

Feasibility and Safety of Outpatient Parenteral Antimicrobial Therapy in Conjunction With Addiction Treatment for People Who Inject Drugs

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Background. Research is limited on combining outpatient parenteral antimicrobial therapy (OPAT) with addiction treatment for people who inject drugs (PWID) with serious infections.

Methods. This is a retrospective study of PWID (n = 68) requiring intravenous antibiotics evaluated for suitability for our OPAT program with concurrent addiction treatment.

Results. Most common infections were bacteremia and/or endocarditis (73.5%), bone and/or joint infections (32.4%), and epidural abscess (22.1%). Of the 20 patients (29.4%) who qualified, 100.0% completed the course of antibiotics, 30.0% experienced a 30-day readmission, and 15.0% relapsed. No overdoses, deaths, or peripherally inserted central catheter-line complications were reported.

Conclusions. Outpatient parenteral antimicrobial therapy with addiction treatment may be feasible and safe for PWID with serious infections.

Keywords. bacterial infections; injection drug use; opioid use disorder; outpatient parenteral therapy.

As a result of the opioid epidemic, there has been a significant increase in hospitalizations for infectious complications of opioid use disorder (OUD) related to injection drug use (IDU) [1, 2]. Prolonged parenteral antimicrobial therapy is often considered first-line treatment for these types of serious infections and is increasingly delivered outside of the hospital setting with outpatient parenteral antimicrobial therapy (OPAT) [3]. Because durable venous access is required for OPAT, typically using a peripherally inserted central catheter (PICC), there has been considerable concern that people who inject drugs (PWID) would access the PICC line to administer illicit drugs intravenously (IV). As a result, PWID are typically excluded as candidates for OPAT. Although there is a growing body of evidence that suggests outpatient parental antibiotic treatment for PWID may be safe, research on integrating OPAT with addiction treatment for PWID has been limited [4–7].

In April of 2018, our institution launched a pilot program to offer discharge home with OPAT for select individuals with infectious complications of IDU. Eligibility criteria were agreed upon by a multidisciplinary group including representatives from

Infectious Diseases, OPAT Leadership, Addiction Psychiatry, Care Coordination, and Risk Management and are summarized in Table 1. All patients must be evaluated by both the Infectious Disease consult team and the Inpatient Addiction Psychiatry team during admission, and a multidisciplinary decision is made regarding suitability for OPAT. In this study, we report on our first year's experience of this new pilot program.

METHODS

Setting

The retrospective study was conducted at Brigham and Women's Hospital (Boston, MA). The Partners Human Research Committee approved the study. Because this was a retrospective study, patient consent was not required.

Participants

Patients admitted to Brigham and Women's Hospital between April 1, 2018 and March 31, 2019 with any infectious complication of IDU requiring prolonged IV antibiotics were included for chart review. Patients were identified from multiple sources including the inpatient Infectious Disease consult list, the Infectious Disease OPAT registry, and the inpatient Addiction Psychiatry consult database. We identified 113 charts for possible inclusion. After manual review, 45 patients were excluded for not meeting inclusion criteria. Reasons for exclusion were as follows: 16 patients had no active IDU, 16 patients were determined not to need IV antibiotics, 10 patients had infections not related to IDU, 2 patients were not admitted for an infection,

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Table 1. OPAT Eligibility Criteria for PWID

Patients That Have Infectious Complications From Injection Drug Use Must Meet the Following Criteria to Be Considered Eligible for Discharge Home on OPAT

Safe housing, without cohabitants with active substance use disorder, ideally with sober support

Engagement in treatment for addiction including medication for OUD during the admission and continued postdischarge

Patient is not engaging in illicit substance use or violent behavior during latter part of hospitalization once receiving appropriate treatment for substance use disorder

Patient agrees to return to Bridge Clinic (Substance Use Disorder) weekly for intensive monitoring during OPAT

Patient agrees to return for Infectious Disease follow-up appointment as scheduled by the inpatient Infectious Disease consult team

Multidisciplinary assessment of the patient confirms the patient is appropriate for discharge to home on intravenous antibiotics

Abbreviations: OPAT, outpatient parenteral antibiotic therapy; OUD, opioid use disorder; PWID, people who inject drugs.

and 1 patient was transitioned to hospice care. In total, 68 patients met inclusion criteria.

Data Extraction

Chart review was conducted by the authors (C.N.P., D.A.S., J.J., M.M., B.M., and J.S.), and discrepancies were resolved through conference. Extracted data included sociodemographic data, psychiatric and substance use histories, site of infection requiring antibiotics, whether or not patients met OPAT eligibility criteria, and ultimate disposition. For patients discharged on OPAT, additional data were extracted including completion of IV antibiotics, adherence to follow-up visits, PICC line complications, 30-day readmission rate, and relapse to IDU. The number of inpatient and/or rehabilitation days avoided was calculated by determining the number of days between the date of discharge and the date antibiotics were completed and the PICC line was removed.

Analytic Strategy

Descriptive statistics were used to summarize the extracted data. Demographic and clinical variables between those who were and were not discharged on OPAT were compared using χ^2 or Fisher's exact test for categorical variables and Student *t* test for continuous variables.

RESULTS

Sixty-eight individuals were included in the study, with 34 (50.0%) males, mean age of 40.2 (standard deviation = 10.7), and majority (76.5%) of white race (Table 2). Twenty patients met the criteria listed in Table 1 and were discharged home with OPAT. There were no differences in demographics between the 2 groups except patients who did not qualify for home OPAT were more likely to be homeless ($P < .0001$) because stable housing was one of the inclusion criteria (Table 2). These patients either were discharged to a skilled nursing

facility (54.2%), discharged on oral antibiotics (35.4%), or remained in the hospital for their IV antibiotic course (10.4%). Five individuals (14.6%) left the hospital against medical advice and were included among those who were discharged on oral antibiotics. Rates of concurrent infectious comorbidities such as human immunodeficiency virus or hepatitis C infections or concurrent psychiatric comorbidities were no different between both groups (Table 2).

Patients who were discharged home on OPAT were more likely to have already been on medications for opiate use disorder (MOUD) at the time of admission ($P = .043$) and more likely to be initiated or continued on MOUD during the admission ($P = .05$) (Table 2). One patient had developed a serious infection secondary to IV cocaine use, for which there is no US Food and Drug Administration-approved medication treatment. All 20 patients who went home on OPAT completed the recommended course of IV antibiotics. Three (15%) relapsed to IV drug use during OPAT; however, all 3 reported they did not use the PICC line when they relapsed, and this was supported by lack of evidence for line tampering, thrombosis, line infection, or line dislodgement. No deaths or overdoses were reported. Collectively, by discharging these 20 patients home for completion of their IV antibiotics, 570 inpatient or rehabilitation days were avoided.

There was no difference between individuals who went home on OPAT and the comparison group in terms of 30-day readmission rate (30.0% vs 16.7%, $P = .32$) (Table 2). Individuals who were not discharged on OPAT did not have consistent follow-up after discharge, and therefore there is no data on relapse rate, antibiotic completion rate, or PICC line complication rate for this cohort. During chart review, documentation of death was noted in 2 patients' charts who had not gone home with OPAT. One occurred 6 months after discharge from the index admission, and the other occurred 7 months after the admission. No inpatient mortality occurred in either group.

DISCUSSION

The purpose of this pilot study was to examine the safety and feasibility of discharging PWID who met select criteria home with OPAT in conjunction with addiction treatment. There is a growing recognition that hospitalizations for serious infections among PWID are critical opportunities to initiate and engage patients in addiction treatment [8, 9]. Our results suggest that OPAT in conjunction with addiction treatment for PWID may be safe and feasible. All participants who qualified for OPAT completed their recommended course of antibiotics, and no PICC line complications were noted (ie, thrombosis, infection, dislodgement, or evidence of tampering). Although 3 individuals did relapse, they nevertheless successfully completed their recommended antibiotic treatment. Of those who qualified for OPAT, the majority (87%) accepted the treatment, confirming that most patients would indeed prefer the option to be

Table 2. Characteristics and Outcomes of Patients With Infectious Complications From Injection Drug Use^a

Characteristic	Total (n = 68)	OPAT (n = 20)	Excluded From OPAT (n = 48)	PValue
	Mean (SD)	Mean (SD)	Mean (SD)	
Age, years	40.2 (10.7)	39.3 (9.8)	40.5 (11.1)	.66
	n (%)	n (%)	n (%)	
Sex, male	34 (50.0)	9 (45.0)	25 (52.1)	.59
Race				
White	52 (76.5)	16 (80.0)	36 (75.0)	1
Black	13 (19.1)	3 (15.0)	10 (20.8)	
Other	3 (4.4)	1 (5.0)	2 (4.2)	
Ethnicity				
Hispanic	7 (10.3)	3 (15.0)	4 (8.3)	.40
Non-Hispanic	59 (86.8)	16 (80.0)	43 (89.6)	
Missing	2 (2.9)	1 (5.0)	1 (2.1)	
Marital Status				
Single	43 (63.2)	12 (60.0)	31 (64.6)	1
Married/partner	9 (15.0)	3 (15.0)	6 (12.5)	
Separated/divorced	16 (23.5)	5 (25.0)	11 (22.9)	
Home status				
Homeless	25 (36.8)	0	25 (52.1)	<.0001
Domiciled	43 (63.2)	20 (100.0)	23 (47.9)	
Patient Status				
Alive	66 (97.1)	20 (100.0)	46 (95.8)	.55
Deceased	2 (2.9)	0	2 (4.2)	
Lifetime Substance Use				
Lifetime opioid	66 (97.1)	19 (95.0)	47 (97.9)	.50
Lifetime alcohol	21 (30.9)	8 (40.0)	13 (27.1)	.29
Lifetime benzos	14 (20.6)	5 (25.0)	9 (18.8)	.74
Lifetime tobacco	62 (91.2)	18 (90.0)	44 (91.7)	1
Lifetime marijuana	16 (23.5)	8 (40.0)	8 (16.7)	.059
Lifetime cocaine	44 (64.7)	13 (65.0)	31 (64.6)	.97
Lifetime amphetamines	15 (22.1)	3 (15.0)	12 (25.0)	.52
Current Injection Drug Use				
IV opioids	68 (100.0)	20 (100.0)	48 (100.0)	1
IV amphetamine	64 (94.1)	19 (95.0)	45 (93.8)	1
IV amphetamine	6 (8.8)	0	6 (12.5)	.17
IV cocaine	18 (26.5)	4 (20.0)	14 (29.2)	.44
Psychiatric Comorbidities				
Any psychiatric comorbidity	58 (85.3)	19 (95.0)	39 (81.3)	.26
Mood disorder	47 (69.1)	13 (65.0)	34 (70.8)	.64
Anxiety disorder	32 (47.1)	13 (65.0)	19 (39.6)	.056
Posttraumatic stress disorder	15 (22.1)	4 (20.0)	11 (22.9)	1
Infectious Comorbidities				
Hepatitis C	59 (86.8)	15 (75.0)	44 (91.7)	.11
HIV	4 (5.9)	1 (5.0)	3 (6.3)	1
Medication for OUD				
Already on MOUD at admission	19 (27.9)	9 (45.0)	10 (20.8)	.043
Initiated or continued MOUD during admission	57 (86.4)	19 (100.0)	38 (80.9)	.050
Specific MOUD				
Buprenorphine	31 (54.4)	10 (52.6)	21 (55.3)	.57
Methadone	26 (45.6)	9 (47.4)	17 (44.7)	
Infection Type				
Bacteremia/endocarditis	50 (73.5)	13 (65.0)	37 (77.1)	.30
Osteomyelitis/Joint infection	22 (32.4)	6 (30.0)	16 (33.3)	.79
Abscess	15 (22.1)	6 (30.0)	9 (18.8)	.35
Other	11 (16.2)	4 (20.0)	7 (14.6)	.72
Cardiac valve repair	10 (14.7)	1 (5.0)	9 (18.8)	.26
OPAT outcomes (n = 20)				
Antibiotic completion		20 (100.0)		
PICC line complication				

Table 2. Continued

Characteristic	Total (n = 68)	OPAT (n = 20)	Excluded From OPAT (n = 48)	PValue
Relapse to illicit drug use (n = 20)		3 (15.0)		
Discharge Against Medical Advice	7 (10.3)	0	7 (14.6)	.096
30-day readmission	14 (20.6)	6 (30.0)	8 (16.7)	.32
Disposition (n = 48)				
Discharge to rehabilitation			26 (54.2)	
Discharge on oral antibiotics			17 (35.4)	
Completed antibiotics in hospital			5 (10.4)	
Reason to Exclude From OPAT (n = 48)				
Care team did not feel patient was appropriate			25 (52.1)	
Homeless			15 (31.3)	
Patient left AMA			4 (8.3)	
Patient declined OPAT			2 (4.2)	
Patient declined MOUD			1 (2.1)	
Lack of transportation			1 (2.1)	

Abbreviations: AMA, against medical advice; HIV, human immunodeficiency virus; IV, intravenous; MOUD, medication for opioid use disorder; OPAT, outpatient parenteral antimicrobial therapy; OUD, opioid use disorder; PICC, peripherally inserted central catheter; SD, standard deviation.

^a χ^2 or Fisher's exact test for categorical variables and Student *t* test for continuous variables.

discharged home if given the opportunity. Our results are in line with previous studies that demonstrate that OPAT is safe and feasible even among those with history of IDU [4, 10]. However, more research is needed to better understand optimal strategies to provide both infectious disease and addiction treatment to further improve outcomes.

Given our desire to ensure the safety of our patients, entry into the OPAT program had numerous requirements, which may explain that up to two thirds of the possible candidates were excluded. Individuals who qualified for this OPAT program were significantly more likely to be on MOUD at the time of admission, suggesting that out-of-treatment individuals at admission may be a particularly vulnerable population. One third of patients were excluded from OPAT because they were discharged against medical advice or were homeless. Our results therefore suggest that strategies to improve outcomes among PWID with housing insecurity and who are not engaged in care are also critically needed.

Patients who went home on IV antibiotics were followed at our institution's Bridge Clinic (a rapid access, low barrier, multidisciplinary substance use disorder [SUD] clinic) during their outpatient antibiotic treatment. Whenever possible, the addiction and infectious disease treatments occurred simultaneously given that one of our Bridge Clinic physicians (D.A.S.) is also an infectious disease specialist. This highlights the advantage of the interdisciplinary nature of the program, allowing for an integrated approach that minimized patient burden. Buprenorphine was prescribed by the Bridge Clinic provider, whereas patients on methadone received daily doses at a community methadone program. Patients receiving methadone were still encouraged to follow-up in the Bridge Clinic each week; however, many were unable to do so given their daily requirements at the methadone clinic. In either case, patients completed their antibiotic treatment, affirming the importance of providing both medications during and after the inpatient admission.

There are numerous limitations to the study. This was a retrospective study of a small sample at a single institution. All patients in our study were evaluated by our inpatient addiction consultation service, which may limit the ability to generalize our findings to other institutions that do not have such a service. The study was designed to evaluate the safety and feasibility of our pilot program and was only a preliminary study of clinical outcomes. We did not examine outcomes of those individuals who did not qualify for our OPAT program. The included patients almost entirely had a primary OUD, and, as such, our findings may not apply to institutions and programs that treat a higher proportion of patients with primary cocaine or methamphetamine use disorder.

CONCLUSIONS

The results from this retrospective study adds to the growing evidence-base that some PWID can safely engage in OPAT and that concurrent treatment of the underlying SUD is feasible. We believe that simultaneous treatment of the addiction in addition to the acute infection is crucial, and that the SUD treatment should, when possible, be initiated before hospital discharge. More research is needed to study the impact of integrating addiction treatment with OPAT for PWID and, in particular, examine the longitudinal outcomes for both the infection as well as the SUD.

Notes

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