



Justifiable Psychopharmacology or Overzealous Prescription? Examining Parental Reports of Lifetime Prescription Histories of Psychiatrically Hospitalised Children

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Background: This research investigated parent reports of pre-admission psychotropic medication histories of psychiatrically hospitalised children in the United States. The emphasis was on identifying factors related to potentially overzealous medication use. **Method:** Diagnosis, insurance type, and demographics for 170 consecutive admissions were assessed via research case conference and chart review. An extreme group of children with lengthy medication histories ($n = 20$) was also identified, and prescription and diagnostic patterns for this group were compared to other medicated children in the sample ($n = 100$). Cumulative medication history, rather than specific polypharmacy, was examined. **Results:** Psychopharmacotherapy was common (71%). Privately insured children, children with previous psychiatric hospitalisations, and children with Oppositional Defiant Disorder (ODD), Attention Deficit Hyperactivity Disorder (ADHD), and the specific comorbidities of ODD/ADHD, and ODD/Parent Child Relational Problems had more past medication trials. Depressed children had fewer. Analyses of the extreme group suggest that young, privately insured, oppositional children with parent-child relationship problems were at highest risk for overmedication (including multiple trials of stimulants, as well as mood stabilisers, central adrenergic agonists, and antipsychotics). **Conclusions:** Results raise important questions about the role of health care pressures on clinical practice in the United States.

Keywords: Psychiatric treatment; child inpatients; psychopharmacology; managed care

Introduction

The use of psychotropic medications with children in the United States has dramatically increased over the past 20 years due to several factors including an increased understanding of psychiatric disorders in childhood, the number of drugs available, and managed-care related changes in psychiatric treatment for

children (Gadow, 1997; Jellinek, 1999). Noting that these forces have not necessarily been balanced, some have expressed concern that children are now being 'overzealously medicated' (Behr, 1998, p. 990; Woolston, 1999) by physicians who seem 'overly eager to try ... new medications, often in combinations of multiple medications to the same patient' (Behr, 1998, p. 990).¹ Although there are growing concerns about the increased use of psychotropic medications with children, there are few empirical studies of prescription patterns and the forces that drive them (Gadow, 1997). Such empirical studies are essential to clarify how much of the recent increase in psychopharmacotherapy with children represents progress and how much of it is problematic.

Pharmacoepidemiology studies of inpatients and children admitted to residential treatment in the US have shown widespread and increasing use of medications (Ahsanuddin et al., 1983; Connor et al., 1997; Safer, 1997; Zito et al., 1994), often combined and often for 'unlabelled indications' (Zito et al., 1994, p. 48). In these studies, severity of illness, indexed by inpatient

¹ Behr describes a 13-year-old boy he evaluated who had been using buspirone, valproate, gabapentin, and olanzapine simultaneously, with the recommendation from the consultant who referred him to try pimozide, propranolol, fluoxetine, trazodone, quetiapine, or clozapine if the current medications were not effective. The present study was stimulated by similar clinical observations of lengthy psychopharmacotherapy histories for children admitted to a university-affiliated psychiatric hospital in the Northeastern United States. Three different 7-year-old boys who had been previously prescribed 7, 11, and 13 different medications (5 simultaneously at the time of admission for the third boy) were admitted within a 6-month period.

status or length of stay, has been related to number and type of medications prescribed, but specific diagnosis is often unrelated. Severe aggression and nonseizure neuropsychiatric comorbidity are strongly related to polypharmacy (Connor et al., 1997).

Pharmacoepidemiological studies of outpatients suggest less frequent use of medications but also a general increase (Gadow, 1997; Kaplan et al., 1994; Safer, 1997; Storch, 1998). Notable trends over the past 20 years include increased use of selective serotonin reuptake inhibitors (SSRIs) and mood stabilisers, high (and in some studies increasing) rates of stimulant prescription, increases in polypharmacy, and decreases in tricyclic antidepressant (TCA) and conventional neuroleptic prescription (Batey & Wright, 1982; Jensen et al., 1999; Safer, 1997). Prior hospitalisation and having a disorder believed to respond to medication have been linked to greater medication use in outpatient settings.

The increased use of psychotropics with children, in and of itself, is not necessarily problematic: substantial numbers of appropriate prescriptions of many kinds were noted in psychopharmacotherapy reviews in the 1990s for child outpatients and inpatients in the United States (Kaplan & Busner, 1997; Kaplan et al., 1994; Storch, 1998). In particular, the increase in SSRI use, and decreases in conventional neuroleptic and TCA use in outpatients have been described as progress given side effect and efficacy considerations (Olsson et al., 1998).² However, the extremely high (and increasing) level of psychopharmacotherapy in inpatient and residential programs in the US requires examination (Gadow, 1997; Connor et al., 1998). Prescription history is often *not* related to diagnosis for these children, and medications are often used for purposes other than those for which they were designed and tested (Connor et al., 1998; Ahsanuddin et al., 1983; Zito et al., 1994). Although concerns about overzealous use of psychiatric medications seem more prominent in the United States (with perhaps the exception of public concern about stimulant use and ADHD), concerns about 'off label' prescribing in child psychiatry, and its impact on clinical practice, have been growing internationally (see Rothenberger & Banaschewski, 2002).

The present research examines the forces that might be creating a reliance on psychopharmacotherapy for children requiring inpatient hospitalisation in the United States. We emphasise lifetime medication history to examine broad prescription practices, rather than those of one type of provider in one type of setting (e.g. paediatricians, psychiatrists, inpatient, outpatient). We first describe prescription patterns in this sample. Then, we predict numbers of psychotropic medication trials from both clinical and nonclinical variables. Associations with diagnoses believed to respond to medication would indicate that clinically relevant forces were driving prescription practices. Associations with diagnoses not known to respond to medication or with nonclinical factors, such as type of health insurance, could suggest problematic prescription patterns. Many

have noted that managed-care pressures in the United States have limited psychotherapy benefits and inpatient stays, curtailed assessment practices, and increased pressure on treatment providers to be efficient (see Jellinek, 1999; Woolston, 1999 for discussions). We evaluate whether this push towards efficiency and cost containment is increasing pharmacological treatment of conditions that are not responsive to medication, and encouraging a pattern of piecemeal polypharmacy rather than holistic assessment and treatment.

Method

Participants

Participants for this study were admitted over a 14-month period to the children's inpatient unit of a university-affiliated children's psychiatric hospital in the Northeastern United States. The hospital served as the inpatient facility for all children from the state of Rhode Island (RI) who were insured through the federal Medicaid program, and served the majority of all privately insured patients in RI, as well as some from Eastern Connecticut, and Southeastern Massachusetts. All 170 participants were admitted for severe aggressive behaviour and/or suicidal ideation/behaviour, and were determined to be at risk of endangering themselves or others. Seventy-five percent ($n = 128$) of the participants were male and 25% ($n = 42$) were female. Seventy-nine percent were Caucasian ($n = 134$), 7% were Latino/a ($n = 12$), 6% were African American ($n = 11$), 6% were Asian American ($n = 10$), and 2% were of other ethnic backgrounds ($n = 3$). Participants ranged in age from 3–12 ($M = 8.62$, $SD = 2.46$).

Measures

Medication history interview. During the structured intake interview, parents were asked to report on their child's current and previous psychiatric prescriptions. All prescriptions were recorded verbatim onto the intake form by the trained intake clinician. Medication histories were later coded by a trained research assistant. Total number of medication trials was calculated. Changes in dosage were not counted as new medication trials, nor were repeat trials. Each medication was then assigned to one of the following medication categories: stimulants, antidepressants, antipsychotics, anxiolytics, mood stabilisers, and central adrenergic agonists. Positive prescription history for each type of medication was noted. Multiple different stimulant trials were also noted as present or absent.

DSM-IV diagnoses. A weekly research case conference was used to assess DSM-IV diagnoses. Children were reviewed at this conference within 2 weeks of discharge. Core participants in the case conference were the chief psychiatrist for the unit, two unit psychologists, and a postdoctoral fellow. For all cases, at least two of the three conference attendees had worked directly with the participant during hospitalisation. At the conference, the following hospital documents were reviewed: 1) the admission document based on interview with the parent and interview/examination of the patient, which is completed by the admitting social worker and psychiatrist; 2) the psychosocial history based on family

² Recent concerns about suicide risk and limited efficacy, the subject of US Congressional hearings in September of 2004, now suggest SSRI use in children may be outpacing the evidence.

interview, which is completed by the inpatient family therapist; 3) the psychological evaluation completed by the psychologist or a member of the assessment team; and 4) the discharge summary completed by the attending psychiatrist. Diagnoses at admission and at discharge were part of the medical record, and were reviewed, but not relied upon, during the research case conference.

DSM-IV diagnoses were assigned after the conference team reached consensus. Diagnostic frequencies (for primary diagnosis and all comorbid diagnoses) are listed in descending order according to primary diagnosis: Major Depressive Disorder, Dysthymia, and Depressive Disorder NOS (DEP: 18.8%, 35.3%), Post-traumatic Stress Disorder (PTSD: 16.5%, 24.1%), Oppositional Defiant Disorder (ODD: 14.7%, 48.8%), Adjustment Disorder with Mixed Disturbance of Emotions and Conduct (A-MIX: 10.7%, 31.6%), Conduct Disorder (CD: 7.1%, 11.8%), Generalised Anxiety Disorder, Obsessive Compulsive Disorder, Separation Anxiety Disorder, and Anxiety NOS (ANX: 7.1%, 14.1%), Reactive Attachment Disorder (RAD: 5.3%, 15.9%), Parent Child Relational Problems (P-CH: 5.3%, 31.2%), Attention Deficit Hyperactivity Disorder (ADHD: 4.1%, 23.5%), and Bipolar Disorder (Bipolar: 2.9%, 2.9%). Any diagnosis not listed here was given to less than 2% of the children in the sample.

Type of insurance. Type of insurance (private vs. Medicaid) was assessed during the intake interview with the parents. Private insurance is usually available in the United States through a person's employer. Typically an employee is given a choice of private insurance plans and makes a selection based on the cost of the plan, and the benefits it offers (including additional payments required at the time of service [co-payments], how much a person needs to pay out of pocket before the insurance plan will cover expenses [deductibles], and limits of coverage). Employers contribute to the cost of annual insurance premiums for covered employees. The employee's contribution typically depends on their salary, with higher paid employees making a larger contribution to their own health insurance premium. Highly managed plans typically cost less, but put more restrictions on benefits. In the state of Rhode Island, where the majority of participants lived, there were three major private insurance options, all of which were managed care plans. Currently, 75% of all privately insured persons in the US are enrolled in managed care plans (Kiesler, 2000). These managed care plans are distinguished from the traditional fee-for-service plans that covered mental health treatment in the US from the 1950s to the mid 1980s (Comer, 2004) in several ways: in a managed care program the insurance company determines such key issues as which therapists its clients may choose, the cost of the sessions, and the number of sessions for which a client may be reimbursed (Rothbard et al., 2002; Manderscheid et al., 1999). Two of the plans held by our participants were managed fee-for-service plans, which direct patients to approved treatment providers in the community, and monitor/limit coverage for those services. The other plan, serving a minority of the participants, was a closed-panel Health Maintenance Organisation (HMO) plan, which directs patients to treatment providers

employed by the HMO, and monitors/limits coverage for those services. In these less expensive, and less flexible plans, clients must seek treatment at the HMO treatment center with HMO treatment staff, and approval for specialist referrals or high-cost treatments can be more difficult to obtain.

Medicaid is a federal healthcare program that offers health care coverage for certain people with low-income, including all children under age 19, in families with incomes at or below the federal poverty level. Up until the late 1990s Medicaid in the state of Rhode Island, and elsewhere, was unmanaged. At the time of the current study, Medicaid was just starting to follow the path taken by private health insurance companies in the US towards managed benefits, with the goal of cutting costs. Children in the custody of state protective services, or those who had exhausted their managed Medicaid benefits, but required further hospitalisation or residential treatment, retained the traditional unmanaged Medicaid. Because changes in the Medicaid system were only beginning to take place, and because we were examining past prescription histories, we combined children with traditional unmanaged Medicaid and those in the newly-instituted managed Medicaid program for the current analyses. An inspection of service utilisation patterns also suggested that there were few differences between the two groups. For example, children with managed Medicaid were now theoretically more able to access treatment providers in the private sector (and would therefore be subject to the same control and management of services experienced by those with private managed insurance); however, families in both Medicaid groups almost exclusively used public mental health treatment facilities. Treatment in public mental health facilities is not regulated by managed care. Forty-eight percent ($n = 81$) of the sample had private insurance and 52% ($n = 89$) had Medicaid.

Additional measures. Medical records were reviewed for number of past psychiatric hospitalisations. They were also reviewed during diagnostic conference for evidence of four forms of maltreatment: physical, neglect, sexual, and emotional. Children were rated on a 4-point severity scale for each type of maltreatment based on Barnett et al. (1993) and a total severity score was calculated for use as a covariate in insurance analyses.

Institutional review. All the data used for this research were drawn from the child's official medical record (e.g. medication history) or from a supplemental file developed to augment clinical assessment and eventual clinical research on the unit (e.g. case-conference DSM diagnosis, and maltreatment severity ratings). Institutional Review Board approval for this study therefore involved permission for medical records research using these data.

Results

Medication histories

Total number of psychotropic medication trials ranged from 0 to 14 per child ($M = 2.59$, $SD = 2.86$), with 71% having positive medication histories. Approximately 28% had been prescribed 1 or 2 medications, 21% had

been prescribed 3 or 4, and 22% had been prescribed 5 or more. Because older children had more opportunities to be medicated, the raw number of medication trials was divided by age and age-adjusted totals were used for all subsequent analyses, $M = .31$, $SD = 0.38$, range = 0 to 2.07 per year of life.

Stimulants were the most commonly prescribed medications (55.3%). Thirty percent of the children in the study had been prescribed multiple stimulants in their treatment histories. Antidepressants were the next most common (44.7%), followed by central adrenergic agonists (36.5%), mood stabilisers (14.1%), antipsychotics (6.5%) and anxiolytics (4.1%).

Diagnosis and medication history

Children with a primary diagnosis of depression received fewer medication trials than children with other primary diagnoses, $t(168) = 2.52$, $p < 0.05$. Conversely, children with ODD, $t(168) = 2.54$, $p < 0.05$, and those with ADHD, $t(168) = 3.30$, $p < 0.001$, received more. No other effects for primary diagnosis were obtained. This pattern of findings was replicated when secondary and tertiary diagnoses were examined.

To examine the joint contribution of these, and other diagnoses to prescription rates we next examined comorbidity. Children with comorbid ODD/ADHD were prescribed significantly more medications than others, $t(168) = 1.97$, $p < 0.05$, as were children with comorbid ODD and clinically significant Parent Child Relational Problems, $t(168) = 3.86$, $p < 0.001$. Neither comorbidity of ADHD or ODD with depression, nor any other specific comorbidities between these diagnoses and others examined in this study, were related to medication history.

Prior hospitalisation, demographics, and medication history

Number of previous psychiatric hospitalisations was correlated with past medication trials, $r = 0.27$, $p < 0.01$. Boys experienced more medication trials per year of life than girls, $t(168) = 2.03$, $p < 0.05$. Caucasian children experienced more medication trials than children from other racial and ethnic backgrounds, $t(168) = 2.15$, $p < 0.05$.

Insurance and medication history

We next examined whether insurance type was related to medication history. Children with private insurance experienced more medication trials per year of life than children with Medicaid, $t(168) = 3.18$, $p < 0.01$. The proportions of children treated with stimulants, antipsychotics, anxiolytics, mood stabilisers, and central adrenergic agonists did not differ over insurance type. Medicaid children were, however, less likely to be treated with antidepressants, $X^2(1) = 6.82$, $p < 0.01$, than were privately insured children.³

³ To rule out some alternative explanations for insurance differences in number of prescriptions, maltreatment and ethnicity were examined. Privately insured children were less maltreated [$M = 2.67$ vs. 4.44 for total maltreatment with $t(155) = 4.01$, $p < 0.05$] and more likely to be caucasian, $X^2(1) = 24.18$, $p < 0.001$, than children with Medicaid, but insurance differences remained significant when maltreatment and ethnicity were controlled for.

In order to determine whether insurance type made a unique contribution to the prediction of medication history, we next conducted an ANCOVA with insurance as the predictor variable, and other clinical predictors of medication history (primary diagnosis of DEP, ADHD, ODD, and prior hospitalisation) as covariates. The overall model was significant, $F(5, 167) = 10.77$, $p < 0.001$, and insurance remained a significant individual predictor of number of medication trials, $F(1, 167) = 9.92$, $p < 0.01$. This finding was replicated using secondary and tertiary diagnoses as well.⁴

Extreme group comparison

Finally, we compared the 20 most highly medicated children in the sample (number of medications per year of life ≥ 0.70 : $M_{\text{number of meds per year of life}} = 1.02$, $SD = 0.42$; $M_{\text{number of meds}} = 7.75$, $SD = 2.73$) to the 100 children who had positive, but less extreme, prescription histories ($M_{\text{number of meds per year of life}} = 0.30$, $SD = 0.16$; $M_{\text{number of meds}} = 2.73$, $SD = 1.48$) to identify risk features for high medication use. As before, children in the high medication group were less likely to be diagnosed with depression: primary $X^2(1) = 6.00$, $p < 0.05$, overall $X^2(1) = 3.92$, $p < 0.05$, more likely to be diagnosed with ODD: primary $X^2(1) = 4.14$, $p < 0.05$, overall $X^2(1) = 4.17$, $p < 0.05$, more likely to be diagnosed with comorbid ODD and clinically significant Parent Child Relational Problems: $X^2(1) = 5.09$, $p < 0.05$, more likely to have private insurance, $X^2(1) = 4.53$, $p < 0.03$, and likely to have experienced more prior psychiatric hospitalisations, $t(117) = 2.80$, $p < 0.01$. In contrast to comparisons using the entire sample, the high and moderate medication groups did not reliably differ in ADHD diagnosis: primary $X^2(1) = 3.67$, $p < 0.06$, overall $X^2(1) = 3.0$, $p < 0.08$, nor in comorbid ODD/ADHD: $X^2(1) = 1.51$, $p < 0.22$. Additionally, children in the high medication group ($M_{\text{age}} = 7.69$, $SD = 1.54$) were significantly younger than those in the moderate medication group ($M_{\text{age}} = 9.48$, $SD = 2.19$: $t(118) = 3.48$, $p < 0.001$). They did not reliably differ for sex or ethnicity.

Specific prescription comparisons revealed that these high risk children were more likely than other medicated children to have been prescribed central adrenergic agonists, $X^2(1) = 11.21$, $p < 0.001$, antipsychotics, $X^2(1) = 14.57$, $p < 0.001$, and mood stabilisers, $X^2(1) = 6.00$, $p < 0.05$. Antidepressants, anxiolytics, and single stimulant trials did not differ, but children in the high medication group were more likely to have experienced numerous stimulant trials, $X^2(1) = 18.54$, $p < 0.001$ (see Table 1 for prescription rates).

Discussion

This study examined predictors of lifetime medication histories in children admitted to a psychiatric hospital in the United States, with the goal of evaluating whether medication histories were related to sound clinical indicators, or whether children were being 'overzeal-

⁴ Insurance remained a significant predictor of medication history when demographic variables associated with medication history (sex and ethnicity) were also included as covariates.

Table 1. Prescription rates by type of medication for high medication group and all other children receiving medication

Medication type	High medication group	Others
Stimulants	85%	76%
Multiple stimulants	80%	33%***
Central adrenergic agonists	80%	44%**
Antidepressants	75%	59%
Mood stabilisers	40%	16%*
Antipsychotics	25%	44%***
Anxiolytics	10%	5%

Note: Percentages marked with asterisks are significantly different across the high medication and other group at * $p < .05$, ** $p < .01$, or *** $p < .001$

ously medicated.' We found evidence of both. Lifetime pharmacotherapy histories were predicted sensibly by some clinical variables (e.g. ADHD diagnosis), but not so sensibly by others (e.g. ODD). Medication history was also predicted by nonclinical variables including whether the child had private managed health insurance. An analysis of extreme cases suggests several factors that might increase risk for overmedication in the managed-healthcare climate of the United States.

Consistent with literature on the growing use of psychotropic medications with children, the vast majority of these psychiatrically hospitalised children had a history of psychopharmacotherapy. The prescription rate we observed was higher than most reported outpatient prescription rates (15–19% Kaplan et al., 1994; 60% Safer, 1997; 44% Storch, 1998), even though the majority of the prescriptions were made on an outpatient basis. This higher rate may reflect further increases in outpatient prescription rates since these reviews, a regional difference, and/or the symptom severity of children referred for inpatient treatment (Kaplan & Busner, 1997; Safer, 1997). The types of medications prescribed to this southern New England sample, however, were similar in proportion to other recent national research (Jensen et al., 1999). For our entire sample, stimulants were the most commonly prescribed medication for children, followed by antidepressants, central adrenergic agonists, mood stabilisers, antipsychotics, and anxiolytics. With regard to concerns about 'off label prescribing', it is useful to note that the most commonly prescribed medications were those approved for use in children (fluoxetine being the most commonly prescribed SSRI).

Diagnosis was predictive of medication history, and sometimes this relationship suggested sound clinical practice. Children with depression had fewer past prescriptions. This is consistent with evidence in some past studies of SSRI effectiveness, and a large placebo response with depression (Wagner et al., 2003). The high likelihood of symptom reduction in response to a single medication trial could explain why these children experience fewer medication trials. Also, other treatments may be recommended first for childhood depression. At least for adults, antidepressant medication is one of many effective alternatives (Elkin et al., 1989). In contrast, children with ADHD experienced more medication trials than other children. This is consistent with evidence that stimulant medication is the treatment of choice for ADHD (Barkley, 2002), so

that even if other treatments are used, stimulants are likely to be a part of the treatment picture for most children with this diagnosis. It could also point to treatment resistance in this hospitalised group of children with ADHD.

The observation that children with ODD experienced more medication trials, alone and in the context of ADHD, is more difficult to justify. Disruptive behaviour disorders are not typically responsive to medication, and even in the context of comorbid ADHD require psychosocial interventions (Arnold et al., 2004). Unfortunately, we were unable to reliably examine psychosocial treatment history, so we do not know whether the frequent medication trials observed for children with ODD/ADHD were conducted in the context of psychosocial treatments, or in isolation. Clinical observations, and our findings regarding ODD/Parent Child Relational Problems comorbidity, raise concerns about the latter scenario. Given that neither ODD nor Parent Child Relational Problems respond to medication, it is difficult to imagine a justification for this group's larger numbers of medication trials, even if these children were also receiving concurrent psychotherapy.

Our findings regarding diagnosis and medication history must be understood in the context of our other main finding that children with private (managed) health insurance experienced more medication trials than children with Medicaid (largely unmanaged). Managed care pressures are a likely source of this difference. The current managed care climate in the US has been described as one in which time for assessment is limited, psychiatrists are encouraged to limit their practice to medication management, care is fragmented, more primary care physicians are prescribing medication, and outpatient psychotherapy benefits are limited (Jellinek, 1999; Woolston, 1999). All of these factors create risk for overmedication.

Differential access to physicians between Medicaid and privately insured children may also be a part of the picture. It is more likely that privately insured children in our sample were seen by physicians for their mental health problems, either because their primary care physician is the access point to other specialty services (HMO patients) or simply because their insurance plan allows them easier access to specialty services. The vast majority of children with Medicaid in the region receive their services from community mental health centres. Child psychiatrists in these centres are in short supply with severe time limitations on their contact with patients and families. Thus, medications are likely to be prescribed only in extreme cases, or in situations where children have not responded to other therapies. These centres also generally offer an unlimited outpatient therapy benefit, and intensive home-based services that are used to prevent hospitalisation, both of which could reduce the prescription rates for these children.

An analysis of the distinctive features of the 20 most highly medicated children in the sample helps paint a picture of forces that may be contributing to overmedication, at least in extreme cases. Recall that these were young, privately insured, oppositional children with parent-child relationship problems and a history of psychiatric hospitalisation, and that they were more likely to have been prescribed multiple stimulants,

central adrenergic agonists, mood stabilisers, and antipsychotics than were other children in the sample. This situation might unfold as follows: Having private (managed) insurance grants a parent greater access to a physician who could prescribe medication for his/her child. This physician may not be a psychiatrist, so biological treatments might come to mind more readily than psychotherapy. This physician will also likely experience at least implicit pressure to quickly diagnose and resolve the problem, further motivating a medication trial. If that parent has a young child, who is oppositional, and with whom the parent has developed significant relationship problems, parental distress will be high, and parental perspective-taking may be impaired. In this context, a parent is very likely to conceptualise the problem as the child's problem, and is very likely to seek or accept medication for that child. Because medication is unlikely to help a child with ODD and parent-child relationship problems, the problem will worsen, other medications might be tried, and eventually hospitalisation might be considered. Intensive home-based preventative services are rarely available to children with private insurance, so the hospitalisation is likely to be authorised. Once hospitalised, our findings suggest that further medication is likely.

Limitations

The biggest limitation of the current study is its reliance on parental reports of children's prescription histories. Although parental reports are usually good guides to past psychiatric treatment for clinical purposes, and in our experience usually correspond well to reports from referring providers, there may be systematic bias in parental reports of medication history affecting our results. Likely sources of bias include educational background, and socioeconomic status. For example, parents from higher socio-economic groups may be better at recalling the various medications their child has used. It will be important to replicate these findings using actual records of medication trials. Having access to a child's complete medical record would provide other advantages as well. Without a child's longitudinal medical record, it was difficult to determine exactly which medications were prescribed simultaneously and which were sequential across the child's treatment history. Because of this we focused on cumulative medication history rather than specific polypharmacy. This is a limitation. We could have examined specific patterns of polypharmacy at the time of admission (e.g. Connor et al., 1998). However, we wanted to focus on the collective prescription practices of numerous providers to make our findings more generalisable, and highlight prescription problems that might accumulate over time. Future research should examine specific patterns of polypharmacy, and more closely examine how lengthy prescription histories develop. Future research should also examine whether these lengthy histories represent an over-reliance on medications at the expense of psychosocial interventions, as we suspect.

Our insurance comparisons are limited by the fact that we did not examine distinct types of managed plans within the privately insured group (e.g. Olfson et al., 1998). For example, the closed-panel HMO plan

rarely approved inpatient hospitalisation, and patients in this small subgroup may have had different prescription histories than those in the more typical managed, fee-for-service plans. Another important topic to explore is whether there are subtle differences in prescription histories between children with managed and unmanaged Medicaid, or whether differences develop as the managed Medicaid program becomes more established. Future research should also examine parent and observer reports to more thoroughly explore links between symptom severity, chronicity and medication history. Comparing symptom reports between parents and other observers would help investigate how much 'medication seeking behaviour' is involved in cases where there is an extreme reliance on psychotropic medications (Behr, 1998; Gadow, 1997). Comparing parental reports to longitudinal medical records would also help establish whether parent-reports of medications at the time of admission were reliable. Finally, it will be important to examine whether problematic prescription histories are linked to healthcare pressures, or other external forces, in other countries as well.

Clinical implications

This research should remind the practitioner to consider patterns of past psychotropic prescriptions when making treatment decisions, and examine reasons for potentially overzealous use of medication in some cases. Is the child privately insured? Is the child embroiled in a parent-child relationship conflict that might bias the treatment s/he receives? Has a careful biopsychosocial assessment been conducted? Current theories of childhood psychiatric problems highlight the complex interactions between biology and environment from which symptoms originate and are maintained. Clearly, both factors need to be considered in assessment and treatment. Type of insurance, or other healthcare pressures, should not direct the focus of treatment to one or the other exclusively, but our results suggest that this may be happening.

It is clear that regardless of health care status, nothing can replace careful assessment and intervention. Although thorough assessments, and combined or exclusively psychosocial treatments may cost more in the short run, if they prevent piecemeal pharmacotherapy and revolving door treatment the long term benefits will certainly outweigh the costs. Assessments will reveal that some children require medication. Combined pharmacotherapy may even be the 'optimal therapeutic intervention for some children,' (Woolston, 1999, p. 1456). However, in all cases, 'pharmacovigilance' is needed (Rothenberger & Banachewski, 2002). Until more medications are tested and deemed safe for children, clinicians should operate with the perspective, 'the fewer the medications the better' (Woolston, 1999, p. 1456). Our findings suggest that this perspective should be a longitudinal one as well as a cross-sectional one. Closely examining a child's complete treatment history before prescribing new medications is advised, especially if the child fits the high risk profile we have identified: young children with private insurance who present with disruptive behaviour problems, parent-child relationship problems, and prior hospitalisations.

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