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■ **Abstract** *Objective* To identify clinical variables influencing the length of stay (LOS) of inpatient treatment for anorexia nervosa (AN). *Method* We analyzed structured clinical charts of 300 consecutive hospitalizations for AN in a specialized eating disorder unit. The sample included patients from 12 to 22 years old. Factors related to the patient and events occurring during the stay were investigated as possible predictors of LOS. *Results* Mean LOS was 135 days. The best model of linear regression revealed that the following factors were significantly related to LOS: duration of AN at admission, use of tube feeding during the stay, accomplishment of the therapeutic weight contract and presence of a comorbid disorder. *Conclusions* The identification of factors influencing duration of stay, both at the outset and during the hospitalization, could help clinicians to optimize and individualize treatments, as well as increase patient and family compliance.

■ **Key words** anorexia nervosa – length of stay – inpatient treatment

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Introduction

Anorexia nervosa is a life-threatening disorder with a long average duration [28]. Treatment usually encompasses a wide variety of therapeutic approaches. Among these approaches, inpatient treatment is considered the last resort, used only in cases of acute somatic and/or psychiatric need [2, 7]. Traditionally, the length of stay (LOS) of such hospitalizations has been around 3 months in the UK [23], United States [18], and Switzerland [26], and between

2 and 7 months in Japan [20]. In the United States, LOS for anorexia nervosa has been dramatically reduced since the 1980s in favor of less intensive forms of care believed to be less costly and more cost-effective [8, 30]. However, an excessively short LOS for inpatients with anorexia can be detrimental to care [30].

The need for inpatient treatment in the most severe cases of anorexia nervosa, and the equally real need to improve the cost-effectiveness of this type of treatment may be balanced by considering three questions: (1) Which factors influence LOS? (2) Can LOS be predicted at intake or during hospitalization? (3) Is there a safe way of reducing LOS, without consequences on relapse rates and prognosis? Identifying clinical variables involved in the prediction of LOS would make possible the elaboration of new treatment strategies focused on these elements. The objective would be to reduce LOS, and thereby the acute phase of the illness, avoiding its negative clinical and economic consequences. The ability to predict the duration of treatment, at the beginning and during the course of hospitalization would optimize treatment strategies for each patient, ameliorating compliance. Therefore, identifying predictors of LOS in anorexia is a crucial first step in safely reducing overall LOS and improving cost-effectiveness.

According to Huntley et al. [15], LOS of hospitalization for anorexia nervosa depends on three factor groups: factors related to the health care system, factors related to the patient, and factors related to treatment. Including more factors from each cluster group increases predictive power [6].

A Medline search revealed only two studies that directly examine factors influencing LOS in anorexia. Both studies consider only factors related to the patient. First, Nozoe et al. [20] evaluated possible predictors of outcome for AN for their relationship to LOS. This research concerned 55 subjects who completed the entire course of a behavior-oriented inpatient therapy in Japan. Second, Maguire et al. [19] published the results of a study regarding predictive factors of LOS in anorexia, based on data garnered from a multi-centre international database. Data on 218 hospitalizations (154 patients), in 5 medical centers (4 in Australia and 1 in New Zealand) were collected during a 20-month period. In both studies, neither the history of illness nor the events during inpatient stay were considered as possible predictors of LOS. The only two published studies on this topic together revealed four predictors of LOS: minimum body weight after onset, age of admission, BMI at admission and number of previous inpatient admissions (See Table 1 for details).

Our clinical experience in an inpatient eating disorders unit for adolescents [9] suggests that addi-tional factors related to the patient, to the treatment and to the French health care system may be linked to a longer duration of inpatient care. In terms of clinical characteristics of these patients, before hospitalization, we believe that the following factors may be related to LOS: presence of child psychological disorders (enuresis, encopresis, anorexia, hyperphagia, rumination, history of suicide attempts, education level, socio-economic level, patient living away from home, alcohol and marijuana abuse, stealing, age at onset of anorexia, menstrual status (primary or secondary amenorrhea), duration of anorexia at admission, delay between first symptoms and first consultation, and distance from home to the hospital (selection of more difficult cases because our centre is specialized in treatment of the most severe cases). Furthermore, it is believed that the following factors concerning the patient during hospitalization are related to LOS: subtype of anorexia nervosa (restrictive or binge-purging), and presence of a comorbid obsessive compulsive, depressive or personality disorder during inpatient treatment. Additionally, our experience suggests that factors related to treatment and the French health care system during hospitalization, specifically tube feeding, transfer to intensive care, amplitude of the therapeutic contract (see "Methods" for details on the therapeutic contract; BMI at discharge, BMI at admission), and accomplishment of the therapeutic contract may lead to a longer LOS.

The purpose of this study is therefore to investigate whether these clinical factors, in addition to those patient factors already proven in research (minimum body weight after onset, age of admission, BMI at admission, and number of previous inpatient admissions), predict LOS.

Method

■ Treatment ward description

This study was carried out in the adolescent psychiatry department of the Institut Mutualiste Montsouris (IMM) in Paris. In this ward, inpatient treatment for anorexia nervosa is prescribed only as a last resort, as recommended by the APA [2]. Inpatient treatment is employed either because of the patient's physical state (i.e., emaciation, and somatic difficulties), or because of the patient's psychological condition (i.e., depression, suicide attempt or withdrawal). Treatment is multidisciplinary, including nurses, psychologists, physicians, physiotherapists and social workers, and is supervised by psychiatrists. During inpatient treatment, patients receive nutritional rehabilitation,

L. Strik Lievers et al.
LOS inpatient anorexia

77

Table 1 Predictors of LOS examined in prior research

Study	Factors considered in univariate analyses	Factors significantly related to LOS
Nozoe et al. [20]	Sex Poor social adaptation before onset (defined as not going to school or to work or being unemployed) Poor relationship between the patient and other family members before onset Age at onset Binge eating and/or vomiting after onset Abuse of laxative and of diuretics after onset Presence of severe bulimia, anxiety and/or personality disorders before onset (retrospective diagnosis on chart) Minimum body weight (percentage of ideal body weight) after onset Duration of illness History of inpatient treatment for AN or other physical disorders after onset "Other" factors (age at admission, body weight at admission, number of previous hospital treatments after onset, habitual stimulant abuse -alcohol, coffee and/or cigarettes-, stealing, patients living away from family, absence for work or not going to school after onset)	Minimum body weight after onset Age of admission
Maguire et al. [19]	Gender Occupation Education Marital status Age at onset of eating disorder (ED) Age at admission Minimum body weight after onset of ED Body weight at admission Previous treatment for an ED Number of previous admissions Binge purging subtype Abuse of dieting products Comorbid diagnosis Drug use prior to admission Menstrual status on admission Presence of medical abnormalities (electrolytes, liver/renal enzymes, ECG) Compliance with psychometric questionnaires on admission Treatment site	BMI at admission Number of previous inpatient admissions

physical care and medication if necessary as well as individual and family psychological support. Tube feeding is used only when patients manifest severe physical symptoms of malnutrition, as well as an inability to eat to gain weight.

Intensive care indications are described in Table 2.

The focal point of our standard inpatient treatment is the therapeutic contract [17] established between the patient, the family and the staff. The contract stipulates a lapse of time, called "separation," where contact between the patient and her normal social world (i.e., family, friends, school) is not allowed. We believe that the "separation" period allows the young patient to become acquainted with the treatment team, to think about her illness and difficulties, and to take a break from family conflicts. This contract is established during the pre-admission consultation and, with rare exceptions, is not changed during the hospital stay.

The contract focuses on two weight goals [9, 10] and it is therefore often called the "weight contract:" 1. The "target discharge weight," or the weight the patient must attain to be discharged from the unit. This weight is determined through consideration of

Table 2 Intensive care indications

Rare but life threatening indications
  Circulatory failure (due to ventricular fibrillation)
  Coma or epileptic seizures (for hypoglycemia or hyponatriemia)
  Respiratory failure (due to vomit and consequent inhalation)
  Sovraventricular tachycardia
  Ventricular tachycardia
  Multiple hypoglycemias (<2.5 mmol/L)
  Conscience disturbances
Frequent indications
  ECG anomalies (long QT, extrasystoles, junctional bradycardia, negative T wave over V3, abnormal ST)
  Synusal bradycardia (<40/min)
  Electrolytes abnormalities: Potassium <2.5 mmol/L, Phosphate <0.5 mmol/L, Sodium >150 or <125 mmol/L
  Systolic blood pressure <70 mmHg on clynostatism
  Central body temperature <35°C
  BMI < 12 if recent weight loss or with other associated factors
  Renal failure
Rare indications
  Gastric dilatation or functional ileum associated with apathy
  Pneumothorax, pneumomediastinum

the patient's ideal medical body weight, the patient's maximum past weight, and the desires of the patient and her parents. 2. The "end of separation" or

"intermediate" weight. This weight, situated within 2 kg of the mean of the final weight goal and the weight of the patient intake, is called the "end of separation weight" because the "separation" period ends when the patient attains this weight. Therefore, the duration of hospitalization is not defined at admission; rather, timing depends on the patient, who is discharged when final target weight is reached.

Weight objectives for inpatient treatment have not been defined by any eating disorder guidelines. Before becoming ill, our population of patients with anorexia has a large variability in weight, quite similar to that of the general French population [24] in terms of BMI (See graph for details). In our program, the ultimate discharge weight objective is a weight that will "allow the patient to re-enter normal life outside the hospital." Concretely, we define this objective by considering primarily the patient's weight before anorexia (or the patient's weight percentile before anorexia if the patient has grown substantially or if the patient has had anorexia for many years), as well as the patient's desired weight and her parents' desired weight for her. Unless the patient was extremely under- or overweight before anorexia, the weight before anorexia corresponds to the healthy, balanced weight that is most appropriate for that individual patient. Because we believe that returning to a weight that is close to this value during inpatient care is a reasonable objective [11], the team proposes this weight during the negotiation. The discharge weight is determined using concrete indications with the goal of finding a "reasonable" weight related to the patient's personal history.

Participants

Participants were selected from 300 consecutive hospitalizations of 12–22-year-old patients with eating disorders discharged from the adolescent and young adult psychiatry department of the IMM in Paris between May 1996 and February 2004. Inclusion criteria was a diagnosis of Anorexia Nervosa, according to DSM IV [3] criteria as confirmed by one of the senior psychiatrists of the team. Four participants met all diagnostic criteria except "amenorrhea for 3 months"; these patients were included regardless because most clinicians concur that amenorrhea is not indispensable for the diagnosis of Anorexia Nervosa [4, 29]. Three participants had a two month duration of amenorrhea, while one participant had a one month duration of amenorrhea.

Three patients were excluded from this research because a severe somatic disease complicated the symptoms (one patient with Diabetes Mellitus and two with Ewing Sarcoma). Further, 13 patients with eating disorders were excluded from this research because they did not meet diagnostic criteria for Anorexia Nervosa and had in most cases been hospitalized for comorbid mood disorders.

In addition, the 16 males treated as inpatients during this time were excluded from this study, because of their small number.

Measures

Patient information questionnaire

For each hospitalized patient, a structured chart, collecting clinical information was completed (483 items). The chart, created in 1996 by the last author (copies available on request), was inspired by the Maudsley database experience (i.e., systematic data collection on all hospitalized patients) [12] but includes different items, specifically socio-demographic information, information related to the medical state and clinical features, family and personal history at admission, specific symptoms, comorbidity, events during the time of hospitalization, plans for outpatient care at discharge, and also notes whether special interventions like tube feeding and transfer to intensive care were needed during care.

Procedure

The chart was completed for each patient by the resident child psychiatrist in charge of the patient's care. The first two parts were completed during the hospitalization and concern past history (individual and family) and events during the stay. The third part was completed at discharge and contains treatment information and future projects. The chart was then double checked for its contents and completeness, once by the senior resident and once by the chief psychiatrist responsible for the inpatient unit.

Data analysis

Qualitative variables were described using proportions and percentages. Proportions were compared using the chi-square test, with and without Yates' correction or Fisher's exact test, as required by the size of expected frequencies [5]. Quantitative variables were described using mean, standard deviation (SD) and range. The means of two independent groups were compared using Student T tests or ANOVAs. A Bonferroni adjustment for multiple comparisons was carried out. The association between two quantitative variables was assessed using Pearson correlation coefficient r_s for continuous variables. All

L. Strik Lievers et al.
LOS inpatient anorexia

79

statistical tests were two-tailed; the level of significance was $\alpha = 0.05$.

The relationship between LOS and possible predictors was investigated in two stages. First, this relationship was examined through univariate tests. Then, we tested the relationship between LOS (dependent variable) and the independent variables (selected through the results of the univariate tests and findings reported in the literature) using stepwise multiple linear regression).

Analyses were conducted using SPSS 10 (statistical package for social sciences).

Results

■ Population description

Our sample includes 268 hospitalizations of 213 female patients. Thirty-nine cases were repeat hospitalizations (1 patient was hospitalized 5 times, 4 were hospitalized 4 times, 5 were hospitalized 3 times, and 29 were hospitalized twice). The rate of previous hospitalizations for the same pathology was 0.58 hospitalizations (SD = 1), 0.46 hospitalizations (SD = 0.86).

The mean age of our sample was 16.1 years (SD = 1.6). Patients' average age of onset of anorexia was 15.3 (SD = 1.8) years, with an average age of first consultation of 15.5 (SD = 1.9) years. The average duration of illness was 20.39 (SD = 17.2) months.

Out of 268 hospitalizations, 217 (81%) were for Anorexia Nervosa- restrictive type and 51 (19%) were for Anorexia nervosa- purging type. In our population, 40 hospitalizations (14.9%) were of patients presenting primary amenorrhea. Out of the 268 hospitalizations, 32 (12.7%), were of patients taking oral contraceptives, of whom three presented primary amenorrhea. The average duration of secondary amenorrhea was 17.24 months (SD = 14.38).

The mean BMI at admission was 13.46 (SD = 1.26) similar to the minimal BMI after onset of anorexia (M = 13.13; SD = 1.3), with a lifetime maximum BMI of 19.72 (SD = 2.68). There was a mean difference of 4.1 points between BMI at discharge and BMI at admission. The mean "end of separation" BMI was 15.6 (SD = 1), on average 2.1 (SD = 0.9) BMI over BMI at admission. The mean BMI at discharge was 17.35 (SD = 1.4, Range = 11.7–20.4), while the mean contract discharge weight was 17.63 (SD = 1). For 196 hospitalizations (76.1%) the contract was fulfilled (the patient was discharged once reached the weight target); in 72 (33.9%) it was not. For those 72 discharges, 27% were discharged during the first part of the contract ("separation") and 73% in the second part, and we found no significant difference for LOS be-

tween patients discharged during the first and second parts of their contracts (139 vs. 190 days). The mean LOS for all patients was 135 days (SD = 97).

During inpatient treatment, patients were transferred to intensive care in 47 hospitalizations (17.5%) and 73 (27%) needed tube feeding. During hospitalization patients presented comorbid personality disorders (26.1%), mood disorders (23.9%) and anxiety disorders (9%). History of marijuana use, stealing and alcohol abuse were reported in only 6, 8 and 11 hospitalizations, respectively. The rate of suicide attempts was 12.6%.

Socio-demographic questionnaires revealed that 77.2% of patients went to school, 22% to college and the rest of the patients had stopped school. They mostly lived in Paris (29.1%), the close suburbs (31.7%) or the further suburbs (34%); only 5.2% lived in other French regions or abroad. A majority of participants (87%) lived with one or both their parents. Divorce (12%) and separation (12%) percentages of the parents were notably low; in the general population of metropolitan France there is a 42.5% divorce rate [16].

Out of the 268 hospitalizations, 22 (8%) were of participants whose fathers worked in agriculture, or as artisans, shopkeepers or heads of business. Seventy-eight (27%) had fathers working as blue collar workers or employees. One hundred and sixty-two (60.5%) had fathers working in high-level professional jobs (managers, intellectual professions).

■ Predictive factors of LOS

We first tested the link between possible predictive variables (those reported in previous research and our hypothesized variables; see "Introduction") and LOS with univariate tests and then conducted a multiple linear regression analysis.

Univariate analyses

First, we checked whether or not there was an association between each of the possible predictors defined in the introduction and LOS using univariate tests (see Tables 3, 4). The following factors were related to LOS; duration of anorexia ($r = 0.127$; $P = 0.038$), tube feeding ($P = 0.000$), transfer to intensive care ($P = 0.012$) accomplishment of the therapeutic weight contract ($P = 0.001$), and presence of a comorbid disorder during hospitalization (LOS for each comorbid group compared to the non-comorbid group, $P = 0.000$). Each comorbid group had a significantly longer LOS than the group without any comorbid disorders, with no significant differences in LOS found between the three comorbid dis-

Table 3 Possible qualitative predictors of LOS

	Mean LOS (days) ± SD	P value
Tube feeding	No 117 ± 84	0.000
	Yes 180 ± 114	
Accomplishment of the contract	Yes 120 ± 78	0.001
	No 180 ± 132	
Comorbidity yes/no	Yes 120 ± 78	0.000
	No 99 ± 75	
Needing intensive care treatment during hospitalization	Yes 167 ± 103	0.012
	No 127 ± 94	
Anorexia sub- type	Restrictive 131 ± 96	0.266
	Binge purging 148 ± 99	
History of stealing	Yes 150 ± 81	0.648
	No 134 ± 97	
Marijuana abuse	Yes 178 ± 61	0.264
	No 133 ± 97	
Alcohol abuse	Yes 122 ± 77	0.666
	No 135 ± 98	
Distance from hospital	Paris, PC 126 ± 98	0.098
	GC, Province 146 ± 94	
Education	Middle or high schooler 140 ± 102	0.065
	College student 117 ± 74	
Childhood psychological disorders	Yes 133 ± 101	0.927
	No 134 ± 97	
Lives with her parents	Yes 135 ± 101	0.090
	No 131 ± 67	
Menstrual status	Amenorrhea I 125 ± 92	0.542
	Amenorrhea II 135 ± 97	
Socio economic level (1)	I 108 ± 23**	0.532
	II 139 ± 103	
	III 128 ± 92	

(1) I = Agricultural, artisan, shopkeepers or heads of business
II = As blue collar workers or employees
III = High-level professional jobs (managers, intellectual professions)
**F value = 0.821

Table 4 Possible quantitative predictors of LOS

	Correlation coefficient	P value
Duration of anorexia	0.127	0.038
Age at onset	−0.087	0.157
Amplitude of contract (BMI discharge–BMI admission)	0.104	0.090
BMI admission	−0.099	0.105
Age at admission	−0.035	0.564
Minimal BMI after onset	−0.082	0.182
Nr of previous hospitalizations for anorexia	0.100	0.103
Delay between onset of illness and first treatment	−0.101	0.116

(1) I = Agricultural, artisan, shopkeepers or heads of business
II = As blue collar workers or employees
III = High-level professional jobs (managers, intellectual professions)

order groups [Mood disorders: 141 days (SD = 77); Anxiety disorders: 174 days (SD = 142); Personnality disorders: 171 days (SD = 103). Most (22/24; 91.6%) of the patients diagnosed with an anxiety disorder had obsessive compulsive disorder. The duration of the first part of the hospital stay, "separation," was significantly correlated to the second part ($r = 0.24$

Table 5 Predictors of LOS

	B	P
Duration of anorexia	7,491	0.038
Use of tube feeding	49,500	0.000
Comorbidity (yes/no)	19,775	0.000
Accomplishment of the therapeutic weight contract	−50,281	0.000

$P = 0.000$), with patients who took longer to reach their "end of separation weight" also taking longer to reach their hospital discharge weight. Notably, there was no significant difference in LOS between patients over and under 18 years, suggesting that patients over 18, who do not need their parents' consent for discharge, are not more likely leave hospital earlier. In addition, the amplitude of the weight contract (BMI at discharge–BMI at admission), which reflects the amount of weight to be gained during the hospitalization, is not related to LOS.

■ Linear regression

The best model obtained (the model that included all variables found to be significantly related to LOS in the univariate analyses as well as the variables identified in the literature) revealed that the duration of anorexia ($P = 0.038$), the use of the tube feeding ($P = 0.000$), adherence to the therapeutic weight contract ($P = 0.000$), and an observed comorbid disorder during hospitalization ($P = 0.000$) were significantly related to LOS, accounting for 24.6% of the variance ($R^2 = 0.246$). LOS increased in direct correlation to the duration of anorexia, the use of tube feeding and an observed comorbid disorder and decreased in relation to adherence to the therapeutic contract (see Table 5 below). The same analyses were conducted including the amplitude of the contract as an independent variable. The results did not change.

Discussion

The present research examined possible predictors of LOS for anorexia. In doing so, this study considered many variables concerning the patient before treatment, as had the few previous studies on the subject; however, in addition, this research examined variables related to the patient during hospitalization and the French health care system.

Our findings show that LOS is explained by the duration of anorexia at admission, the use of tube feeding during the stay, the presence of a comorbid disorder during hospitalization and the accomplishment of the therapeutic weight contract. Only one of

L. Strik Lievers et al.
LOS inpatient anorexia

81

these factors (duration of anorexia) preceded the hospitalization; the three others were observed during the inpatient stay, suggesting that LOS can be most accurately predicted during hospitalization.

The relationship between duration of anorexia history and LOS has been frequently noted as an important prognostic factor for the evolution of the illness [14, 21, 25, 27]. A longer illness is likely to be more psychopathologically complicated and will thus be less sensitive to therapeutic intervention[1]. Such patients also are more likely to have a longer history of ineffective treatment attempts. Although Nozoe et al. [20] did not find a link between these variables and LOS, some characteristics of that research may explain why: 1. The sample size was small, 2. It evaluated less than four patients per year, treated between 1972 and 1988, a 16 year period during which treatment may have evolved. 3. Patients were described and diagnosed retrospectively. 4. The patient group included only 5 males and 50 females, only 49% (55/112) of hospitalized patients, and the patients included spanned a wide age range (mean 20 years old, varying from 13 to 37). 5. Drop-out and discharges before completing the program were not considered. Our research finding that a longer duration of anorexia leads to a longer LOS lends support to Agras's theory [1]. Identifying patients with a long history of illness at admission will enable clinicians to prepare the patient and her family for the length of treatment. In this way, clinicians may improve patient and family adhesion to a long treatment program.

Our findings also suggest that the prediction of LOS needs to be re-considered during hospitalization, since patient characteristics during hospitalization and factors related to treatment also predicted LOS in our study. First, our research shows that the use of tube feeding (27.2% of hospitalizations) is related to longer hospitalizations. To our knowledge this relationship has not yet been considered in research. In fact the only study to our knowledge on this topic concerned nocturnal feeding in a pediatric ward [22]. That study suggested a decreased LOS; however, while use of feeding tubes does lead to faster weight gain, the need for tube feeding suggests resistance to treatment and the incapacity to gain weight by eating. This resistance is independent of the duration of illness, of comorbid disorders and of therapeutic contract completion. Perhaps this resistance means that the patient is psychologically unable to begin to gain weight on personal initiative; and/or perhaps, it is a sign of an inadequate therapeutic alliance with the patient and/or her parents.

Transfer to intensive care (17.5% of patients) was also shown to predict a longer LOS. The need for intensive care does not necessarily indicate low weight or weight gain stagnation, as admission could also be due to severe medical conditions, such as cardiac or electrolytic symptoms. These medical situations would correspond either to patients who vomit very frequently, or to patients who have rapidly lost dangerously large quantities of weight. Both situations are related to grave cases of anorexia, and the severity of these cases is reflected in LOS.

Further, accomplishment of the therapeutic weight contract used in our ward was significantly related to LOS. Patients who do not fulfill the contract (that is, those for whom the hospitalization is interrupted before reaching the target weight), were found to have longer LOS. The rupture of the contract usually occurs in a late phase of the stay (73% in the second part vs. 27% in the first part). This finding is linked to the treatment team's use of the weight contract; only patients who have experienced long hospitalizations without weight gain are discharged before attaining their target weight [10]. It would be interesting to study the clinical characteristics of the patients that do not fulfill the contract (in our population, 24%) because their identification at the beginning of inpatient treatment would allow us to develop other treatment strategies more appropriate for them. Furthermore, we found that the duration of the first part of the hospitalization, "separation," was significantly linked with the second part. This finding further suggests that LOS should be re-evaluated during hospitalization: with this information, patient treatment can be modified during the hospital stay and clinicians can help adapt patient expectations.

We also found a strong relationship between the presence of a comorbid disorder during hospitalization after re-nutrition and LOS: specifically, we found that the mean LOS for a patient with anorexia and a comorbid mood disorder, anxiety disorder or personality disorder is longer than for anorexia with no comorbid disorder. Nozoe et al. [20] and Maguire et al. [19] also hypothesized that the presence of a comorbid disorder would affect LOS but did not demonstrate this. We did not, however, find significant differences between diagnostic groups in terms of LOS. Anorexia, when complicated by a secondary diagnosis, should not be the only target of treatment and requires longer hospitalizations because the presence of a comorbid disorder slows weight gain even further. Some inpatient treatment programs for anorexia exclude patients without sufficient weight gain after just a few weeks. The presence of a comorbid disorder needs to be more thoroughly considered in patients resistant to traditional treatment programs so that appropriate treatment can be focused on these problems before concluding that such patients are untreatable. Further, it is important to note that the presence of a comorbid disorder is a negative prognostic factor for the evolution of anor-

exia [13, 26, 28]. Therefore, in light of our findings that these patient and treatment characteristics during hospitalization predict LOS, we believe that it is essential that these factors be considered during inpatient treatment in order to adapt treatment and hopefully, minimize LOS.

Some results did not support our hypotheses or previous research findings. First, our findings that the minimal BMI after onset of anorexia, the BMI at admission, and the amplitude of weight contract (or weight to be gained) were not significantly linked to LOS did not support those of Nozoe et al. [20] and Maguire et al. [19]. Differing therapeutic approaches may account for these divergences. The Nozoe et al. study concerned patients treated with behavior therapy, for whom the timing of the inpatient stay depended strictly upon weekly rates of weight gain. Therefore, a patient with a lower BMI at admission was likely to need a longer hospitalization. Our psychodynamically-oriented treatment allows patients to determine the timing of weight gain. The patient does this with the help of the intensive psychological and rehabilitative work done during the stay. A patient with a very low BMI at outset might therefore gain weight more quickly than one with a higher BMI at the time of admission. A number of factors, including different psychopathology (including comorbid disorders) and the degree of therapeutic alliance with the patient and her family, may explain individual differences in weight-gain curves. Factors explaining these differences should be examined in future research.

Furthermore, our findings did not support a relationship between age at onset and at admission and LOS. Although our results would concur with those of Maguire et al. [19], Nozoe et al. [20] found positive correlations for both age at onset and LOS and age at admission and LOS. One explanation for this difference is that our sample was on average younger (16 vs. 20 years old), with a younger age of onset (15 vs. 17 years old), than that of Nozoe et al. Furthermore, this age difference would also explain why the number of previous hospitalizations was not found to be linked to LOS in our sample: our patients were young with short clinical histories.

Also in contrast to our hypotheses, we did not demonstrate relationships between LOS and the delay between onset of symptoms and first psychiatric consultation (variable not present in the literature) or between LOS and the type of anorexia, or finally, between LOS and elements of personal history (level of education, positive anamnesis for psychiatric disturbances or diseases, for stealing, violence or alcohol abuse). Those factors have been partially examined in the literature, although their relationship to LOS has not been established through multivariate analysis:

Maguire et al. found a positive correlation with the number of years of education and Nozoe et al. found positive correlations for the variables "poor social adaptation," "history of stealing" and "habitual stimulant abuse." Finally, we did not find a relationship between LOS and the distance from the hospital (as found by Maguire et al.).

The findings of this research are noteworthy for two reasons in particular. First, this research has identified a new factor preceding the hospitalization that may predict LOS (i.e., duration of illness). Second, this prospective study is the first to also consider therapeutic changes occurring during the hospitalization. Our results are strengthened by our low drop-out rate (24% vs. 49% for Nozoe et al. [20]; of the 24, 50% staff decision, and 50% parent decision). In addition, because of our young sample [we admit mainly young girls before 18 (under 22)], hospitalization can be interrupted only with parental agreement, reducing drop-out bias. Like Maguire [19], we believe that determining LOS is a pragmatic consideration in the development of inpatient programs. We also believe that identifying predictive factors of LOS is important to help clinicians better inform patients and their families about the potential for a long hospitalization, which should increase adherence to treatment and improve therapeutic alliance.

■ Limitations

These results apply to a sample of patients cared for in the French health system with a specific treatment protocol. Therefore, these results can not be generalized to all populations. Nevertheless, this research has identified potential therapeutic targets for improving inpatient care, specifically comorbid disorders. Furthermore, the predictive factors identified by this research may be relevant for other teams and health systems because of the similarities found between Nozoe's and Maguire's results and our own. It might appear that another potential limitation of this research was our method of contract or weight-goal determination; because two patients with the same height and age do not necessarily have the same weight goal, it could appear that the variability of the amount of weight to be gained would affect LOS. It should be noted that the amplitude of the contract (the amount of weight to be gained) was taken into account in the multivariate analyses, voiding this possibility.

Although our regression model explained only 24.6% of the variance of LOS, our results were consistent with our clinical hypotheses. However, our results need to be confirmed by other studies which

L. Strik Lievers et al.
LOS inpatient anorexia

83

may identify factors that further contribute to the model.

In addition, these results emphasize the fact that variables may have differenc effects on LOS as a function of the reasons for their use. For example, systematic use of feeding tubes may reduce LOS; however, when feeding tubes are prescribed because all other techniques have failed, their use may predict an increase in LOS.

Conclusions

Identifying clinical variables involved in the prediction of length of inpatient treatment could help us to develop new treatment strategies focused on these elements. Furthermore, the ability to identify factors that influence LOS at its beginning and during its course, would optimize treatment strategies for each patient, enhancing compliance. In this way, LOS and the acute phase of the illness could be minimized, limiting negative clinical and economic consequences.

However, this research also highlights the need for longer hospitalizations in specific cases. Specifically, longer hospitalizations may be necessary for cases in which the patient needs to spend more time in the hospital to attain a sufficient discharge weight, which is a predictor of a good long-term prognosis. We hope that by identifying factors that predict LOS, such as the presence of a comorbid disorder, and targeting these factors for treatment, we will be able to reduce LOS. However, perhaps we also need to concentrate our efforts on convincing financial decision makers of the necessity and long-term cost effectiveness of longer hospitalizations in more complicated cases. In order to accomplish these goals, future research should examine the efficacy of such hospitalizations and measure the impact of early treatment for comorbid disorders on LOS.

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