fewer and shorter rehospitalisations, and a more stable residence [22, 23, 28]. Nevertheless, other studies failed to find such improvements either in the clinical outcomes [23] or in the substance abuse [29–31].

Several complicating issues may have contributed to these conflicting results. One such factor is that most of the studies included heterogeneous patients with a multitude of different primary diagnoses, ranging from psychotic to mood, anxiety and personality disorders [18, 32–34]. As it is to be expected that clinical symptoms as well as substance abuse and social outcome measures are influenced differently by treatment depending on the primary diagnosis, inclusion of more homogeneous patient groups is likely to generate more consistent findings. In this line, a recent study [35] focusing exclusively on (affective or non-affective) patients with psychosis and co-morbid substance abuse reported favourable effects of their integrated treatment on the psychiatric outcomes and service costs, but found no significant effects on substance abuse in terms of monthly costs for drugs.

The interpretation of the results is further impeded by the limited number of outcomes in most studies. Some took the reduction of substance use as the hypothesised treatment result but failed to include clinical, social or functional parameters, which was partially due to the heterogeneity of the patient samples [36–38].

In the present study we recruited two well-defined groups of inpatients diagnosed with schizophrenia and co-morbid SUD for an open, non-randomised comparative study consisting either of integrated treatment (IDDT) or treatment as usual (TAU). The patients were assessed four times in 12 months. The two treatment arms were compared in terms of psychiatric symptoms, alcohol and/or illicit substance use, quality of life and overall functioning 3 months after baseline. Furthermore, differences in dropout rates as a measure of therapy engagement were calculated on all follow-up assessments. We expected the IDDT group to perform significantly better on all four domains than the TAU group and expected fewer dropouts in the IDDT group.

Patients and Methods

Participants

Patients were diagnosed with a non-drug-induced psychotic disorder and a concurrent SUD according to DSM-IV criteria [39]. Diagnoses were assessed by the experienced resident psychiatrist according to the guidelines of the ICD-10 and definitively defined at the time of discharge. The diagnosis at discharge was used for this study. The residents were supervised by senior psychiatrists. Patients were recruited from four psychiatric hospitals in Belgium: Sleidinge (Unit DD, IDDT, n = 44), Liège (Units Dedale, IDDT, n = 41, and Cadran, TAU, n = 12), Zelzate (Unit Lumen, TAU, n = 17) and Duffel (Unit Baken A, TAU, n = 3). Patients between the ages of 18 and 45 years with illness duration of more than 2 years were included, while patients with a history of neurological disorders were excluded from the study.

All subjects gave their informed consent prior to participation and the study was carried out in accordance with the latest version of the Helsinki Declaration and was approved by the local medical ethics committee. The study took place between December 2003 and June 2007.

Presence of SUD (table 1) was established with a positive screening on the Drug Use Scale (see Methods) (a score of 0 = 'not relevant' or 1 = 'abstinence' defined the absence of a disorder on that specific substance).

There were no statistically significant between-group differences in any of the demographical or clinical baseline variables (tables 1, 2), except for benzodiazepine abuse which was significantly more present in the control group.

In about half of the patients, numbers on duration of treatment were established (IDDT: n = 43; TAU: n = 19). On average, the patients in the IDDT group participated 150 days (SD = 85.8) in the inpatient treatment and 194 days (SD = 128.0) in outpatient aftercare by a therapist or case manager associated to the treating unit. The patients in the TAU group, on the other hand, remained in the hospital for 125 days (SD = 92.8) and continued with their outpatient treatment for 98.8 days (SD = 122.4).

Table 1. Demographics of the DD patients in both treatment groups

Demographics	Integrated treatment (n = 85)	Standard treatment (n = 35)	Test[1]	p
Age, years (SD)	28.4 (6.9)	27.8 (8.0)	<1	0.680
Educational level, years (SD)	10.6 (2.3)	11.3 (1.9)	1.153	0.285
Sex, % male	87.1	85.3	–0.254	0.800
Ethnicity, n (%)			–1.551	0.121
Belgian	63 (74)	30 (86)		
European	9 (11)	1 (3)		
African	10 (12)	1 (3)		
Asian	0 (0)	1 (3)		
South American	2 (2)	0 (0)		
Alcohol use disorder at baseline, %	46.4	60.0	–1.177	0.239
Other SUD at baseline, %				
Cannabis	70.9	60.0	–1.458	0.145
Cocaine	27.3	47.3	–0.111	0.912
Hallucinogens	1.8	0	–1.307	0.191
Opiates	29.1	44.4	–0.124	0.901
Stimulants	14.5	12.5	–1.337	0.181
Medication	38.2	75.0	–2.226	0.026
Marital status, n (%)			–0.214	0.831
Single	69 (81.2)	27 (79.4)		
In relationship	5 (5.8)	3 (8.8)		
Married	6 (7.0)	2 (5.9)		
Divorced	5 (5.8)	1 (2.9)		
Living situation, n (%)			–0.138	0.890
Alone	19 (22.1)	8 (23.5)		
Family/friends	23 (24.8)	10 (29.4)		
Partner	6 (7.0)	0 (0)		
Controlled environment	33 (38.4)	9 (26.5)		
Other	3 (3.5)	0 (0)		
Job, n (%)			–0.224	0.822
Full-time job	10 (11.8)	1 (2.9)		
Part-time job	7 (8.2)	2 (5.9)		
Without job	25 (29.4)	10 (29.4)		
Invalidity	30 (35.3)	16 (47.1)		
Other	7 (8.3)	5 (14.7)		

[1] Parametric variables: GLM analyses; non-parametric variables: Mann-Whitney test. SUD = Substance use disorder.

Treatment

The experimental group (n = 85) was composed of inpatients from two participating centres in which a newly developed integrated DD treatment (IDDT) had recently been introduced. The IDDT programme was in line with the principles of Drake et al. [40]. The treatment was delivered by a multidisciplinary and fully cross-trained team, i.e. regular training in motivational interviewing, relapse prevention and interventions and developing skills in monitoring substance use and its consequences. The team was composed of psychiatrists, psychiatric nurses, social workers, psychologists, non-verbal therapists, and work rehabilitation counsellors, with the two disorders being treated by the same team. To facilitate a fully IDDT, the patient-staff ratio was extended to 1.7 full-time equivalents for each treated patient in both IDDT units. All team members of the IDDT programmes received training. The components of this treatment were: a specialised assessment with a focus on medical, psychological and social functioning, psycho-education, engagement, individual counselling as well as group counselling, pharmacological treatment, stage-wise treatment, motivational interviewing, active outreach treatment, relapse prevention interventions, long-term retention and comprehensive services (somatic and social services). After discharge they were assigned to a case manager who was responsible for the coordination and organisation of further treatment. The social network of the patient was always involved in the treatment of the patient. Both IDDT units included all these described components and were thus very similar units.

Table 2. Substance use and clinical outcomes at all four assessments for the IDDT and TAU group

	IDDT				TAU				Matching at baseline
	0 months (n = 85)	3 months (n = 60)	6 months (n = 46)	12 months (n = 36)	0 months (n = 35)	3 months (n = 22)	6 months (n = 10)	12 months (n = 7)	F(1,104)
Substance use									
ASI-alc	1.94 (2.31)	1.69 (2.29)	1.23 (1.70)	1.03 (1.53)	2.74 (2.68)	2.48 (1.78)	1.38 (1.60)	1.50 (1.76)	2.531
ASI-drugs	5.10 (2.12)	3.26 (2.18)	2.40 (1.85)	1.88 (2.00)	5.45 (2.08)	4.33 (1.96)	4.25 (2.87)	4.83 (2.64)	<1
AUS	1.79 (1.34)	1.33 (0.94)	1.60 (1.10)	1.52 (1.16)	2.03 (0.96)	2.10 (0.77)	1.75 (0.71)	2.00 (1.29)	2.079
DUS	10.61 (13.22)	7.06 (3.39)	6.47 (2.45)	6.19 (2.88)	14.94 (24.77)	8.85 (3.29)	10.33 (3.93)	8.40 (5.59)	<1
Clinical symptoms									
PANSS-pos	18.03 (7.69)	14.85 (6.69)	13.65 (4.75)	11.55 (4.22)	16.03 (5.95)	13.77 (5.98)	13.33 (5.41)	13.14 (3.72)	1.672
PANSS-neg	18.21 (7.44)	16.68 (7.26)	15.98 (6.03)	14.45 (5.78)	17.65 (7.02)	14.95 (6.04)	15.44 (5.94)	15.29 (8.67)	<1
PANSS-gen	39.01 (12.21)	34.58 (9.63)	33.28 (8.77)	29.94 (10.46)	38.71 (10.50)	33.77 (9.61)	35.33 (8.25)	38.71 (20.21)	<1
PANSS-tot	74.99 (23.09)	66.10 (19.80)	62.90 (14.85)	55.94 (17.60)	72.39 (20.10)	62.50 (18.79)	64.11 (17.36)	67.14 (30.86)	<1
ASI-psy	6.19 (1.90)	4.52 (1.98)	4.26 (2.20)	4.39 (2.15)	5.68 (1.70)	5.70 (1.69)	4.83 (2.86)	4.50 (3.27)	
Overall functioning									
SQLS-psych	29.53 (10.44)	25.63 (8.69)	24.59 (8.51)	20.71 (8.54)	28.90 (12.15)	30.09 (8.96)	28.11 (12.45)	27.33 (13.81)	<1
SQLS-energy	12.03 (4.71)	12.44 (4.69)	11.70 (4.15)	11.23 (5.05)	11.77 (5.67)	13.22 (4.17)	14.00 (4.06)	14.17 (2.23)	<1
SQLS-sympt	9.34 (5.61)	6.60 (5.58)	5.01 (5.09)	5.55 (5.84)	9.67 (5.19)	10.43 (6.08)	10.44 (5.25)	8.17 (5.27)	<1
SQLS-total	50.89 (15.99)	43.67 (14.38)	41.26 (13.67)	37.48 (14.67)	50.33 (19.10)	53.74 (15.47)	52.56 (16.67)	49.67 (17.14)	<1
ASI-health	2.33 (2.38)	1.42 (2.01)	1.40 (1.82)	0.70 (1.43)	2.00 (2.20)	2.15 (1.95)	0.33 (0.82)	0.67 (0.82)	<1
ASI-job	3.95 (2.47)	3.31 (4.43)	2.78 (2.49)	2.06 (2.66)	3.80 (2.59)	4.75 (2.99)	2.00 (2.45)	3.17 (2.64)	<1
ASI-law	2.42 (2.76)	1.56 (2.46)	1.39 (2.07)	0.50 (1.52)	2.07 (2.10)	0.95 (2.01)	1.60 (2.07)	3.00 (1.73)	<1
ASI-family	4.20 (1.89)	2.69 (2.21)	2.37 (1.92)	2.24 (2.22)	4.13 (2.29)	3.90 (1.97)	3.80 (2.05)	5.00 (2.00)	<1

ASI = Addiction Severity Index (alc = alcohol); AUS = Alcohol Use Scale; DUS = Drug Use Scale; PANSS = Positive and Negative Syndrome Scale (gen = general symptoms; neg = negative symptoms; pos = positive symptoms; tot = total score); SQLS = Schizophrenia Quality of Life Scale (energy = motivation and energy; psych = psychosocial functioning; sympt = symptoms and side effects).

The control group (n = 35) consisted of similar patients who were included from participating hospitals where they received TAU, which consisted of standard residential psychiatric care with a stronger focus on the psychotic symptomatology. In this programmes, no formal treatment was offered for substance use. In addition, on the TAU units, there was less focus on motivational dialogue and no outreaching was offered after discharge. Treatment was also provided by a multidisciplinary team but with a for Belgian psychiatric hospitals standard patient-staff ratio between 0.6 and 1.4 full-time equivalents per patient. The social network was not systematically involved in the treatment of the patient. The TAU units of Zelzate and Liege implemented a cognitive behavioural therapeutic approach, whereas the TAU unit of Duffel had a more psychodynamic approach. Given that the different teams of the TAU units did not receive similar training, these three units were more dissimilar compared to the two IDDT units who did receive the same training.

Procedures and Design

The study has an open-label, longitudinal design with a follow-up period of 12 months, with assessments taking place at baseline and after 3, 6 and 12 months.

All patients entering one of the contributing units were asked to participate in the study. All patients started off in a residential treatment programme, after which, when completed, follow-up in an outpatient aftercare programme was offered.

Whether participants received the IDDT or TAU was determined by the hospital unit the patients were admitted to. The allocation of the patient to either IDDT or TAU was random in the sense that this choice was solely based on availability and not patient characteristics.

Assessment Tools

Assessments of the patients were completed by research psychologists, who received adequate training.

Substance Use. We applied two measures to evaluate substance use. The European version of the Addiction Severity Index (EuropASI) [41] was used to assess the severity of problems in seven potential problem areas: medical, employment/support, alcohol, drugs, legal, family/social and psychiatric. The EuropASI is a well-validated, semi-structured interview with the patient designed to provide important information about aspects of the patients' life which may contribute to the substance abuse. We used the Alcohol Use Scale (AUS) and the Drugs Use Scale (DUS) [42] to quantify the substance use on a scale from 1 (abstinence) to 5 (serious dependence). We added a 0 score denoting 'Not relevant'. The assessment is based on self-report, direct behavioural observations, collateral information and clinical evidence. It should be noted

Table 3. Results of the 3-month versus baseline within-group and between-group analyses for the IDDT and TAU groups for all measures (F values)

	Within-group comparisons		Between-group comparisons
	IDDT	TAU	IDDT vs. TAU
Substance use			
ASI-alc	1.390	<1	<1
ASI-drugs	26.691***	3.036^{+}	1.409
AUS	3.954^{+}	<1	2.124
DUS	7.320**	8.048*	<1
Clinical symptoms			
PANSS-pos	33.554***	3.066^{+}	2.247
PANSS-neg	8.891**	4.406*	<1
PANSS-gen	27.751***	9.406**	<1
PANSS-tot	39.798***	7.847*	<1
ASI-psy	24.735***	<1	6.291*
Overall functioning			
SQLS-psych	16.080***	<1	4.955*
SQLS-energy	<1	<1	<1
SQLS-sympt	11.350***	<1	4.815*
SQLS-total	13.498***	<1	4.413*
ASI-health	7.783**	<1	<1
ASI-job	2.674	1.851	4.677*
ASI-law	7.083**	<1	<1
ASI-family	23.209***	<1	3.796^{+}

ASI = Addiction Severity Index (alc = alcohol); AUS = Alcohol Use Scale; DUS = Drug Use Scale; PANSS = Positive and Negative Syndrome Scale (gen = general symptoms; neg = negative symptoms; pos = positive symptoms; tot = total score); SQLS = Schizophrenia Quality of Life Scale (energy = motivation and energy; psych = psychosocial functioning; sympt = symptoms and side effects).

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

that the reliability of the scores is largely dependent on the information elicited from the patients although the instruments used allow for the interviewer to ask more in detail and assess patients' information properly.

Psychiatric Symptoms. To determine the presence and the severity of the clinical psychiatric symptoms we opted for the Positive and Negative Syndrome Scale (PANSS) [43], a widely used scale to distinguish between positive, negative and general symptoms.

Quality of Life. Patients completed the Schizophrenia Quality of Life Scale (SQLS) [44], a 30-item questionnaire using a 5-point scale from Never (0) to Always (4). Apart from a total score, three separate scales are scored: psychosocial functioning (15 items), motivation and energy (7 items), and symptoms and side effects (8 items).

Motivation. The readiness of change questionnaire was used as a measure for motivation towards treatment. The (RCQ) was administered on each assessment for both drugs (RCQ-D) and alcohol (RCQ-A). The RCQ is a 12-item scale that needs to be scored by the patient, which provides three four-item scales, each representing a stage of change: 'pre-contemplation', 'contemplation', and 'action'. Answers are given on a Likert scale ranging from 'strongly disagree' to 'strongly agree' and are scored from –2 through 0 to +2. The range for each scale was –8 to +8.

Analysis

The SPSS (version 14.0; SPSS Inc., Chicago, Ill., USA) for Microsoft Windows was used for the statistical analysis. For some patients we did have both baseline and 12-month outcomes but no 3-month (IDDT: n = 5; TAU: n = 2) or 6-month data (IDDT: n = 2; TAU: n = 1). In these cases we carried the data of the previous assessment forward.

First, a multivariate general linear model (GLM) for repeated measures was used to contrast the outcomes of the 3-month assessment to the baseline measures in both groups. Multivariate GLM repeated measure analyses were also used for the between-group (treatment condition) comparisons.

Secondly, a multivariate GLM for repeated measures was also used to perform a between-group comparison in their dropout rates over all three assessments contrasted to baseline.

Due to the high dropout rates at 6 and 12 months, only tentative additional analyses were performed to contrast both assessment periods separately to the baseline scores on all outcomes.

Results

Table 2 lists the descriptive statistics for the two treatment conditions for all measures and all four assessments. There were no differences between the two groups at baseline for any of the assessments of substance abuse, clinical or overall functioning.

Comparison between the IDDT and TAU Groups between Baseline and the 3-Month Follow-Up

The results of the GLM analyses for repeated measures comparing assessment outcomes at the 3-month follow-up versus baseline are presented in table 3.

Within-group comparisons of the drug abuse variables did reveal highly significant improvements in the IDDT group on both the DUS and the ASI. For the TAU group, in contrast, we only found moderate improvements on the DUS and no change on the ASI. The DUS improvements in the IDDT group were attributable to trends in reductions in the use of cannabis ($F = 3.410$; $p = 0.070$), cocaine ($F = 3.184$; $p = 0.080$). The improvements on the DUS in the TAU group could not be attributed to specific changes in drug use. Similar analyses for the alcohol abuse showed no significant change in either treatment group on ASI score. The IDDT group barely missed significance on the AUS score ($F = 3.954$; $p = 0.052$), whereas no significant improvements were found in the TAU scores on the AUS.

The IDDT group improved significantly in all PANSS scores, whereas the TAU group revealed improvement of negative and general symptoms but not positive symptoms on the PANSS. Correspondingly, the IDDT group improved in the psychiatric symptomatology subscale on the ASI whereas the TAU group did not.

Finally, the IDDT group showed great improvements on almost all measures of overall functioning, whereas no such effects were observed in the TAU group on any of the assessments (table 3).

Between-group comparisons did not reveal any differences between the IDDT and the TAU group for any of the substance use variables 3 months after baseline assessment. The IDDT group did have significantly better scores compared to the TAU group on the ASI-psy suggesting an overall superior improvement in their psychiatric symptoms, although this was not found for any of the PANSS subscales.

Importantly, the IDDT group also showed significantly more improvement on several of the functioning variables (table 3).

Differences in Dropout Rates between IDDT and TAU Groups

Of the 85 patients who entered the IDDT group, 60 (71%) were reassessed 3 months later, while only 36 patients (42%) completed the study and were assessed at 12 months. 35 patients entered the TAU group, of whom 25 (71%) were reassessed at 3 months, while only 7 trial completers (20%) took part in the 12-month follow-up (fig. 1).

In order to investigate to what extent the different treatment programmes were able to engage the patients, dropout rates were compared at all follow-up moments.

Overall, there was a significant difference in dropout rates between the two patient groups ($F = 3.839$; $p = 0.012$). Three months after baseline no significant difference was found ($F < 1$; $p = 0.927$), but there was a higher dropout rate at the 6-month follow-up in the TAU group compared to the IDDT group ($F = 6.758$; $p = 0.011$), the difference of which was still significantly present 12 months after baseline ($F = 5.547$; $p = 0.020$). Unfortunately, in most cases the reason for dropout could not be established. However, in both treatment conditions the patients who remained in the study longer also systematically attended the outpatient aftercare treatment longer than those who had dropped out earlier (IDDT: $F = 18.320$; $p < 0.001$; TAU group: $F = 16.977$; $p = 0.001$), suggesting that dropout and treatment discontinuation were highly associated.

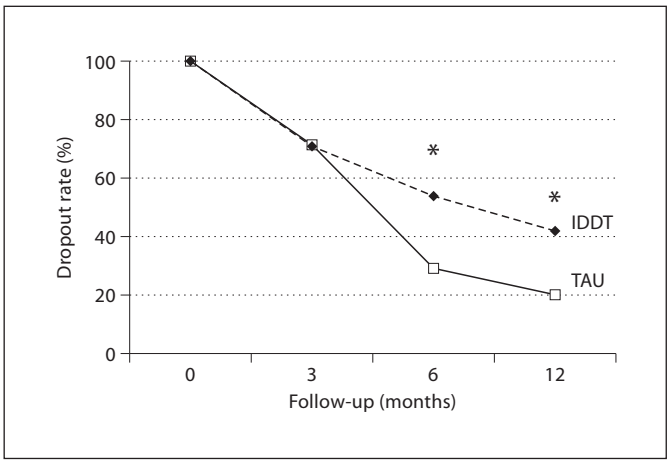

Fig. 1. Dropout rates (in %) in IDDT and TAU patient groups on all follow-up moments. * $p < 0.05$.

When comparing the baseline scores of the trial completers with those of their peers who had dropped out, we found no significant differences for the substance abuse scales or for the functioning scales for either treatment group. As to the positive and negative symptoms, compared to the IDDT completers, the IDDT dropouts tended to have higher positive symptom scores ($F = 5.697$; $p = 0.020$). No such differences were found in the TAU group.

Importantly, whereas the two groups did not significantly differ in the length of their hospital stays (see also Methods section), the patients in the IDDT group attended the outpatient aftercare clinic significantly longer ($F = 7.722$; $p = 0.007$).

As to the residential treatment, we found no significant differences in either group between the patients who left after 3 months and those who stayed in the programme longer.

In order to investigate whether motivation towards the treatment model may have played a role, RCQ scores were compared between the two groups. At baseline, no differences were found for either alcohol or drugs between the two groups on any of the RCQ scores. Interestingly however, the 'action' subscale of the RCQ-D was significantly higher in the IDDT group after 3 months of treatment compared to TAU whereas this was not found for the other two subscales, which seems to reflect that after 3 months of IDDT, patients were more motivated to actively work on their substance abuse, compared to TAU. After 3 months no significant differences were found in either of the RCA-A scales.

Analyses at the 6- and 2-Month Assessments

Tentatively, some additional analyses were performed to cautiously explore the evolution of the measures of substance use, psychiatric symptoms and outcome at the 6- and 12-month assessments. It should be mentioned that these results are to be interpreted with caution due to the high attrition rates.

All the improvements found at the 3-month assessment in the IDDT group remained significantly present at the last two assessments with the exception of DUS which lost significance at the 6-month assessment, although present again at 12 months. In the TAU group, only the comparison for DUS between baseline and 12 months was found to be significant ($F = 8.048$; $p = 0.016$), whereas all other comparisons were not, including the comparisons for all PANSS measures.

Between-group comparisons revealed no significant differences between the two treatment groups for any of the substance use measures. Comparison between the two groups on positive symptoms subscale on the PANSS at 12 months versus baseline tended towards significance in favour of the IDDT group ($F = 3.320$; $p = 0.077$) whereas the psychiatric symptom subscale on the ASI, which was already significantly more improved in the IDDT group 3 months after baseline, remained significant on both assessments. As for the functional outcome measure, both SQLS-psych ($F = 9.950$; $p = 0.003$) and the ASI-family ($F = 4.815$; $p = 0.035$) measures were significantly better in the IDDT group 12 months after baseline.

Discussion

The DD patients who had participated in the IDDT programme addressing both their schizophrenia-related symptomatology and SUD showed statistically significant improvements on almost all measures after 3 months of treatment. All psychotic symptoms and illicit substance use had substantially been reduced and their self-reported quality of life and social and community functioning had greatly improved. In contrast, the patients who had received TAU had only improved modestly with moderate clinical improvements at 3 months, moderate improvements in a limited number of substance abuse measures, and no improvement in social and community functioning. Secondly, there was significantly less dropout in the IDDT group, suggesting that the IDDT programme engaged patients more compared to TAU. In this line, patients from the IDDT group attended the outpatient aftercare treatment longer than patients in the TAU condition.

Although not consistently confirmed [35], IDDT protocols have repeatedly been demonstrated to be effective in reducing substance use in patients with schizophrenia [37] as well as other DD groups [12, 45]. With the current study, we also find a substantial reduction in drug abuse in those patients having received IDDT, an effect we observed less consistently in the control group. Moreover, we demonstrated that the IDDT group improved significantly more in their substance abuse compared to the control group at 3 months. In the within-group analyses, neither of the two treatment groups had reduced their alcohol consumption, except for a trend in one alcohol-related measure in the IDDT group, but given their low baseline scores improvement was less likely to occur or make a noticeable impact.

The patients having received IDDT additionally showed highly significant improvements in all schizophrenia-related symptom domains after 3 months. The patients in the TAU condition only showed moderate improvements in their negative and general symptoms but not convincingly in their psychotic symptoms. Furthermore, the IDDT patients reported a better quality of life and fewer legal, somatic and familial problems. Six months after baseline, there was significantly less dropout in the IDDT group compared to their peers receiving TAU, an effect that was still observable after 12 months of treatment. This seems to suggest that IDDT enhances treatment adherence and retention. This was reflected in higher motivational scores on the RCQ for drug abuse after 3 months of treatment compared to the TAU group, whereas both groups had similar motivational levels at the start of treatment. This may be explained by several factors. First, IDDT had better effects after only 3 months of treatment on all clinical symptoms as well as in their social functioning which may enforce the patient to continue treatment. In addition, IDDT has a strong focus on motivational interviewing which also could result in less discontinuation. Finally, after discharge, in the IDDT programme the patients were appointed to a case manager who was responsible for the coordination and organisation of the aftercare, an important element which was lacking in the TAU programmes. This is corroborated by the finding that the IDDT patients also attended the outpatient aftercare programme significantly longer than the patients in the TAU condition. This is of great relevance as time in treatment is increasingly reported to be related to superior substance use outcomes [46]. Nevertheless, it should be noted that data on the reason of dropout was lacking, so dropout may not only reflect discontinuation of treatment, although the results demon-

strate that these two factors are highly associated. It should be noted that in the IDDT group, patients with more intensive positive symptoms prematurely dropped out in our study. Patients who were most resistant to the effects of treatment were probably more prone to discontinue their participation. Patients who relapsed with substance use were more likely to leave to early the treatment programme or were excluded from further participation, leaving those who were more motivated in the study longer. Although significantly less dropout was registered in the IDDT group compared to the TAU group, still 58% of the IDDT group was lost after 12 months. However, similar dropout rates have been reported in other studies investigating IDDT, specifically in schizophrenic patients [20, 47]. It could also be suggested that the transition from hospital-based towards community-based treatment is a moment when patients are prone to drop out and that this transition may have played a role in the high attrition rates in both groups. However, given that dropout was highest in the first 3 months in both groups whereas average hospital stay was 4–5 months, this seems less likely.

The inconsistency in the existing IDDT literature results from various issues. The complexity of the treatment programmes and the variation in the types of IDDTs are likely to have contributed to the diversity in findings. Most of the earlier studies included patients with various [36, 48] primary diagnoses, ranging from mood, anxiety, and psychotic syndromes to personality disorders, while some even omitted to specify the nature or prevalence of the primary diagnosis in their cohorts [49, 50]. Lastly, the sample sizes in many of the studies were relatively small. In an attempt to circumvent these latter limitations, we included a larger number of similar DD patients who were well defined, all having a confirmed primary diagnosis of schizophrenia and a co-occurring substance abuse disorder, thus enhancing the interpretability of the results.

Few IDDT studies had a similar focus on schizophrenic patients with co-morbid substance abuse [20, 30, 31, 37, 47, 51]. However, several of these studies had major limitations [20, 30, 31, 37, 47]. Two of the these four studies did not have a comparison group [37, 47], whereas all of these studies had small sample sizes (the largest investigated sample included 34 patients). These studies systematically demonstrated improved substance use in the IDDT group, which is in line with our findings although significant differences with the comparison group were not always found [20]. Similar to our results, most of these studies, but not all [47], also demonstrated reductions in psychiatric symptoms. Finally, improvements in functional outcome and quality of life have also been documented as a result of IDDT [30, 47].

A recent large-scale open, rater-blinded randomised controlled trial [51] tried to overcome the above-mentioned limitations by comparing integrated motivational interviewing and cognitive behavioural therapy (n = 164) to a TAU condition (n = 163) in two large patient samples. This study found that IDDT was associated with significant reductions in amount of substances used and higher readiness to change. However, and in contrast with our findings, they did not demonstrate effects on psychotic symptoms or functioning.

The limitations of the present study are that it is a non-randomised study; sample sizes are still rather small, especially in the TAU condition, and there was a substantial difference in the sample size between the two groups. Furthermore, while this is an important finding of the study and a characteristic of this population, there are still high dropout rates in both patient groups, although these dropout rates were significantly higher in the TAU group. Although dropout rates do not automatically reflect discontinuation of treatment, we chose to use the former measure to reflect attrition, given that discontinuation of treatment was not systematically registered. The psychologists that assessed the patients were also members of the clinical teams participating to the study. They ascertained us that dropout and attrition were very closely related, strengthening us in the use of dropout as outcome measure.

It should be noted that the IDDT model was compared to a traditional single focus psychiatric model, which did not have elements such as case management or motivational interviewing. This may have influenced the comparison between the two groups. Even if so, our findings thus only accentuate that, as mentioned before, these intrinsic elements of the IDDT model play a significant role in the engagement of the patient to the programme. Nevertheless, a comparison between the IDDT model and a treatment model that includes these components as well while lacking the integrated approach may be interesting. Research aimed at defining the active components of IDDT is also much needed. Finally, other staff-related aspects may also have confounded the results, such as the higher staffing in the IDDT programme compared to the TAU programmes, motivation and competence of the staff, a focus on a more homogeneous patient group in the IDDT programme or the positioning of the staff towards substance abuse.

Our results suggest that an integrated approach to patients with schizophrenia and co-morbid SUDs may be superior to standard treatment. Moreover, they also support the notion of comprehensive treatment and continuity of care. However, future studies should evaluate in the light of cost effectiveness which aspects of the IDDT programme are the effective components and how dropout rates could considerably be lowered.

Acknowledgments

The authors thank Sophie Van Ham and Maureen Malone for their help in preparing the data. They would also like to thank the staff of the participating units in the psychiatric hospitals of Sleidinge, Zelzate, Liège and Duffel for their help in the inclusion and assessment of the patients.

The work reported in this paper was supported by a grant from the Belgian Federal Department of Health and the Belgian Federal Department of Science Policy.

References

1 Dixon L, Haas G, Weiden PJ, Sweeney J, Frances AJ: Drug abuse in schizophrenic patients: clinical correlates and reasons for use. Am J Psychiatry 1991;148:224–230.
2 Fowler IL, Carr VJ, Carter NT, Lewin TJ: Patterns of current and lifetime substance use in schizophrenia. Schizophr Bull 1998; 24:443–455.
3 Ziedonis DM, Smelson D, Rosenthal RN, Batki SL, Green AI, Henry RJ, Montoya I, Parks J, Weiss RD: Improving the care of individuals with schizophrenia and substance use disorders: consensus recommendations. J Psychiatr Pract 2005;11:315–339.
4 Blanchard JJ, Brown SA, Horan WP, Sherwood AR: Substance use disorders in schizophrenia: review, integration, and a proposed model. Clin Psychol Rev 2000;20:207–234.
5 Ries RK, Russo J, Wingerson D, Snowden M, Comtois KA, Srebnik D, Roy-Byrne P: Shorter hospital stays and more rapid improvement among patients with schizophrenia and substance disorders. Psychiatr Serv 2000;51:210–215.
6 Swofford CD, Kasckow JW, Scheller-Gilkey G, Inderbitzin LB: Substance use: a powerful predictor of relapse in schizophrenia. Schizophr Res 1996;20:145–151.
7 Cantwell R, Scottish Comorbidity Study Group: Substance use and schizophrenia: effects on symptoms, social functioning and service use. Br J Psychiatry 2003;182:324–329.
8 Caton CL, Shrout PE, Eagle PF, Opler LA, Felix A: Correlates of codisorders in homeless and never homeless indigent schizophrenic men. Psychol Med 1994;24:681–688.
9 Dixon L, McNary S, Lehman A: Substance abuse and family relationships of persons with severe mental illness. Am J Psychiatry 1995;152:456–458.
10 Xie H, McHugo GJ, Helmstetter BS, Drake RE: Three-year recovery outcomes for long-term patients with co-occurring schizophrenic and substance use disorders. Schizophr Res 2005;75:337–348.
11 Ouimette PC, Ahrens C, Moos RH, Finney JW: During treatment changes in substance abuse patients with posttraumatic stress disorder. The influence of specific interventions and program environments. J Subst Abuse Treat 1998;15:555–564.
12 Drake RE, Mercer-McFadden C, Mueser KT, McHugo GJ, Bond GR: Review of integrated mental health and substance abuse treatment for patients with dual disorders. Schizophr Bull 1998;24:589–608.
13 Drake RE, Mueser KT: Psychosocial approaches to dual diagnosis. Schizophr Bull 1993;26:105–118.
14 Tsuang J, Fong TW: Treatment of patients with schizophrenia and substance abuse disorders. Curr Pharm Des 2004;10:2249–2261.
15 Ziedonis DM: Integrated treatment of co-occurring mental illness and addiction: clinical intervention, program, and system perspectives. CNS Spectr 2004;9:892–904, 925.
16 Tiet QQ, Mausbach B: Treatments for patients with dual diagnosis: a review. Alcohol Clin Exp Res 2007;31:513–536.
17 Cleary M, Hunt G, Matheson S, Siegfried N, Walter G: Psychosocial interventions for people with both severe mental illness and substance misuse. Cochrane Database Syst Rev 2008;1:CD001088.
18 Kofoed L, Kania J, Walsh T, Atkinson RM: Outpatient treatment of patients with substance abuse and coexisting psychiatric disorders. Am J Psychiatry 1986;143:867–872.
19 Hellerstein D, Meehan B: Outpatient group therapy for schizophrenic substance abusers. Am J Psychiatry 1987;144:1337–1340.
20 Hellerstein DJ, Rosenthal RN, Miner CR: A prospective study of integrated outpatient treatment for substance-abusing schizophrenic patients. Am J Addict 1995;4:33–42.
21 Ziedonis DM, Trudeau K: Motivation to quit using substances among individuals with schizophrenia: implications for a motivation-based treatment model. Schizophr Bull 1997;23:229–238.
22 Blankertz LE, Cnaan RA: Assessing the impact of two residential programs for dually diagnosed homeless individuals. Soc Serv Rev 1994;68:536–560.
23 Drake RE, Yovetich NA, Bebout RR, Harris M, McHugo GJ: Integrated treatment for dually diagnosed homeless adults. J Nerv Ment Dis 1997;185:298–305.
24 Herman SE, Frank KA, Mowbray CT, Ribisl KM, Davidson WS, BootsMiller B, Jordan L, Greenfield AL, Loveland D, Luke DA: Longitudinal effects of integrated treatment on alcohol use for persons with serious mental illness and substance use disorders. J Behav Health Serv Res 2000;27:286–302.
25 Weiss RD, Griffin ML, Jaffee WB, Bender RE, Graff FS, Gallop RJ, Fitzmaurice GM: A 'community-friendly' version of integrated group therapy for patients with bipolar disorder and substance dependence: a randomized controlled trial. Drug Alcohol Depend 2009;104:212–219.
26 Hides L, Carroll S, Catania L, Cotton SM, Baker A, Scaffidi A, Lubman DI: Outcomes of an integrated cognitive behaviour therapy treatment program for co-occurring depression and substance misuse in young people. J Affect Disord 2010;121:169–174.
27 Moggi F, Brodbeck J, Költzsch K, Hirsbrunner HP, Bachmann KM: One-year follow-up of dual diagnosis patients attending a 4-month integrated inpatient treatment. Eur Addict Res 2002;8:30–37.
28 Moggi F, Hirsbrunner HP, Brodbeck J, Bachmann KM: One-year outcome of an integrative inpatient treatment for dual diagnosis patients. Addict Behav 1999;24:589–592.
29 Bartels SJ, Drake RE: A pilot study of residential treatment for dual diagnosis. J Nerv Ment Dis 1996;184:379–381.
30 Barrowclough C, Haddock G, Tarrier N, Lewis SW, Moring J, O'Brien R: Randomized controlled trial of motivational interviewing, cognitive behavior therapy, and family intervention for patients with comorbid schizophrenia and substance use disorders. Am J Psychiatry 2001;158:1706–1713.

31 Haddock G, Barrowclough C, Tarrier N, Moring J, O'Brien R, Schofield N: Cognitive-behavioural therapy and motivational intervention for schizophrenia and substance misuse. 18-month outcomes of a randomised controlled trial. Br J Psychiatry 2003;183:418–426.
32 Burnam MA, Morton SC, McGlynn EA, Petersen LP, Stecher BM, Hayes C, Vaccaro JV: An experimental evaluation of residential and nonresidential treatment for dually diagnosed homeless adults. J Addict Dis 1995;14:111–134.
33 Nigam R, Schottenfeld R, Kosten TR: Treatment of dual diagnosis patients: a relapse prevention group approach. J Subst Abuse Treat 1992;9:305–309.
34 Ries RK, Ellingson T: A pilot assessment at one month of 17 dual diagnosis patients. Hosp Community Psychiatry 1990;41:1230–1233.
35 Craig TK, Johnson S, McCrone P, Afuwape S, Hughes E, Gournay K, White I, Wanigaratne S, Leese M, Thornicroft G: Integrated care for co-occurring disorders: psychiatric symptoms, social functioning, and service costs at 18 months. Psychiatr Serv 2008;59:276–282.
36 Bartels SJ, Drake RE, Wallach MA: Long-term course of substance use disorders among patients with severe mental illness. Psychiatr Serv 1995;46:248–251.
37 Drake RE, Bartels, SB, Teague GB, Noordsy DL, Clark RE: Treatment of substance use disorders in severely mentally ill patients. J Nerv Ment Dis 1993;181:606–611.
38 Durell J, Lechtenberg B, Corse S, Frances RJ: Intensive case management of persons with chronic mental illness who abuse substances. Hosp Community Psychiatry 1993;44:415–416, 428.
39 American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, ed 4 rev. Washington, APA, 2000.
40 Drake RE, Mueser KT, Brunette MF, McHugo GJ: A review of treatments for people with severe mental illnesses and co-occurring substance use disorders. Psychiatr Rehabil J 2004;27:360–374.
41 McLellan AT, Luborsky L, Woody GE, O'Brien CP: An improved diagnostic evaluation instrument for substance abuse patients: The Addiction Severity Index. J Nerv Ment Dis 1980;168:826–833.
42 Drake RE, Mueser KT, McHugo GJ: Clinician Rating Scales: Alcohol Use Scale (AUS), Drug Use Scale (DUS), and Substance Abuse Treatment Scale (SATS); in Sederer LI, Dickey B (eds): Outcomes Assessment in Clinical Practice. Baltimore, Williams & Wilkins, 1996, pp 113–116.
43 Kay SR, Fiszbein A, Opler LE: The Positive and Negative Syndrome Scale (PANSS) for schizophrenia. Schizophr Bull 1987;13:261–275.
44 Wilkinson G, Hesdon B, Wild D, Cookson R, Farina C, Sharma V, Fitzpatrick R, Jenkinson C: Self-report quality of life measure for people with schizophrenia: the SQLS. Br J Psychiatry 2000;177:42–46.
45 Hesse M: Integrated psychological treatment for substance use and co-morbid anxiety or depression vs. treatment for substance use alone. A systematic review of the published literature. BMC Psychiatry 2009;9:6.
46 Grella CE, Stein JA, Weisner C, Chi F, Moos R: Predictors of longitudinal substance use and mental health outcomes for patients in two integrated service delivery systems. Drug Alcohol Depend 2010;110:92–100.
47 Shaner A, Eckman T, Roberts LJ, Fuller T: Feasibility of a skills training approach to reduce substance dependence among individuals with schizophrenia. Psychiatr Serv 2003;54:1287–1289.
48 Godley SH, Hoewing-Roberson R, Godley MD: Final MISA Report. Bloomington, Lighthouse Institute, 1994.
49 Detrick A, Stiepock V: Treating persons with mental illness, substance abuse, and legal problems: The Rhode Island experience; in Stein LI (ed): Innovative Community Mental Health Programs. New Directions for Mental Health Services. San Francisco, Jossey-Bass, 1992, vol 56, pp 65–77.
50 Jerrell JM, Ridgely MS: Comparative effectiveness of three approaches to serving people with severe mental illness and substance abuse disorders. J Nerv Ment Dis 1995;183:566–576.
51 Barrowclough C, Haddock G, Wykes T, Beardmore R, Conrod P, Craig T, Davies L, Dunn G, Eisner E, Lewis S, Moring J, Steel C, Tarrier N: Integrated motivational interviewing and cognitive behavioural therapy for people with psychosis and comorbid substance misuse: randomised controlled trial. BMJ 2010;341:c6325.