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ABSTRACT

We examined factors predictive of dropout from inpatient treatment for anorexia nervosa (AN) among adolescents in a prospective study of 359 consecutive hospitalizations for AN (DSM-IV). Patients were assessed at admission (clinical, socio-demographic, and psychological data). Multivariate analyses were performed. Drop-out (i.e. leaving hospital before the target weight is achieved) occurred in 24% ($n=86$) of hospitalizations; in 42.3% ($n=30$) of the cases, dropout was initiated by the treatment team and in 58.6% ($n=41$) by the patients and/or their parents. 18.6% (16/86) occurred during the first half of the inpatient program. Frequency of drop-out was significantly higher when the patient was living with only one parent, had been hospitalized previously, had a lower BMI at admission and was over 18 at admission. These elements should draw the attention of the clinician, so that he/she can prepare hospitalization with patients presenting lower admission BMI, particularly by motivational interventions for a better therapeutic alliance, and by the deployment of intensive accompaniment of single parents. Further studies aiming to replicate these results, and including the evaluation of other clinical dimensions such as impulsivity and other personality traits, are needed to elucidate this important topic.

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1. Introduction

Patients with the most severe forms of anorexia nervosa (AN) often require hospitalization because of malnutrition, the chronic course of their illness, or their psychological state (American Psychiatric Association, 2006). However, a significant percentage of patients with AN do not successfully complete inpatient treatment. Reported drop-out rates range from 20.2% (Surgenor et al., 2004) to 57.6% (Vanderheiken and Pierloot, 1983). Dropping out from inpatient treatment for AN also appears to have a negative impact on the successful long-term treatment overall. More specifically, leaving the hospital before the care program is complete (i.e. target weight achieved) predicts poorer outcome, with an increased risk of relapse

within the first year (Baran et al., 1995; Strober et al., 1997; Carter et al., 2004). Furthermore, patients who have dropped out from inpatient care display more eating disorder symptoms in follow-up (Baran et al., 1995) and a more chronic and severe course of illness. In addition it has been shown that compliance is a major factor among treatment-resistant eating-disordered in-patients, and facilitates recovery and successful treatment (Towell et al., 2001).

Very few studies have examined pre-admission factors predictive of drop-out (see Wallier and Fassino for a comprehensive review (Wallier et al., 2009; Fassino et al., 2009)). Socio-demographic, psychological and other clinical factors have been associated with drop-out, although only a small number of predictors have been identified in more than one study. In multivariate analysis, only a few factors have emerged as predictive of drop-out: lower Body Mass Index (BMI) among adults at admission (Surgenor et al., 2004), higher BMI among adolescents at admission (Godart et al., 2005), low desired BMI at admission (Huas et al., 2010), binge eating/purging AN subtype (Surgenor et al., 2004), the

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absence of comorbid depression (Zeeck et al., 2005), later age at onset, factors related to the eating disorder (weight concerns, restraint, maturity fears, number of symptoms at admission, general psychopathology, eating behavior symptoms) (Kahn and Pike, 2001; Woodside et al., 2004; Surgenor et al., 2004; Huas et al., 2010), having one or more children (Huas et al., 2010), and low educational status (Huas et al., 2010).

Although these studies have unearthed a certain number of predictors of drop-out, they have all focused on samples mostly in an adult age range. We have already published preliminary results in a letter concerning both pre-admission and pre-hospitalization factors in an adolescent population (Godart et al., 2005). We postulated that the reasons why adolescents drop out from care may be different from those for adults, and that this requires further study: the treatment programs and clinical characteristics of these two patient populations are somewhat different. For example, the family environment of adolescent patients, and the parents in particular, has an important role in the success of the treatment (Lock et al., 2006; Pereira et al., 2006). In addition, non-adult patients are under the legal care of their parents, and hospitalization is possible only with parental approval. Little research has examined these topics.

An understanding of the factors associated with adolescents dropping out of care would theoretically make it possible to develop strategies to reduce drop-out rates and improve treatment success rates for the most severe cases of adolescent AN (i.e. needing inpatient treatment), this being a predictive factor for a better long-term outcome (Steinhausen, 2002).

Therefore the purpose of this study was to examine factors related to drop-out from inpatient treatment in a large sample of adolescent inpatients with AN. More specifically, this research explored the factors cited above that have been shown to predict drop-out in adult populations, as well as some further elements that we hypothesized could be linked to drop-out (socio-demographic features of parents and patients, and clinical characteristics that describe the severity of patient condition).

2. Methods

2.1. Recruitment and assessment procedures

For this study, all patients aged from 12 to 22 discharged from our eating disorders inpatient unit between May 1996 and February 2006 ($N=328$) were considered. These subjects were hospitalized in our care unit during the inclusion period for a life-threatening physical and/or mental state or states (BMI below 14 and/or rapid weight loss and/or compromised vital functions, severe depression, high suicide risk, chronic under-nutrition with low weight, and failure of outpatient care. Failure of outpatient treatment is defined as a significant deterioration, or the absence of any significant improvement, in terms of weight gain, eating disorders symptoms and/or psychological severity).

All subjects with a clinical diagnosis of AN (according to the DSM-IV criteria (1) confirmed by one of the senior psychiatrists in the team) were included in this research. Twelve patients who met all the diagnostic criteria except "amenorrhea for 3 months" were nevertheless included, as this criterion is not essential for the diagnosis of AN (5). Of these 12 patients, six were taking birth control pills, three had a 2 months duration of amenorrhea and three had a 1 month duration of amenorrhea.

A total of 35/328 (10.7%) patients were excluded from this research. Three patients were excluded because a severe somatic disease complicated the symptoms of AN (one had diabetes mellitus and two had Ewing's sarcoma). Thirteen patients, with eating disorders but who did not meet all the diagnostic criteria for AN and were hospitalized without a weight contract, were also excluded from this research. In addition, male patients were not included in this study because of their small number ($n=19$).

2.2. Patient characteristics

In the present study, the 359 consecutive hospitalizations of 293 patients were included. One patient was hospitalized five times, six were hospitalized four or three times, 32 were hospitalized twice and the others once ($n=248$). Mean age

admission was 16.6 years (S.D.=1.9), range: 12.2–22.8 (≤ 13 years: 6.6%; 14–17 years: 67.8%; ≥ 18 years: 25.6%). Most patients came from a "managerial and professional" category family (68.6%, $n=234$). They presented restrictive type AN for 78% ($n=281/359$) and purging type for 22% ($n=78/359$). The majority of the patients had menstruated before anorexia nervosa (85%, $n=304$) and 15% ($n=55$) had primary amenorrhea.

2.3. Procedure

The Patient Information Questionnaire was completed by each patient's psychiatrist or intern, using information gathered in clinical interviews. These questionnaires were completed in three distinct phases: at the time of the patient's admission to hospital, during hospitalization, and at the time of discharge. The content was double-checked by the psychiatrist responsible for the patient, and then by another psychiatrist with first-hand knowledge of the patient (N. Godart, F. Perdureau).

2.4. Patient information questionnaire

This questionnaire was used to record clinical information for all patients hospitalized in the department. It was created in 1996 by Godart (copies available on request) using the concept of systematic data collection as modeled by the Maudsley database (Wannan and Fombonne, 1998).

Part one collects general information concerning the patient, the diagnosis/es at discharge made by the clinician according to DSM-IV criteria, the treatment proposed at discharge, and socio-demographic data as previously described (Strik-Livers et al., 2009).

Part two concerns the patients with eating disorders and comprises information on DSM IV criteria for AN, Bulimia and non-specified eating disorders; patient history regarding weight, including weight and stature on admission to hospital, weight before AN, minimum weight (at what age for what stature), age at onset of the eating disorders, dates of first and last menstruation, duration of amenorrhea, duration of untreated AN (time that elapsed between the onset of AN and the first psychiatric consultation), use of oral contraception, any nasal-gastric tube use, period spent in intensive care, and comorbid diagnosis of major depressive disorder (according to DSM-IV criteria) during hospitalization. The predictive variables for drop-out reported in the literature (except for psychopathological features) were assessed in Part 2 of this questionnaire.

2.5. Terminology: definition of drop-out

The treatment in our inpatient eating disorders unit involves a multidisciplinary approach. It revolves around a therapeutic contract described in Godart et al. (2009). This verbal contract is established between the patient, the family and the staff, and defines two target weights: the "end of separation weight" and the "target discharge weight". The latter is the weight to attain before discharge. The former is an intermediate weight situated between the final weight goal and the weight of the patient upon arrival (within one or two kilos of the mean of these two weights). The patient must reach this weight in order to complete the first part of the hospital stay. During the first part of the inpatient program the patient remains in the unit every day. During the second part of inpatient program the patient stays 5/7 days in the hospital and spends the weekend at home (Godart et al., 2005).

The determination of final discharge weight is based on the following:

1. The weight and stature of the patient before AN (BMI before AN). This is based on family and/or patient report, the *carnet de santé*¹ and medical records, and constitutes a reference for the normal state. However for a previously overweight patient, objectives are set lower, and for a previously underweight patient they are set higher in accordance with the growth chart.
2. The patient's desired weight (participant's desired BMI).
3. The parent's desired weight for their daughter.

The duration of hospitalization is therefore not defined at admission. The timing depends rather on the patient, who can regulate her weight gain to reach the final target weight and be discharged.

For this research, *drop-out* was defined as not completing the therapeutic contract (i.e. not reaching the discharge weight) regardless of whether the patient, the parents or the staff terminated the treatment. *Patient-initiated discharge* was defined as any drop-out initiated by the patient and/or her parents when patients were minors. *Staff discharge* refers to instances where the staff decides to discharge a patient who has not yet reached her target weight, usually because of a lack of

¹ The *carnet de santé* contains medical information including detailed information regarding stature and weight development from birth. In France, all children have a *carnet de santé* which is to be presented at each medical appointment.

progress over a long period of hospitalization (i.e. some months of stagnation in the second phase).

Drop-outs are also defined according to the contract, either as “early” (before the end of the first part of hospitalization) or “late” (before reaching the discharge target weight), i.e. by the period during which they occur.

3. Statistical analyses

Qualitative variables were described using proportions and percentages. Proportions were compared using the Phi test for all the two class variables and Cramer's *V* test for parental socio-economic status (three classes). Quantitative variables were described using means and standard deviations (S.D.). The means of two independent groups were compared using Student *T*-tests. The association between two quantitative variables was assessed using the Pearson correlation coefficients [*r*]_s. We did not make corrections for multiple comparisons, as recommended by Bender and Lange (2001). All statistical tests were two-tailed; the level of significance was $\alpha=0.05$.

The association between premature termination and possible related factors was investigated in two stages. First, we tested the link between drop-out and all the potential predictors using univariate analysis. The following variables were considered: predictive factors for drop-out studied in literature: body mass index BMI = weight in kg/(height in m)² at admission, desired BMI at admission, binge eating/purging AN subtype, comorbid depression, age at onset; and in addition: any need for intensive care during hospitalization, the existence of a period of enteral feeding, a history of suicide attempt, the “amplitude” of the contract (discharge BMI–admission BMI), the family situation in which the patient was living (if the patient was living with both parents or only one, single, divorced or widowed).

For strongly correlated variables, to avoid biasing our results and our explicative model for drop-out, we retained those with the greatest “clinical relevance”.

Then a stepwise descending logistic regression model was performed using drop-out as the dependent variable and all the variables previously found to be significantly related to drop-out in univariate analysis as the independent variables, to which were added those significantly linked to drop-out in the literature even if they were not significant in univariate analysis.

4. Results

4.1. Demographic and clinical characteristics (Table 1)

Drop-out occurred in 24.0% ($n=86$) of the hospitalizations. Among drop-outs, 42.3% ($n=36$) were initiated by the treatment team in agreement with patients and parents, and 58.7% ($n=52$) by the patients and/or their parents. 18.6% (16/86) of all drop-outs occurred during the first half of the inpatient program. The hospitalizations terminated by the staff compared to those terminated by the patient were significantly longer ($m \pm S.D. = 74.7 \pm 4$ months versus $m 4.1 \pm 3.5$ months, $p < 0.03$), and they concerned patients who had a longer duration of AN ($m \pm S.D. = 29.0$ 19.1 months versus $m \pm SD = 20.6 \pm 15.3$ months, $p < 0.03$).

4.2. Univariate analyses (Tables 1a and b)

The patients who dropped out were older than treatment completers ($p < 0.02$). Patients under 18 years at admission dropped out less frequently than the others ($p < 0.02$). The lower the BMI at admission ($p < 0.002$) and the previous minimum BMI ($p < 0.007$), the greater the likelihood of dropping out.

The longer the duration of amenorrhea (months) ($p < 0.04$), the greater the number of hospitalizations ($p < 0.009$) and the longer the hospitalization (months) ($p < 0.08$), the greater the likelihood of drop-out.

Patients who dropped out had a lower BMI at discharge (kg/m²) than completers ($p < 0.001$).

Previous suicide attempts were linked to greater likelihood of drop-out ($p < 0.05$). Patients living with only one parent were nearly twice as likely to drop out ($p < 0.004$).

4.3. Multivariate logistic regression analysis

The best logistic regression model with adjusted hazard ratio for each factor studied and the 95% CI is presented in Table 2; R^2 was 0.15. In all, nine variables were introduced into the drop-out model. The variables significantly linked to drop-out in univariate analysis that were introduced into the model were as follows: BMI at admission (kg/m²), number of hospitalizations, past history of suicide attempt, living with a single parent, and being under 18 at admission. Then the variable AN duration was introduced, rather than duration of amenorrhea, as these two variables were correlated ($r=0.806$, $p < 0.001$), in order to consider primary amenorrhea AN patients. Similarly, previous minimum BMI was not introduced because it was correlated with BMI at admission ($r=0.7$, $p < 0.001$).

Factors reported to be significant in multivariate analysis in the literature were included in multivariate analysis (binge eating/purging AN subtype, diagnosis of depression during the hospitalization, low desired body mass index at admission). In addition, age at admission was introduced because BMI is linked to age.

Frequency of drop-out was significantly higher when the patient was living with only one parent (three times more frequent, $p < 0.000$), had been frequently hospitalized previously (0.005), had a lower BMI at admission ($p < 0.002$) and was over 18 at admission ($p < 0.014$).

5. Discussion

To our knowledge, this is the largest study concerning drop-out from inpatient treatment for AN conducted in a population of adolescents (and very young adults). We found a drop-out rate of 24% (either patient- or staff-initiated) in this population, which is one of the lowest rates observed to date. Previous research suggests that drop-out rates vary from 20.2% (Surgenor et al., 2004) (defined as patient-initiated discharge) to 57.6% (Vanderheiken and Pierloot, 1983), (defined as either patient- or staff-initiated discharge). Drop-out was predicted by four factors at admission: frequent past hospitalizations, living with only one parent, lower admission BMI and being over 18.

Our low level of drop-out can be explained both by low levels of staff-initiated drop-out and by low levels of patient or parent-initiated drop-out. The low level of staff-initiated drop-out is linked to our treatment program. While Woodside et al. or Huas et al. reported that their staff prematurely discharged patients in case of repeated violation of program rules (e.g. purging in the unit), Woodside also discharged patients when there was a lack of progress (e.g. lack of weight gain, failure to stop purging), or the development of serious comorbidity (e.g. psychosis). Our treatment protocols do not lead to premature discharge for patients who fail to gain weight or continue purging early in their hospital stay. Indeed the mean duration of hospitalization was longer when it was terminated by treatment staff than when terminated early by the patient, which is a reflection on our treatment practice (Strik-Livers et al., 2009). As mentioned above, in our program the staff does not discharge a patient

Table 1

(a) Socio-demographic and clinical characteristics, description of the patients and results of univariate comparisons between completers and drop-outs (quantitative variables).

	Total (n=359) M (S.D.)	Completer (n=273) M (S.D.)	Drop-out (n=86) M (S.D.)	t	p values
Age at admission (years)	16.6 (1.9)	16.5 (1.9)	17.1 (2)	-2.401	0.017
BMI at admission	13.6 (1.3)	13.6 (1.3)	13.2 (1.3)	2.735	0.007
Previous minimum BMI	13.2 (1.4)	13.3 (1.3)	12.8 (1.4)	3.062	0.002
Previous maximum BMI	19.8 (2.7)	19.9 (2.7)	19.4 (2.6)	2.977	0.137
Weight lost at admission	6.2 (2.5)	6.2 (2.5)	6.2 (2.4)	0.062	0.951
Age at onset (years)	14.4 (1.4)	14.4 (1.5)	14.3 (1.3)	-1.432	0.153
Duration of AN (months)	21.2 (17.3)	20.4 (17.4)	23.4 (16.8)	-1.389	0.166
Duration of amenorrhea (months)	16.8 (14.5)	12.7 (9.9)	16.4 (12.6)	-2.159	0.034
Duration of untreated AN (months)	10.5 (10.8)	10.9 (11.2)	9.8 (9.5)	0.971	0.333
Number of hospitalizations	0.75 (1.2)	0.6 (1.1)	1.1 (1.6)	-2.668	0.009
Length of hospitalization (months)	4.4 (3.1)	4.2 (2.7)	5 (4)	-1.759	0.081
BMI at discharge	17.5 (1.4)	17.9 (1)	15.7 (1.4)	11.684	< 0.0001
Desired BMI at admission	17 (1.4)	17 (1.3)	17 (1.5)	0.322	0.748
Amplitude of the weight contract	4.1 (1.1)	4.1 (1.2)	4.3 (1.1)	-1.51	0.132

AN: Anorexia Nervosa.

The bold numbers are those implicated in the significant results.

Table 1

(b) Socio-demographic and clinical characteristics, description of the patients and results of univariate comparisons between completers and drop-outs (qualitative variables).

	Total (n=359) % (N)	Completer (n=273) % (N)	Drop-out (n=86) % (N)	Phi2	p values
AN subtype: bingeing/purging	22 (78)	76 (59)	24 (19)	0.004	0.937
Comorbid depression	59.1 (112)	58.1 (158)	62.8 (54)	0.041	0.439
Nasal gastric tube	31.8 (114)	71 (81)	28.9 (33)	0.079	0.136
Intensive care	22 (79)	74.7 (59)	25.3 (20)	0.015	0.773
Past history of suicide attempt	13.4 (48)	64.5 (31)	35.4 (17)	0.104	0.049
Living with single parent	25.3 (91)	64.8 (59)	35.2 (32)	0.152	0.004
Minor at admission (< 18 years old)	75.8 (86)	80.1 (218)	19.9 (54)	0.163	0.002
Parental socio-economic status				V de Cramer	P values
Unskilled workers	7.6 (26)	76.6 (183)	23.4 (56)	0.069	0.650
Semi-skilled professionals	22.7 (78)	75.6 (59)	24.4 (19)		
Managers and professionals	69.7 (239)	65.4 (17)	34.6 (9)		

Table 2

Adjusted hazard ratios (aHRs) and 95% confidence intervals (95% CI) for predictive factors related to drop-out data from logistic regression model, multivariate analysis (stepwise logistic regression).

Dropouts (n=86)	Prognostic factors	B	p values	Exp(B)	CI for Exp(B) 95.0%	
					Inf.	Sup.
	BMI at admission	-0.298	0.005	0.742	0.604	0.912
	Number of hospitalizations	0.322	0.002	1.379	1.127	1.689
	Under 18 years at admission	-0.711	0.014	0.491	0.278	0.867
	Living with single parent	1.102	0.000	3.011	1.700	5.335
	Constant	2.797	0.045	25.177		

because of a lack of progress in the first part of the treatment. Drop-out is decided by the team when the length of the stay extends unreasonably and the treatment has lost its effective-potential.

The very low rate of patient-initiated drop-out in our sample is probably due to the fact that our sample was composed of young people (74.4% were younger than 18), requiring their parents' permission (according to the law) to terminate treatment against medical advice. In our department, we also focus on a strong therapeutic alliance with patients' parents (Godart et al., 2005, 2009), enabling clinicians to work with parents on their feelings of reluctance toward hospitalization and to help them to overcome these feelings. This could contribute to explaining why the drop-out rate found in our sample was

one of the lowest of those reported in the literature on the subject.

All drop-out patients were offered out-patient treatment, but we have no information about their cooperation.

The first factor predicting drop-out in our study is the frequency of past hospitalizations for AN. The more frequently a subject had been hospitalized since the onset of AN, the greater the risk of drop-out. It is harder to keep a patient in treatment when he/she has experienced many hospitalizations without achieving any results. As suggested by Herpertz-Dahlmann and Salbach-Andrae, p. 135, "to prevent more adolescents from dropping out of treatment, it may be helpful to introduce some sort of "motivational enhancement intervention" to engage them in therapy and reduce ambivalence and resistance to change"

(Herpertz-Dahlmann and Salbach-Andrae, 2009). Previous studies have shown that among adolescent inpatients, low motivation for change predicts readmission to hospital (Ametller et al., 2005).

In addition, motivational intervention, which has been used in the treatment of addiction, may be helpful in short-term treatment outcomes in adolescent AN (Herpertz-Dahlmann and Salbach-Andrae, 2009) as has already been shown (Gowers and Smyth, 2004; Schmidt and Treasure, 2006). Hence in these situations of more than one previous inpatient admission, we think that motivational sessions should be organized for patients prior to admission in order to prevent drop-out, as proposed by Dean et al.

The second condition predicting drop-out in our study is the family situation of the patient on admission. Drop-out is more likely among patients from a single-parent environment (separation, divorce, widowhood). Having only one parental figure (mother or father alone) seems to compromise the continuity of treatment.

In fact, 25.4% of the patients in this study were living with a single parent, either separated, single, or widowed. When parents are separated (or divorced) and in conflict, establishing a strong alliance is far more problematic. An adolescent with AN often leans towards the parent that is more opposed to treatment to obtain a termination of the treatment contract. When a parent is isolated (widowed or single), he or she may be incapable of opposing the patient's decision to refuse treatment.

These situations must be detected early in order to provide guidance for parents, and support and accompany them in managing their conflicts or their solitude. They will thus be better able to back up the treatment and resist their child's desire to drop out, in the child's best interests.

The third condition predicting drop-out in our study is the admission BMI. The lower the BMI at admission, the more likely was the patient to drop-out. This is consistent with past studies showing that lower BMI is linked to poorer outcome (Hebebrand et al., 1996; Huas et al., 2010). Very low BMI seems to identify very severe patients who are less compliant with the proposed treatment (Hebebrand et al., 1996; Halmi, 2005). This non-compliance leads to drop-out and hence lower BMI at discharge, which in turn contributes to poor prognosis and also to more costly care itineraries (Baran et al., 1995; Wiseman et al., 2001). All this could be avoided with a better-designed pre-hospitalization program, in particular motivation for change therapy (Dean et al., 2007), which needs to be evaluated.

The fourth factor predicting drop-out in our study is being 18 or over. Patients over 18 more often dropped out than patients under 18. Patients who are legally minors are hospitalized following agreement by their parents, and cannot leave without parental assent. Although at the time of hospitalization patient opinion is sought, it is solely consultative. Resistance to treatment is considerable during hospitalization and patients are often tempted to leave before reaching their target weight. When patients are over 18 the parents cannot legally prevent them from leaving, and unless there is a life-threatening condition that warrants forced hospitalization (compulsory treatment on request of both the family and the medical doctor), nor can the medical team oppose it.

Consequently, caring for under-age subjects, when the alliance with the parents is good, is easier than caring for adult subjects who can freely opt for premature termination of treatment.

Our findings did not confirm previous findings according to which the absence of depression was related to drop-out. The overall rates for current depression found in our sample were comparable to those cited in literature (Woodside et al., 2004; Zeeck et al., 2005). However, in our sample, rates for depression were equally distributed between the two AN subgroups, whereas higher rates of depression were found in the bingeing/purging subgroup in other studies. In addition, previous research has found

that this AN sub-type is linked to drop-out (Surgenor et al., 2004; Woodside et al., 2004). However, like some other authors (Kahn and Pike, 2001; Zeeck et al., 2005) we were unable to confirm this finding in our sample. Only 22% of our sample was diagnosed with this sub-type of AN, most probably because of the lower mean age and the shorter duration of AN in our population in comparison to those in other studies. Indeed, about half of AN patients develop bingeing-purging behavior during the course of their illness. However when patients develop these behaviors they are usually older, with a longer duration and development of the illness (Zeeck et al., 2005). Our findings did not confirm those of previous research suggesting that the duration of illness, and the duration of untreated AN were related to dropping out of treatment (Woodside et al., 2004; Zeeck et al., 2005), but our sample is younger with a shorter illness duration.

There are certain limitations to this study. First, as for all other drop-out studies, the general applicability of our findings is restricted because of the particular treatment setting examined, as indeed is the case for any other study of this type. Second, our analyses focused on socio-demographic and clinical characteristics; we did not assess specific psychopathological traits that might have shed light on the reasons for dropping out of treatment (such as impulsivity, other personality traits, factors related to the eating disorder (weight concerns, restraint, maturity fears, number of symptoms at admission, general psychopathology, or eating behavior symptoms). Two of our predictive factors (repeated past hospitalizations, lower BMI) could be the consequence of general psychopathology, personality factors or eating disorder severity. In addition, depression was assessed via the treating psychiatrist's application of DSM-IV criteria, rather than using structured interviews or rating scales. On the other hand, this study included the largest number of subjects explored to date for adolescent drop-out. We excluded males, but specific studies in this population are needed as males differed from the females in drop-out rates in a recent study, which suggests a higher drop-out rate among males (Støvning et al., 2011). Given the small numbers in our dropout subgroups (initiated by the team or by the patients and/or their parents) we were not able to identify predictors of dropout specific to these two situations. In fact the only difference between the two types of dropout found in univariate comparisons was the length of stay.

Finally, as in other earlier studies, it would be relevant to determine how many of the previous hospitalizations terminated in drop-out (initiated by the team or by the patient), since this may involve a circular chain of reasoning. We do not however have this information, because the majority of previous hospitalizations were in other facilities, and no patient dropped out more than once from our unit.

6. Conclusion

Our findings suggest that adolescents who prematurely terminate inpatient treatment for AN (i.e. drop-outs) and those who complete it differ with respect to four predictive variables in multivariate analysis, which should be brought to the attention of the clinician: past history of hospitalization, lower BMI, legal status at admission (major or minor) and living with only one parent. The first three elements should draw the attention of the clinician so that he/she can prepare the way for the hospitalization of these subjects by means of motivational interviews aiming for a better therapeutic alliance and reduced likelihood of drop-out. The fourth element (living with a single parent) should lead to the deployment of an intensive accompaniment of parents, to reduce conflict and inform and support them in this situation so that they in turn can help their child to comply with treatment. Further

studies aiming to replicate these results, and including the evaluation of other clinical dimensions such as impulsivity and other personality traits, are needed to elucidate this important topic. These studies should also differentiate dropout initiated by the team and by the families.

References

- American Psychiatric Association, 2006. Practice guidelines for the treatment of patients with eating disorders third edition. *American Journal of Psychiatry* 163, 4–54.
- Ametller, L., Castro, J., Serrano, E., Martinez, E., Toro, J., 2005. Readiness to recover in adolescent anorexia nervosa: prediction of hospital admission. *Journal of Child Psychology and Psychiatry* 46 (4), 394–400.
- Baran, S., Weltzi, T., Kaye, W.H., 1995. Low discharge weight and outcome in anorexia nervosa. *American Journal of Psychiatry* 152 (7), 1070–1072.
- Bender, R., Lange, S., 2001. Adjusting for multiple testing—when and how? *Journal of Clinical Epidemiology* 54, 343–349.
- Carter, J.C., Blackmore, E., Sutandar-Pinnock, K., Woodside, D.B., 2004. Relapse in anorexia nervosa: a survival analysis. *Psychological Medicine* 34 (4), 671–679.
- Dean, H.Y., Touyz, S.W., Rieger, E., Thornton, C.E., 2007. Group motivational enhancement therapy as an adjunct to inpatient treatment for eating disorders: a preliminary study. *European Eating Disorders Review* 16 (4), 256–267.
- Fassino, S., Pierò, A., Tomba, E., Abbate-Daga, G., 2009. Factors associated with dropout from treatment for eating disorders: a comprehensive literature review. *BMC Psychiatry* 9, 67.
- Godart, N., Wallier, J., Hubert, T., Curt, F., Galès, O., Perdereau, F., Agman, G., Jeammot, P., 2009. Determining factors for target weights for adolescent anorexia nervosa inpatient program: study on the links between theory-based hypotheses and the realities of clinical practice. *Eating and Weight Disorders* 14 (4), 76–83.
- Godart, N.T., Rein, Z., Perdereau, F., Curt, F., Jeammot, P., 2005. Predictors of premature termination of anorexia nervosa treatment. *American Journal of Psychiatry* 162 (12), 2398–2399.
- Gowers, S., Smyth, B., 2004. The impact of a motivational assessment interview on initial response to treatment in adolescent anorexia nervosa. *European Eating Disorders Review* 12, 87–93.
- Halmi, K., 2005. The multimodal treatment of eating disorders. *World Psychiatry* 4 (2), 69–73.
- Hebebrand, J., Himmelman, G., Wewetzer, C., Gutenbrunner, C., Hesecker, H., Schafer, H., et al., 1996. Body weight in acute anorexia nervosa and at follow-up assessed with percentiles for the body mass index: implications of a low body weight at referral. *International Journal on Eating Disorders* 19 (4), 347–357.
- Herpertz-Dahlmann, B., Salbach-Andrae, H., 2009. Overview of treatment modalities in adolescent anorexia nervosa. *Child and Adolescent Psychiatry Clinics of North America* 18 (1), 131–145.
- Huas, C., Godart, N., Foulon, C., Pham-Scottez, A., Divac, S., Fedorowicz, V., et al., 2010. Predictors of dropout from inpatient treatment for anorexia nervosa: data from a large French sample. *Psychiatry Research* 185 (3), 421–426.
- Kahn, C., Pike, K., 2001. In search of predictors of dropout from inpatient treatment for anorexia nervosa. *International Journal on Eating Disorders* 30 (3), 237–244.
- Lock, J., Couturier, J., Bryson, S., Agras, S., 2006. Predictors of dropout and remission in family therapy for adolescent anorexia nervosa in a randomized clinical trial. *International Journal on Eating Disorders* 39 (8), 639–647.
- Pereira, T., Lock, J., Oggins, J., 2006. Role of therapeutic alliance in family therapy for adolescent anorexia nervosa. *International Journal on Eating Disorders* 39 (8), 677–684.
- Schmidt, U., Treasure, J., 2006. Anorexia nervosa: valued and visible. A cognitive-interpersonal maintenance model and its implications for research and practice. *British Journal of Clinical Psychology* 45 (3), 343–366.
- Steinhausen, H., 2002. The outcome of anorexia nervosa in the 20th century. *American Journal of Psychiatry* 159 (8), 1284–1293.
- Strik-Livers, L., Curt, F., Wallier, J., Perdereau, F., Rein, Z., Jeammot, P., et al., 2009. Predictive factors of length of inpatient treatment in anorexia nervosa. *European Child and Adolescent Psychiatry* 18 (2), 75–84.
- Støving, R.K., Andries, A., Brixen, K., Bilenberg, N., Hørder, K., 2011. Gender differences in outcome of eating disorders: a retrospective cohort study. *Psychiatry Research* 2–3, 362–366.
- Strober, M., Freeman, R., Morrel, W., 1997. The long-term course of severe anorexia nervosa in adolescents: survival analysis of recovery, relapse and outcome predictors over 10–15 years in a prospective study. *International Journal on Eating Disorders* 22 (4), 339–360.
- Surgenor, L., Maguire, S., Beumont, P., 2004. Drop-out from inpatient treatment for anorexia nervosa: can risk factors be identified at point of admission? *European Eating Disorders Review* 12, 94–100.
- Towell, D., Woodford, S., Reid, S., Rooney, B., Towell, A., 2001. Compliance and outcome in treatment-resistant anorexia and bulimia: a retrospective study. *British Journal of Clinical Psychology* 40, 189–195.
- Vanderheiken, W., Pierloot, R., 1983. Drop-out during in-patient treatment of anorexia nervosa: a clinical study of 133 patients. *British Journal of Medical Psychology* 56 (2), 145–156.
- Wallier, J., Vibert, S., Berthoz, S., Huas, C., Hubert, T., Godart, N., 2009. Dropout from inpatient treatment for anorexia nervosa: critical review of the literature. *International Journal on Eating Disorders* 7 (42), 636–647.
- Wannan, G., Fombonne, E., 1998. Gender differences in rates and correlates of suicidal behaviour amongst child psychiatric outpatients. *Journal of Adolescence* 21 (4), 371–381.
- Wiseman, C., Sunday, R., Klapper, F., Harris, W., Halmi, K., 2001. Changing patterns of hospitalisation in eating disorders patients. *International Journal on Eating Disorders* 30 (1), 69–74.
- Woodside, D., Carter, J., Blackmore, E., 2004. Predictors of premature termination of inpatient treatment for anorexia nervosa. *American Journal of Psychiatry* 161 (12), 2277–2281.
- Zeeck, A., Hartmann, A., Buchholz, C., Herzog, T., 2005. Drop outs from in-patient treatment of anorexia nervosa. *Acta Psychiatrica Scandinavica* 111 (1), 29–37.