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Specific Components of Pediatricians' Attention-Deficit/Hyperactivity Disorder (ADHD) Medication-Related Care Predict ADHD Symptom Improvement:

RH: ADHD Care Predicts Improvement

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Abstract

Objective—The development of attention-deficit/hyperactivity disorder (ADHD) care quality measures is a prerequisite to improving the quality of community-based pediatric care of children with ADHD. Unfortunately, the evidence base for existing ADHD care quality metrics is poor. The

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objective of this study was to identify which components of ADHD care best predict patient outcomes.

Method—Parents of 372 medication-naïve children in grades 1-5 presenting to their community-based pediatrician (n = 195) for an ADHD-related concern and who were subsequently prescribed ADHD medication were identified. Parents completed the Vanderbilt ADHD Parent Rating Scale (VAPRS) at the time ADHD was raised as a concern and again approximately 12 months after starting ADHD medication. Each patient's chart was reviewed to measure twelve different components of ADHD care.

Results—Across all children, the mean (SD) VAPRS Total Symptom Score (TSS) reduction over the first year of treatment was 11.6 (10.1). Of the twelve components of ADHD care, shorter times to first contact and more teacher ratings collected in the first year of treatment significantly predicted greater reductions in patient TSS scores. Notably, it was timeliness of contacts, defined as either office visits, phone calls, or email communication, that predicted more ADHD symptom reduction. Office visits alone, in terms of number or timeliness, did not predict patient outcomes.

Conclusion—The magnitude of ADHD symptom reduction that can be achieved with the use of ADHD medications was associated with specific components of ADHD care. Future development/modifications of ADHD quality care metrics should include these ADHD care components.

Keywords

ADHD; quality indicators; healthcare; standard of care

Introduction

Pharmacological interventions are the most common^{1,2} and most effective treatment for reducing attention-deficit/hyperactivity disorder (ADHD) symptoms in children with ADHD.³ However, medication prescribing and monitoring practices can significantly impact the magnitude of ADHD symptom reductions.⁴⁻⁶ In the US, pediatricians provide the majority of ADHD medication-related care to pediatric patients.^{7,8} Despite multiple efforts to address the quality of ADHD care delivered by pediatricians,^{4,9-11} there is much room for improvement in medication-related ADHD care.^{1,12,13}

Specific metrics are required to define and measure ADHD care quality. While ADHD consensus guidelines^{14,15} provide an important framework for providing ADHD care, quality metrics (e.g., Healthcare Effectiveness Data and Information Set [HEDIS]) set clear and measurable goals. For example, the two HEDIS measures require that physicians prescribing ADHD medication for children (aged 6-12) observe the following metrics: 1) have one follow-up visit within 30 days of prescribing an ADHD medication and 2) have at least two additional follow-up visits and ensure patients remain on medication for at least 210 days during the 9 months following medication initiation.¹⁶ Such quality metrics are particularly relevant in today's healthcare climate given efforts towards use of metrics in pay-for-performance and episode-based payment programs.

Current ADHD quality metrics, as with most quality metrics, were derived using literature reviews and expert consensus panels.¹⁷ Unfortunately, all of the existing ADHD quality

measures have received a “poor” or “not-rated” strength of evidence grade.¹⁸ In fact, no ADHD quality metric has been tested empirically to determine whether compliance relates to patient outcomes.¹⁹

Testing for relations between components of ADHD medication care can be difficult, especially if studied in typical community-based pediatric settings, due to minimal variability in some ADHD medication-related practice behaviors (e.g., 90% of pediatric ADHD patients do not have a single parent or teacher rating scale to monitor treatment response in the year following initial medication prescription¹). However, similar to research examining quality metrics with other conditions,²⁰ studying these relations in the context of a quality improvement project introduces variability in ADHD care allowing for examination of associations between ADHD care and patient outcomes.

Thus, in the context of an ADHD care quality improvement study,⁴ we examined several components of medication-related ADHD care to identify which components of care best predict ADHD symptom improvement. Relevant medication-related components of pediatric ADHD care were selected based upon recommendations put forth in the American Academy of Pediatrics (AAP)¹⁵ and American Academy of Child and Adolescent Psychiatry (AACAP)¹⁴ ADHD consensus guidelines and from ADHD care quality metrics.^{16,21} These include rates and timeliness of 1) office visits^{14,16,21} as well as more broadly defined contacts such as phone calls and email correspondence²²; 2) medication titration^{14,22}; 3) collection of parent and teacher ratings to monitor medication response.^{14,15,22} We also include the number of days medicated¹⁶ and medication dose, since these relate to ADHD symptom improvement.^{23,24} This empirical examination of association between ADHD care and ADHD symptom improvement provides a much-needed evidence-base to guide future development/modification of ADHD care quality metrics and will also inform the development and refinement of interventions to improve pediatric ADHD care.

Method

Patients and Settings

We wrote 128 practices in central and northern Ohio inviting their participation in a quality improvement (QI) study on improving ADHD care. From August 2010 to December 2012, the first 50 pediatric practices that responded and met our inclusion/exclusion criteria were selected to participate. These criteria included having at least two physicians, using electronic billing, having internet access, and not having co-located mental health care. These practices included 195 primary care pediatricians, 4 nurse practitioners, and 14 pediatric resident physicians. Among non-residents, mean provider age was 43.3 (SD = 9.5) years, 15% were non-white, and 62% were female. The average time since training completion was 12.8 years (SD = 9.1). There was diversity in terms of practice location (urban: 30.6%; suburban: 59.5%; rural: 11.1%) and population served (e.g., proportions of Medicaid patients in their patient population (range = 0–99%; mean = 44.6%, SD = 30.5%).

Study Design

Pairs of practices were matched on the number of providers in the practice and the percentage of Medicaid patients served and then randomly assigned to receive a QI intervention or to a control condition where they waited 2 years to receive the QI intervention. Briefly, the QI intervention consisted of didactics on evidence-based ADHD care, assistance with office flow modification to accommodate evidence-based care, guided tests of change to target under-performing areas of ADHD care, and an ADHD internet portal to assist with treatment monitoring. See Epstein et al.⁴ for additional information about the QI intervention. For the first year after random assignment, pediatricians across both groups identified patients in grades 1-5 who were presenting to their office for an ADHD-related concern and who were medication naïve. After consenting to participate, research staff administered the Vanderbilt ADHD Parent Rating Scale (VAPRS)²⁵ via telephone before starting treatment. The VAPRS asks parents to rate their child on each of the 18 *DSM-IV* ADHD symptoms as occurring “never” (0), “occasionally” (1), “often” (2), or “very often” (3). The ADHD total symptom score (TSS) is the sum of these 18 scores. The VAPRS also includes 8 oppositional defiant (ODD), 14 conduct disorder (CD), and 7 anxiety/depression symptoms that are rated on this same scale. Symptom counts can be created for the ADHD, ODD, CD, and anxiety/depression domains by summing items within each domain rated as occurring “often” or “very often.” Research staff re-contacted the family via telephone at 3-, 6-, and 12 months to re-administer the VAPRS. The VAPRS was collected for research and was not shared with the pediatrician. At 6- and 12-month time points, parents also answered several questions from the Services for Children and Adolescents – Parent Interview (SCA-PI²⁶) asking about medication and other ADHD-related mental health services the family received over the past 6 months. Data collection ended 1/12/15.

At the conclusion of the QI study, the patient's medical chart and ADHD portal record (at intervention practices) were reviewed to document one year of ADHD care dating back to the first ADHD-related contact. Chart data included: 1) dates of any ADHD-related contacts (i.e., office visit, phone, or email) excluding those contacts exclusively related to request a refill; 2) dates, medication, dosage, and number of pills to dispense for any ADHD prescription; and 3) dates of any ADHD parent- and teacher-rating scales. Inter-rater reliability for chart reviews was calculated using a random sampling of 20% of patient charts, with intra-class correlations for continuous data and kappas for dichotomous data all exceeding .70.

The Cincinnati Children's Medical Center and Nationwide Children's Hospital institutional review boards approved this study. Physicians gave written and parents gave verbal informed consent (over the phone) for participation.

Statistical Analyses

Though the chart review encompassed all ADHD-related care for the 12 months subsequent to the initial documentation of ADHD as a concern in the patient chart, for the research questions posed in this manuscript, we were interested in medication-related ADHD care. Hence, only care delivered from the time of the first prescription until the 12-month post-

initial evaluation was abstracted from each patient's chart. For many children, there were delays between the initial evaluation and the first medication prescription. Therefore, rates of components of care were determined by dividing the total number of care events (e.g., office visits) by the number of days between the date of the initial medication prescription and the 12-month evaluation. Events per day were then rescaled to events per year to make them more interpretable. Time-to-event (e.g., first office visit) variables were computed by calculating the number of days from the first prescription until the event. If the event did not occur during the 12-month observation period, the case was dropped from any analyses involving that event variable.

To estimate medication continuity, the number of days covered by medication prescriptions (assuming a 7-day-per-week dosing schedule) was calculated and then converted to the proportion of days covered by dividing by the number of days from treatment start date until the end of the study. Time to the first medication adjustment (i.e., dosage change, medication switch, addition/removal of a medicine) was calculated. For children prescribed stimulant medication, the daily dosage for the final prescription written was calculated in methylphenidate-equivalent milligrams by converting other stimulant medications using the following conversions (mixed salt amphetamines dose or dexamethylphenidate dose $\times$ 2; lisdexamfetamine dimesylate $\times$.8).

Because multilevel structural equation modeling longitudinal analyses (repeated measures collected from patients nested within physicians nested within practices) with random slope loadings to accurately capture variation in time of measurement are not currently available in any statistical package, we utilized only a single post-medication assessment point, the parent-rated VADPRS closest to the 12 months post-initial prescription (range: 23-691; mean = 346.2 [SD = 130.4] days). We collected at least one post-baseline parent-rating 90% of the sample. Those 10% with post-baseline missing parent data did not differ from the 90% with post-baseline data on age, gender, or baseline parent TSS scores (all p s > .05); however, those with missing data were more likely to be non-white (p < .0001). Missing data ranged between 8-16% and were handled via the default three-level parameter estimation algorithm (i.e., maximum likelihood estimation with robust standard errors).

All analyses utilized Mplus (version 7.4) and accounted for the multilevel clustering of the data. To examine bivariate associations between ADHD care components and ADHD symptom improvement, baseline VADPRS TSS scores were entered along with each component of ADHD care, and 12-month VADPRS TSS scores were entered as the outcome variable. Each estimate in these models reflects the raw change in the 12-month VADPRS TSS that can be expected per unit of change in the predictor. Due to concerns that variability in collection of the 12-month post-prescription assessment point might impact VADPRS TSS scores, number of days to this 12-month time point was entered as a covariate in these analyses. However, insertion of this covariate did not affect the patterns of significant effects. Hence, it was not included in these models. Next, a multivariable model predicting ADHD TSS outcomes was conducted once again inserting baseline VADPRS TSS scores as well as all of the ADHD care components that significantly predicted ADHD TSS outcomes. Note that group (intervention vs. control) was not included in the statistical models because group had large effects on all of the ADHD care variables (see Epstein et al.⁴) and thus

including group in the model would have accounted for the variance ADHD care behaviors that we were trying to associate with ADHD symptom improvement.

Results

Across intervention and control practices, 2.4 (SD = 3.1) and 3.6 (SD = 3.4) families per provider were enrolled respectively for a sum total of 577 patients (258 from intervention practices; 319 from control practices). Charts were reviewed for 574 of those patients. Based on chart reviews, 372 patients (165 at intervention practices; 208 at control practices) were prescribed ADHD medication (stimulants: $n = 342$; atomoxetine: $n = 1$; clonidine hydrochloride: $n = 2$; guanfacine hydrochloride: $n = 8$; bupropion hydrochloride: $n = 1$) in the year following initial presentation. All analyses reported here involve this subset of 372 patients who received ADHD medication.

The SCA-PI interview was completed for 333 of the 372 patients. Based on these interviews, two children were also prescribed a selective serotonin reuptake inhibitor over the course of the first year of medication treatment. Parents also reported that 83 children received psychosocial services consisting of either one or a combination of the following: family therapy ($n = 22$), individual therapy or counseling ($n = 56$), or a parenting group or parent-focused counseling to help manage the child ($n = 14$).

The mean baseline TSS score across the 372 patients was 34.4 (8.9). Using symptom counts on the baseline VAPRS and the National Institute for Children's Health Quality (NICHQ) AAP scoring instructions²⁷, 109 children met criteria for inattention presentation, 30 children met criteria for hyperactive-impulsive presentation, 168 children met for combined presentation, and 65 did not meet ADHD symptom domain thresholds based on the VAPRS. In addition, 161 children met AAP symptom-defined screening thresholds for ODD (4 symptoms), 32 met for CD (3 symptoms), and 87 met for anxiety/depression (3 symptoms).

The mean (SD) TSS score approximately one year after their first medication prescription was 22.8 (9.9). Table 1 reports rates of ADHD medication-related care as well as each ADHD care component's bivariate relation with 12-month TSS scores controlling for baseline TSS scores. Controlling for baseline TSS scores, five components of ADHD care significantly predicted TSS scores 12 months after medication initiation. Fewer days until the first contact and until collection of the first parent rating scale predicted lower TSS scores at 12 months. Notably, the number or timeliness of office visits did not predict patient outcomes. Rather, it was the timeliness of any form of initial contact consisting of visits ($n = 214$) or phone calls ($n = 150$) or email communication ($n = 1$) that predicted lower TSS scores. In addition, having more parent and teacher ratings predicted lower TSS scores at 12 months. Finally, the greater proportion of days covered by prescriptions predicted lower TSS scores at 12 months.

Inter-correlations between the five ADHD care components that were associated with ADHD symptom improvement did not indicate excessive multicollinearity (r range = .01-.66; see Table S1, available online). In the first multivariable regression with all five variables, the number of teacher rating scales in the first year of treatment and the days to

first contact and to the first completion of an ADHD parent rating scale after prescribing medication predicted patient TSS symptom reductions (see Table 2). However, this multivariable analysis dropped cases with no data on any five of these ADHD care variables. Only 129 patients had a parent rating scale collected by their physician in the first year, making it impossible to calculate time to the completion of an ADHD parent rating scale for 246 of the 372 patients. The regression was re-run without this variable. In this new multivariable regression utilizing 365 patients (7 patients excluded because they did not have a contact in the first year of treatment), shorter time to first contact and more teacher ratings collected in the first year of treatment predicted a greater reduction in TSS scores. To assess whether the relations between these components of ADHD care and ADHD symptom improvement were non-linear, we examined graphical depictions of these relationships (see Figure 1) and entered non-linear (i.e., quadratic) terms. In all cases, linear terms provided the best fit. Finally, we ran a model that included an interaction term examining whether there was a synergistic combined effect of these two components of care. The interaction term was not significant.

To better understand the incremental benefits of each of these ADHD care variables, both individually and in combination (see Table 3), we cross-tabulated mean (SD) ADHD TSS reductions according to days to first contact and number of teacher rating scales collected. As shown in Table 3, the average ADHD symptom reduction was -11.6 (10.1) TSS points. However, there was clear variation in TSS reduction based on the timeliness of the initial contact and number of teacher rating scales collected. For example, the mean ADHD TSS reduction for children receiving the highest quality of ADHD care (i.e., initial contact within 30 days and 4+ teacher ratings in first year of treatment) was nearly double (15.3 TSS reduction) that for children receiving the lowest quality of care (i.e., initial contact after 60 days and 0 teacher ratings collected during first year of treatment; 6.9 TSS reduction).

Discussion

Overall, children prescribed ADHD medication demonstrated significant ADHD symptom reductions during the first year of treatment. However, the magnitude of this improvement varied considerably and was associated with certain aspects of care. In particular, shorter time to first patient–physician contact after prescribing medication and the collection of more teacher ratings of ADHD symptoms were both strongly associated with patients making more substantial ADHD symptom reductions. The relations between these two components of care and ADHD symptom improvement were linear within the ranges observed in our sample, indicating that there is no clear demarcation for values of these variables that indicate appropriate ADHD care.

The timeliness of the initial office visit after prescribing medication is a component of care targeted by one of the HEDIS measures¹⁶. Specifically, the initiation phase HEDIS measure specifies that an office visit occur within 30 days after prescribing medication¹⁶. However, in analyses limiting the initial contact to office visits, there was no association with ADHD symptom reduction. Rather, our results suggest that the initial contact does not need to be an office visit to improve target symptoms. Over 40% of initial contacts were phone calls, suggesting that non-office-based services can be beneficial in monitoring ADHD follow-up

care. This type of care may be more patient-centered, reducing barriers related to transportation, loss of work, and school attendance and thus allowing for enhanced patient engagement. The most current version of the AAP ADHD consensus guidelines also suggest using alternative forms of contacts such as phone calls during the first month of prescribing.²⁸ In order to efficiently maximize patient outcomes, payers or integrated networks that bear financial risk may want to consider reimbursing and possibly incentivizing physicians for timely communication that is not limited to office visits. Similarly, pay for performance incentive structures should allow diverse methods of communication in meeting this measure.

The association between teacher ratings and symptom improvement makes clinical sense. The most common reason that children present for an ADHD evaluation is school difficulties.²⁹ Moreover, the pharmacodynamics of most ADHD medications result in peak medication response occurring during school hours,³⁰ so it is teachers who can best report on medication effectiveness. Because parents do not always ask teachers about their child's behavior before medication follow-up visits, supplying physicians with teacher ratings of ADHD symptoms may have great clinical utility in decision making about medication adjustments to optimize effectiveness. They also reinforce the efficacy of the medications and encourage physicians as well as families to adhere to medication. Indeed, there were small but significant positive correlations between the number of teacher rating scales and the number of medication adjustments ($r = .17$, $p < .05$) and between the number of teacher rating scales and the proportion of days covered by medicine ($r = .18$, $p < .0001$).

Unfortunately, the two components of ADHD care that were associated with ADHD symptom reductions in this study tend to be implemented poorly in typical community-based pediatric settings. For example, in community-based pediatric settings, the average time to the first contact is 72.4 days¹ and only 7.5% of children prescribed medication have at least one teacher rating scale in the first year of medication treatment.¹ Clearly, there is much room for improvement, but revision of payment to include alternative forms of communication and evaluation would be an important first step.

It is also clear that additional strategies will be necessary to improve ADHD care. Strategies for improving ADHD care will likely need to include the following efforts. First, existing quality metrics need revision. The evidence base for these metrics is thin, particularly whether they contribute to better patient outcomes. This study provides initial evidence linking specific components of care and patient outcomes. More research is needed, but the present results support revising the existing metrics to include all forms of initial contact, as well as the collection of ratings to objectively measure medication response. Second, primary care pediatricians should be provided with the skills and tools to improve care. Indeed, several quality improvement efforts, including some with empirical support,^{4,9,11,31} exist that directly improve the quality of several components of ADHD care, including timeliness of initial visits and teacher-rating scale collection.⁴ Many of these efforts offer technological innovations, some of which include electronic health record integration,³² that facilitate parent- and teacher-rating scale collection^{4,9,32}. Finally, primary care pediatricians should be incentivized to focus on components of ADHD care that lead to better outcomes. For example, exploring adequate reimbursement for alternative forms of contact and rating

scale collection might be considered. Alternatively, pay for performance plans or episode-based payments might be created to incentivize specific components of ADHD care that have been shown to improve patient outcomes.

Admittedly, many ADHD care quality components, including those that were related to patient outcomes, do not rely entirely on physician behavior. For example, the initial contact after prescribing is partially determined by parents calling in to the office or the family showing up for a scheduled follow-up visit. Similarly, the number of teacher ratings depends on teachers periodically and repeatedly completing ratings. Thus, it is possible that the observed relationships between components of ADHD care and improved patient outcomes are the result of, or mediated by, a confounding variable such as parent and/or teacher engagement, which could affect both timeliness and rates of ADHD components of care, medication adherence, as well as patient outcomes. That said, evidence from randomized clinical trials that experimentally manipulate ADHD care demonstrates that physician ADHD care behaviors do impact medication-related ADHD symptom improvement.⁴⁻⁶ In reality, it is a combination of quality ADHD care as well as caregivers' engagement in ADHD care that will lead to the best child outcomes. Interventions that address both are needed.

The study's findings must be interpreted in light of its limitations. First, patient outcome measurement relied on parent but not teacher ratings. Given that the school setting is where many children experience problems²⁹ and where peak medication effects are likely to occur, teachers' perceptions of ADHD symptom improvement might have strengthened the observed associations and/or increased power to detect relations between other components of ADHD care and symptom improvement. Second, measurement of outcomes focused on ADHD symptoms, not functional impairment. However, functional impairment is the primary reason that families present for ADHD treatment.^{33,34} Most studies focus on ADHD symptoms because medications typically improve ADHD symptoms.^{3,35} Unfortunately, medication does not improve functioning.³⁶⁻³⁸ To address functional impairment, other forms of treatment (e.g., behavioral treatment) are necessary.³⁹ Patient outcomes also did not include measurement of side effects, which might be less amenable to measurement through ratings and may require an office visit for comprehensive assessment of side effects (e.g., blood pressure). Finally, this study was conducted in a quality improvement project. While this design increased the variability in ADHD care, which increased power to detect associations, the pediatric practices were volunteers and may not be representative of all practices.

The magnitude of ADHD symptom reduction that can be achieved with the use of ADHD medications can be predicted by the quality of specific components of ADHD care. The timeliness of initial contact after prescribing medication and the periodic acquisition of ADHD ratings from teachers appear to be particularly important to improving medication effectiveness for ADHD symptom reductions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Clinical Guidance

- The quality of medication-related ADHD care is related to ADHD symptom improvement in patients.
- The time to the first contact after the initial prescription and the periodic collection of teacher ratings appear to be especially relevant for maximizing ADHD symptom improvement.
- Physicians do not need to necessarily rely on office visits to monitor medication response and side effects in the week(s) after initially prescribing medication but instead could utilize phone calls or email correspondence to check in with the family.

Figure 1.

Associations between different thresholds of (a) time to first contact after prescribing medication and (b) number of teacher rating scales collected in the first year of treatment and attention-deficit/hyperactivity disorder (ADHD) symptom reductions in pediatric patients with ADHD. Note: TSS = total symptom score.

Table 1
Attention-Deficit/Hyperactivity Disorder (ADHD) Care Descriptive Statistics and Bivariate Regression Results

ADHD care measures	Intervention Group Mean (SD)	Control Group Mean (SD)	Overall Mean (SD)	Practice ICC	Provider ICC	Estimate (SE)
Contacts						
Office visits in first year since prescribed medication, n	4.50 (1.98) n=165	4.71 (1.90) n=207	4.62 (1.93) n=372	.06	.01	.34 (.27)
Days to first office visit since prescribed medication, n	60.10 (56.91) n=157	53.13 (56.92) n=192	56.27 (56.94) n=349	.08	.01	.01 (.01)
Contacts in first year since prescribed medication, n	8.28 (3.84) n=165	6.72 (2.69) n=207	7.41 (3.34) n=372	.07	.02	-.11 (.16)
Days to first contact since prescribed medication, n	20.40 (34.23) n=165	35.74 (39.93) n=200	33.32 (37.51) n=365	.07	.01	.03 (.01)**
Medication Titration						
Medication adjustments in first year since prescribed medication, n	2.41 (1.93) n=165	1.70 (1.54) n=207	2.01 (1.76) n=372	.07	.02	.05 (.28)
Days to first medication adjustment since first prescribed medication, n	29.55 (76.60) n=131	81.30 (81.03) n=147	80.47 (78.84) n=278	.05	.02	.01 (.01)
ADHD Ratings Collection						
Parent rating scales collected by pediatrician in year since prescribed medication, n	3.02 (4.58) n=165	.52 (1.28) n=207	1.63 (3.43) n=372	.06	.01	-.38 (.12)**
Days to first parent rating scale collection by pediatrician since prescribed medication, n	56.58 (62.66) n=85	84.09 (77.86) n=44	65.96 (69.17) n=129	.05	.01	.03 (.01)**
Teacher rating scales collected by pediatrician in year since prescribed medication, n	2.81 (4.66) n=165	.29 (.80) n=207	1.41 (3.40) n=372	.07	.01	-.44 (.10)***
Days to first teacher rating scale collection by pediatrician since prescribed medication, n	68.79 (85.97) n=81	90.47 (98.99) n=34	75.20 (90.13) n=115	.09	.02	-.01 (.01)
Medication Continuity/Dosage						
Proportion of days covered by prescriptions	.60 (.24) n=165	.54 (.25) n=207	.56 (.25) n=372	.07	.01	-3.94 (1.72)*
Ultimate daily dosage (in milligrams)	25.40 (11.82) n=148	23.05 (9.82) n=193	24.07 (10.78) n=341	.07	.02	-.00 (.05)

Note: ICC = intra-class correlation; SE = standard error.

* p<.05;

**

p<.001;

p<.0001

Table 2
Multivariable Regressions Predicting 12-Month Attention-Deficit/Hyperactivity Disorder
Total Symptom Score

Predictors	Model #1 n=126 ^a Estimate (SE)	Model #2 n=365 Estimate (SE)
Baseline TSS scores	.40 (.09) ****	.46 (.06) ****
Number of days to first contact since prescribed medication	.02 (.03)	.02 (.01) ***
Number of parent rating scales collected by pediatrician in year since prescribed medication	-.03 (.16)	-.10 (.15)
Number of days to first parent rating scale collection by pediatrician since prescribed medication	.02 (.01) *	
Number of teacher rating scales collected by pediatrician in year since prescribed medication	-.33 (.14) *	-.35 (.12) **
Proportion of days covered by prescriptions	2.92 (2.43)	-2.13 (1.94)

Note: SE = standard error; TSS = total symptom score.

^a The reduced sample size for this analysis is due to missing data on the “Number of days to first parent rating scale collection” variable (i.e., 246 patients did not have evidence of a parent rating scale during their first year of treatment).

*
p<.05;

**
p<.01;

p<.001;

p<.0001

Table 3
Mean (SD) Attention-Deficit/Hyperactivity Disorder (ADHD) Total Symptom Score
Reductions Associated With Incremental Improvements in the Two Components of
ADHD Care Most Highly Related to ADHD Symptom Improvement

Number of Teacher Ratings				
Time to first contact	0 ratings	1-3 ratings	4+ ratings	Marginal Means
0-30 days	-12.35 (10.62) n=143	-10.39 (10.22) n=41	-15.31 (9.91) n=36	-12.47 (10.49) n=220
31-60 days	-10.87 (8.80) n=60	-13.00 (9.53) n=17	-10.14 (8.63) n=7	-11.24 (8.87) n=84
61-365 days	-6.94 (9.20) n=32	-9.17 (9.06) n=6	-13.00 (13.02) n=5	-7.35 (9.62) n=43
Marginal Means	-11.23 (10.12) n=235	-10.97 (9.88) n=64	-14.31 (10.03) n=48	-11.61 (10.10) n=347