HEALTH CARE REFORM

Collaborative Care of Opioid-Addicted Patients in Primary Care Using Buprenorphine

Five-Year Experience

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Background: Opioid addiction is a chronic disease treatable in primary care settings with buprenorphine hydrochloride, but this treatment remains underused. We describe a collaborative care model for managing opioid addiction with buprenorphine hydrochloride–naloxone hydrochloride dihydrate sublingual tablets.

Methods: Ours is a cohort study of patients treated for opioid addiction using collaborative care between nurse care managers and generalist physicians in an urban academic primary care practice during a 5-year period. We examine patient characteristics, 12-month treatment success (ie, retention or taper after 6 months), and predictors of successful outcomes.

Results: From September 1, 2003, through September 30, 2008, 408 patients with opioid addiction were treated with buprenorphine. Twenty-six patients were excluded from analysis because they left treatment owing to preexisting legal or medical conditions or a need to transfer to another buprenorphine program. At 1 year, 196 of 382 patients (51.3%) underwent successful treatment. Of patients remaining in treatment at 12 months, 154 of 169 (91.1%) were no longer using illicit opioids or cocaine based on urine drug test results. On admission, patients who were older, were employed, and used illicit buprenorphine had significantly higher odds of treatment success; those of African American or Hispanic/Latino race had significantly lower odds of treatment success. These outcomes were achieved with a model that facilitated physician involvement.

Conclusion: Collaborative care with nurse care managers in an urban primary care practice is an alternative and successful treatment method for most patients with opioid addiction that makes effective use of time for physicians who prescribe buprenorphine.

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OPIOID ADDICTION IS A chronic, relapsing brain disease that affects millions of Americans and produces tremendous burden on the health care system.[1,2] Recent epidemiologic studies[3] have revealed alarming increases in opioid addiction and overdoses, particularly with regard to prescription opioids. Less than 25% of individuals addicted to opioids receive addiction treatment.[3] For more than 45 years, research has confirmed that opioid agonist therapy (ie, methadone hydrochloride) is a highly effective treatment for opioid addiction provided outside primary care.[4-6] In 2002, US physicians gained the opportunity to treat opioid-addicted patients with buprenorphine hydrochloride in primary care settings, commonly referred to as office-based opioid treatment (OBOT).[7] This treatment has been shown to be effective in primary care settings[8-15]; however, it remains underused in traditional care models.[16] One consistently cited barrier preventing OBOT expansion is lack of adequate clinical support given the additional needs for patient monitoring.[16-18] Although collaborative care improves management of other chronic diseases (eg, hypertension[19] and diabetes mellitus[20]), experience with this model for the treatment of opioid addiction in primary care has not been described.[21]

On September 1, 2003, an OBOT program using a collaborative care model was started at Boston Medical Center, an urban academic medical setting. This model accommodated the large public demand for OBOT and faculty physicians with part-time clinical practices. We describe Boston Medical Center's OBOT program and report on patient and program outcomes.

METHODS

PROGRAM DESCRIPTION

Collaborative Model of Care

The collaborative care OBOT program included a full-time nurse program director, nurse care managers (NCMs), a program coordinator, and generalist physicians with part-time clinical practices. The nurse program director (0.40 full-time equivalent) supervised the NCMs and program coordinator and integrated care with OBOT physicians. The program coordinator (1 full-time equivalent), a former medical assistant, was trained to collect standardized intake information regarding individuals requesting OBOT. The NCMs, registered nurses who completed a 1-day buprenorphine training program, performed patient care roles, followed treatment protocols, and maintained a standard of clinical practice that satisfied federal regulations for buprenorphine treatment. Their clinical responsibilities included assessing for the appropriateness for OBOT, educating patients, obtaining informed consent, developing treatment plans, overseeing medication management, referring to other addiction treatment, monitoring for treatment adherence, and communicating with prescribing physicians, addiction counselors, and pharmacists. Collaboration with pharmacists reduced the OBOT physician burden by allowing buprenorphine prescriptions with multiple refills while allowing for cancellation of the refills if the patient showed nonadherence. The OBOT program currently includes NCMs (2.2 full-time equivalents) for 22 clinical half-day sessions per week. The OBOT physicians, all generalists with part-time clinical practices, reviewed and supplemented the NCM assessments (including laboratory results), performed physical examinations, prescribed buprenorphine, and followed up patients at least every 6 months or more frequently if needed. The OBOT program includes 9 generalist physicians, all waivered to prescribe buprenorphine by completing the required 8 hours of buprenorphine training; 3 of them (including D.P.A. and J.H.S.) are certified by the American Board of Addiction Medicine. The physicians had an average of 3 primary care half-day sessions each week, ranging from 1 to 6.

The treatment model included 3 stages: (1) NCM and physician assessment (appropriateness for OBOT and intake evaluations), (2) NCM-supervised induction and stabilization (buprenorphine dose adjustments during days 1-7), and (3) maintenance (buprenorphine treatment with monitoring for illicit drug use and weekly counseling) or discharge (voluntary or involuntary).

Assessment

The program coordinator conducted a scripted screening, by telephone or in person, documenting substance use, addiction treatment history, medical and psychiatric history, medications, addiction treatment goals, and availability of social support. The nurse program director reviewed the screen and triaged the patient to NCM and physician intake appointments or to other treatment options. Patients were triaged to other treatment options (eg, detoxification program) if they had active co-occurring substance use disorders. The NCM intake included documentation of opioid dependence diagnosis based on a checklist of the *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition, Text Revision)[22] criteria, assessing ability to adhere to treatment plan, mental health stability, polysubstance use, absence of painful conditions requiring long-term opioid analgesic therapy, and absence of medical contraindications (eg, pregnancy). All patients transferring from methadone maintenance were required to taper their methadone dose to 30 mg/d.[23] Individuals were excluded if they were unwilling to stop all illicit drug use or were not interested in buprenorphine maintenance lasting at least 6 months. Patients were educated regarding the scientific basis of buprenorphine maintenance. All patients signed an informed consent and treatment agreement, which included a weekly counseling requirement with a release for communication. Initial laboratory tests included viral hepatitis and syphilis serologic tests, liver function tests, pregnancy tests, and a urine drug test for opiates, cocaine, benzodiazepines, barbiturates, and amphetamines. Because many of these patients were new to primary health care, laboratory tests for a broader primary care evaluation were also ordered, including a complete blood cell count and electrolyte levels. Starting June 1, 2006, all patients were also tested for oxycodone, methadone, and buprenorphine. Patients were required to test negative for all nonprescribed substances other than opioids before starting buprenorphine treatment.

The OBOT physician intake included reviewing and supplementing the NCM assessment and treatment plan, performing a physical examination, and evaluating any medical issues (eg, need for hepatitis vaccinations). Patients with active psychiatric diagnoses were comanaged with a psychiatrist, with releases to facilitate communication.

Induction and Stabilization

The physician prescribed buprenorphine based on federal guidelines.[23] Induction and stabilization occurred during the first 7 days. Induction occurred on site (ie, in the office) with direct observation by the NCM for signs of opioid withdrawal before the first dose of buprenorphine and signs of precipitated withdrawal after the first dose. Physicians were not present during buprenorphine induction but were available by pager for consultation. Dose adjustments were made based on OBOT program protocols. The combination tablet buprenorphine hydrochloride–naloxone hydrochloride dihydrate was used for all inductions. During dose stabilization (days 2-7), dosing occurred off site (ie, at home), with patients having at least daily telephone contact with the NCM to assess for withdrawal and adverse effects. Telephone support continued until a stable maintenance dose was achieved, usually 8 to 16 mg. All patients were reassessed in person by the NCM on day 8 or sooner if needed.

Maintenance

Ongoing monitoring occurred at follow-up appointments at least weekly for the first 4 to 6 weeks followed by visits every 2 to 4 weeks if adherent (ie, 4 consecutive urine drug tests with negative results for illicit drugs and positive results for buprenorphine and attending at least 3 of 4 counseling sessions per month). Patients who maintained sobriety and treatment adherence for 3 months had their NCM visit frequency decreased to a monthly basis, then once every 3 months. Patients seen on a less than monthly basis had up to 6 random callbacks per year for unscheduled urine drug testing and pill counts. Patients were always subject to requests to return to the clinic within 72 hours for urine drug tests, observed dosing, pill counts, or treatment plan revisions. Urine drug tests occurred at every NCM visit and OBOT physician visit at least every 6 months. All patients with abnormal urine drug test results were called in the following week to meet with the NCM. If a patient continued to use illicit drugs (eg, opiates, cocaine, and benzodiazepines) or showed nonadherence with scheduled appointments or monitoring requests (ie, urine drug tests or pill counts), the NCM intensified treatment, including increased visits to 2 or more times per week for pill

counts, observed urine drug tests and adjusted buprenorphine dose, reengaged social supports, and intensified counseling.

The NCMs and physicians encouraged patients to attend self-help groups and mandatory weekly addiction counseling. Most addiction counseling (individual and group) was offered by outside addiction services with confidentiality releases. For an 18-month period, a few patients were seen by an in-house counselor. The NCM reminded patients of upcoming appointments with addiction counselors and OBOT physicians.

Discharge

Patients were referred to methadone maintenance treatment if they continued to use illicit opiates as determined by 3 consecutive urine drug test results positive for opiates despite increased buprenorphine dose or if they needed more structured care (eg, daily observed dosing due to concerns regarding medication misuse) than could be offered in an office-based practice. Patients were involuntarily discharged if they declined transfer to methadone maintenance after continued illicit opiate use or showed repeated nonadherence with more than 3 OBOT appointments or monitoring requests (ie, supplying urine sample for drug testing or bringing in remaining pills for pill counts). Patients were also discharged if they engaged in disruptive behavior. Patients could request a buprenorphine taper at any time but were encouraged to wait until they had achieved at least 6 months of abstinence and treatment adherence.

PATIENT CHARACTERISTICS AND DATA COLLECTION PROCEDURE

Patient characteristics documented included age; sex; race; employment; history of psychiatric illness; human immunodeficiency virus and hepatitis status; opioid of choice; years of opioid use; history of overdose; other substance use (tobacco, alcohol, cocaine, or benzodiazepines); previous addiction treatment, including history of opioid agonist therapy (ie, methadone or buprenorphine); and current use of illicit buprenorphine. A retrospective clinical medical record review was conducted for all patients admitted to the Boston Medical Center OBOT program from September 1, 2003, through September 30, 2008, with 12-month outcome data continued through September 30, 2009. All data were originally collected by OBOT clinical staff for the purposes of clinical care.

OUTCOME ASSESSMENTS

Treatment Outcomes at 12 Months

Treatment status (ie, successful, unsuccessful, or methadone maintenance transfer) was determined for all patients at 12 months or at program departure, whichever came first. Successful treatment was defined as treatment retention or buprenorphine taper after treatment adherence and absence of illicit drug use for at least 6 months. Treatment retention required patients to demonstrate a consistent pattern of adherence, including physician, nursing, and counseling appointments; monitoring requests (ie, urine drug tests or pill counts); no buprenorphine diversion (ie, accurate pill counts or positive buprenorphine drug test results); and willingness to engage in intensified treatment (eg, increased frequency of NCM visits) when illicit drug use occurred. Unsuccessful treatment included loss to follow-up, involuntary discharge due to continued illicit drug use, treatment nonadherence or disruptive behavior, or voluntary discharge due to adverse effects of buprenorphine. Treatment was considered neither successful nor unsuccessful if patients voluntarily transferred to methadone maintenance treatment for more structured care (eg, observed daily dosing) or for full opioid agonist therapy due to opioid craving while taking maximum doses of buprenorphine. Records were reviewed for the specific date of and reason for discharge from the program. Patients who left the program because of preexisting legal or medical conditions or transferred to another OBOT program because of relocation or consolidation of their care (eg, the same psychiatrist to treat mental illness and opioid addiction) were not included in analyses because treatment discharge was not related to the buprenorphine treatment program.

Illicit Drug Use

Both scheduled and random callback urine drug tests were conducted at least once every 3 months. In each study assessment window (ie, 3, 6, 9, and 12 months), the result of the test performed the closest, yet prior, to the time point was examined. For those patients who missed appointments within the 3-month interval, no urine sample was obtained; consequently, the number of urine samples available at each testing interval was less than the number of patients enrolled in that interval. Patients who were unable to be contacted were still considered enrolled in the program until their 30-day prescriptions ran out. Urine drug tests were mostly unsupervised, but measures were taken to try to minimize falsified tests (eg, testing urine temperature). Urine collections were supervised for patients with a recent abnormal urine test result, including a cold or diluted specimen, and for patients with aberrant behaviors (eg, missed appointments).

Program Activity

The average workload for the program coordinator was determined by tracking inquiries for OBOT treatment. Caseload for NCMs and OBOT physicians was determined by their schedules.

STATISTICAL ANALYSIS

Descriptive statistics (eg, means and proportions) were used to characterize the sample. Exploratory, hypothesis-generating tests were then performed to compare characteristics between patients with successful and unsuccessful treatments at 12 months. The χ^2 or Fisher exact tests (for dichotomous variables) and t tests or Wilcoxon rank sum tests (for continuous variables) were used to assess factors associated with treatment success at 12 months. Characteristics that were significantly associated in bivariate analyses, along with other characteristics deemed clinically important, were entered into a multivariable logistic regression model, with treatment success as the dependent variable. Reported P values are 2-tailed, and $P < .05$ was considered statistically significant. All analyses were run using SAS/STAT software, version 9.1 (SAS Institute Inc, Chicago, Illinois). This research was approved by the institutional review board at Boston University Medical Center.

RESULTS

PATIENT CHARACTERISTICS

In 5 years, 408 patients with opioid dependence were admitted to the OBOT program. Twenty-six patients were excluded from exploratory analysis because they left treatment owing to preexisting legal issues leading to incarceration (n=13) and medical conditions unrelated to their buprenorphine treatment (chronic pain [n=3] and

Table 1. Characteristics of 382 Opioid-Dependent Patients Entering Office-Based Opioid Treatment in Primary Care

Characteristic	Total, No.	Patients, No. (%)[a] Successful Treatment (n=196 [51.3%])	Unsuccessful Treatment (n=162 [42.4%])	Methadone Hydrochloride Transfer (n=24 [6.3%])	*P* Value
Sex					
Male	252	120 (47.6)	117 (46.4)	15 (6.0)	.09
Female	130	76 (58.5)	45 (34.6)	9 (6.9)	
Race					
White	254	146 (57.5)	94 (37.0)	14 (5.5)	.03
Hispanic/Latino	59	20 (33.9)	34 (57.6)	5 (8.5)	
Black/African American	63	27 (42.9)	31 (49.2)	5 (7.9)	
Other/unspecified	6	3 (50.0)	3 (50.0)	0	
Age on admission, mean (SD), y	39 (11)	39 (11)	38 (11)	39 (12)	.29
Employed at time of admission					
Yes	132	84 (63.6)	41 (31.1)	7 (5.3)	.002
No	249	112 (45.0)	120 (48.2)	17 (6.8)	
Data Missing	1		1 (1.06)		
Psychiatric illness (self-reported)					
Yes	252	132 (52.4)	105 (41.7)	15 (6.0)	.82
No	130	64 (49.2)	57 (43.8)	9 (6.9)	
HIV infected (self-reported)					
Yes	57	27 (13.8)	26 (45.6)	4 (7.0)	.94
No	312	162 (82.6)	130 (41.7)	20 (6.4)	
Unknown	13	7 (3.6)	6 (46.2)	0	
Hepatitis C infected (laboratory report)					
Yes	192	90 (45.9)	92 (47.9)	10 (5.2)	.08
No	190	106 (54.1)	70 (36.8)	14 (7.4)	
Opioid use at time of admission					
Heroin	231	105 (45.5)	115 (49.8)	11 (4.8)	<.001
Prescription opioids only	64	41 (64.1)	21 (32.8)	2 (3.1)	
Methadone maintenance treatment	51	29 (56.9)	12 (23.5)	10 (19.6)	
Buprenorphine hydrochloride maintenance treatment	36	21 (58.3)	14 (38.9)	1 (2.8)	
Illicit buprenorphine use at time of admission					
Yes	40	27 (13.8)	9 (22.5)	4 (10.0)	.02
No	342	169 (86.2)	153 (44.7)	20 (5.8)	
Opioid use, median (range), y	12 (1-40)	12 (1-40)	10 (1-40)	14 (1-32)	.65
History of opioid overdose					
Yes	176	82 (41.8)	79 (44.9)	15 (8.5)	.11
No	205	113 (57.6)	83 (40.5)	9 (4.4)	
Data missing	1	1 (0.6)			
Tobacco use at time of admission (past year, self-reported)					
Yes	304	157 (80.1)	131 (43.1)	16 (5.3)	.24
No	77	39 (19.9)	30 (39.0)	8 (10.4)	
Data missing	1	1 (0.5)			
Alcohol use at time of admission (past year, self-reported)					
Yes	180	94 (48.0)	76 (42.2)	10 (5.6)	.84
No	202	102 (52.0)	86 (42.6)	14 (6.9)	
Cocaine use at time of admission (past year, self-reported)					
Yes	165	73 (37.2)	83 (50.3)	9 (5.4)	.02
No	217	123 (62.8)	79 (36.4)	15 (6.9)	
Any past opioid agonist maintenance therapy					
Yes	221	122 (62.2)	84 (38.0)	15 (6.8)	.13
No	161	74 (37.8)	78 (48.4)	9 (5.6)	
Methadone maintenance					
Yes	165	87 (44.4)	63 (38.2)	15 (9.1)	.08
No	217	109 (55.6)	99 (45.6)	9 (4.2)	
Buprenorphine maintenance					
Yes	82	48 (24.5)	31 (37.8)	3 (3.7)	.26
No	300	148 (75.5)	131 (43.7)	21 (7.0)	
Past inpatient detoxification					
Yes	323	157 (80.1)	145 (44.9)	21 (6.5)	.05
No	59	39 (19.9)	17 (28.8)	3 (5.1)	
Past residential treatment					
Yes	194	103 (52.5)	79 (40.7)	12 (6.2)	.77
No	188	93 (47.5)	83 (44.2)	12 (6.4)	

Abbreviation: HIV, human immunodeficiency virus.
[a]Data are presented as number (percentage) of patients unless otherwise indicated. Percentages may not total 100 because of rounding.

Table 2. Treatment Outcomes at 12 Months of 382 Opioid-Dependent Patients Entering Office-Based Opioid Treatment in Primary Care

Outcome	Patients, No. (%)
Successful treatment	196 (51.3)
Treatment retention	187 (49.0)
Successful taper after 6 months of adherence[a]	9 (2.4)
Unsuccessful treatment	162 (42.4)
Lost to follow-up	113 (29.6)
Nonadherence despite enhanced treatment[a]	46 (12.0)
Administrative discharge due to disruptive behavior	2 (0.5)
Adverse effects of buprenorphine hydrochloride	1 (0.3)
Transfer to methadone hydrochloride treatment program	24 (6.3)

[a] Adherence was defined as attending scheduled office-based opioid treatment program appointments, complying with required monitoring (ie, urine drug tests or pill counts), absence of evidence of buprenorphine diversion, and lack of sustained illicit opiate use.

advanced-stage AIDS [n=1]) or transferred to another OBOT program because of relocation or consolidation of their care (n=9), leaving 382 patients. This group, described in **Table 1**, was predominantly male (252 [66.0%]) and white (254 [66.5%]). The mean age was 39 years; 132 (34.6%) were employed at admission. Comorbidities were common; 252 (66.0%) reported psychiatric illness and 192 (50.3%) tested positive for hepatitis C antibody. On admission, patients were using the following: heroin (with or without prescription opioids), 231 (60.5%); prescription opioids exclusively, 64 (16.8%); methadone from a maintenance program, 51 (13.4%); and buprenorphine from another OBOT program, 36 (9.4%). Past-year use of tobacco (304 [79.6%]) and cocaine (165 [43.2%]) was common. A total of 323 (84.6%) reported a history of inpatient detoxification; 221 (57.9%), past opioid agonist maintenance treatment; 40 (10.5%), current use of illicit buprenorphine; and 176 (46.1%), history of opioid overdose.

PATIENT OUTCOMES

Patient outcomes are described in **Table 2**. At 12 months, 196 of the 382 patients (51.3%) showed a successful outcome (187 [49.0%] remained in treatment and 9 [2.4%] were tapered after 6 months of adherence and the absence of illicit drug use), and 162 patients (42.4%) showed an unsuccessful outcome (113 [29.6%] lost to follow-up and 49 [12.8%] discharged). A few patients (24 [6.3%]) had courses of treatment that were considered neither successful nor unsuccessful because those patients voluntarily transferred to methadone maintenance treatment for more structured care or for full opioid agonist therapy.

Patients who achieved successful outcomes were compared with those who had unsuccessful outcomes to determine factors associated with treatment success. In bivariate analyses, treatment success at 12 months was significantly associated with the following characteristics on admission: female sex, white race, being employed, self-maintaining with illicit buprenorphine, prescription opioid abuse or methadone maintenance, and no self-report of past-year cocaine use.

Table 3. Multivariable Logistic Regression for Factors That Influence Treatment Success at 12 Months for 356 Opioid-Dependent Patients Entering Office-Based Opioid Treatment in Primary Care[a]

Characteristic	OR (95% CI)
Sex	
Female	1.65 (0.97-2.81)
Male	1 [Reference]
Race	
African American	0.50 (0.26-0.99)[b]
Hispanic	0.45 (0.22-0.93)[b]
Other	0.37 (0.06-2.22)
White	1 [Reference]
Age, 10-y increase	1.40 (1.09-1.80)[c]
Employed	
Yes	2.24 (1.33-3.77)[c]
No	1 [Reference]
Hepatitis C infected (laboratory report)	
Yes	0.75 (0.43-1.29)
No	1 [Reference]
Opioid use on admission	
Prescribed buprenorphine hydrochloride	1.06 (0.45-2.48)
Methadone hydrochloride maintenance	2.02 (0.87-4.67)
Prescription opioids only	1.01 (0.48-2.12)
Heroin	1 [Reference]
Illicit buprenorphine use at time of admission	
Yes	3.04 (1.32-7.00)[c]
No	1 [Reference]
Cocaine use at time of admission (past year, self-reported)	
Yes	0.71 (0.44-1.15)
No	1 [Reference]
Previous history of detoxification admission	
Yes	0.59 (0.28-1.25)
No	1 [Reference]
Previous history of methadone maintenance treatment	
Yes	1.22 (0.70-2.11)
No	1 [Reference]
Psychiatric illness (self-reported)	
Yes	1.19 (0.72-1.99)
No	1 [Reference]
History of opioid overdose	
Yes	0.97 (0.58-1.63)
No	1 [Reference]

Abbreviations: CI, confidence interval; OR, odds ratio.
[a] Twenty-four patients transferred to methadone maintenance were excluded from this analysis, and data were missing for an additional 2 patients.
[b] $P<.05$.
[c] $P<.01$.

These characteristics, along with factors considered to be clinically important to successful treatment (ie, age, past methadone maintenance treatment, self-reported psychiatric illness, and history of opioid overdose), were entered into a multivariable logistic regression model (**Table 3**). The patients who were transferred to methadone maintenance treatment were excluded from the analysis of treatment success because they could arguably be perceived as having successful or unsuccessful courses of treatment; 358 patients remained. On admission, patients who were older, employed, and self-maintained with illicit buprenorphine had significantly higher odds of treatment success, whereas those of African American or Hispanic/Latino race had significantly lower odds of treatment success. Of patients remaining

Table 4. Urine Drug Tests During 12 Months[a] for Opioid-Dependent Patients Retained in Office-Based Opioid Treatment in Primary Care

Variable	No. (%) of Patients by Month			
	3	6	9	12
Opioids, total[b]				
Tested	263 (100)	220 (100)	189 (100)	169 (100)
Negative	249 (94.7)	207 (94.1)	176 (93.1)	161 (95.3)
Positive	14 (5.3)	13 (5.9)	13 (6.9)	8 (4.7)
Cocaine, total				
Tested	263 (100)	220 (100)	189 (100)	169 (100)
Negative	249 (94.7)	211 (95.9)	180 (95.2)	165 (97.6)
Positive	14 (5.3)	9 (4.1)	9 (4.8)	4 (2.4)

[a] Percentages are derived from how many patients were still enrolled at each time point who had at least 1 test result, using the last test before the time point.
[b] Oxycodone testing started on June 1, 2006.

in treatment at 12 months, 154 of 169 (91.1%) were no longer using illicit opioids or cocaine based on the results of urine drug testing (**Table 4**).

PROGRAM ACTIVITY

On average, the program coordinator received 20 calls per week requesting OBOT. An NCM saw 75 patients per week, and each OBOT physician prescribed to an average of 35 patients (range, 13-68) per month.

COMMENT

This large observational study of OBOT with buprenorphine in an academic medicine practice serves as a treatment model for facilitating access and improving outcomes in patients with opioid addiction. Collaborative care with NCMs resulted in feasible initiation and maintenance of buprenorphine for most patients (51.3%) admitted, which is comparable to previous studies in primary care settings involving smaller numbers of patients with 6- to 12-month follow-up.[9-15]

The collaborative care model ensured program compliance with federal laws[24] (eg, limits to the number of patients treated per OBOT physician) while maintaining access to a large number of patients. OBOT is ideal for collaborative care because much of the clinical work (eg, assessment, medication management, and monitoring) is based on established protocols.[23] Having relevant clinical data (eg, nursing assessments, documentation of treatment adherence, and urine drug test results) before physician visits allowed efficient use of physician time to focus on patient management (eg, dose adjustments and continued maintenance vs taper). In this particular setting, collaborative care allowed academic generalist physicians with research, administrative, and part-time clinical responsibilities to treat a large number of patients, many of whom had complex psychosocial needs. As described, the NCM was central to day-to-day clinical care with daily open access to address the myriad needs (eg, housing, employment, and health insurance) of this complicated population. This model satisfied a key principle of coordinated care by "assuring accessibility, continuity and high quality care that includes effective communication with, education of, and outreach to patients."[25(p404)]

Other important factors may have affected the outcomes of this intervention. Open communication between the NCM and addiction counselors improved patients' ability to comply with this essential element of good addiction care. Access to methadone maintenance allowed the program to safely transfer patients who required a more structured treatment modality.

We identified several preadmission factors associated with treatment success, some of which were consistent with the finding of previous studies and some that were not. Similar to previous reports, patients who were older[12] and employed[11,15] had more successful outcomes. The finding that self-maintaining with illicit buprenorphine on admission predicted success has not been previously published. These patients reported self-treating their opioid addiction with illicit buprenorphine rather than trying to get high. This suggests that these patients were highly motivated to obtain a dependable and health insurance–covered source of buprenorphine and to avoid relying on the illicit market. This finding is similar to that of other studies[26,27] that found that patients who self-treated with illicit methadone were more likely to have positive treatment outcomes. We did not find that cocaine use and psychiatric illness were associated with worse outcomes. This suggests that patients with these co-occurring issues should not be excluded from consideration for office-based treatment. We found that African American or Hispanic/Latino race lowered the odds of treatment success in our program. This finding requires confirmation and further study to better understand the ways that race and clinic structure may affect success in OBOT.

Several limitations of this study should be considered. Although data were collected prospectively using a medical record designed for OBOT patients, the study was retrospective, examining patients from a clinical program. In addition, follow-up information was not available after patient departure from the program. However, of patients who left the program earlier than 12 months, the reasons for leaving (ie, successful or unsuccessful treatment or methadone maintenance treatment transfer) were known. Urine drug test protocols also changed over time: testing for semisynthetic and synthetic opioids was not standardized un-

til June 1, 2006, so early urine results may underestimate prescription opioid abuse. However, once prescription opioid testing began, the rates of positive urine test results for illicit opioids did not change. This study did not have a control group, but this was acceptable because its purpose was not to retest the efficacy of buprenorphine treatment but to evaluate the feasibility of delivering this known effective treatment using a collaborative care model. Lastly, an experienced, skilled NCM played an essential role in caring for patients, and the ability to generalize such a model may depend on skills of such key individuals. However, the issue simply speaks to the need for the training of a nursing workforce with skills in caring for patients with addictions. In an effort to increase nursing involvement in buprenorphine treatment, a federally supported "Guide for Nurses" has recently been developed.[28]

In conclusion, OBOT can be offered effectively in a primary care practice using a collaborative care model. In this model, heavily reliant on NCMs, patient-level outcomes were comparable to those derived from other physician-centered approaches. This study of collaborative care adds to the growing body of evidence that office-based treatment of opioid addiction is feasible in primary care settings.

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