Physicians' Decision-making When Implementing Buprenorphine With New Patients: Conjoint Analyses of Data From a Cohort of Current Prescribers

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Objectives: Few studies have considered how providers make decisions to prescribe buprenorphine to new patients with opioid use disorder. This study examined the relative importance of patients' clinical, financial, and social characteristics on physicians' decision-making related to willingness to prescribe buprenorphine to new patients and the number of weeks of medication that they are willing to initially prescribe after induction.

Methods: A national sample of 1174 current prescribers was surveyed. Respondents rated willingness to prescribe on a 0 to 10 scale and indicated the number of weeks of medication (ranging from none to >4 weeks) for 20 hypothetical patients. Conjoint analysis estimated relative importance scores and part-worth utilities for these 2 outcome ratings.

Results: The mean rating for willingness to prescribe was 5.52 (SD 2.47), indicating a moderate willingness to implement buprenorphine treatment. The mean prescription length was 2.06 (SD 1.34), which corresponds to 1 week of medication. For both ratings, the largest importance scores were for other risky substance use, method of payment, and spousal involvement in treatment. Illicit benzodiazepine use, having Medicaid insurance to pay for the office visit, and having an opioid-using spouse were negatively associated with these outcome ratings, whereas a history of no risky alcohol or benzodiazepine use, cash payment, and having an abstinent spouse were positively associated with both ratings.

Conclusions: Reticence to prescribe to individuals using an illicit benzodiazepine and individuals with a drug-using spouse aligns with practice guidelines. However, reluctance to prescribe to patients with Medicaid may hamper efforts to expand access to treatment.

Key Words: buprenorphine, conjoint analysis, opioid use disorder, physician decision-making, vignettes

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Untreated opioid use disorder (OUD) is associated with numerous negative consequences, including mortality, acquisition and transmission of human immunodeficiency virus (HIV) and hepatitis C virus (HCV), and criminal involvement (Volkow et al., 2014). Buprenorphine is effective (Fiellin et al., 2008), but its implementation is suboptimal (Jones et al., 2015). The current study explores physician decision-making about prescribing buprenorphine for OUD through conjoint analysis, a methodology that uses clinical vignettes to describe the factors influencing choices. Understanding physicians' implementation of buprenorphine is critical given the current US opioid epidemic (Compton et al., 2015).

RESEARCH ON BUPRENORPHINE IMPLEMENTATION

Early research on buprenorphine diffusion measured its availability within specialty substance use disorder (SUD) treatment organizations through surveys of leadership (Koch et al., 2006; Friedmann et al., 2010) and counselors (Rieckmann et al., 2011). Within programs offering buprenorphine, just 37% of OUD patients received it (Knudsen et al., 2011),

suggesting processes were differentiating which OUD patients were considered appropriate for buprenorphine.

Physician surveys have not addressed how providers make prescribing decisions. Initial surveys identified characteristics differentiating prescribers from waivered nonprescribers (Kissin et al., 2006; Thomas et al., 2008). Surveys measured physicians' knowledge and attitudes about buprenorphine (Kissin et al., 2006; Thomas et al., 2008; Netherland et al., 2009; Hutchinson et al., 2014), dosing and counseling practices (Arfken et al., 2010), and perspectives on misuse and diversion (Yang et al., 2013).

A significant question remains as to whether patient-level factors, beyond a diagnosis of OUD, influence prescribing decisions. Alcohol and benzodiazepine use disorders are contraindications because they increase the risk of mortality and relapse (Center for Substance Abuse Treatment, 2004; American Society of Addiction Medicine, 2015). For several years, buprenorphine's impact on hepatic toxicity in patients with HIV or HCV was unknown. Although research has shown buprenorphine is safe for these patients (Vergara-Rodriguez et al., 2011; Saxon et al., 2013), it is unclear whether these findings have diffused to prescribers.

Other clinical characteristics may influence decision-making. Patients who only use prescription opioids stay in buprenorphine treatment longer than those who use heroin (Nielsen et al., 2015). Some studies indicate that buprenorphine has attracted new patients into treatment (Sullivan et al., 2005), and, for individuals who use prescription opioids, treatment outcomes are better among those who are new to treatment (Dreifuss et al., 2013).

Family support and employment are social factors that may be prognostic indicators of better treatment outcomes. Involving an abstinent spouse in treatment adherence results in superior outcomes in traditional medication management (Galanter et al., 2004). Employed patients are retained longer in buprenorphine treatment (Parran et al., 2010), which may influence physicians' prescribing decisions.

Finally, prescribing decisions may be influenced by how patients intend to pay for the office visits associated with treatment. Buprenorphine providers have substantial concerns about the adequacy of reimbursement (Netherland et al., 2009). In other fields, inadequate reimbursement and cumbersome prior authorization processes are potent barriers to the acceptance of Medicaid (Sommers et al., 2011). Some state Medicaid programs have implemented restrictions on access and duration of buprenorphine treatment (Clark and Baxter, 2013), which may serve as a further deterrent. A disinclination to treat Medicaid patients has heightened significance with Medicaid expansion in many states under the Affordable Care Act (McLellan and Woodsworth, 2014).

Physicians also must decide how many days of medication to prescribe to new patients. Practice guidelines recommend that prescribers initially prescribe no more than a week of medication (Center for Substance Abuse Treatment, 2004), with weekly visits until patients are stable (American Society of Addiction Medicine, 2015). It is not clear whether prescribers adhere to this recommendation or if patient-level characteristics are associated with this initial prescription.

CONJOINT ANALYSIS FOR STUDYING DECISION-MAKING

Studying physician decision-making is challenging, and historically has relied upon self-report or clinical case vignettes. Seminal research found case vignettes were more accurate than record abstraction and equivalent to using standardized patients when measuring physician behaviors (Peabody et al., 2000).

Conjoint analysis is an extension of case vignettes. It quantifies the relative contributions of a priori specific factors in decision-making (Luce and Tukey, 1964; Orme, 2010) through vignettes that provide multiple pieces of information (Ryan and Farrar, 2000; Sattler and Hensel-Borner, 2003). The underlying logic is that individuals typically make decisions by simultaneously evaluating a mixture of attributes that represent a number of trade-offs that are common in real-life choices (Stevens and Jason, 2015). In health care, a patient presents for care with a combination of clinical and social attributes. Physicians' decision-making is likely influenced by some attributes more than others. Conjoint analysis estimates the magnitude of influence of the attributes embedded in a series of vignettes. Furthermore, it produces more accurate estimates than asking a series of individual questions of the relative importance of key variables and reduces social desirability bias (Sattler and Hensel-Borner, 2003).

An additional benefit is that software programs allow researchers to deploy orthogonal designs where algorithms efficiently identify the smallest number of vignettes that are needed to understand the relative importance of the included attributes. In contrast, a full factorial design, where all possible combinations of the attributes are shown, can quickly yield an untenable number of vignettes. Orthogonal designs in conjoint surveys increase the feasibility of examining more attributes while reducing participant burden. Although it has been applied to other medical professions (Bachmann et al., 2008), this research is the first known study to apply conjoint analysis to physician decision-making in SUD treatment.

METHODS

Sample

A national random sample of buprenorphine prescribers was recruited. The May 2014 issue of the Drug Enforcement Agency's Controlled Substances Act (CSA) Active Registrants database was purchased, and all civilian physicians waivered to prescribe buprenorphine (n = 24,506) in the 50 US states and the District of Columbia were extracted. Physicians were randomly sampled within states. In a pilot phase, we constructed a simple random sample and discovered some small states were not represented due to chance. Hence, sampling within states ensured the sample would include all states and approximate the proportion of waivered physicians in each state.

We randomly sampled 8031 physicians from the CSA database for screening. Telephone screening assessed eligibility, as determined by the current treatment of at least 1 OUD patient with buprenorphine within the sampled state. The CSA database lacked telephone numbers, so we searched across multiple websites, including Substance Abuse and

Mental Health Services Administration's buprenorphine locator, HealthGrades, Google, ASAM's web site, and the National Provider Index directories. Working telephone numbers were not found for 757 physicians (9.4%), screening was incomplete after 10 attempts for 845 physicians (10.5%), and 444 physicians refused to complete the screening (5.5%). Ineligible physicians included 1986 with no current patients (24.7%), 386 not practicing in the sampled state (4.8%), and 60 (0.8%) who were not recruited because enrollment targets had already been met in their state. Screening yielded 3553 eligible physicians (44.2% of those sampled).

Research staff mailed an advance notification letter and then express-mailed a packet approximately 1 week later containing a study description letter, survey, consent forms, postage-paid envelope, and a form for receiving a $100 incentive. All physicians were mailed a postcard reminder. After 6 weeks of nonresponse, staff called the practice and sent a second packet. Between July 2014 and January 2017, 1174 physicians participated (33.0% response rate). All procedures were consistent with the Helsinki Declaration and were approved by the University of Kentucky's Institutional Review Board (Protocol 13-0068-P6J).

Measures of Physician Characteristics

Several physician characteristics were measured (Table 1). Information regarding waiver type (30 vs 100 patients) was extracted from the CSA database. Physicians indicated the settings in which they delivered buprenorphine treatment. Medical specialty was coded into 3 mutually exclusive groups: addiction (eg, addiction medicine, addiction psychiatry), psychiatry (with no mention of addiction), and all others. Demographic characteristics included age, sex, and race/ethnicity.

Conjoint Vignettes and Outcome Ratings

The conjoint vignettes consisted of 6 attributes (ie, variables) with 3 levels (ie, pieces of information presented in varying combinations) plus 1 attribute with 2 levels. Development of the attributes and levels was informed by our literature review, qualitative interviews conducted with 21 physician-mentors within the Physician Clinical Support System-Buprenorphine (PCSS-B; now PCSS-MAT), and clinical expertise within our investigative team. This strategy of attribute development is consistent with the literature (Bridges et al., 2011). A full factorial design would have required 1458 vignettes ($3^*3^*3^*3^*3^*2^*3 = 1458$). We used IBM SPSS conjoint analysis commands to select a representative subset of vignettes using an orthogonal design. Attributes and the number of levels in each attribute were entered using IBM SPSS ''generate orthogonal design'' command, which determined the minimum number of vignettes and the composition of each vignette to support later calculations of relative importance scores and part-worth utilities after data collection was completed. Results indicated the survey should include 18 vignettes and specified the 7 levels to be depicted within each vignette, which were presented in bullet point format in the survey. SPSS also generated 2 additional holdout vignettes for model validation, for a total of 20 vignettes. Table 2 presents the combination of levels within each vignette and the wording of the 2 outcome ratings (ie, likelihood of prescribing and weeks of medication initially prescribed) appears in Table 3. Table 4 includes the precise wording of each level (full vignettes are available by request).

TABLE 1. Professional and Demographic Characteristics of Current Buprenorphine Prescribers (N = 1174)

	Mean (SD) or % (n)
Waiver type	
Up to 30 concurrent patients	42.2% (496)
Up to 100 concurrent patients	57.8% (678)
Delivers buprenorphine in an individual medical practice	50.8% (587)
Delivers buprenorphine in a group medical practice	35.2% (406)
Delivers buprenorphine in a Veterans Administration Medical Center (VAMC)	4.6% (53)
Delivers buprenorphine in a hospital (non-VAMC)	13.2% (152)
Delivers buprenorphine in an opioid treatment program (OTP)	6.2% (71)
Delivers buprenorphine in a substance use disorder program (non-OTP)	14.0% (161)
Demographic characteristics	
Medical specialty	
Addiction (ie, addiction medicine, addiction psychiatry)	21.6% (248)
Psychiatry (with no mention of addiction)	27.2% (312)
Nonaddiction/nonpsychiatry	51.3% (589)
Female	22.9% (267)
Age, yrs	55.5 (11.4)
Race/ethnicity	
White	76.5% (878)
Asian	12.5% (144)
African American/Black	4.7% (54)
Hispanic	4.4% (50)
Multiracial/Other	1.9% (22)

Some percentages may sum to greater than 100% due to rounding error. Physicians could indicate delivering buprenorphine in more than 1 practice setting. At the time of data collection, the 275-patient waiver had not been fully implemented.

Before fielding the survey, the vignettes were pilot-tested using cognitive interviewing (Beatty and Willis, 2007). Eight buprenorphine prescribers in Lexington, KY, were recruited and consented. As they completed the vignettes, prescribers were queried by a trained interviewer to identify areas of potential misinterpretation and structural problems that might impede valid survey administration (Willis, 2005). Interviews were audio-recorded and transcribed. Although feedback was generally positive, participants identified some modest wording changes that were incorporated into the vignettes.

Data Management and Statistical Analysis

Data were entered into Research Electronic Data Capture (REDCap), a secure web-based application hosted by the University of Kentucky, that supports validated data entry and automated exporting of data into statistical software (Harris et al., 2009). Descriptive statistics for the 2 outcome ratings were calculated. SPSS Conjoint estimated the part-worth utilities for each of the levels and the average relative importance of the 7 attributes. Larger part-worth utilities, which represent regression coefficients, indicate greater influence of attributes on physicians' responses. Our model specified that all levels were categorical and that the outcome ratings represented scores as opposed to ranks. Average relative

TABLE 2. Combinations of Levels in 20 Vignettes of Patients Presenting for Buprenorphine Treatment

Patient Vignette	Opioid Type and Primary Route	Treatment History	Risky Substance Use	Co-occurring Infections	Spousal Involvement	Employment Status	Method of Payment
1	Heroin; IV	Fourth episode; hx of MMT	No hx AUD or BUD	HCV+ HIV−	Spouse uses opioids	Employed	Medicaid
2	Heroin; IV	First episode	Binge drinking	HCV+ HIV−	Hiding tx from spouse	Unemployed	Private insurance
3	Rx opioid; IV	First episode	Illicit alprazolam	HCV− HIV+	Spouse uses opioids	Employed	Cash
4	Rx opioid; IV	Fourth episode; hx of MMT	Binge drinking	HCV− HIV+	Abstinent spouse	Employed	Private insurance
5	Rx opioid; IV	Fourth episode; hx of OPDF	No hx AUD or BUD	HCV+ HIV−	Hiding tx from spouse	Employed	Cash
6	Heroin; IV	Fourth episode; hx of MMT	Binge drinking	HCV− HIV−	Spouse uses opioids	Employed	Cash
7	Heroin; IV	Fourth episode; hx of OPDF	No hx AUD or BUD	HCV− HIV+	Abstinent spouse	Unemployed	Cash
8	Heroin; IV	Fourth episode; hx of OPDF	Illicit alprazolam	HCV− HIV−	Abstinent spouse	Employed	Private insurance
9	Rx opioid; non-IV	Fourth episode; hx of OPDF	Illicit alprazolam	HCV+ HIV−	Spouse uses opioids	Employed	Private insurance
10	Rx opioid; IV	Fourth episode; hx of OPDF	Binge drinking	HCV− HIV−	Hiding tx from spouse	Employed	Medicaid
11	Rx opioid; IV	Fourth episode; hx of MMT	Illicit alprazolam	HCV+ HIV−	Abstinent spouse	Unemployed	Medicaid
12	Rx opioid; non-IV	First episode	No hx AUD or BUD	HCV− HIV−	Abstinent spouse	Employed	Medicaid
13	Heroin; IV	First episode	Illicit alprazolam	HCV− HIV+	Hiding tx from spouse	Employed	Medicaid
14	Rx opioid; non-IV	Fourth episode; hx of MMT	Illicit alprazolam	HCV− HIV−	Hiding tx from spouse	Unemployed	Cash
15	Rx opioid; non-IV	Fourth episode; hx of OPDF	Binge drinking	HCV− HIV+	Spouse uses opioids	Unemployed	Medicaid
16	Rx opioid; non-IV	First episode	Binge drinking	HCV+ HIV−	Abstinent spouse	Employed	Cash
17	Rx opioid; non-IV	Fourth episode; hx of MMT	No hx AUD or BUD	HCV− HIV+	Hiding tx from spouse	Employed	Private insurance
18	Rx opioid; IV	First episode	No hx AUD or BUD	HCV− HIV−	Spouse uses opioids	Unemployed	Private insurance
19	Rx opioid; IV	Fourth episode; hx of MMT	Binge drinking	HCV+ HIV−	Hiding tx from spouse	Unemployed	Cash
20	Heroin; IV	Fourth episode; hx of OPDF	Binge drinking	HCV− HIV−	Hiding tx from spouse	Employed	Private insurance

Each vignette consisted of 7 levels that were presented in bullet point format and then the 2 outcome ratings. Patients 19 and 20 represented the 2 holdouts, which were not used to calculate part-worth utilities. AUD, alcohol use disorder; BUD, benzodiazepine use disorder; HCV, hepatitis C virus; HIV, human immunodeficiency virus; Hx, history; IV, intravenous route; MMT, methadone maintenance treatment; OPDF, outpatient drug-free clinic; Rx opioid, prescription opioid; Tx, treatment.

importance scores sum to 100, allowing comparison of the magnitudes of these scores. They are calculated by first calculating the range in part-worth utilities for each attribute, then dividing each attribute's range by the sum of these ranges, and multiplying by 100. Preference scores, based on alternative configurations of the part-worth utilities plus the constant, were calculated.

RESULTS

Willingness to Prescribe

Across the 20 vignettes, the overall mean for willingness to prescribe buprenorphine was 5.52 (SD 2.47), indicating a moderate willingness to implement buprenorphine. Responses varied across the 20 vignettes, as seen in Table 2. Means ranged from a low of 4.14 (SD 3.62; patient 13) to a high of 7.62 (SD 2.69; patient 7). In the patient 13 vignette, 31.0% of respondents indicated they were not at all willing to prescribe. In contrast, just 4.7% of respondents reported being not at all willing to prescribe to patient 7.

Relative importance scores appear in Fig. 1 (dark gray bars). The attributes with the largest relative importance scores were risky substance use (33.5), method of payment (31.9), and spousal involvement in treatment (21.3). The remaining 4 attributes of type of opioid/route, treatment history, co-occurring infections, and employment status had importance scores that were small; the sum of these 4 importance scores was only 13.3.

Part-worth utilities indicated how specific levels within attributes were correlated with willingness to prescribe (Table 3, rating 1 column). For risky substance use, the large positive part-worth utility for patients with no history of alcohol or benzodiazepine disorders indicated greater willingness of physicians to prescribe to such patients. Weekly binge drinking had a modest negative impact on willingness to prescribe. Weekly illicit alprazolam use had a large negative part-worth utility, indicating much lower willingness to prescribe. For payment, private insurance had little impact on willingness to prescribe. Cash payment had a large positive part-worth utility while having Medicaid yielded a large negative part-worth utility. Finally, physicians were more willing to prescribe when the patient had an abstinent spouse who was willing to supervise dosing. When the patient did not want to disclose to their spouse about their treatment, there was a modest-sized negative part-worth utility. A much larger negative part-worth utility was observed when the patient had a spouse who also used opioids, but was not seeking treatment.

Alternative configurations of patient characteristics were then calculated as preference scores to examine the range of willingness to prescribe buprenorphine. When the largest positive utilities were combined with the constant, the preference score for physicians' willingness to prescribe buprenorphine was 7.87. This configuration represented a patient with prescription OUD with nonintravenous use, first time seeking treatment, no other risky substance use, HCV-positive but HIV-negative, a spouse who did not use drugs, employed, and was willing to pay out of pocket. When the largest negative utilities were combined, the preference score was just 2.94. In this configuration, the patient characteristics

TABLE 3. Descriptive Statistics for 20 Vignettes of Patients Presenting for Buprenorphine Treatment

	Rating 1: Willingness to Prescribe (Range = 0–10)		Rating 2: Amount of Medication (Range = 0–6)	
	Mean (SD)	Distribution	Mean (SD)	Distribution
Patient 1	5.28 (3.64)	0 = 21.0% 1–5 = 25.9% 6–9 = 37.4% 10 = 15.5%	1.99 (1.67)	None = 22.2% <1 wk = 15.5% 1 wk = 36.3% ≥2 wks = 26.0%
Patient 2	5.28 (3.43)	0 = 17.6% 1–5 = 29.3% 6–9 = 40.8% 10 = 13.2%	1.97 (1.59)	None = 19.7% <1 wk = 18.7% 1 wk = 35.7% ≥2 wks = 25.9%
Patient 3	5.11 (3.40)	0 = 15.9% 1–5 = 35.4% 6–9 = 35.4% 10 = 13.4%	1.93 (1.62)	None = 20.3% <1 wk = 21.2% 1 wk = 32.9% ≥2 wks = 25.5%
Patient 4	5.93 (3.43)	0 = 15.6% 1–5 = 22.1% 6–9 = 44.9% 10 = 17.4%	2.16 (1.62)	None = 15.9% <1 wk = 16.5% 1 wk = 37.3% ≥2 wks = 30.4%
Patient 5	7.11 (2.77)	0 = 5.0% 1–5 = 18.6% 6–9 = 51.7% 10 = 24.8%	2.45 (1.51)	None = 5.3% <1 wk = 17.7% 1 wk = 42.5% ≥2 wks = 34.5%
Patient 6	5.64 (3.25)	0 = 11.6% 1–5 = 33.6% 6–9 = 39.9% 10 = 15.1%	2.07 (1.58)	None = 14.9% <1 wk = 21.1% 1 wk = 37.1% ≥2 wks = 26.9%
Patient 7	7.62 (2.69)	0 = 4.7% 1–5 = 12.7% 6–9 = 50.0% 10 = 32.8%	2.54 (1.52)	None = 4.9% <1 wk = 15.9% 1 wk = 42.2% ≥2 wks = 37.1%
Patient 8	5.31 (3.55)	0 = 19.6% 1–5 = 25.9% 6–9 = 39.9% 10 = 14.5%	2.04 (1.66)	None = 20.6% <1 wk = 16.8% 1 wk = 34.2% ≥2 wks = 28.3%
Patient 9	4.55 (3.41)	0 = 21.4% 1–5 = 36.4% 6–9 = 32.6% 10 = 9.6%	1.83 (1.61)	None = 23.7% <1 wk = 20.3% 1 wk = 32.6% ≥2 wks = 23.4%
Patient 10	4.65 (3.54)	0 = 24.4% 1–5 = 30.2% 6–9 = 35.0% 10 = 10.4%	1.85 (1.63)	None = 24.9% <1 wk = 16.9% 1 wk = 34.0% ≥2 wks = 24.2%
Patient 11	4.43 (3.64)	0 = 28.1% 1–5 = 28.1% 6–9 = 32.9% 10 = 11.0%	1.77 (1.65)	None = 28.7% <1 wk = 16.6% 1 wk = 30.9% ≥2 wks = 23.8%
Patient 12	6.51 (3.89)	0 = 19.2% 1–5 = 13.6% 6–9 = 33.0% 10 = 34.2%	2.18 (1.64)	None = 18.4% <1 wk = 12.7% 1 wk = 36.5% ≥2 wks = 32.4%
Patient 13	4.14 (3.62)	0 = 31.0% 1–5 = 30.6% 6–9 = 28.3% 10 = 10.3%	1.61 (1.60)	None = 31.8% <1 wk = 18.0% 1 wk = 30.2% ≥2 wks = 20.0%
Patient 14	5.14 (3.35)	0 = 15.4% 1–5 = 35.3% 6–9 = 36.3% 10 = 12.9%	2.00 (1.60)	None = 17.8% <1 wk = 21.1% 1 wk = 34.4% ≥2 wks = 26.6%
Patient 15	4.18 (3.47)	0 = 28.0% 1–5 = 33.3% 6–9 = 30.3% 10 = 8.6%	1.71 (1.62)	None = 28.6% <1 wk = 18.8% 1 wk = 31.3% ≥2 wks = 21.3%
Patient 16	6.87 (2.98)	0 = 6.2% 1–5 = 22.0% 6–9 = 49.0% 10 = 22.8%	2.39 (1.52)	None = 7.3% <1 wk = 18.1% 1 wk = 39.7% ≥2 wks = 34.8%
Patient 17	6.15 (3.32)	0 = 13.4%	2.24 (1.58)	None = 13.0%

(Continued on next page)

TABLE 3 (*Continued*)

	Rating 1: Willingness to Prescribe (Range = 0–10)		Rating 2: Amount of Medication (Range = 0–6)	
	Mean (SD)	Distribution	Mean (SD)	Distribution
		1–5 = 22.3%		<1 wk = 16.4%
		6–9 = 45.3%		1 wk = 39.4%
		10 = 19.1%		≥2 wks = 31.2%
Patient 18	5.85 (3.46)	0 = 15.7%	2.06 (1.54)	None = 15.4%
		1–5 = 24.0%		<1 wk = 19.8%
		6–9 = 41.8%		1 wk = 37.4%
		10 = 18.6%		≥2 wks = 27.3%
Patient 19	5.54 (3.20)	0 = 11.4%	2.10 (1.54)	None = 13.0%
		1–5 = 35.4%		<1 wk = 21.9%
		6–9 = 39.2%		1 wk = 36.8%
		10 = 14.1%		≥2 wks = 28.3%
Patient 20	5.20 (3.42)	0 = 18.6%	1.97 (1.59)	None = 19.5%
		1–5 = 29.2%		<1 wk = 18.7%
		6–9 = 40.2%		1 wk = 36.6%
		10 = 12.0%		≥2 wks = 25.3%

Vignettes were designed before the release of the *Diagnostic and Statistical Manual of Mental Disorders V* (DSM-5), which is why the words ''dependence'' and ''abuse'' were used. Outcome rating 1 asked respondents, ''How likely are you to begin prescribing buprenorphine-naloxone to treat this patient?'' on a scale ranging from 0 = not at all likely, to 10 = extremely likely. Outcome rating 2 asked, ''How many weeks of medication would you initially prescribe to this patient after induction?'' with 7 response options (ie, 0 = none [would not induct], 1 = <1 week, 2 = 1 week, 3 = 2 weeks, 4 = 3 weeks, 5 = 4 weeks, 6 = >4 weeks). Patients 19 and 20 represented the 2 holdouts, which were not used to calculate part-worth utilities, but were used for examining model reliability. Percentages may not sum to 100% due to rounding.

were prescription OUD with intravenous use, fourth time seeking treatment with history of methadone, weekly illicit alprazolam use, HIV-negative and HCV-negative, spouse used opioids and was not seeking treatment, unemployed, and had Medicaid.

Weeks of Buprenorphine Medication

Physicians were also asked about the number of weeks of medication that they would prescribe (Table 2, rating 2 column). The mean across the 20 vignettes was 2.06 (SD 1.34), which corresponds most closely to 1 week of medication. In terms of physicians endorsing less than 1 week of medication, prevalence ranged from 12.7% of physicians for patient 12 to 21.9% of physicians for patient 19. For longer prescriptions (ie, 2 weeks or more), Patient 13 had the least physicians willing to prescribe medication for this longer timeframe (20.0%) and patient 7 had the most (37.1%).

The results for amount of medication were similar to willingness to prescribe. The 3 largest relative importance scores (Fig. 1, light gray bars) were for risky substance use (33.5), method of payment (31.9), and spousal involvement (21.3). The directions of the part-worth utilities were also similar (Table 3, rating 2). Physicians would prescribe more medication when the patient had no history of alcohol or benzodiazepine use disorder, but less when the patient reported illicit alprazolam use. Physicians were willing to prescribe more medication to patients paying out of pocket, yet less medication to patients with Medicaid. Finally, the part-worth utility was positive when patients had an abstinent spouse who would supervise dosing, and the utility was negative when the spouse used opioids and was not seeking treatment.

Consideration of alternative configurations with the largest all-positive versus all-negative part-worth utilities (plus the constant) did reveal differences in weeks of medication. In the all-negative scenario (ie, prescription OUD with intravenous use, first treatment, alprazolam use, HIV-positive and HCV-negative, spouse uses opioids and not seeking treatment, unemployed, and Medicaid), the preference score was 1.08, which represented less than 1 week of medication. In the all-positive scenario (ie, prescription OUD with non-intravenous use, fourth treatment with prior outpatient treatment, no risky substance use, HCV-positive but HIV-negative, spouse does not use drugs, employed, and paying out of pocket), the preference score was 2.70, which was between 1 and 2 weeks of medication.

DISCUSSION

Through vignettes of individuals with OUD presenting for buprenorphine treatment, this study was the first to examine prescriber decision-making using conjoint analysis. Observed data indicated a moderate level of willingness to prescribe buprenorphine, but also notable variability. On average, physicians were willing to prescribe 1 week of medication. About 1 in 5 physicians consistently indicated they would prescribe 1 week or less of medication regardless of patient characteristics, but some physicians were willing to prescribe 2 weeks or more of buprenorphine to new patients, which exceeds practice guidelines (Center for Substance Abuse Treatment, 2004; American Society of Addiction Medicine, 2015).

For both outcome ratings, co-occurring substance use had the largest relative importance scores. Specifically, physicians were less willing to prescribe and willing to prescribe fewer weeks of medication to patients reporting illicit alprazolam use. This suggests physicians may be sensitive to the risk of concomitant use of buprenorphine and a benzodiazepine. It is possible that ''illicit'' (ie, prescribed to someone else) sensitized physicians to a behavior that may be a red flag for potential buprenorphine misuse or diversion, both of which are public health concerns (Lofwall and Walsh, 2014).

TABLE 4. Attributes and Levels of Conjoint Vignettes With Part-worth Utilities for Likelihood of Prescribing Buprenorphine (Outcome Rating 1) and Weeks of Medication (Outcome Rating 2)

Attribute	Levels Within the Attribute	Rating 1: Part-worth Utility (Standard Error)	Rating 2: Part-worth Utility (Standard Error)
Type of opioid and primary route of administration	Heroin dependence (DSM-IV); primary route is intravenous	−0.010 (0.036)	−0.010 (0.008)
	Prescription opioid dependence (DSM-IV); primary route is intravenous	−0.023 (0.036)	−0.011 (0.008)
	Prescription opioid dependence (DSM-IV); primary route is nonintravenous	0.033 (0.036)	0.021 (0.008)
Treatment history	First time seeking treatment	0.096 (0.036)	−0.024 (0.008)
	Fourth time seeking treatment; previous treatment at outpatient drug-free clinics	0.042 (0.036)	0.036 (0.008)
	Fourth time seeking treatment; previous treatment has included methadone maintenance	−0.139 (0.036)	−0.012 (0.008)
Risky substance use	No history of alcohol or benzodiazepine use disorders	0.947 (0.036)	0.281 (0.008)
	No history of benzodiazepine abuse, but engages in weekly binge drinking	−0.121 (0.036)	−0.016 (0.008)
	No history of alcohol abuse, but weekly illicit alprazolam use	−0.826 (0.036)	−0.264 (0.008)
Co-occurring infections	HIV− and hepatitis C−	−0.021 (0.036)	−0.015 (0.008)
	Hepatitis C+ and HIV−	0.035 (0.036)	0.033 (0.008)
	HIV+ and hepatitis C−	−0.014 (0.036)	−0.017 (0.008)
Spousal involvement in treatment	Does not want spouse to know about treatment	−0.139 (0.036)	−0.036 (0.008)
	Spouse also abuses opioids, but is not seeking treatment	−0.480 (0.036)	−0.155 (0.008)
	Spouse does not use drugs and is willing to supervise dosing	0.619 (0.036)	0.192 (0.008)
Employment status	Employed	0.093 (0.027)	0.037 (0.006)
	Unemployed	−0.093 (0.027)	−0.037 (0.006)
Method of payment for office visits	Has Medicaid to pay for office visits; cannot pay out of pocket	−0.753 (0.036)	−0.261 (0.008)
	Has private insurance to pay for office visits; cannot pay out of pocket	−0.021 (0.036)	0.003 (0.008)
	Willing to pay out of pocket (cash) for office visits	0.774 (0.036)	0.258 (0.008)
Constant		5.272 (0.027)	1.846 (0.006)

Part-worth utilities were calculated based on patients 1 to 18. Higher part-worth utilities, which represent regression coefficients, were indicative of greater influence of attributes on physicians' responses. Rating 1 asked respondents, "How likely are you to begin prescribing buprenorphine-naloxone to treat this patient?" on a scale ranging from 0 = not at all likely, to 10 = extremely likely. Rating 2 asked, "How many weeks of medication would you initially prescribe to this patient after induction?" with 7 response options (ie, 0 = none [would not induct], 1 = <1 week, 2 = 1 week, 3 = 2 weeks, 4 = 3 weeks, 5 = 4 weeks, 6 = >4 weeks). Analysis of the hold-out vignettes (patients 19–20) indicated high correlations between predicted responses based on the conjoint model and responses to the hold-out vignettes. Vignettes were designed before the release of the DSM-5, which is why the words "dependence" and "abuse" were used.

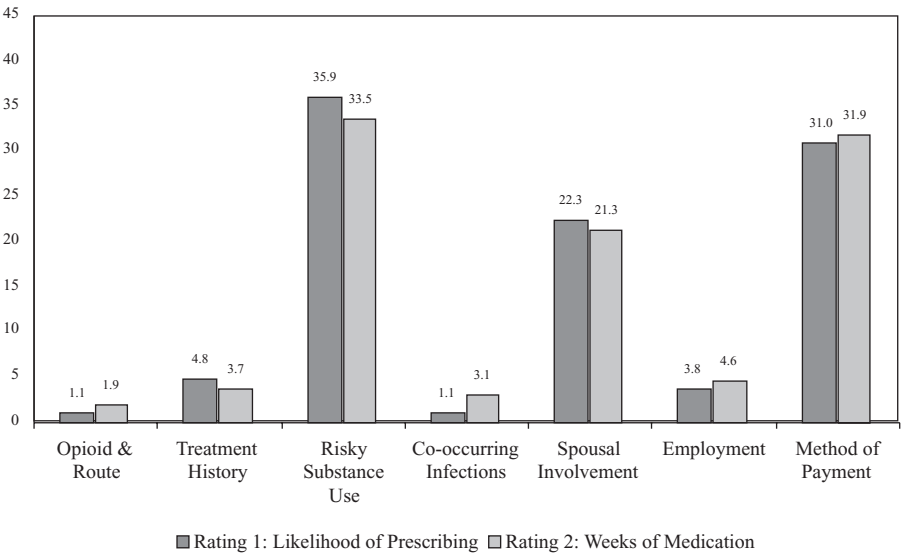

FIGURE 1. Average relative importance scores of seven attributes in buprenorphine prescribing decisions. Note: Average relative importance scores sum to 100, thus allowing the magnitudes of these scores to be compared across the seven attributes.

The second largest factor was the patient's method of payment for their office visit. Physicians indicated a clear preference for cash-paying patients, whereas physicians were less willing to prescribe and were willing to prescribe less medication when patients intended to pay with Medicaid. There have been reports of cash-only practices (Torrington et al., 2007), which may reduce the administrative burdens of navigating the complexities of insurance and barriers imposed by lack of parity by some payers (The Mental Health and Substance Use Disorder Parity Task Force, 2016). However, cash-only practices may be detrimental to treatment access for patients with limited economic resources.

The finding regarding Medicaid is troubling, given the prediction that the Medicaid expansion under the Affordable Care Act (ACA) would reduce treatment barriers (McLellan and Woodsworth, 2014). Medicaid expansion has substantially reduced the number of uninsured individuals (Sommers et al., 2015). However, if individuals with Medicaid cannot find buprenorphine providers who will accept their insurance, the expected treatment gains from the ACA will be underrealized. One issue that we cannot address is whether refusing Medicaid patients is an economic decision, reflects stigma about the Medicaid population, or other factors.

Prescribers' greater willingness to treat patients with abstinent spouses who were willing to supervise dosing is reassuring. It is concordant with published guidelines that patients who have supportive and sufficiently stable psychosocial circumstances are good candidates for office-based buprenorphine treatment (Center for Substance Abuse Treatment, 2004; American Society of Addiction Medicine, 2015). It suggests that such spouses may be a strong network support (Galanter et al., 2004). On the contrary, having a spouse with untreated OUD may pose a risk to safe storage of the medication and increase risk for diversion. Such patients may need closer monitoring and structured treatment with observed dosing (Lofwall and Walsh, 2014). Patients' social networks influence their drug-taking behavior (Young et al., 2014), which is a reason to be concerned about spouses with untreated OUD.

Identifying factors that do not influence prescribing decisions is also important for equity in treatment access. It was somewhat surprising that decision-making was only minimally impacted by the type of opioid and primary route, as users of prescription opioids may have better outcomes than users of heroin (Nielsen et al., 2015). Previous treatment history was not a substantial driver of physician decision-making. We found minimal evidence of disparities based on HIV or HCV serostatus, which, from the perspective of access to treatment, is favorable. There were minimal differences by employment status.

Several study limitations should be noted. First, conjoint analysis can only speak to the factors explicitly presented in the vignettes. Future research should consider additional factors while retaining the 3 key characteristics identified in the present study. Such a design could determine whether those new factors are more or less influential than the 3 factors identified in our study. Furthermore, future research should consider whether physician and setting characteristics are associated with prescribing decisions; latent class analysis may be useful in such an examination.

Also, our response rate was low, which is common in national studies of physicians (Klabunde et al., 2013). Because this represented a newly recruited sample, we cannot ascertain how respondents may have differed from nonrespondents beyond their Drug Enforcement Agency waiver status. We estimated a mixed-effects regression model (not shown) comparing respondents to nonrespondents, and found that physicians holding the 100-patient waiver were 1.4 times ($P < 0.001$) more likely to respond than physicians holding the 30-patient waiver. The intraclass coefficient (ICC) for nesting of physicians within states was relatively small (ICC = 0.040). Unfortunately, SPSS Conjoint does not support the weighting of data that would adjust for the differences in response rates by types of participants or the nesting of respondents within clusters. It is also unknown whether other design choices, such as a web-based survey or a larger financial incentive, would have increased response rate. However, research has shown that physicians were less likely to respond to online surveys than mailed surveys (McLeod et al., 2013). Our financial incentive was the maximum amount allowed by our institution in the absence of a Social Security number; obtaining Social Security numbers would increase the risk of identity theft, which we viewed as antithetical to human protections.

Given the opioid crisis in the United States, significant efforts have been undertaken to expand access to evidence-based pharmacotherapies. Our findings highlight considerable variation in physicians' willingness to prescribe buprenorphine as a function of clinical, financial, and social factors. Reticence to prescribe to patients with risk factors, such as ongoing benzodiazepine use or a spouse with untreated OUD, may be rational from the provider's perspective. However, the negative association between Medicaid insurance and willingness to prescribe suggests that policymakers should consider whether restructuring Medicaid would encourage more physicians to accept this form of payment. In the absence of such changes, efforts to expand buprenorphine treatment may stall despite the policy measures, such as the Medicaid expansion, implemented in some states under the ACA.

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