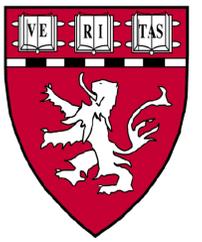




# Outcomes of Outpatient Antibiotic Treatment of Injection Drug Users Discharged with Central Venous Access.



Helen D'Couto, BS<sup>1</sup>, Gregory K. Robbins, MD, MPH, FIDSA<sup>1,2,3</sup>, Kevin Ard, MD<sup>1,2,3</sup>, Sarah Wakeman, MD<sup>3</sup>, Justin Alves, RN<sup>2</sup>, Sandra B. Nelson, MD, FIDSA<sup>1,2,3</sup>

<sup>1</sup>Harvard Medical School, Boston, MA; <sup>2</sup>Division of Infectious Diseases and <sup>3</sup>Department of Medicine, Massachusetts General Hospital, Boston, MA

## Introduction

- Opioid addiction is an increasingly challenging public health problem.<sup>1-2</sup>
- Complicated infections requiring prolonged IV antibiotics are a significant cause of morbidity and mortality among Persons Who Inject Drugs (PWID) and inpatient admissions for these infections are among the costliest complications of injection drug use.<sup>3-4</sup>
- Outpatient parenteral antimicrobial therapy (OPAT) programs are used for out-of-hospital IV antibiotic therapy, saving thousands of healthcare dollars.<sup>5</sup>
- OPAT guidelines do not address treatment options for PWID.
- Data on the safety and efficacy of OPAT vs. alternative models for antibiotic delivery such as prolonged inpatient stays and skilled nursing facility (SNF)/rehabilitation stays do not exist<sup>6</sup>

## Objective

- To describe the outcomes of PWID enrolled into the OPAT program after being discharged from the Massachusetts General Hospital (MGH) to home or to a skilled nursing (SNF)/rehabilitation facility.

## Methods

**Study Design:** Retrospective observational study

**Inclusion Criteria:**

- Admitted to MGH between 1/1/2010 – 12/31/2015 with diagnoses of endocarditis, prosthetic joint infection, septic arthritis, and/or osteomyelitis and diagnosis of substance abuse, drug addiction, substance use disorder, and/or opioid abuse
- MGH OPAT program with planned course of ≥2 weeks of IV antibiotics post-discharge
- Known or highly suspected injection drug use within the 2 years prior to admission
  - Ongoing injection drug use was within the month preceding admission
  - Recent injection drug use was >1-24 months preceding admission

**Data Collected:**

- Demographics (ethnicity, age, sex), index hospitalization, infectious disease diagnosis, and planned antibiotics course
- Injection drug use history- type of drugs, last known use
- Injection drug treatment and planning – engagement of addictions counseling and care, family involvement in discharge planning, IV line risks counseling and patient understanding, and toxicology monitoring
- Outcomes
  - Line complication – infection, thrombosis
  - Loss to follow-up
  - Injection drug relapse
  - Readmission
  - Death
  - Law enforcement involvement

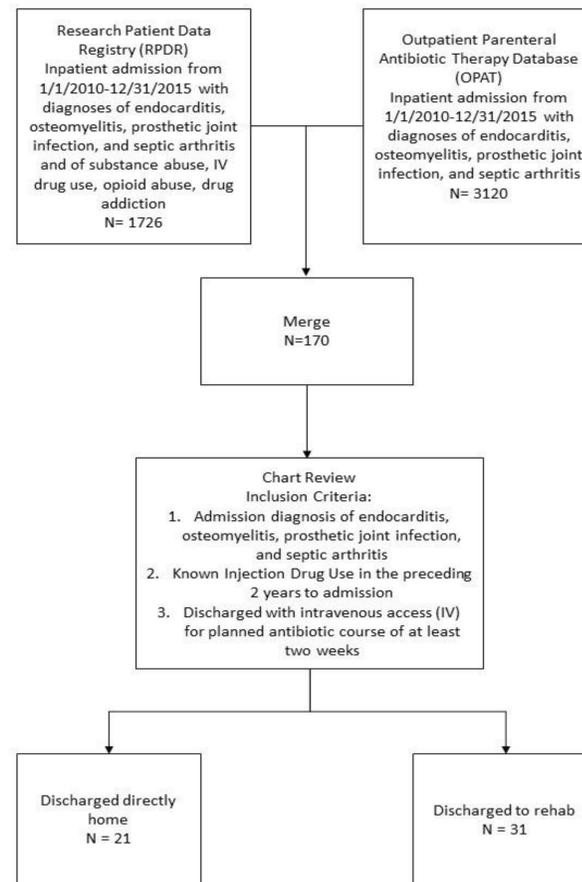
**Statistics:**

- Descriptive statistics of central tendency were used to describe the patient cohorts
- Fisher's exact test was used to compare discharge planning and outcomes of patients discharged to home and to a SNF/rehabilitation facility

## Acknowledgements

Thank you to the Harvard Medical School Center for Primary Care for funding support.

## Results



**Table 1.** Characteristics of Patients Discharged to Home and Rehab

	Discharged to Home (n=21)	Discharged to Rehab (n=31)	p-value (Fisher's Exact Test)
<b>Demographics</b>			
<b>Gender</b>			
Female	6 (29%)	10 (32%)	
Male	15 (71%)	21 (68%)	
<b>Ethnicity</b>			
Black	1 (5%)	0	
Hispanic	0	0	
Asian	0	0	
White	20 (95%)	30 (97%)	
Other/Unknown	0	1 (3%)	
<b>Age (Median, Range)</b>			
	30 (23-51)	33(24-61)	
<b>Injection Drug History</b>			
Ongoing	7 (33%)	21 (68%)	0.01
Within 24 mo.	14 (67%)	10 (32%)	
Opioids	20 (95%)	28 (90%)	
Cocaine	3 (14%)	14 (45%)	
<b>Admission Information</b>			
<b>Diagnosis</b>			
Endocarditis	8 (38%)	6 (19%)	
Osteomyelitis	6 (29%)	13 (42%)	
Prosthetic Joint Infection	1 (5%)	1 (3%)	
Septic Arthritis	5 (24%)	10 (32%)	
Other	3 (14%)	14 (45%)	
<b>Pathogen</b>			
MRSA	3 (14%)	6 (19%)	
MSSA	12 (57%)	16 (52%)	
Other GP	6 (29%)	8 (26%)	
Other GN	2 (10%)	4 (13%)	
Fungal	1 (5%)	0	
<b>Treatment</b>			
Penicillins	11 (52%)	8 (26%)	
Vancomycin	3 (14%)	7 (23%)	
Cephalosporins	7 (33%)	17 (55%)	
Daptomycin	3 (14%)	3 (10%)	
Fluoroquinolones	0	3 (10%)	
Carbapenems	0	1 (3%)	
<b>Substance Abuse</b>			
<b>Treatment</b>			
Medication	12	5	0.00
Counseling	9	5	0.06
Toxicology Monitoring	9	3	0.01
IV risk counseling	5	2	0.10
Family involvement	20	13	<0.01
	8	5	0.11

**Table 2.** Characteristics of PWID Discharged to Home

Patient	Demographics			IDU History		Admission Information					Complications						
	Gender	Age	Ethnicity	Duration of Use	Injection Drug	Diagnosis	Organism	Antibiotics	Substance Abuse Treatment	Toxicology Monitoring	IV Risk Counseling	Family Involvement	Line Complication	IDU Re-Use	Loss to Follow-up	Readmission	Law Enforcement
1	M	37	White	Ongoing	Opioids	Right-sided Endocarditis	GP	Penicillins	Counseling	Yes	Yes	No	N/A	N/A	N/A	N/A	N/A
2	M	33	White	Ongoing	Opioids	Left-sided Endocarditis	GP	Penicillins	Medication, Counseling	Yes	Yes	Yes	No	No	No	No	No
3	M	29	White	Ongoing	Opioids	Spinal hardware infection	MSSA	Cephalosporins	Medication	No	Yes	No	No	No	No	No	No
4	M	25	White	Ongoing	Opioids, Cocaine	Osteomyelitis	MSSA	Penicillins, Cephalosporins	Medication, Counseling	Yes	Yes	Yes	No	No	No	No	No
5	F	23	White	Within 2 yrs	Opioids	Endocarditis	MSSA	Penicillins	No	No	Yes	Yes	No	No	No	No	No
6	M	24	White	Within 2 yrs	Opioids	Right-sided Endocarditis	MSSA	Penicillins	Medication, Counseling	No	Yes	No	Infection	Yes	No	Yes	No
7	M	25	White	Ongoing	Opioids	Right-sided Endocarditis, Septic Arthritis	MSSA	Vancomycin	No	No	Yes	Yes	No	No	No	No	No
8	F	29	White	Ongoing	Opioids	Right-sided Endocarditis	MSSA	Penicillins	Medication, Counseling	Yes	Yes	Yes	No	No	No	No	No
9	M	26	White	Within 2 yrs	Opioids	Left-sided Endocarditis	GP	Penicillins	No	No	Yes	No	No	No	No	No	No
10	M	30	White	Within 2 yrs	Opioids	Septic arthritis	MRSA	Daptomycin	Medication	No	Yes	No	No	No	No	No	No
11	F	51	White	Within 2 yrs	Opioids, Cocaine	Osteomyelitis	MSSA	Vancomycin, Cephalosporin	Medication	Yes	Yes	No	No	No	No	No	No
12	M	32	White	Within 2 yrs	Opioids	Osteomyelitis	GN	Cephalosporins	Medication, Counseling	No	Yes	No	No	Unknown	Yes	Yes	Yes
13	M	41	White	Within 2 yrs	Opioids	Osteomyelitis	MSSA	Cephalosporins	No	No	Yes	No	No	No	No	No	No
14	M	30	White	Within 2 yrs	Cocaine	Osteomyelitis	MSSA, GP, GN	Penicillins	No	No	Yes	No	No	No	No	No	No
15	M	55	White	Within 2 yrs	Opioids	PJI	MRSA	Daptomycin	Medication, Counseling	No	Yes	No	No	No	No	No	No
16	F	50	White	Within 2 yrs	Opioids	Septic arthritis	MSSA	Cephalosporins	No	No	Yes	No	No	No	No	No	No
17	F	46	White	Within 2 yrs	Opioids	Osteomyelitis	MSSA	Daptomycin	Counseling	No	Yes	Yes	No	No	No	No	No
18	M	29	White	Within 2 yrs	Opioids	Septic arthritis	MSSA	Penicillins	No	No	Yes	No	No	No	No	No	No
19	F	33	Black	Within 2 yrs	Opioids	Septic arthritis	MSSA	Cephalosporins	No	No	Yes	Yes	No	No	No	No	No
20	M	29	White	Ongoing	Opioids	Bacteremia of Unknown Source	GP	Penicillins	Counseling	No	Yes	Yes	No	No	No	No	No
21	M	35	White	Within 2 yrs	Opioids	Endocarditis	GP, Fungal	Penicillins, Voriconazole	No	No	Yes	No	No	No	No	Yes	No

**Table 3.** Outcomes of Patients Discharged to Home Versus Rehab

	Discharged to Home (n=21)	Discharged to Rehab (n=31)	p-Value (Fisher's Exact Test)
Line Complications	1	5	0.38
Injection Drug Use	1	5	0.38
Relapse			
Loss to Follow-up	1	4	0.64
Readmission	3	9	0.32
Law Enforcement *	1	1	1.00
Death	1	0	0.40

\*Police were contacted, but were unable to locate the patient

- More patients discharged to home had a documented substance abuse treatment program than those discharged to SNF/rehab: 12 (57%) vs 5 (16%).
- 18 (86%) of patients discharged to home were able to complete OPAT courses without known complications from injection drug use
- 23 (74%) of patients discharged to SNF/Rehab completed OPAT courses without known complications from injection drug use.

**Limitations:**

- Small study size
- Single institution and OPAT program
- Patients discharged to home and to SNF/rehab are intrinsically different groups, as those discharged to rehab may have more severe infections, more co-morbidities, and/or be at a perceived higher risk of relapse

## Conclusions

- Patients discharged to home did not appear to have increased complications compared to those who were discharged to a SNF/rehabilitation facility
- A majority of a patients in both cohorts were able to safely complete planned OPAT courses
- A larger proportion of patients discharged to home had pre-discharge planning to address the risks of injection drug.
- Guidelines to identify potential PWID for safe discharge to home under the OPAT program should be developed.**

**Table 4.** Proposed Guidelines for the Use of OPAT in PWID

Engagement with addictions care  
 Family member or friend who is aware of substance use and agrees to help ensure safety  
 Patient demonstrates understanding of risks and safety concerns  
 Strong consideration for opioid replacement therapy at discretion of addictions care team

## References

- Dart RC, Surratt HL, Cicero TJ, et al. Trends in Opioid Analgesic Abuse and Mortality in the United States. *N Engl J Med.* 2015;372(3):241-248. doi:10.1056/NEJMs1406143.
- Rudd RA, Paulozzi LJ, Bauer MJ, et al. Increases in heroin overdose deaths - 28 States, 2010 to 2012. *MMWR Morb Mortal Wkly Rep.* 2014;63(39):849-854. http://www.ncbi.nlm.nih.gov/pubmed/25275328. Accessed August 27, 2016.
- Bassetti S, Hoffmann M, Bucher HC, Fluckiger U, Battegay M. Infections Requiring Hospitalization of Injection Drug Users Who Participated in an Injection Opiate Maintenance Program. *Clin Infect Dis.* 2002;34(5):711-713. doi:10.1086/338876.
- Scheidegger C, Zimmerli W. Infectious complications in drug addicts: seven-year review of 269 hospitalized narcotics abusers in Switzerland. *Rev Infect Dis.* 11(3):486-493.
- Tice A. Outpatient parenteral antimicrobial therapy as an alternative to hospitalization. *Int J Clin Pract Suppl.* 1998;95:4-8. http://www.ncbi.nlm.nih.gov/pubmed/9796549. Accessed August 28, 2016.
- Tice AD, Rehm SJ, Daloviso JR, et al. Practice Guidelines for Outpatient Parenteral Antimicrobial Therapy. *Clin Infect Dis.* 2004;38(12):1651-1671. doi:10.1086/420939.