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A Naturalistic Study of Medication Reduction in a Residential Treatment Setting

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ABSTRACT

The primary aim of this pilot study was to ascertain if psychiatric medications could be reduced in a convenience sample of seriously emotionally disturbed children and adolescents over the course of residential treatment. We also sought to understand factors correlated with reduction in the number of medications during treatment. A review of the treatment of 141 patients (*n* = 112 admitted on medication and *n* = 29 admitted on no medication) admitted to, and discharged from, a residential treatment setting between 1992 and 2001 was undertaken. Significantly more children were discharged from treatment on no medications than were admitted to residential treatment on no medications. In children receiving more than 1 medication at admission, the number of combined medications was significantly reduced over the course of residential treatment. However, the majority of children admitted on medications continued on some psychiatric medications, indicating that psychopharmacology continued to play an important role in their treatment. In 112 patients admitted on psychoactive medications, our pilot data suggests that improvement in externalizing, internalizing, psychotic, and autistic psychopathology while in residential treatment, the presence of an intact family (adoptive or biological), the absence of a history of either sexual or physical abuse, and the type of medication used appear to be factors that correlate with a reduced use of medications in this population.

INTRODUCTION

Children and adolescents with serious emotional disturbances (SED) often present to clinicians with severe impairments and chronic, intense, and treatment-resistant symptoms. Some of these children and adolescents (referred to hereafter as children) may have been exposed to multiple psychiatric medications, beginning at an early age and continuing for extended periods of time. More frequent medication interventions, with an increasing number of concurrent psychiatric medications and with prescription at ever-younger ages, have been documented by several investigators in various study samples (Connor et al. 1998; Zito et al. 2000; Zito et al. 2003). Rates of pediatric antidepressant, antipsychotic, and stimulant use, and coprescription of multiple concurrent classes of psychiatric medications for youths less than 18 years of age expanded markedly between 1987 and 2002 in the United States (Olfson et al. 2002; Patel et al. 2002; Zito et al. 2003). Clinical use of other psychotropic medications in the pediatric age range, such as clonidine for ADHD, atypical antipsychotics, anticonvulsants for psychiatric disor-

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ders, benzodiazepines, and lithium is also increasing (Jensen et al. 1999; Zito et al. 2003).

Youths with SED admitted to institutional services appear to have especially high rates of pediatric psychopharmacology use and multiple concurrent medication use. One study of the patterns of psychotropic and anticonvulsant medication use in 83 SED children in residential treatment found that, at admission, 76% of children were receiving at least 1 psychotropic medication and 40% of children were admitted receiving more than 1 psychoactive medication concurrently (Connor et al. 1998). When lifetime treatment history was assessed in this study, 57% of children had received trials of multiple concurrent psychotropic medications before admission. Of multiple medication treatments, 52% involved 2 psychotropic medications, 29% involved 3 drugs, 11% involved 4 drugs, and 7.9% involved 5 different medications given simultaneously in combination. Thus, almost half of the medication interventions given to these children involved 3 or more drugs, and remarkably, 19% entailed 4 or more drugs given simultaneously. There were 89 identifiable, distinct, multiple medication trials in these 83 children, encompassing 52 different combinations of medications (Connor et al. 1998). To date, few controlled studies are available that assess the efficacy and safety of 2 medications combined in referred children (Safer et al. 2003). There are presently no controlled studies examining the efficacy and tolerability of multiple combinations of greater than 2 concurrently prescribed psychotropic medications for children with or without SED symptoms (Jensen et al. 1999; Safer et al. 2003).

Given concerns about the use of multiple medication combinations in psychiatrically referred youngsters, studies investigating whether or not psychiatric medications can be safely discontinued, and variables associated with successful medication discontinuation, are important for clinicians. When faced with the child presenting on multiple concurrent medications, it is important for the clinician to know which child, family, and medication variables might be associated with successful medication reduction, especially in inpatient and residential treatment settings. Presently, we are aware of no studies assessing whether multiple combinations of psychotropic medications, having been prescribed for children, can be safely and effectively tapered so that a smaller number of medications remains in use. This data vacuum exists for both SED and non-SED children, and for children both within and outside of institutional-care settings.

We carried out a naturalistic pilot study, retrospectively reviewing psychotropic medication use among children, 6 to 19 years of age, with various emotional and behavioral problems, who were admitted to a well-established residential treatment center over a 9-year period, from 1992 through 2001. The primary aims of this study were to ascertain if medications could be safely reduced in children prescribed medications at admission to residential treatment and to identify patient characteristics, medication types, and clinical circumstances that were associated with the presence or absence of reduced psychotropic medication use by the time of discharge from the institution.

SUBJECTS AND METHODS

Throughout the residential stay, child psychiatrists, who were responsible for medication management, implemented best-practice efforts to prescribe medications (AACAP 1997; Steiner 1997), and carefully followed children every 4–6 weeks to assess safety, tolerability, and medication efficacy. Medication changes were made as a routine component of clinical care, with these agent or dose changes recorded in the medical record. No a priori decisions were made at the start of this study to reduce medication levels for any child in residential treatment. A total of 8 separate child psychiatrists were involved in this effort over the 9 years that comprise retrospective review. All treating psychiatrists were unaware of the aims of this study.

As a routine part of institutional care, clinical assessment data were available in the medical record—as recorded at admission—periodically through each patient's stay, and at discharge. History data included complete psychiatric and medical history information, including relevant family history data. In particular, physical or sexual abuse history, parental violence, and parental substance abuse data were obtained for each

child. In addition to these routinely recorded medical records data, at admission and at discharge, a reliable and valid measure of psychopathology the Devereux Scales of Mental Disorder (DSMD; Naglieri et al. 1994), were administered to all children.

Consent

All data used in this study were obtained as part of the standard clinical care provided to all clients of this residential center. As is standard practice, any medication changes in the institution were reviewed with the child's guardian, and guardian and patients' assent to these changes was obtained. Data in this review were collected in such a way as to protect the confidentiality of the clients, and data sets were purged of data that could be used to identify patients. The retrospective review of data was reviewed and approved by the University of Massachusetts Medical School Institutional Review Board and the Client Care Monitoring Board of the residential treatment center. After a full explanation of the review procedure, independent written, informed consent was obtained from all parents and guardians.

Treatment setting

The clinical setting is a not-for-profit residential treatment program serving seriously emotionally disturbed children and adolescents from the New England and Mid-Atlantic regions of the United States. Children and adolescents are placed in this facility through referrals from child protective service agencies; departments of mental health and education of nearby states; as part of a continuum of care after acute inpatient psychiatric hospitalization; through placement by juvenile justice authorities as an alternative to incarceration; and by referral from local school districts, when the school is unable to educate and maintain the student within the school community.

The RTC setting provides a highly structured milieu, organized around group therapy programs managed by well-trained staff that emphasize safety skills, assertiveness and communication training, social problem-solving skills, and academic remediation. There also are strong community service and family outreach components, and the school maintains close contact with hospitals and other providers in the area. Treatment is conceptualized along a continuum of care with every discharged child receiving psychoeducational after-care services. There is a 3:1 client-to-staff ratio. Treatment components include individual psychotherapy, group therapy, behavioral therapy, milieu therapy, and individualized pharmacotherapy, with medication treatment managed by consulting child and adolescent psychiatrists. All children receive special education services in a highly structured school environment featuring a small class size, with 8 students, 1 teacher, and 1 aide per class on average. Length of stay ranges from several months to several years.

Subjects

We reviewed the records of all children (n = 171) admitted to this residential center between 1992 and discharged during or before 2001. Complete medication records were available on 141 subjects (112 subjects receiving medications at the time of admission and 29 subjects admitted free of medications). The 30 subjects with missing medication data were compared to subjects with complete data sets to examine for any systematic differences that might arise from missing data. No significant differences were found when the complete group was compared to the missing group on gender, verbal IQ, a developmental history of physical and/or sexual abuse, developmental history of parental violence, and length of stay in placement (p = NS). A significant difference was found in age at admission ($t = 2.89$; $p = 0.004$). The group admitted on medication was significantly younger at the time of admission (13.1 ± 2.6 years) than the group with missing medication data (14.6 ± 2.8 years). Of these 141 children with complete medication data sets, 112 children were admitted on medications and form the subset for this analysis.

Diagnostic procedures

All admitted children received a psychiatric evaluation and all met criteria for at least one psychiatric diagnosis. However, the frequent

presence of cognitive delay and expressive and receptive language delays in children resulted in a lack of confidence in the reliability of these psychiatric diagnoses obtained by clinical interview. Accordingly, psychiatric diagnosis was not used as an explanatory or stratification measure in this study.

The standard evaluation in this institution included the following measures.

Measures

Psychopathology. The Devereux Scales of Mental Disorder (DSMD) is a 110-item behavior rating scale designed to evaluate psychopathology in children and adolescents (Naglieri et al. 1994). The DSMD assesses psychopathology along continuous dimensions, so that categorical psychiatric diagnoses are not derived from the DSMD. There are three composite scores obtained from the DSMD scale: Internalizing, externalizing, and critical pathology, and a total score. Behaviors that involve aggression, violence, hyperactivity, impulsivity, oppositional behaviors, and conflicts between the child and his or her environment are measured by the externalizing composite; behaviors that reflect the child's state of psychological well-being, such as anxiety and depression, are assessed by the internalizing composite, and severe disturbances, such as autism or psychosis, are measured by the critical psychopathology composite. The total scale score provides an assessment of overall psychopathology. DSMD standardization data, based on a large sample representative of the U.S. population comprising 3153 children and adolescents 5 to 18 years of age, indicate that the DSMD instrument has high internal consistency, as well as excellent test-retest reliability. Inter-rater reliability, when examined across parent and teacher raters, was adequate (range, 0.44–0.66; all $p < 0.01$) (Naglieri et al. 1994). Item content and content-related validity adequately reflect *Diagnostic and Statistical Manual of Mental Disorders, 4th edition* (DSM-IV) criteria (Naglieri et al. 1994). The DSMD is treatment-sensitive and reliably assesses psychopathology over the previous 4 weeks (Naglieri et al. 1994). As noted above, the DSMD was completed by staff at admission (baseline) and again at discharge from treatment. Change-from-baseline measures for all DSMD scales were ascertained.

Historical and demographic variables. Chart review variables included age at admission to the current residential placement, gender, current primary caregiver, number of out-of-home placements (the current placement was not counted), family history of parental violence and/or substance abuse, and child history of physical and/or sexual abuse. Physical or sexual abuse history was only coded as present if the clinical record supported a documented change of caregiver because of suspected abuse, court appearance because of abuse charges, or a supported protective services evaluation of abuse as mandated by state law. Type of medications assessed at admission, and then again at discharge, included neuroleptics and antipsychotics, stimulants, antidepressants, lithium, anticonvulsants used for psychiatric disorders (valproex sodium and carbamazepine), and clonidine.

Reliability

Inter-rater reliability studies on chart review and treatment variables were completed on a random sample of 34 of 112 subjects (30%) on medications at admission, with data provided by two child psychiatrist raters. Results (k, kappa; ICC, intraclass correlation) were as follows: Parental history of alcohol/substance (K = 1.0), parental history of violence (K = 1.0), history of physical abuse (K = 0.85), history of sexual abuse (K = 0.93), and number of medications at admission (ICC = 0.97). The median kappa for chart review and treatment items was 0.94. No formal inter-rater reliability data on the DSMD were obtained because of the documentation of adequate reliability of the instrument provided by the authors (Naglieri et al. 1994).

Statistical analysis

We categorized each subject having at least one psychotropic medication at admission (n = 112) as either medication-reduced or medication not reduced at discharge. The medication-reduced category included all children whose medication regimen included fewer distinct psychiatric medications at discharge than at admission. The not-medication-reduced category included all other children with at least one med-

ication at admission. The medication-reduced and medication-not-reduced subgroups were compared on study variables assessing demographics, psychiatric history, psychopathology, and family circumstances. We compared the two groups on the number and type of psychotropic medications at admission and at discharge. Univariate statistical analysis of categorical and continuous data was accomplished by the use of chi-square and paired *t* tests, respectively. Some variables (e.g., length-of-stay) were log-transformed prior to modeling to achieve more normal distributions. Univariate data are reported as mean (±SD) or *n* (%). For each subject, we obtained DSMD change-from-baseline (discharge minus admission) psychopathology data on the DSMD total score and the three DSMD composite scores. Analyses of covariance models were used to adjust for baseline differences in the three DSMD composite scales and the total score. Statistical significance was set at $p \leq 0.05$.

RESULTS

Patient characteristics

Characteristics of the 141 subjects with complete medication data are presented in Table 1. Comparisons are made between the 112 children admitted on medications and the group of 29 children admitted without medications. Children admitted without medications were significantly older than children admitted on medications (13.3 ± 2.5 years versus 14.2 ± 1.8 years) (t = 2.23; $p = 0.03$). Children admitted without medications had fewer "other family configurations" than children admitted on medications (6.9% other family configurations versus 36.6%) ($\chi^2 = 9.6$; $p = 0.002$). Children with higher DSMD scores at admission also received more medications at admission (internalizing score, t = 2.42; $p = 0.02$; total score, t = 2.01, $p = 0.05$). Other demographic, family, psychiatric history, and length of stay in residential treatment did not distinguish the two groups.

The majority of subjects in the two groups were male, with over half coming from biological parent or adoptive parent homes. Mean verbal IQ was a standard deviation below the expected population mean for nonreferred youngsters. Over half the subjects had experienced either physical or sexual abuse in their developing years, and the majority of patients in the two groups came from families characterized by substance abuse in parents and/or parental violence. Almost all children had experienced a previous placement prior to enrollment in the residential treatment program. All subjects were classified as seriously emotionally disturbed (SED) for educational purposes. Of the group receiving medications (n = 112), 64 patients (57.2%) were receiving more than 1 psychotropic medication, with an average of 2.64 ± 1.3 (range, 1–6) concurrent medications at admission.

Correlates of medication reduction

Among the 112 children admitted receiving medication, 74 children (66.1%) were discharged from residential treatment on less medication than at admission, and 38 children (33.9%) did not have medications reduced at discharge compared with the number at admission. Several factors significantly discriminated the reduced and nonreduced subjects. Children admitted on medications with a biological or adoptive parent caregiver were more likely to be discharged on fewer medications than at admission (71.4% versus 18.4%) ($\chi^2 = 8.6$; $p = 0.003$). Children admitted on greater numbers of concurrent medications were more likely to have reduced medications at discharge (3.09 ± 1.3 versus 1.79 ± 0.8 medications) (t = 4.84; $p < 0.001$). There existed a strong trend in the data for abused children to be less likely to have medication reductions at discharge than nonabused children, but this did not quite reach statistical significance (76.3% versus 57.1%) ($\chi^2 = 3.62$; $p = 0.057$).

Drug type and medication reduction

Changes in use of specific drug types over the course of residential treatment for the 112 children admitted on medications are described in Table 2. As can be seen, neuroleptic and antipsychotic, antidepressant, anticonvulsant, lithium, and clonidine use significantly diminished, comparing use at discharge with use at

TABLE 1. CHARACTERISTICS OF 141 RESIDENTIAL PATIENTS ON/NOT ON MEDICATIONS AT THE TIME OF ADMISSION

	N *(%) or mean (SD) (range)*		
*Characteristic**	*On medication* (n = *112)*	*Not on medication* (n = *29)*	p *value*†
Demographics			
Sex			
(*n*, % males)	89 (79.5)	25 (86.2)	NS
(*n*, % females)	23 (20.5)	4 (13.8)	NS
Age, at admission	13.3 ± 2.5 (6–19)	14.2 ± 1.8 (10–19)	0.03
IQ, verbal	84.1 ± 16.7 (46–128)	85.1 ± 18.5 (55–124)	NS
Psychiatric History			
Physical/Sexual Abuse	72 (64.2)	16 (56.1)	NS
Children with ≥ 1 placement**	107 (95.5)	28 (96.5)	NS
Family History			
Parents (*n*, %)			
Biological	58 (51.8)	17 (58.6)	NS
Adoptive	13 (11.6)	13 (6.9)	NS
Other	41 (36.6)	2 (6.9)	0.002
Parental violence history	81 (72.3)	21 (72.4)	NS
Parental substance abuse history	77 (68.7)	18 (62.1)	NS
DSMD Psychopathology T-Scores at Admission‡			
Externalizing T-Score	56.5 ± 10.4	52.5 ± 9.3	NS
Internalizing T-Score	62.4 ± 12.8	56.0 ± 10.6	0.02
Critical Pathology T-Score	57.3 ± 11.6	54.4 ± 11.9	NS
Total T-Score	59.5 ± 11.8	54.5 ± 10.6	0.05
Medications at Admission			
On 1 psychiatric medication	48 (19.7)	0	
On 2 psychiatric medications	0 (0.0)	0	
On 3 psychiatric medications	24 (21.4)	0	
On 4 psychiatric medications	31 (27.7)	0	
On 5 psychiatric medications	7 (6.3)	0	
On 6 psychiatric medications	2 (1.8)	0	
Total number of medications	2.64 ± 1.3 (1–6)	0	
Treatment Variables			
Length-of-stay (days)	662.5 ± 426.6 (39–1847)	506 ± 346.5 (138–1676)	NS

*For binary measures, *n* (%) is reported; for continuous measures, mean ± standard deviation (range).
**Not counting admission to current placement.
†*t* test for continuous variables; χ^2 test for dichotomous variables.
‡df = 7, 135.
DSMD, Devereaux Scales of Mental Disorder; NS, not specified.

TABLE 2. CHANGES IN MEDICATION USAGE OVER THE COURSE OF RESIDENTIAL TREATMENT, BY DRUG TYPE (N = 112)

Drug type	*Admission* n *(%)*	*Discharge* n *(%)*	χ^{2*}	p *value*
Neuroleptics/antipsychotics	53 (47.3)	15 (14.0)	27.4	<0.0002
Stimulants	32 (28.6)	35 (31.3)	0.1	0.77
Antidepressants	69 (61.6)	46 (41.1)	8.1	0.001
Anticonvulsants	45 (40.2)	25 (22.3)	6.0	0.004
Lithium	9 (8.0)	3 (2.7)	2.2	0.05
Clonidine	38 (39.3)	16 (14.3)	6.8	0.003

*Fischer's exact test.

admission. In contrast, stimulant medication use did not decrease over the course of treatment. Examining the entire sample of 141 children for whom complete medication data was available, the number of children discharged from residential treatment on no medication (n = 40) significantly differed from the number (n = 29) admitted on no medication (χ^2 = 27.6; p = 0.0001). Of the 112 children on admission medications, 19 children were discharged off all medications. Of the 29 children admitted on no medications, 21 children were discharged on no medications. The number of children on multiple concurrent medications dropped substantially, from 78% (87 of 112) of subjects at admission to 48% (48 of 101) at discharge. This suggests that, even among SED children admitted on multiple combined psychopharmacological regimens, psychiatric medications can be reduced in highly structured treatment settings. However, the majority were discharged on some medication, indicating that psychopharmacology continued to be an important component of treatment for these seriously emotionally disturbed children, despite the substantial reduction in the total number of medications taken over the course of residential treatment.

DSMD psychopathology scores and medication reduction

Comparisons between medication reduced/not reduced groups (n = 112) on change-from-baseline DSMD psychopathology composite and total scores were completed using analysis of covariance (ANCOVA) controlling for variability in baseline DSMD scores. Findings indicated a significant difference for all DSMD T-Score comparisons: Externalizing score, $t_{[2,109]} = 2.23$, $p = 0.02$; internalizing score, $t_{[2,109]} = 2.05$, $p = 0.04$; critical pathology, $t_{[2,109]} = 2.10$, $p = 0.04$; and total score, $t_{[2,109]} = 2.40$, $p = 0.02$; indicating that medication reduction is correlated with diminishing psychopathology scores in the sample.

DISCUSSION

We completed a single-site pilot study investigating change in psychiatric medication use over the course of treatment in a convenience sample of children with severe emotional and behavioral disorders admitted to, and discharged from, residential treatment. We were particularly interested in whether psychiatric medication use could be reduced in children with psychiatric problems severe and chronic enough to require residential treatment and variables correlated with change in medication status over the course of treatment.

Neuroleptic or antipsychotic, antidepressant, anticonvulsant use for psychiatric disorders, lithium, and clonidine use were all significantly reduced at discharge, compared to admission. Stimulant use did not decrease over the course of treatment, probably reflecting high rates of attentional deficits and hyperactive and impulsive behavior in this population (Connor et al. 1998). Significantly more children were discharged from treatment on no medication (n = 40) than were admitted to residential treatment on no medication (n = 29). Considering combined pharmacotherapy, on average the number of medications at discharge was only 65% of the number of admission medications, among subjects with at least 1 medication at admission. As well, the number of children on multiple medications dropped substantially, from 78% of subjects at admission to 48% at discharge. Given concerns about high rates of combined pharmacotherapy in seriously emotionally disturbed children in residential treatment (Connor et al. 1997), these results suggest that multiple and complex medication regimens can be reduced in therapeutic and structured treatment environments characterized by the use of physician best-practice prescribing guidelines and relatively long lengths of stay. In residential and long-term inpatient treatment settings, prescribing clinicians should actively and continuously attempt to ascertain which children require continued multiple medication regimens and in which patient medications can be safely reduced. However, it should be noted that the majority of patients admitted to residential treatment on medications continued to require them at discharge, suggesting that psychiatric medications continued to be an important component of their overall treatment plan.

We identified several factors correlated with reduced medication use. Children who: (1) responded to residential treatment with dimin-

ishing psychopathology and lessening internalizing, externalizing, psychotic, and autistic symptoms, (2) who were admitted to residential treatment from more intact families with biological or adoptive parents, and (3) who were receiving nonstimulant psychiatric medications were significantly more likely to reduce their psychiatric medications over the course of treatment. A trend in the data suggested that children with no history of physical or sexual abuse were significantly more likely to reduce their psychiatric medications over the course of treatment than abused children. It is possible that these characteristics describe a sample of children with serious emotional and behavioral disorders who may respond most strongly to the multidisciplinary psychoeducational treatment offered in residential centers, and require less medication upon discharge from care than they required at admission to treatment.

Furthermore, our results suggest the possibility that interactions between the treatment environment, individual child characteristics, and drug type may be a fruitful area of further research useful in increasing the understanding of psychopharmacology use in SED children in naturalistic treatment settings. Characteristics of the treatment environment (length of stay, degree of therapeutic behavioral structure) and/or individual psychiatric history (abuse history, intactness of family structure) may interact with medication type (nonstimulants) to further explain variance in which children can and cannot reduce medication use in inpatient treatment settings.

There was a robust correlation between improvement in DSMD psychopathology scores and medication reduction in our sample. This association was found for both internalizing and externalizing psychopathology. Because of the naturalistic organization of this study, we cannot determine if clinical improvement in psychopathology among children resulted in reductions in the number of medications they were prescribed, or whether the reduction in the number of medications resulted in reduced symptom severity. Perhaps both interpretations are germane, with some children prescribed fewer medications because of symptom severity reduction, and other children achieving clinical improvement because of reductions in the number of medications they were taking. Despite this ambiguity in interpretation, it is clear that the association between clinical improvement and medication reduction is very important. In structured treatment environments, prescribing clinicians should be aware of improvements in individual patient psychopathology and consider whether these patients are candidates for a clinical trial of medication reduction.

Limitations

This study was carried out at a single site, and this site, in several respects, may not be typical of all residential treatment. The medication-reduction data summarized in this report were obtained within the context of a focused effort by treating child and adolescent psychiatrists to implement best practices, based upon published standard-of-care guidelines (AACAP 1997; Steiner 1997). Data from a control condition were not available within the study. In this clinical setting, children could not be randomized to medication-reduced and medication-not-reduced groups for ethical reasons and so results are suggestive, not definitive. Because of concern about the reliability of the informants, clinical psychiatric diagnoses were not used in the analysis. Some children in our sample may have had medications reduced because of side effects or poor tolerability. However, we did not have this data available for analysis in this report. For all of these reasons, the results of this study may not fully generalize to studies using different methodologies or other child and adolescent mental health treatment settings.

SUMMARY

Our results suggest the possibility that, within the setting of a therapeutic and highly structured residential treatment environment with a long length of stay, psychiatric medications can be reduced for the child with severe and chronic emotional and behavioral problems. However, not all children may achieve this reduction in medication use. A subset of SED youths, characterized by improvement in psychopathology symptoms within the context of

residential treatment, nonstimulant medication treatment, no history of abusive trauma, and a more intact family structure characterized by the continued presence of biological or adoptive parents in the child's life, may best achieve a reduction in medication use.

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