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A Comparison of American and English Hospital Discharge Rates for Pediatric Bipolar Disorder, 2000 to 2010

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Abstract

Objective—Controversy exists over the diagnosis and prevalence of pediatric bipolar disorder (PBD). Although several small surveys suggest that the rate of the PBD diagnosis in clinical settings is higher in the United States than in other countries, no comprehensive cross-national comparisons of clinical practice have been performed. Here, we used longitudinal national datasets from 2000 to 2010 to compare US and English hospital discharge rates for PBD in patients aged 1 to 19 years.

Method—We used the English National Health Service (NHS) Hospital Episode Statistics (HES) dataset and the United States National Hospital Discharge Survey (NHDS) to compare US and English discharge rates for PBD (bipolar I disorder [BP-I], bipolar II disorder [BP-II], bipolar disorder not otherwise specified [BP-NOS], and cyclothymia). We also conducted cross-national comparisons for all other psychiatric diagnoses in youth and for adults with bipolar disorder (BD).

Results—There was a 72.1-fold difference in discharge rates for PBD in youth between the United States and England (United States, 100.9 per 100,000 population, 95% confidence interval

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= 98.1–103.8, versus England, 1.4 per 100,000 population, 95% CI = 1.4–1.5). After controlling for cross-national differences in length of stay, discharge rates for PBD remained 12.5 times higher in the United States than in England. For all other child psychiatric diagnoses, the discharge rate was 3.9-fold higher, and for adults with BD 7.2-fold higher, in the United States than in England.

Conclusion—The disparity between US and English discharge rates for PBD is markedly greater than the disparity for child psychiatric discharge rates overall and for adult rates of BD. This suggests that the difference in discharge rates for PBD may be due to differing diagnostic practices for PBD in the United States versus in England.

Keywords

pediatric; bipolar disorder; hospital discharge rates

There is considerable controversy regarding the diagnosis of pediatric bipolar disorder (PBD),¹ particularly within the United States. Some US researchers have suggested that children with severe irritability, mood lability, and symptoms of attention-deficit/hyperactivity disorder (ADHD), with or without clearly demarcated manic episodes, should be regarded as having PBD.² Although there is general agreement on the diagnosis of bipolar I disorder (BP-I) in older adolescents, as a consequence of the broader diagnostic boundaries, there may be a trend for PBD to be more commonly diagnosed in the United States than in other countries.³

A recent meta-analysis of epidemiologic surveys cross-nationally found that the rate of narrowly defined PBD was 1.8%, with no significant difference between US and non-US studies,⁴ including US and English prepubertal case patients.^{5,6} However, when using broader diagnostic criteria, including bipolar disorder not otherwise specified (BP-NOS), the rates of PBD rose to 6.7% in the United States, which was significantly higher than the 2.4% reported in other countries.⁴ The structured research interviews and trained interviewers used in epidemiologic studies may yield similar prevalence estimates cross-nationally, especially when studies focus on narrowly conceived PBD. However, diagnostic practices in the community, where broader definitions may be used, may nonetheless vary between the United States and other countries. Specifically, although the prevalence of PBD in clinical settings has increased markedly in the United States in the past decade, similar trends are not as apparent in other countries. For example, a 40-fold increase in outpatient visits for PBD was reported in the United States over an 8-year period between 1994 and 1995 and between 2002 and 2003.⁷ Similarly, population-adjusted rates of hospital discharges for children with a primary diagnosis of PBD increased linearly from 1.3 per 10,000 U.S. children in 1996 to 7.3 per 10,000 U.S. children in 2004—a 563% increase.⁸ Surveys generally find lower admission rates for PBD in other countries than in the United States, with percentage estimates of total admissions for PBD ranging between 1.2% and 1.7% in Denmark⁹ and between 2.5%¹⁰ and 4.2%¹¹ in India. Similarly, a Finnish study found 1.7 cases of PBD per 100,000 population per year.¹² Although trend data are limited, a German study reported such data, specifically that although inpatient admissions for PBD in individuals aged up to 19 years increased 68.5% between 2000 and 2007, from 1.13 to 1.91 per 100,000, the rates for depression increased by 219.6%.¹³ However, the rates for PBD were still considerably

lower than those reported for the United States. A recent New Zealand study¹⁴ reported a linear decrease in the proportion of admissions for PBD, from 14% to 8% compared to total hospital admissions between 1998 and 2007, perhaps because of greater provision of community services.

The possible increase in the use of the PBD diagnosis, at least among some US clinicians, reflects a shifting view of PBD that has generated considerable controversy.¹⁵ Given this controversy, it is important to gather up-to-date, longitudinal, comparative national data to place this shift in US practice within a broader international context. To accomplish this goal, we used data collected over an 11-year period to examine the rate and time trends of hospital discharges for PBD (including BP-I, bipolar II disorder [BP-II], BP-NOS, and cyclothymia) in the United States and England. To our knowledge, this is the first study comparing rates of hospitalization for PBD in the United States versus another country. We hypothesized that inpatient discharge rates for PBD would be higher in the United States than in England. In addition, we hypothesized that this cross-national difference in rates would be unique to PBD and would not be present in other childhood psychiatric diagnoses or in adult BD. In addition, given the relatively recent controversy¹ regarding the diagnosis of PBD in the United States, we performed linear trend analyses for PBD to see if such trends differed cross-nationally.

METHOD

Dataset for English Discharge Rates

Anonymized statistical records for all NHS hospital discharges in England, for all specialties, were analyzed using the national Hospital Episode Statistics (HES) dataset (www.hesonline.nhs.uk). This dataset includes all inpatient discharges between January 1, 2000, and December 31, 2010. Diagnoses were coded using the International Classification of Diseases Version 10 (ICD-10). The codes for BD were as follows: all BD, F31; BP-I, F31.0 to F31.78; BP-II, F31.8; BP-NOS, F31.9; and cyclothymia, F34.0. The full HES dataset was supplied to the Oxford Unit of Health-Care Epidemiology (UHCE) as individual-level records for each hospital admission by the English National Health and Social Care Information Centre. The records were analyzed by UHCE staff for this study.

Dataset for US Discharge Rates

US data were from the National Hospital Discharge Survey (NHDS; <http://www.cdc.gov/nchs/nhds.htm>), a nationally representative survey of hospital discharges. The sample included 500 hospitals from 2000 to 2007 and 239 hospitals from 2008 to 2010. Military, federal, Department of Veterans Affairs, and prisons were excluded, as was any unit with fewer than 6 beds. The anonymous data included demographic details such as age, sex, and race/ethnicity.

Diagnoses were coded using the International Classification of Diseases Version 9, Clinical Modification (ICD-9-CM). The codes used for BD were as follows: all BD, 296.4 to 296.8 inclusive; BP-I, 296.4 to 296.7; BP-II, 296.89; BP-NOS, 296.67 to 296.88; and cyclothymia, 301.13.

Because the NHDS is a representative survey (0.5% sample) rather than a database including all discharges, it was necessary to adjust the results to provide a national estimate for the United States. The NHDS survey provides a weight for each discharge, signifying the total number of discharges that 1 unweighted discharge would represent nationally. Thus, an estimate of the number of discharges for each diagnosis nationally could be calculated by summing the weights for the particular discharge diagnosis in each year and for each particular age. The SAS code published by the NHDS was used as the basis for our analysis. Strenuous efforts were made to check our methods against previously published research,⁸ including contacting other authors who had used the NHDS dataset so that we could validate the results from our SAS analysis.

Data on the number of discharges were combined with population data from the United States census bureau for each year of the survey to calculate discharge rates and to compare them with the UK data. Each discharge also has the length of stay coded, allowing calculation of an average length of stay for each diagnosis.

Study Inclusion Criteria

For this study, we selected all inpatient discharges in patients aged 1 to 19 years between January 1, 2000, and December 31, 2010. For the same time period, we also selected all inpatient discharges for adults aged 20 to 34 years with a diagnosis of BD.

Statistical Analysis

To calculate hospital discharge rates for PBD, we divided the total number of hospital discharges for BD in patients aged 1 to 19 by the totals of the mid-year populations for the same age group over the study period. We also calculated age-specific rates in a similar way, by dividing the total number of discharges for each year of age by the total population of children in each single-year age group. Ninety-five percent CIs for the English discharge rates were calculated using the Mid-P test.¹⁶ For US discharge rates, CIs were calculated using a Poisson estimation of the 95% confidence of the unweighted counts.¹⁷ The weights used to calculate the discharge rates were then applied to the lower and upper Poisson CIs of the unweighted counts to provide an estimate of the CI of the discharge rate. Statistical analyses were carried out using SAS Version 9.2. (SAS Institute, Cary, NC).

To assess trends and their significance, we used linear regression to fit lines to the logarithms of the annual PBD discharge rates and used the estimate of the slope and its standard error to calculate the average annual percentage change over time and the 95% CI.

We used the joinpoint regression model¹⁸ and permutation tests for identifying changes in the trends of the age-specific rates as described.¹⁹ We restricted our analyses to those age groups with 5 or more counts, that is, ages 4 to 19 years for the US data and 11 to 19 years for the English data.

Comparison Groups

To determine pediatric discharge rates in the United States and England for other psychiatric conditions, we extracted data on US discharges for mental disorders (ICD-9-CM 290–319),

excluding the following: 290 to 294, organic conditions; 303 to 305, psychoactive substance use; 310, organic brain damage; 317 to 319, mental retardation; and 296.4 to 296.89, bipolar disorders. We compared these US data to English pediatric discharges for mental disorders (ICD-10 F00–F99), excluding the following F00 to F09, organic conditions; F10 to F19, psychoactive substance use; F70 to F79, mental retardation; and F31, BD.

We also extracted data on single manic episode, unipolar depression, and attention-deficit/hyperactivity disorder (ADHD) in children and adolescents to compare the rates with BD. The following codes were used to extract data on US discharges: single manic episode (ICD-9-CM 296.00–296.16), unipolar depression (ICD-9-CM 292.2–292.3, 311), and ADHD (ICD-9-CM 314.00–314.9). The following codes were used to extract data on English discharges: single manic episode (ICD-10 F30), unipolar depression (ICD-10 F32–F33), and hyperactivity (ICD-10 F90–90.1). We performed the latter analysis to test whether cross-national differences in rates of PBD admissions could reflect differences in the management of suicidal ideation; if so, then similar differences should be seen for patients with unipolar depressive disorders.

We also calculated hospital discharge rates for BD in adults aged 20 to 34 years by dividing the total number of hospital discharges for BD in patients aged 20 to 34 by the totals of the mid-year populations for the same age group over the study period. The CIs for English and US rates were calculated as described above.

Ethical Approval

The English NHS Central Office for Research Ethics Committees approved the current work program of analysis using the dataset (reference number 04/Q2006/176).

RESULTS

Discharge Rates for BP in Children and Adults

Discharge rates for all PBD diagnoses combined (i.e., BP-I, BP-II, BP-NOS, and cyclothymia) differ markedly between the United States and England, with the rate in the United States being 72.1 times higher (i.e., PBD discharges per 100,000 population: United States, 100.9, 95% CI = 98.1–103.8 versus England, 1.4, 95% CI = 1.4–1.5) (Table 1, Figure 1). A large disparity between the United States and England occurs in the preadolescent years, in which no discharges were recorded for English children. Indeed, by 5 years of age, the rate of discharges for PBD in the United States is greater than the maximum discharge rate in England, which occurs at 19 years (9.9 versus 8.9 per 100,000 population). A highly significant 114-fold difference in rates is also found in adolescence, with a peak at age 16 years in the United States (342 per 100,000; 95% CI = 339.9–344.7) versus England (3.0 per 100,000 population, 95% CI = 2.5–3.6). Furthermore, in the United States, the peak age for PBD discharges in children and adolescents is 16 years, followed by a decrease to age 21 years. This pattern is not seen in England, where the discharge rate for PBD continues to rise with increasing age (Figure 1).

The disparity in discharge rates for pediatric BP-I only is 56.7-fold (United States, 51.0 per 100,000 population, 95% CI = 49.1–53.1, versus England, 0.9 per 100,000 population, 95%

CI = 0.8–0.9), with a larger 73.7-fold disparity for BP-NOS for the United States (44.2 per 100,000 population, 95% CI = 42.4–46.0) versus England (0.6 per 100,000 population, 95% CI = 0.5–0.6). Although the absolute rate of BP-II discharges in the United States is considerably lower than for BP-I or BP-NOS, the cross-national difference for BP-II is very large, that is, 570-fold (United States, 5.7 per 100,000 population, 95% CI = 5.0–6.3, versus England, 0.01 per 100,000 population, 95% CI = 0.01–0.02, as virtually no children and adolescents receive this discharge diagnosis in England (Table 1). For cyclothymia, the rates are low in both countries, and the disparity is less at 40-fold (United States, 0.8 per 100,000 population, 95% CI = 0.7–0.9, versus England, 0.02 per 100,000 population, 95% CI = 0.01–0.03). The rates of single manic episodes are similarly very low in both countries (United States, 0.5 per 100,000 population, 95% CI = 0.3–0.7, versus England, 0.5 per 100,000 population, 95% CI = 0.5–0.6).

Across all patients with PBD, the median length of stay in England is 34.5 days (interquartile range, 10–77), compared with 6 days (interquartile range, 4–9) in the United States. If hospitalization rates are adjusted for length of stay, there remains a 12.5-fold difference in PBD discharge rates between England and the United States. There is no gender difference in the rates of discharge for PBD across the age span 0 to 19 years in either the United States or England. Overall, BD accounts for 27.8% of US inpatient child psychiatric discharges (100.9 of 362.1 discharges per 100,000 population) but only 2.1% of English inpatient child psychiatric discharges (1.4 of 69.2 per 100,000 population), a 13.2-fold difference.

Discharge Rates for Adult BD

For adults with BD, the discharge rate is 7.2 times higher in the United States (158.2 per 100,000 population, 95% CI = 154.8–161.6) versus England (22.1 per 100,000 population, 95% CI = 21.8–22.3). The difference in adult total psychiatric admissions is 2.0 times higher in the United States (506.6 per 100,000 population, 95% CI = 500.5–512.7 versus England (249.8 per 100,000 population, 95% CI = 248.9–250.7).

Discharge Rates for Mental Illness Other Than PBD in Children

The discharge rate for all non-bipolar mental illnesses in children and adolescents is 3.9-fold higher in the United States than in England (261.2 per 100,000 population, 95% CI = 257.2–265.3 versus 67.8 per 100,000 population, 95% CI = 67.0–67.9) (Table 1). For ADHD, the rate is 13.2 times higher in the United States than in England (United States, 16.6 per 100,000 population, 95% CI = 15.7–17.6, versus England, 1.26 per 100,000 population, 95% CI = 1.2–1.3). The discharge rate for unipolar depression in children and adolescents is 4.2-fold higher in the United States than in England (United States, 30.3 per 100,000 population, 95% CI = 28.9–31.8, versus England, 7.3 per 100,000 population, 95% CI = 7.1–7.4) (Table 1). For pediatric unipolar depression, the median length of stay is highly similar cross-nationally (England, 5 days [interquartile range 1–22], versus United States, 4 days [interquartile range 2–6]).

Time and Age Trends

Over the 11 years of the study period, the discharge rates for PBD were fairly stable in England and in the United States (Figure 2), and neither the United States nor English rates show significant time trends ($p = 0.22$ and $p = 0.80$, respectively). The average annual percentage change is 3.7% (95% CI = -2.6%) to 10.0% in the United States and 0.3% (95% CI = -2.0 %) to 2.5% in England (Figure 2). Similarly, over the study period, the discharge rates for pediatric non-bipolar mental illnesses in children remained stable in both England and the United States.

As noted above, the age-specific rates for the United States increase with age up to about age 16 and then decline. This change in slope was confirmed by joinpoint analysis, which showed that a model with 2 slopes yielded a significantly better fit than a model with a single slope ($p = 0.0002$). The break was estimated to be at age 15 (95% CI = 13) to 17 years. Adding an additional joinpoint, that is, having 3 slopes (lines) did not significantly improve the model fit ($p = .23$). In contrast, the English rates increase with age from ages 1 to 19 years, and the model for age-specific rates did not show a significant improvement in fit with the addition of a second slope ($p = .07$).

DISCUSSION

Using an English national dataset with complete enumeration of patients and a representative US hospital sample survey, we compared discharge rates for PBD between England and the United States between 2000 and 2010. We found a large (i.e., 72.1-fold) disparity between the United States and England in the rate of PBD discharges, with most of that being driven by cross-national differences in the rates of BP-I and BP-NOS. Crucially, although there were no discharges from English hospitals for PBD patients less than 7 years of age, by 6 years of age the rate of admission for PBD in the United States equaled that seen in England at 19 years. In the United States, the rate of discharges for BD decreased after 16 years of age, whereas, in England, the rate continued to rise throughout later adolescence until a steady rate was reached in adulthood. The disparity in discharge rates for BP-I (56.7-fold) was mirrored by a similar 73.7-fold difference in discharge rates for BP-NOS; furthermore, virtually no children or adolescents received a discharge diagnosis of BP-II in England, whereas the diagnosis was not uncommon in the United States (Table 1). There was a slightly smaller, but significant, 40-fold difference in the rates of cyclothymia between the United States and England, indicating that the cross-cultural difference extends across the spectrum of bipolar and related disorders.

Corresponding data for other psychiatric diagnoses suggest that, although cross-national disparities in hospital discharge rates are present across diagnoses, these disparities are particularly marked in the case of PBD. Specifically, such marked disparities are not seen either for adult BD or for pediatric psychiatric hospitalizations in general. For example, whereas the cross-national difference in hospitalization rates for PBD is 72.1-fold, the comparable difference across all non-bipolar child psychiatric hospitalizations is 3.9-fold. Even after correcting for the difference in rates of child psychiatric hospitalization, there remains a 19.0-fold difference in the rate of patients discharged with a diagnosis of PBD. Similarly, although the discharge rates for pediatric ADHD and unipolar depression are

higher in the United States than in England, the difference is considerably smaller than that for PBD.

Of note, we found that the rates of the diagnosis “single manic episode” did not differ between the United States and England. In understanding this result, it is important to note that “single manic episode” is rarely coded as a discharge diagnosis in either country. Thus, the vast majority of patients in either country who present to the hospital in a manic episode receive a discharge diagnosis of BP-I; very few receive a diagnosis of “single manic episode.” This may be because clinicians typically are able to identify past episodes of either mania or depression: thus, the frequency of “single manic episode” is very low, and too low to show a trans-national difference in rate.

Of course, our data cannot speak to the question of whether US clinicians are too liberal in assigning the diagnosis of BD to youth, or, alternatively, whether English clinicians fail to recognize or diagnose these illnesses. What our data do suggest is that PBD is much more commonly diagnosed in inpatient settings in the United States than in England; that this large disparity is not present across all childhood psychiatric illnesses or in adult BD; and that the reasons for the disparity in the case of PBD warrant further study.

Epidemiologic studies that use research-based diagnostic criteria and standardized assessment methods do not show significant differences between the United States and other countries in the prevalence of more narrowly defined PBD.⁴ However, our results are consistent with studies in other countries that rely on clinician diagnosis and find that the number of pediatric psychiatric hospitalizations assigned a diagnosis of BD is low relative to rates reported in the United States. Specifically, other inpatient surveys give percentage rates of total hospital admissions for PBD as a percentage of all pediatric psychiatric hospitalizations, of 1.2% to 1.7% in Denmark⁹ and 2.5%¹⁰ or 4.2%¹¹ in India, compared to the United States figure of 27.8%. Expressed as population-based rates, rates for PBD have been reported as 1.7 cases per 100,000 population per year in Finland¹² compared to 100.9 cases per 100,000 population per year in the United States. Of note, these other inpatient studies are relatively old and require updating. A more recent study¹³ reported that hospitalization rates for PBD are similar in England and Germany (1.4 versus 1.9 per 100,000 population), adding weight to the suggestion that it is US rates that are disparate relative to other countries.

The NHDS data is compiled from a random sample of 5% of all discharges from nonfederal short-stay hospitals in the United States, excluding federal, military, and Department of Veterans Affairs hospitals, as well as hospital units of institutions (such as prison hospitals) and hospitals with fewer than 6 beds staffed for patient use. A wide range of hospitals was sampled, including university hospitals. The sampling methods and techniques to weight the observed number of patients in the survey to give a national figure have been validated previously,²⁰ and the NHDS provides confidence figures for these national estimates. Given the small number of observed discharges in our study, we elected to use Poisson confidence intervals to calculate the confidence limits around the discharge rates. These confidence intervals are wider than those published in the articles described above and acknowledge the uncertainty around the small numbers observed. In contrast to the United States data, the

English data represent all discharges from inpatient care for NHS patients. These data will include all psychiatrically hospitalized patients except the small number seen in private inpatient facilities. Thus, standard methods were used to calculate the CI for English rates, and no specific methods were required to take account of sampling error.¹⁶ Given these methodological issues and the extent of the difference between the discharge rates for the 2 countries, including the confidence intervals, we are confident that our results reflect a real difference in rates between the 2 countries rather than an artifact of cross-national differences in data collection or analysis.

There are several possible explanations for the observed US/English difference in discharge rates for PBD. First, the criteria used to diagnose BD differ between ICD-10 and the *DSM-IV-TR*.^{21,22} Specifically, ICD-10, which is used more commonly in the UK, requires more than 1 manic episode for a diagnosis of BD, whereas the *DSM-IV-TR*, and the *DSM-5*, require only 1 such episode. However, the rates for hospitalization because of a single manic episode were similarly low in both the United States and England. Furthermore, descriptions of US youth meeting criteria for BD typically describe them as having multiple and frequent episodes.^{23,24} Therefore, it is unlikely that the high rates in the United States are due to youth receiving the diagnosis of BD based on a single episode. We also found cross-national differences not only in the rates of overall PBD, BP-I, and BP-II, but also BP-NOS. In addition, the UK National Institute for Health and Care Excellence (NICE) clinical practice guidelines,²⁵ published in 2006, recommend conservative use of the diagnosis of BP-I in children and adolescents and cautioned against making BP-II diagnoses in this age group. However, our data indicate that the United States/English differences were apparent before 2006, suggesting longer-standing diagnostic differences.

Besides any differences in formal diagnostic systems, there are cross-national conceptual differences, with some US authorities viewing irritability, not euphoria, as the hallmark symptom of pediatric mania.²⁶ Furthermore, in contrast to the episodic nature of adult BD, some US authorities maintain that PBD is characterized by non-episodic, chronic, ultra-rapid cycling, mixed irritable states.^{2,27} The latter phenotype appears to be considerably more common in youth than is episodic BD and, upon longitudinal follow-up, shows an association with new major depressive episodes and the onset of anxiety disorders, rather than with the onset of new manic episodes.^{28–30} In the UK, such cases would be conceptualized not as PBD but as oppositional defiant disorder, conduct disorder and/or ADHD with emotional dysregulation.³¹ Indeed, 1 study that uses standardized vignettes provides evidence for different diagnostic practices between English and US child psychiatrists, with a greater readiness to diagnose PBD in the United States.³² Furthermore, a study of ratings of manic symptoms by clinicians from 3 countries rating the same 2 patient videos,³³ and another study of more than 600 clinicians rating a pediatric vignette,³⁴ suggest that cultural differences influence the interpretation of manic symptoms. As noted above, our data do not speak to whether US or English clinicians are “correct” in their diagnostic practices, but do document significant cross-national differences that are much more marked for PBD than for other pediatric psychiatric illnesses or for adult BD.

Another possible explanation for the differences in hospital discharge rates might be that admissions are longer in England versus multiple, short admissions in the United States. The

US datasets were not linked, and therefore we cannot identify multiple admissions for the same person. Perhaps only individuals with severe cases requiring more prolonged treatment are admitted in England, which may be the case given the markedly increased availability of community child and adolescent mental health in England compared to the United States. Indeed, probably as a reflection of the very different health care systems in the 2 countries, US psychiatrists admit approximately 4 times as many patients per 100,000 population as in England. Also consistent with the suggestion that only those individuals with very severe cases are admitted in England, the length of stay for PBD in England is 5.8 times longer than in the United States (34.5 versus 6 days). However, one cannot rely on the argument that length of stay equates with severity because in the United States, there are considerable financial pressures for short admissions. Indeed, even if hospitalization rates were adjusted for length of stay, there would still be more than a 12.5-fold difference in PBD discharge rates between England and the United States. Furthermore, if our results were due solely to the availability of outpatient care in England, one would not necessarily expect the particularly marked disparity in PBD compared to other diagnoses. It is also likely that the lower availability of psychiatric beds in England contributes to a difference in admission practice, but this would not apply to PBD solely. Nor, for example, can this disparity be explained by differences in the management of suicide risk, as the rate of hospitalization for depression, 1 of the psychopathologic conditions linked with suicide, is only 4.2 times higher in the United States than in England (Table 1).

Although this study focused on PBD, there is evidence here of possibly a US–English difference in hospitalization rates, not only in absolute numbers but also in the peak periods of admission. That is, in the United States, there is a distinct peak at 16 years (Figure 1), when rates are higher than at any other age in the study period (0–34 years) with a decline in admissions afterward, whereas in England there is steady and progressive increase with age. One speculation might be that in the United States, severe adolescent mood lability may be labeled as BD.

Over the 11-year period of this study (2000–2010), we found no evidence in either country of a change in discharge rates for PBD or other psychiatric diagnoses. This is in contrast to US studies reporting increases in overall psychiatric discharge rates of 182% in children and 141% in adolescents between 1996 and 2007,^{35,36} a period of time that partially overlapped with our study. Blader and Carlson⁸ reported an even higher 563% increase in US hospital discharges for PBD, from 1.3 to 7.3 per 10,000 between 1996 and 2004. That study pointed to an increase after the year 2000, a period when there was already considerable debate within the United States about the conceptualization of PBD. It is possible that the disparate results between these studies and ours reflect differences in sampling.

Limitations of the study include the fact that we used differing sampling methods. The United States data were collected from a survey, albeit a large survey of more than 500 hospitals initially. Military, federal, Department of Veteran Affairs, prisons, and any unit with fewer than 6 beds were excluded from the United States survey, but academic and university centers were included. Although survey data are open to error upon scaling up, any error would have to be selective, since the cross-national differences in discharge rates are different for PBD than for other US child inpatient disorders. Of course, we are limited

by the ascertainment methods in the United States and England, which use differing diagnostic systems, namely, ICD-9/*DSM-IV* in the United States and ICD-10 in England. In addition, both datasets refer only to inpatient, not outpatient, attendance. Therefore, we cannot further explore the possible impact of the coordinated system of outpatient care in the United Kingdom on our findings, which include a 3.9-fold smaller number of inpatient admissions in England than the United States. The UK data excluded discharges from private and charitable hospitals; however, a national UK audit³⁷ showed that admissions to the private or charitable sector for affective disorders account for a very small proportion of the total child psychiatry admissions each year. Unfortunately, the US survey data were not linked, so it was not possible to exclude multiple short re-admissions as a cause for the disparity in discharge rates. Even when hospitalization rates are adjusted for cross-national differences in the length of stay, significant cross-national disparities exist in the rate of PBD discharge diagnoses; nonetheless, multiple short hospitalizations in the United States are clearly an important potential source of error. In addition, the information presented relates to diagnoses only; the datasets did not allow us to compare the severity of the PBD illness, for example, as indexed by the use of medication.

Moreover, in the United States, the controversy surrounding the diagnosis of PBD started around 1995,³⁸ several years before the data for this study were available. Furthermore, comparable data for the years 2011 to 2012 were not available. Thus we were not able to answer the interesting question of whether the recent debate in the United States over the diagnosis of PBD has resulted in a change in diagnostic practice.

Finally, as noted above, a limitation of this study is that, apart from examining the possible impact of differences in the length of stay, the study is not designed to determine the reasons for the marked cross-national disparity in rates of PBD. Certainly, the study cannot comment on which of the 2 diagnostic practices, namely, use of US ICD-9/*DSM-IV* or World Health Organization (WHO) ICD-10, is more valid.

Our findings of marked cross-national differences in PBD discharge rates contrast with previous epidemiologic findings obtained using standardized diagnostic interviews.⁴⁻⁶ The contrast between our findings and the epidemiologic data suggests that differences in clinical diagnostic practices in this age group may account for our findings, although it must be stressed that neither the diagnosis nor the treatment of classical BD are in dispute in the United States or in England. In addition, the cross-national disparity in PBD discharge rates is considerably more marked than the disparity in the discharge rates of other pediatric psychiatric illnesses, including ADHD, or of BD in adults, suggesting that these cross-national differences in clinical practice may be relatively specific to PBD. If diagnostic differences are the most likely cause of the disparity in hospital admission rates for PBD, then 1 recommendation would involve the use of standardized diagnostic approaches,^{39,40} as these have been shown to significantly reduce diagnostic misclassification.⁴⁰ Indeed, a recent meta-analysis comparing clinical diagnosis as usual to the results of semi-structured interviews in both adults and children⁴¹ found poor agreement in general and particularly poor agreement for BD.

Examination of trans-national trends in clinical practice have previously been very useful in clarifying diagnostic principles, as has been shown in the case with schizophrenia⁴² and ADHD.⁴³ Uncertainties around PBD remain; however, we hope that our study findings contribute to highlighting issues that merit further scrutiny.

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FIGURE 1.

Bipolar disorder (BD) (ICD-9-CM codes 296.40–296.89; ICD-10 code F31) discharge rates per 100,000 population in patients aged 1 to 34 years in the United States versus England, 2000 to 2010. Note: ICD-9-CM = International Classification of Diseases Version 9, Clinical Modification; ICD-10 = International Classification of Diseases Version 10.

FIGURE 2.

Pediatric bipolar disorder (PBD) (ICD-9-CM codes 296.40–296.89; ICD-10 code F31 in patients aged 0–19 years) discharge rates per 100,000 population in the United States versus England by year, 2000 to 2010. Note: ICD-9-CM = International Classification of Diseases Version 9, Clinical Modification; ICD-10 = International Classification of Diseases Version 10.

TABLE 1

Discharge Rates in Patients Less Than 19 Years of Age, and Average Length of Stay, for Pediatric Bipolar Disorder (Bipolar I Disorder [BP-I], Bipolar II Disorder [BP-II], Bipolar Disorder Not Otherwise Specified [BP-NOS], Cyclothymia), and for Other Psychiatric Diagnoses, United States and England, 2000 to 2010

Diagnoses	ICD-9-CM Codes	ICD-10 Codes	US Discharge Rate per 100,000 (95% CI)	English Discharge Rate per 100,000 (95% CI)	US Median Length of Stay (days) Interquartile Range	English Median Length of Stay (days) Interquartile Range	US % Males	English % Males
Bipolar disorder all	296.40–296.89	F31	100.9 (98.1–103.7)	1.4 (1.4–1.5)	6 (4–9)	34.5 (10–77)	51.3	46.4
Bipolar I disorder	296.40–296.66	F31.0–F31.7	51.0 (49.1–53.1)	0.9 (0.8–0.9)	6 (4–9)	39 (15–83)	51.1	45.3
Bipolar II disorder	296.89	F31.8	5.7 (5.0–6.3)	0.01 (0.01–0.02)	5 (3–9)	42.5 (6–106)	37.3	42.9
Bipolar disorder NOS	296.67–296.88	F31.9	44.2 (42.4–46.0)	0.6 (0.5–0.6)	6 (4–9)	26 (4–66)	53.4	48.2
Single manic episode	296.00–296.16	F30	0.5 (0.3–0.7)	0.5 (0.5–0.6)	7.5 (4–9)	25.5 (9–52)	54	52.1
Cyclothymia	301.13	F34.0	0.8 (0.7–0.9)	0.02 (0.01–0.03)	12 (6–19)	21 (6–78)	28	19.3
ADHD	314.00–314.99	F90.0, F90.1	16.6 (15.7–17.6)	1.26 (1.2–1.3)	7 (3–13)	1 (0–7)	55	80.8
Depression	292.2–296.3, 311	F32–F33	30.3 (28.9–31.8)	7.3 (7.1–7.4)	4 (2–6)	5 (1–22)	40	37.6
All other psychiatric diagnoses	295–296.3, 296.9–302, 306–309, 311–316	F20–30, F32–F69, F80–F99	261.2 (257.2–265.3)	67.8 (67.0–67.9)	5 (3–9)	3 (1–22)	49.5	49.5

Note: ADHD = attention-deficit/hyperactivity disorder; ICD-9-CM = International Classification of Diseases Version 9, Clinical Modification; ICD-10 = International Classification of Diseases Version 10; NOS = not otherwise specified.