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Variations in physician attitudes regarding ADHD and their association with prescribing practices

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Abstract

Objective—To test whether physicians' attitudes regarding the impact of ADHD on health-related quality of life (HRQL) explain differences in practices for prescribing psychostimulants in children.

Method—In a cross-sectional survey, US-based pediatricians and psychiatrists ("physicians") used the Paper Standard Gamble—a widely used preference-based assessment of HRQL—to rate four vignettes describing ADHD health states of varying severity. Associations between standard gamble scores and questions about prescribing practices were analyzed using ordinal logistic regression.

Results—Surveys were mailed to 291 physicians; 127 (44%) returned complete forms. Lower standard gamble scores were associated with more emphasis on children's ADHD symptoms ($p=.03$) and less emphasis on parents' concerns about stimulant side effects ($p=.03$) when prescribing psychostimulants.

Conclusions—Differences in physician perceptions of the severity of ADHD symptoms and in their emphasis on parental concerns about side effects may help explain variations in ADHD psychostimulant prescription patterns.

Introduction

In the national debate regarding health care reform, physician-level differences in treatment practices are often cited as an indication of inappropriate care (Wennberg, 2002). In recent decades, prescription of stimulants for the treatment of ADHD has risen rapidly in the United States (Olfson et al., 2003) with the prevalence of stimulant prescriptions in pediatric populations exceeding 4% (Cox et al., 2003; Visser, Lesesne, & Perou, 2007). Although physicians overwhelmingly appear to agree that ADHD symptoms cause problems for their pediatric patients and that stimulants are an effective treatment (Stockl et al., 2003), significant variations in prescription rates have been documented. For example, regional differences have been widely noted, with higher use of stimulant medications in the South and parts of the Midwest with additional significant variation at the county level (Cox et al., 2003; Hoagwood et al., 2000; Stevens, Harman, & Kelleher, 2004). Patient characteristics, such as Caucasian race and health insurance coverage, only partially explain these

differences (Cox et al, 2003; Hoagwood et al., 2000; Olfson et al., 2003; Stevens, Harman, & Kelleher, 2004).

Two types of physicians prescribe the vast majority of stimulant medications in the United States: pediatricians and psychiatrists. Primary care pediatricians have been found to differ in their management and treatment of ADHD. In general, pediatricians vary in their identification of psychosocial problems among their patients (Vogels et al., 2008; Wasserman et al., 1999), their reliance on practice guidelines for ADHD (Rushton, Fant, & Clark, 2004; Wolraich et al., 2010), and their stimulant prescription rates (Gardner et al., 2000). However, little is known about physician characteristics that are associated with these differences. In the identification of psychosocial problems, Wissow and others found that physicians' interview styles may be predictive (Wissow, Roter, & Wilson, 1994; Wissow et al., 2005). To understand variation in prescription rates, Gardner and others found no evidence of effects of pediatricians' training, beliefs about mental health, or practice structure, but did confirm that parental agreement with the treatment plan and a history of recognition of a psychosocial problem led to more prescriptions (Gardner et al., 2000).

In comparison to primary care pediatricians, child and adolescent psychiatrists are more likely to treat children with multiple comorbid conditions (Harpaz-Rotem & Rosenheck, 2006), prescribe medication in any given visit (Goodwin et al., 2001; Thomas et al., 2006), and use multiple medications. Nevertheless, because pediatricians far outnumber child and adolescent psychiatrists in the United States, pediatricians provide the majority of stimulant medication prescriptions (Beardsley et al., 1988; Goodwin et al., 2001). Although psychiatrists differ in their attitudes regarding the risks and benefits of antipsychotic (Newcomer, Nasrallah, & Loebel, 2004) and stimulant medication (Beck et al., 1999), little is known about differences in their prescribing patterns.

In this study, we describe a novel use of a standard method of preference elicitation to explain provider-level differences in willingness to prescribe ADHD medications. The *standard gamble* is a technique for eliciting "utilities," a patient-centered measure of health-related quality of life (HRQL) based on patients' and/or providers' preferences for medical outcomes associated with a disorder (Zimmerman, 2003). Utilities are typically indexed on a standard zero (dead) to one (perfect health) scale and are directly comparable across different health conditions. Large-scale studies have been conducted that use the standard gamble to elicit patient preferences regarding pediatric outcomes (Carroll & Downs, 2009; Matza et al., 2005), primarily for use in decisions about allocation of health care resources (Zimmerman, 2003).

While utilities have typically been used to assess an individual's or a specific population's preference for one health state over another, in this study we assess physicians' utilities for ADHD health states of differing degrees of severity and investigate the association between these utilities and physicians' self-reported prescribing practices. Physicians' responses to standard gambles have been found to predict a number of provider-level variations, including physicians' decisions to hospitalize patients (Nightingale, 1988), their recommendations regarding medical procedures (Nightingale & Grant, 1988), and their use of medical tests (Nightingale 1987; Zaat & van Eijk, 1992), but have not previously been

used to examine pediatric medication treatment decisions. Reporting a lower utility value for a given ADHD health state reflects physician belief that children who have this health state will, on average, experience lower HRQL. We operationalize this to mean that lower utilities reflect the belief that ADHD is a serious disorder—one that may be more likely to require a treatment intervention. We hypothesized that believing that ADHD is a more serious disorder relative to colleagues will increase the likelihood that a physician will emphasize the benefits of treating ADHD symptoms over the risks of medication side effects. Below, we report the results of a two-part survey in which we tested these hypotheses.

Methods

Participants and Procedures

For the initial survey about practice patterns (hereafter, “initial survey”), 1600 psychiatrists were randomly selected from the American Academy of Child and Adolescent Psychiatry membership of over 7,500 and 1600 pediatricians were randomly selected from the American Association of Pediatrics membership of over 65,000 (Leslie et al., 2012). Retirees, trainees, fellows, and non U.S.-based physicians were excluded. Eligibility criteria included providing direct patient care to children aged 5-18 years with ADHD. Among these, 1140 (35.6%) responded and were eligible for the initial survey, which ended with a request to participate in a follow-up survey of provider preferences (hereafter, “preference survey”). Following IRB approval, the 291 (26%) respondents who volunteered to participate in the preference survey were mailed two rounds of surveys (at 3-week intervals) between May and June 2011. One hundred twenty-seven physicians (44%) responded to the preference survey.

Measures

The preference survey consisted of standard gamble exercises for five separate health states. Respondents were asked to a vignette that describes a given health state in detail. They are then asked to choose between that health state for certain or to take a gamble between perfect health or death. For example, respondents might be asked to consider a state of metastatic liver cancer. They are then asked whether they would prefer to have metastatic liver cancer or to take a magic pill that offers a 75% chance of returning them to perfect health, but with a 25% chance of immediate, painless death. The probabilities in the gamble are systematically altered until each respondent’s threshold is found, and the HRQL for metastatic cancer then equals the chance of returning to perfect health. For health states perceived to be more serious than others, respondents should be willing to accept higher levels of risk for the chance to obtain perfect health. The standard gamble has been used in pediatrics and other fields to assess the utility of a variety of health states (Carroll & Downs, 2009; Zimmerman, 2003), usually for measuring either societal or parental utilities for different screening and/or diagnostic tests or treatments.

In particular, we used a version known as the Paper Standard Gamble (P-SG) as a feasible, cost-effective way to conduct standard gamble assessments. To ease respondent burden, the P-SG systematically alters risk of death from low to high over a series of 18 questions, each presenting a different gamble. The P-SG has demonstrated good retest reliability and

concurrent validity, evidenced by strong correlations with assessments of HRQL and close approximation of the results of a standard gamble conducted by computer using an interval division method questions (Littenberg et al., 2003; Ross et al., 2003).

In the preference survey, the five health states included: blindness, mild ADHD, moderate ADHD, severe ADHD, and worst-case ADHD. Blindness was included as a practice question. Vignettes describing each ADHD state were directly adopted from an instrument used in a previously published study of parents' preferences regarding ADHD states (Matza et al., 2005). Data from the preference survey were linked to the initial survey, which included questions about prescribing practices for stimulant medications and attitudes regarding risks of side effects. Questions relevant to this paper included respondent demographics and practice setting characteristics, and questions about prescribing practices for stimulant medication.

Independent Variables

Eight primary independent variables were identified *a priori* to be consistent with study hypotheses. Participants used 4-point Likert-type scales, ranging from “not at all” to “a lot,” to answer, “How much does each of the following factors influence your willingness to initiate treatment with stimulants for a child with ADHD?” (1) the severity of ADHD symptoms, (2) degree of ADHD impairment, (3) parental concerns about side effects, (4) prescriber attitudes about the benefits of stimulant medications, (5) prescriber concerns about side effects, and (6) prescriber concerns about the variable effectiveness of stimulant medication. Respondents were also asked how much they agreed or disagreed with the following statements: (7) “Stimulants represent the best first-line treatment for ADHD in children,” and (8) “The risk for sudden cardiac death in children is sufficiently high to warrant cardiac assessment before initiating treatment with stimulants.”

In addition, our analysis controlled for the following potentially confounding respondent demographic and practice characteristics: specialty (psychiatrist or pediatrician), gender, race/ethnicity (non-Hispanic/White versus others), years in practice (categorized by quartile based on initial survey), practice setting (urban, rural, or suburban), and proportion of patients with private insurance (more than 50% of patients with private insurance versus not).

Dependent Variable

The dependent variable consisted of responses to the P-SG for the four different ADHD health states (mild, moderate, severe, worst-case). Ordered categories corresponded to the top 7 response options, ranging from 100% to 99% chance of cure (corresponding to utilities of 1.00 to 0.99), captured the large majority of participants' responses, with an eighth category to capture responses below 99%. Because each response on the standard gamble corresponds to a particular utility value, differences on the dependent variable can be interpreted as difference in utility.

Statistical Analysis

Stata version 11 was used for all analyses. Descriptive statistics (mean, standard deviation (SD), frequency, percent) were computed for respondent demographic and practice setting characteristics. As a sub-analysis, respondents were randomly assigned to either (1) complete all P-SGs with death as the worst outcome in the gamble, or (2) complete the P-SG for mild, moderate, and severe ADHD with “worst-case ADHD” as the worst outcome. The latter approach is often referred to as “chaining,” and it is commonly employed in the medical literature when investigators are concerned that participants may not accept any probability of death to improve HRQL as may be the case for non-life threatening conditions. Randomization status was controlled for in all analyses. Chained scores were adjusted to be comparable to unchained SG scores using a standard equation ($U_{\text{adjusted chained}} = P_{\text{worst case ADHD}} + (1 - P_{\text{worst case ADHD}}) * P_{\text{chained SG}}$). Some responses that were transformed for chaining did not correspond precisely to responses on the P-SG. Chained scores were therefore assigned to the category of the dependent variable corresponding to the closest value.

Bivariate analyses using logistic regression were used to compare demographic and setting characteristics among the following groups: (1) preference survey respondents; (2) physicians who volunteered for the preference survey but did not complete it; and (3) physicians who completed the initial survey but did not volunteer for follow-up.

An ordinal logistic regression model was used to analyze the effects of independent variables on standard gamble responses. Because each physician rated four ADHD health states, the model included four times as many scores as participants. To account for intra-class correlations among responses, robust standard errors were specified (White, 1980; Williams, 2000). We included all responses in a single analysis because it is more parsimonious than conducting separate analyses for each of the four questions, and because it is more consistent with our hypotheses, which did not vary by health state. A dummy variable reflecting randomization status was included to account for chaining of P-SG results.

We used this model to examine whether physicians assigned lower utilities to more severe ADHD health states, i.e., the within-subject effect of severity of ADHD health state across questions on utility. Further tests of bivariate associations used the same model, controlling for severity of ADHD health state to improve precision. In this way, we examined the bivariate effects of respondent demographic variables, practice setting characteristics, and responses to questions about prescribing patterns on utility. For each non-binary independent variable, we tested for non-linearity using Box-Tidwell tests. Following recommendations of Hosmer & Lemeshow (Hosmer & Lemeshow, 2000) variables that were significant at the $p < 0.25$ level were then included in a final multivariate ordinal logistic regression model.

For each independent variable, we report a regression coefficient. The valence (+/–) of these scores indicates whether associations are positive (i.e., higher scores on the independent variable are related to a higher ADHD HRQL on the standard gamble) or negative (i.e., higher scores on the independent variable are related to lower ADHD HRQL on the standard

gamble). We also summarize key findings using histograms indicating the proportion of scores that fell at or below the overall median outcome category.

We hypothesized that the following variables would be negatively associated with utilities across the four ADHD states (i.e., greater levels of each would be related to lower ADHD HRQL as assessed by the SG): effect of ADHD symptoms on willingness to prescribe, effect of ADHD impairment on willingness to prescribe, effect of belief in the benefits of stimulants in treating ADHD on willingness to prescribe, and agreement that stimulants represent the best first-line treatment for ADHD in children. We further hypothesized that the following variables would be positively associated with utilities (i.e., greater level of each would be related to higher ADHD HRQL): effect of parent concerns about stimulant side effects on willingness to prescribe, effect of personal concerns about side effects on willingness to prescribe, and the degree of influence of concerns about variable effectiveness of stimulant medication on willingness to prescribe.

Results

Of the 291 physicians who volunteered for the follow-up survey, 127 (44%) responded. Descriptive data for respondent demographic and practice setting characteristics are presented in Table 1. No differences were found between follow-up survey respondents and non-respondents, whether or not they had volunteered for the second survey.

As Table 1 illustrates, 73% of respondents were child and adolescent psychiatrists and 27% were pediatricians. Approximately half (50%) were female, and slightly more than three quarters (78%) were non-Hispanic/White. The majority of respondents had been practicing at least 13 years. Urban and suburban practice settings were most common (44% and 43%, respectively). Fewer than half (41%) reported serving patient populations among whom at least 50% had private insurance.

Bivariate ordinal regression analyses

Among demographic and practice setting characteristics, only years-in-practice was significantly associated with utility value (see Table 2), specifically the subcategory of physicians in practice for greater than 18 years. All other effects as measured by regression coefficient scores fell in the expected direction except one: although its regression coefficient was close to zero, the effect of “The benefit of stimulants in treating ADHD” on willingness to prescribe was negative.

As a group, physicians rated the vignettes that described severe ADHD health states with lowest utility scores ($p<0.001$). Compared to their colleagues, physicians who assigned lower ADHD HRQL scores on the SG were more likely 1) to emphasize ADHD symptoms when prescribing stimulant medications ($p<0.01$), 2) to consider ADHD impairment when prescribing stimulant medications ($p=0.051$), and 3) to agree that stimulants represent the best first-line treatment for ADHD ($p=0.087$). Box-Tidwell tests revealed no evidence of nonlinearity in the relationship between any independent variable and the dependent variable.

Multivariate ordinal regression analysis

Five variables were significant at the $p<0.25$ level in bivariate regression analyses and were considered for the multivariate model (see Table 2). Emphasis on ADHD symptoms when prescribing stimulant medications was highly correlated with emphasis on ADHD impairment ($r=0.82$, $p<.05$), and the two displayed notable colinearity in the regression model. Therefore, emphasis on ADHD impairment was dropped from the final model.

In this final model, all effects fell in the expected direction, and three were statistically significant (Figure 1). As a group, physicians assigned progressively lower utilities scores to more severe ADHD health state descriptions ($p<0.001$). Compared to their colleagues, physicians who assigned lower ADHD HRQL scores on the SG were 1) more likely to emphasize ADHD symptoms when prescribing stimulant medications (regression coefficient = -0.49 , $p<0.05$), and 2) less likely to emphasize parental concerns about side effects (regression coefficient = 0.45 , $p<0.05$). Note that approximately 80% of physicians reported that they strongly emphasize ADHD symptoms when prescribing. Response frequencies for parental concerns about side effects were more evenly distributed, with the most frequent response being “a moderate amount” at 44%.

Discussion

The results of this study are consistent with the hypothesis that physicians' attitudes regarding the impact of ADHD on HRQL are associated with their prescribing practices. In short, we found that physicians who reported lower utilities for ADHD health states—suggesting that they believe ADHD to have a greater impact on HRQL relative to their colleagues—were more likely to emphasize ADHD symptoms while prescribing stimulant medications and less likely to emphasize parents' concerns about side effects. These findings are consistent with our hypothesis that believing that ADHD has a significant effect on HRQL relative to colleagues will increase the likelihood that a physician will be positively view the tradeoff between the benefits of treating ADHD symptoms versus the risks of medication side effects.

Results also highlight the potential use of the standard gamble to measure not only population-level preferences regarding health states, but also individual physicians' differences in preferences toward those health states. Our results suggest that such individual differences in standard gamble utilities may help explain real-world variation among physicians in prescribing patterns for ADHD medications. Similar associations have been demonstrated between standard gamble results and physicians' decisions to hospitalize patients with medical conditions (Nightingale, 1988), their recommendations regarding medical procedures (Nightingale & Grant, 1988), and their use of medical tests (Nightingale, 1987). We suggest that the standard gamble may function as a method for ascertaining the impact of physician attitudes on prescribing patterns in future research.

Our study has notable strengths. In the national debate regarding health care reform, physician-level differences in treatment practices are often cited as an indication of inappropriate care (Wennberg, 2002). Our study suggests physician attitudes about care, particularly in preference-sensitive conditions like ADHD, may impact their determination

of what appropriate care entails. Thus, novel evidence that pertain to these differences is of high significance. Moreover, hypotheses and relevant analyses were specified *a priori*; thus, these findings are consistent with prior theory.

Several limitations should also be noted. We purposely restricted our sample to participants of our previous survey so that we could leverage available information from both surveys. We acknowledge that although our sample size was adequate to detect significant effects, it is small for a national survey. Furthermore, although we found no evidence that respondents differed from non-respondents, small sample size reduced our power to detect such effects.

In this paper, we focus on individual differences in utility scores and, with the exception of the y-axis in Figure 1, we do not report their magnitude. Although the P-SG is a validated measure of utility, the high scores we obtained may be an artifact of the anchoring effect (Kuhberger, 1998; Kuhberger, Schulte-Mecklenbeck, & Perner, 1998) induced by the way in which probabilities are altered in this measure (Lenert et al., 1998). Although there is evidence that physicians assign higher utilities than patients for a number of different medical conditions (Brown, Brown, & Sharma, 2000; Chung et al., 2011; Saurez-Almazor et al., 2001; Saurez-Almazor & Conner-Spady, 2001; Schackman et al., 2008), we urge caution in comparing the magnitude of utility values we found to those of similar studies that assessed ADHD utilities in parent populations using different forms of the standard gamble (Carroll & Downs, 2009; Matza et al., 2005). Nevertheless, the alignment of results with the severity of ADHD health states assessed and with our prior hypotheses suggests that the individual differences revealed by the P-SG are valid.

Finally, because the standard gamble measures respondents' preferences for outcomes by assessing their willingness to accept risk, the resulting utility scores are likely a function of both respondent's preferences and their risk tolerance. In this paper, we interpret the standard gamble as a measure of preferences. However, interpreting standard gamble scores to reflect differences in risk tolerance among physicians may be equally valid, and is consistent with previous research in this area (Nightingale, 1988; Nightingale, 1987; Nightingale & Grant, 1988; Zaat & van Eijk, 1992).

In the future, additional research is needed to confirm the relationship between physicians' attitudes regarding the impact of ADHD on HRQL and their practices for prescribing stimulant medications, and to determine whether this association applies to other pediatric disorders as well. In addition, we recommend incorporating the standard gamble into studies of provider-level differences in use of psychoactive medications.

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Figure 1.

Associations between P-SG utility variables from multivariate model

Note. The y-axis displays that proportion of utilities reported by physicians using the Paper-Standard Gamble that fell above the overall median. Lower percentages in one x-axis category indicate that respondents were more likely to report lower utilities, suggesting that they expect children with ADHD to have lower HRQL and hence, more disease burden from their ADHD. Figure 1a confirms that physicians reported progressively lower utilities with increasing severity of symptom descriptions. Figures 1b and 1c show that physician

willingness to prescribe was related to their perception of the burden of disease. In those for whom severity of ADHD symptoms weighed "a lot" in their willingness to prescribe, their HRQL estimates were lower. Conversely, in physicians for whom parental concerns did not influence their willingness to prescribe ("not at all"), their HRQL estimates were lower.

Table 1

Demographic and practice setting characteristics by response status (n, column %)

Characteristics	Response Status to Preference Survey		
	Refused (n=849)	Volunteered for, but did not complete (n=164)	Completed (n=127)
<u>Specialty</u>			
Pediatricians	432 (50.9%)	59 (36.0%)	34 (26.8%)
Psychiatrists	417 (49.1%)	105 (64.0%)	93 (73.2%)
<u>Physician gender</u>			
Female	451 (53.1%)	83 (50.6%)	64 (50.4%)
Male	368 (43.3%)	81 (49.4%)	63 (49.6%)
<u>Physician race/ethnicity</u>			
Non-Hispanic/White	591 (69.6%)	112 (68.3%)	99 (78.0%)
Other	196 (23.1%)	43 (26.2%)	26 (20.5%)
<u>Years in practice</u>			
<8 years	166 (19.6%)	33 (20.1%)	24 (18.9%)
8–12 years	181 (21.3%)	37 (22.6%)	28 (22.0%)
13–18 years	173 (20.4%)	44 (26.8%)	34 (26.8%)
>18 years	295 (34.7%)	49 (29.9%)	41 (32.3%)
<u>Practice Location</u>			
Urban	324 (38.2%)	67 (40.9%)	56 (44.1%)
Suburban	386 (45.5%)	75 (45.7%)	54 (42.5%)
Rural	93 (11.0%)	21 (12.8%)	12 (9.4%)
<u>Patient Insurance</u>			
>= 50% private insurance	304 (35.8%)	67 (40.9%)	52 (40.9%)
> 50% with public, other, or no insurance	466 (54.9%)	89 (54.3%)	71 (55.9%)

Table 2

Associations between standard gamble utilities, initial survey questions, and demographic and practice setting characteristics

	Outcome: Utility score from standard gamble for ADHD			
	Bivariate analysis		Multivariate** (included if p<0.25) analysis	
	Regression coefficient	p-value	Regression coefficient	p-value
<i>Standard gamble question</i> Severity of ADHD health state: (baseline: mild severity)				
Moderate severity	-0.79	<0.001	-0.87	<0.001
Severe severity	-1.25	<0.001	-1.35	<0.001
Worst-Case severity	-1.77	<0.001	-1.90	<0.001
<i>Survey question:</i> How much does each of the following factors influence your willingness to initiate treatment with stimulants for a child with ADHD?				
a. Severity of ADHD symptoms	-0.50	0.006	-0.49	0.027
b. Degree of ADHD impairment	-0.43	0.051	dropped to reduce colinearity	
c. Parental concerns about stimulant side effects	0.28	0.183	0.45	0.026
e. The benefit of stimulants in treating ADHD	-0.03	0.904	--	--
f. My own concerns about stimulant side effects	0.18	0.285	--	--
g. Variable effectiveness of stimulant medication among children with ADHD	-0.07	0.651	--	--
<i>Survey question:</i> How much do you agree or disagree with each of the following statements?				
a. Stimulants represent the best first-line treatment for ADHD in children	-0.37	0.087	-0.14	0.549
b. The risk for sudden cardiac death in children is sufficiently high to warrant cardiac assessment before initiating treatment with stimulants	0.12	0.486	--	--
<i>Demographic & practice setting characteristics</i>				
Psychiatrist (versus pediatrician)	-0.13	0.687	--	--
Male (versus female)	-0.27	0.366	--	--
Non-Hispanic/White (versus other)	0.04	0.917	--	--
Years in Practice (baseline= less than 8 yrs)				
8–12 years	0.09	0.846	0.11	0.819
13–18 years	0.63	0.186	0.73	0.139
>18 years	1.07	0.026	0.91	0.075
Practice Location (baseline=suburban)				
Rural	-0.27	0.559	--	--
Urban	-0.00	0.993	--	--
Patient Insurance 50% private (versus >50% public)	0.27	0.384	--	--