

# PICC Your Poison: Resident Beliefs and Attitudes Regarding Discharge Parenteral Antibiotics for Patients Who Inject Drugs

Scott A. Fabricant,<sup>1,6</sup> Erika L. Abramson,<sup>2,3</sup> Kayla Hutchings,<sup>3</sup> Alexis Vien,<sup>4</sup> Matthew Scherer,<sup>5</sup> and Shashi N. Kapadia<sup>3,6</sup>

<sup>1</sup>Department of Medicine, New York–Presbyterian, New York, New York, USA, <sup>2</sup>Department of Pediatrics, Weill Cornell Medicine, New York, New York, USA, <sup>3</sup>Department of Population Health Sciences, Weill Cornell Medicine, New York, New York, USA, <sup>4</sup>Department of Medicine, Weill Cornell Medicine, New York, New York, USA, <sup>5</sup>Division of Infectious Diseases, Columbia University Medical Center, New York, New York, USA, and <sup>6</sup>Division of Infectious Diseases, Weill Cornell Medicine, New York, New York, USA

**Background.** Serious injection-related infections (SIRIs) in people who inject drugs often lead to prolonged hospitalizations or premature discharges. This may be in part due to provider reluctance to place peripherally inserted central catheters (PICCs) for outpatient parenteral antibiotic therapy in this population. Because internal medicine (IM) residents are often frontline providers in academic centers, understanding their perspectives on SIRI care is important to improve outcomes.

**Methods.** We surveyed IM residents in a large urban multicenter hospital system about SIRI care with a novel case-based survey that elicited preferences, comfort, experience, and stigma. The survey was developed using expert review, cognitive interviewing, and pilot testing. Results are reported with descriptive statistics and linear regression.

**Results.** Of 116 respondents (response rate 34%), most (73%) were uncomfortable discharging a patient with active substance use home with a PICC, but comfortable (87%) with discharge to postacute facilities. Many (~40%) endorsed high levels of concern for PICC misuse or secondary line infections, but larger numbers cited concerns about home environment (50%) or loss to follow-up (68%). While overall rates were low, higher stigma was associated with more concerns around PICC use ( $r = -0.3$ ,  $P = .002$ ). A majority (58%) believed hospital policies against PICC use in SIRI may act as a barrier to discharge, and 74% felt initiation of medications for opioid use disorder (MOUD) would increase their comfort discharging with a PICC.

**Conclusions.** Most IM residents endorsed high levels of concern about PICC use for SIRI, related to patient outcomes and perceived institutional barriers, but identified MOUD as a mitigating factor.

**Keywords.** injection-related infections; medical residency; outpatient infusion therapy; stigma; substance use.

Invasive and potentially life-threatening bacterial infections (eg, endovascular or bone infections) are a common and serious complication of injection drug use [1]. These cases, which we refer to as serious injection-related infections (SIRI), often require weeks of parenteral antibiotics. For hospitalized patients requiring prolonged parenteral antibiotics, several interrelated major decisions must be made by the patients and their clinical team—whether to stay in-house for whole duration of therapy or

discharge to complete treatment course; if discharged, whether to a skilled nursing facility or home; and whether they will be discharged with a peripherally inserted central catheter (PICC). However, outpatient parenteral antibiotic therapy (OPAT) strategies are often withheld from patients with a history of drug use, leading to extended lengths of stay [2].

The treatment of SIRI is also influenced by social factors, including the patients' life circumstances, perspectives of the treating providers, and structural responses to drug use [3]. Providers may be concerned that PICC use may be complicated by secondary line infection, or have opposition to outpatient vascular access as a potential facilitator of further drug use [4–6]. These concerns are not limited to prescribers; skilled rehabilitation and nursing facilities, infusion companies, and visiting home nurse companies frequently decline service to people with active or even historical substance use disorders [7, 8], a discriminatory action that has been challenged as in violation of the Americans With Disabilities Act in recent legal settlements [9]. The existence of these barriers, even if not uniformly applied, can have a strong influence on care plans for patients with SIRI. If these barriers result in prolonged inpatient or skilled nursing facility stays, they increase the risk of

Received 13 March 2024; editorial decision 24 June 2024; accepted 26 June 2024; published online 27 June 2024

Correspondence: Scott Fabricant, MD, PhD, Section of Infectious Diseases, Boston University School of Medicine, 725 Albany Street, Suite 9B, Boston, MA 02118 ([scott.fabricant@bmc.org](mailto:scott.fabricant@bmc.org)); Shashi Kapadia, MD, MS, Weill Cornell Division of Infectious Diseases, 525 E 68th St, Box 130, New York, NY 10065 ([shk9078@med.cornell.edu](mailto:shk9078@med.cornell.edu)).

Open Forum Infectious Diseases®

© The Author(s) 2024. Published by Oxford University Press on behalf of Infectious Diseases Society of America. This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs licence (<https://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial reproduction and distribution of the work, in any medium, provided the original work is not altered or transformed in any way, and that the work is properly cited. For commercial re-use, please contact [reprints@oup.com](mailto:reprints@oup.com) for reprints and translation rights for reprints. All other permissions can be obtained through our RightsLink service via the Permissions link on the article page on our site—for further information please contact [journals.permissions@oup.com](mailto:journals.permissions@oup.com).  
<https://doi.org/10.1093/ofid/ofae364>

a premature patient-directed discharge (“against medical advice” [AMA]) and incomplete treatment with its concomitant risks of rehospitalization and death [10, 11]. Because of this, the common wisdom of OPAT being contraindicated or impractical for patients with SIRI is increasingly being challenged by studies [12–16], including a recent prospective randomized trial [17], showing good outcomes and/or outcomes similar to the general population. Additional facilitators such as medications for opioid use disorder (MOUD) including methadone and buprenorphine, and the growth of inpatient addiction medicine consult teams, are likely to improve treatment completion for patients discharged with OPAT [18].

Internal medicine (IM) residents are often the frontline providers for hospitalized patients with SIRI and have a significant influence on shaping their care. What is learned in training may shape practice for years to come, and their role in care for patients with SIRI will only grow as today’s IM residents become tomorrow’s hospitalists, primary care providers, nursing facility providers, and infectious diseases (ID) or addiction specialists. Recent studies have explored resident attitudes toward patients with opioid use disorder (OUD) and MOUD [19–21] and ID clinician attitudes toward OPAT for people who inject drugs (PWID) [4, 22], but to our knowledge this is the first study to explore how residents as the primary hospital providers conceptualize OPAT in this population. It is important to understand how IM residents think and feel about complex discharges for patients with SIRI, because it will highlight knowledge gaps or biases that can be addressed in their training or by consultants. Therefore, we conducted a survey among IM residents at a large academic health system to understand attitudes and beliefs regarding care strategies for patients with SIRI.

## METHODS

We created a case-based survey designed to elicit management preferences, comfort, experience, and stigma (Supplementary Appendix 1). Responses were measured via Likert scales, with most questions having a 5- or 6-point response scale. Respondents were allowed to leave no response for questions. The central vignette of the survey revolves around a man who presents from home with *Staphylococcus aureus* bacteremia, later found to have endocarditis and possible vertebral osteomyelitis. Questions address preferences around patient management and discharge, concerns related to PICC use, perceived barriers to discharge, preferences around MOUD use, and support for proposed systemic interventions. The majority of the survey was designed through focused discussions with experts in ID and addiction medicine. However, our survey also incorporated elements derived from the survey instrument used by Solomon et al and Shuey et al [22, 23]. We also included the Medical Condition Regard Scale (MCRS) from Christison et al [24], a commonly-used instrument for assessing medical

stigma, by substituting the term “opioid use disorder” for “this condition.” The survey instrument was then refined through an iterative process, including expert review from specialists in ID, addiction medicine, and survey design, followed by cognitive interviewing of the draft instrument with 5 members of the target survey population, and finally piloting within a subset ( $n = 15$ ) of the target population, with revisions made at each step. The final survey instrument had 38 items, including the 11-question MCRS.

The survey was administered via online Qualtrics software to IM residents at 3 programs in a multihospital health system in New York City. These programs are independent, with separate residents and faculty, and work at large academic hospitals in 3 demographically distinct regions within the urban core of New York City. Surveys were administered over 4 weeks in April 2023. Responses were anonymous, though respondents were offered the opportunity to submit their email to enter a raffle drawing for a \$100 gift card incentive. Response rates varied considerably between sites (18%–48%), and responses were pooled for increased generalizability.

Results are reported using descriptive statistics. The MCRS (Supplementary Appendix 1, Block 6) was scored as follows: The Likert responses were converted to an ordinal numerical scale of 1–6. Questions where higher numbers were associated with more stigmatizing responses were the default, and questions wherein less stigmatizing answers were higher had their scale inverted. As in Avery et al [19, 25], the score was averaged across the 11 questions. Finally, scores were normalized around the median of 3.5. We created a measure of PICC line-related concern by converting the 5-point Likert scale to an ordinal numerical scale for each of the 6 questions about residents’ concerns with placing PICC lines in patients with SIRI (Supplementary Appendix 1, Block 2), and then totaling the responses, resulting in a score ranging from 6 to 30, with higher numbers representing higher levels of concern. We then performed linear regression to determine associations between the normalized MCRS score and PICC-related concerns. Statistics were performed in R version 4.04 software. The study was approved by the institutional review board of the Biomedical Research Alliance of New York.

## RESULTS

One hundred sixteen residents responded to the survey (response rate of 34%). Respondents were evenly distributed by year of training and gender. There was considerable variance in personal experience with patients with OUD and use of MOUD (Table 1).

Overall, residents were uncomfortable with the idea of sending a patient with active injection drug use home with a PICC (73% [ $n = 85$ ], reporting being very or moderately uncomfortable), while only 13% ( $n = 15$ ) were uncomfortable discharging to a rehabilitation or skilled nursing facility. Several factors

**Table 1. Survey Participant Characteristics**

Characteristic	No. (%)
No. of responses	116
Response rate	34%
Female	53 (46)
Male	63 (54)
PGY1	36 (31)
PGY2	41 (35)
PGY3 or PGY4	39 (34)
Have treated >5 patients with OUD	96 (86)
Have treated >20 patients with OUD	47 (57)
Have never prescribed MOUD	21 (19)
Have prescribed MOUD >5 times	38 (34)
Have prescribed MOUD >10 times	14 (13)

For questions about number of patients treated,  $n = 111$  due to 5 missing responses. Survey question asked respondents about times MOUD was “prescribed”; this was inclusive of both inpatient orders and outpatient prescriptions. Respondents were allowed to omit answers. Abbreviations: MOUD, medication for opioid use disorder; OUD, opioid use disorder; PGY, postgraduate year.

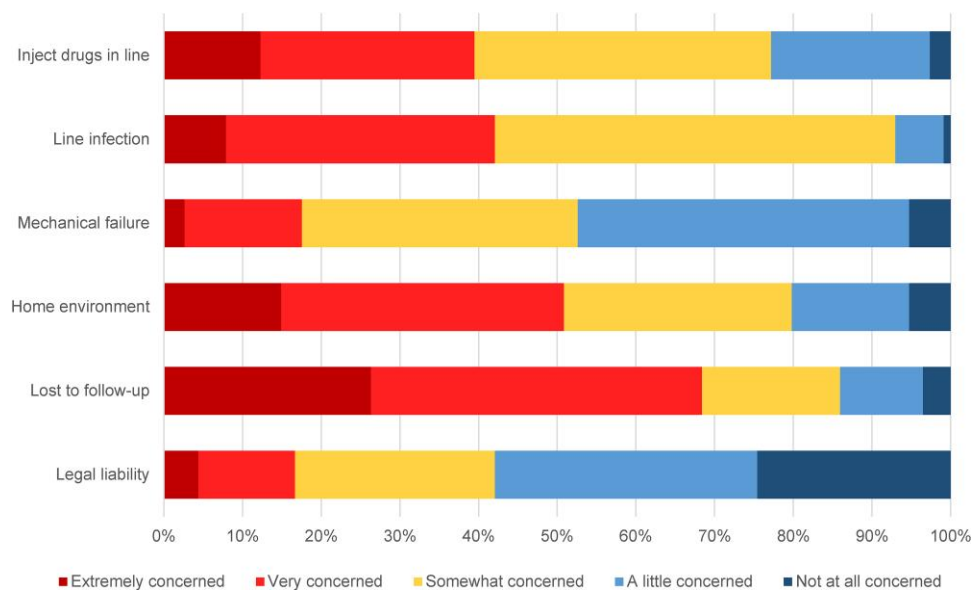
were implicated as concerns around discharging a patient home with a PICC. High levels of concern (answering “very concerned” or “extremely concerned”) were expressed by 68% ( $n = 78$ ) of respondents about this patient being lost to follow-up. About 50% ( $n = 58$ ) were very or extremely concerned that the patient’s home environment may not be conducive to home antibiotics. About 40% ( $n = 45$  and 48) were very or extremely concerned about the patient using the central line to inject drugs or their line getting infected. Much lower numbers of respondents expressed high concern for noninfectious

mechanical failures of the PICC (such as displacement or thrombosis), or legal liability for such adverse outcomes (Figure 1). Sixty percent ( $n = 66$ ) of respondents report it would help “a lot” if ID consult notes for SIRI included contingency oral antibiotic options in case of a premature patient-directed (AMA) discharge.

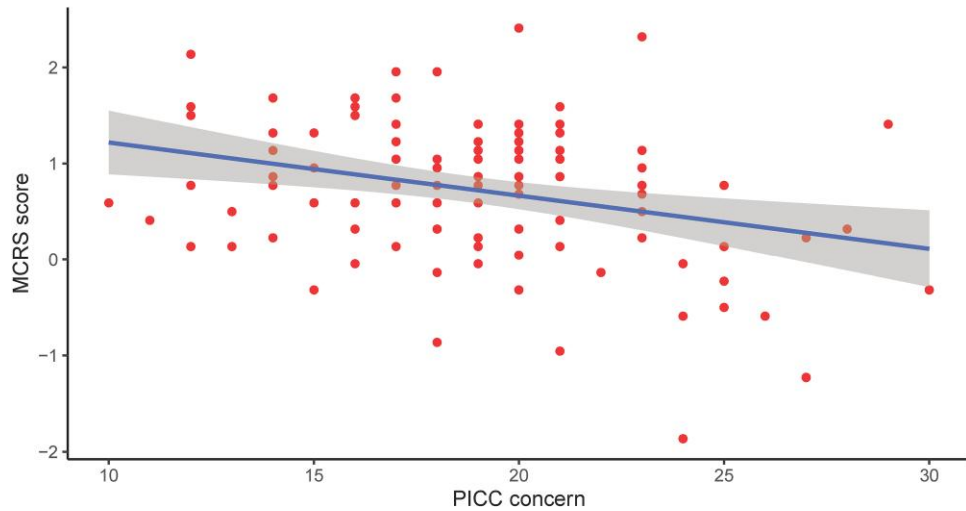
Levels of expressed stigma were generally low; only 14% ( $n = 16$ ) of respondents had MCRS scores below the scale midpoint, meaning they endorsed more negative than positive statements about care for patients with OUD (responses to individual questions in the scale can be found in Supplementary Appendix 2). However, there was a negative correlation between MCRS score and concerns around PICC use, meaning respondents reporting more negative sentiments around patients with OUD were also more likely to express higher overall levels of PICC line-related concern ( $r = -0.30$ ,  $P = .002$ ; Figure 2).

Many residents identified potential barriers to discharging with a PICC. The most cited barrier was hospital institutional policy around PICC use in PWID (58% [ $n = 67$ ]), with institutional barriers at nursing and rehabilitation facilities cited nearly as often (Figure 3). More than half of all respondents ( $n = 59$ ) also cited patient rejection by visiting nursing services as a likely barrier, as well as a third ( $n = 37$ ) citing home infusion companies. A small but sizable minority (29% [ $n = 34$ ]) believed ID consultants would not be amenable to OPAT for this patient population. Few respondents (14% [ $n = 16$ ]) endorsed no anticipated barriers for PICC use in PWID.

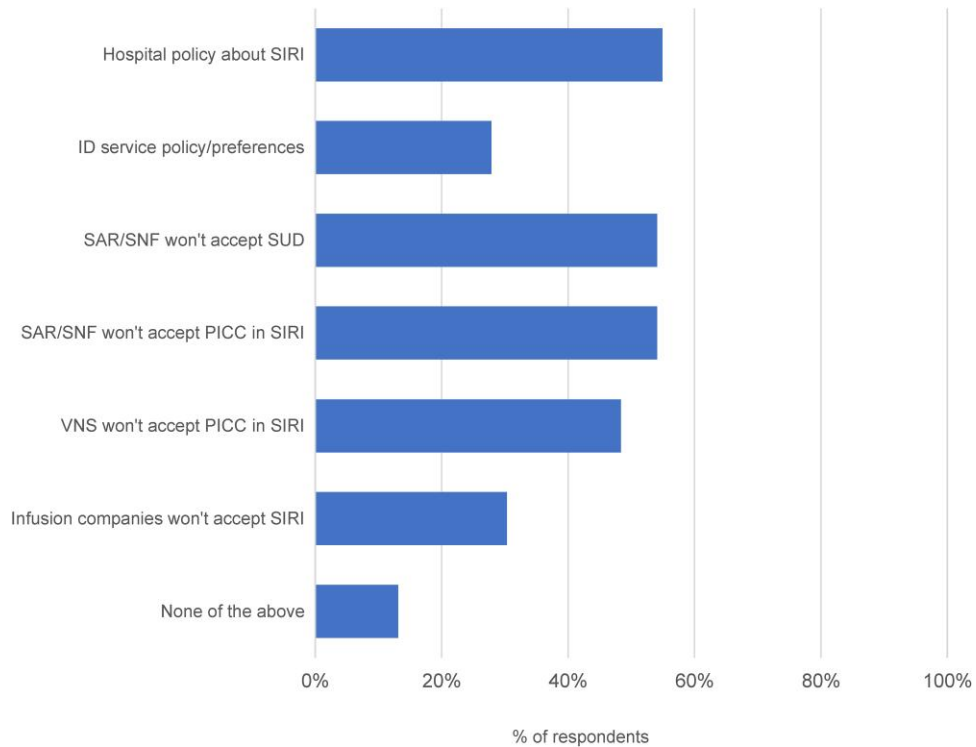
Many residents expressed an interest in initiating MOUD for their patients, with 74% ( $n = 83$ ) of respondents agreeing that it



**Figure 1.** Level of concern for peripherally inserted central catheter (PICC) outcomes. Percentage of respondents who endorsed their level of concern for six possible negative outcomes related to PICC use for a hypothetical patient with serious injection-related infection. Questions were formulated as “How concerned are you about this patient...?”



**Figure 2.** Peripherally inserted central catheter (PICC)-related concerns and Medical Condition Regard Scale scores. Graph of respondents' level of PICC-related concerns (sum total of Likert responses), with higher values indicating more concern, versus normalized stigma score using the Medical Condition Regard Scale (MCRS), with higher values indicating more positive regard (ie, less stigmatizing opinions). Line is linear regression fit; gray area is 95% confidence interval.



**Figure 3.** Anticipated discharge barriers. Percentage of respondents who agreed that a suggested barrier was likely to occur in the process of discharging a patient with serious injection-related infection. Respondents were able to select multiple options or none. Abbreviations: ID, infectious diseases; PICC, peripherally inserted central catheter; SAR/SNF, subacute rehabilitation/skilled nursing facility; SIRI, serious injection-related infection; SUD, substance use disorder; VNS, visiting nurse service.

would increase their comfort discharging with a PICC if their patient started on MOUD while hospitalized. More than two-thirds of respondents endorsed being very or moderately

comfortable starting an opioid agonist such as methadone or buprenorphine on their patient, if they have the assistance of expert consultants. Overall, 71% (n = 79) reported being

comfortable with the use of buprenorphine and 69% (n = 77) with methadone; naltrexone was relatively less popular with 46% (n = 52) reporting being comfortable starting it. Seventy percent (n = 77) said it would help “a lot” to have further training in MOUD. However, several barriers to MOUD were identified including provider inexperience, difficulty connecting to outpatient providers, and especially difficulty connecting newly initiated patients to methadone treatment facilities.

Responses related to residents’ preferences for other aspects of clinical management, as well as PICC placement in the setting of noninjecting drug use, are also reported in [Supplementary Appendix 2](#).

## DISCUSSION

Residents at a large urban academic health system expressed high levels of discomfort sending a patient who injects drugs home with a PICC line, and expressed many concerns related to PICC-specific and general treatment outcomes. However, residents also were broadly supportive of patients with OUD (as measured by the MCRS), and there were high levels of enthusiasm for the use of medications for OUD as a way to improve treatment outcomes.

Several concerns were frequently cited by residents, including patients accessing their central line to inject drugs. Several studies have shown this to be an uncommon practice [12, 26, 27]. Recent studies have sought to devise tools to help select patients at lower risk of negative outcomes related to PICC use [28, 29], and dissemination of these findings may help raise levels of provider comfort. Another frequently cited concern was loss to follow-up if discharged with OPAT, though recent studies suggest high levels of treatment completion in this population [14, 16].

Most respondents also believed the patient in the vignette had a home environment not conducive to OPAT, although the vignette did not describe any specific features of that environment. It is true that people with substance use issues have higher-than-average rates of unstable or congregate housing [30], and it is important that residents consider nuances of a patient’s home situation that may affect OPAT, such as the ability to maintain PICC cleanliness or safe storage of medication, when formulating safe discharge plans. However, defaulting to negative assumptions about housing situation may also be an expression of learned stigmatizing beliefs. Though the MCRS has been shown as an effective tool to assess stigma in residents against patients with OUD [25, 31], these negative assumptions about home environment as well as high levels of concern around loss to follow-up likely reflect beliefs about socioeconomic status and adherence to care that are not well captured by the MCRS. While most respondents expressed predominantly positive feelings toward patients with OUD, the correlation between stigmatizing views and greater levels

of concern for bad outcomes suggests medical stigma may still be playing a role in how a subset of physicians approach complex discharges in SIRI.

One notable finding was the high number of respondents who identified hospital policy as a likely barrier to discharge with a PICC for SIRI, despite the lack of a specific policy at the hospitals included in the survey. Discharge planning is left to the discretion of providers, and focused education around this issue, perhaps by ID or addiction medicine consultants in the context of applicable cases, may be helpful to promote PICC use as a viable discharge option in selected patients. Respondents also noted that rehabilitation, nursing facility, and home nursing institutional policies are also likely to be barriers. Post-acute facilities do frequently reject patients with active or even historical drug use [8]; recently there have been attempts to file lawsuits against rehabilitation facilities for violating the Americans With Disabilities Act and discriminating against patients on MOUD [9], though the practice persists. Without specific training on this subject for residents, beliefs about barriers are likely culturally transmitted either attending to resident or resident to resident within institutions.

Respondents were broadly comfortable with patients being discharged to a subacute rehabilitation/skilled nursing facility to complete antibiotic therapy—if an accepting facility can be identified—but it is worth considering if this confidence is fully warranted. Premature discharge from post-acute facilities before antibiotic completion is relatively common [32], and for patients not already linked to a methadone clinic, it is near-impossible to continue methadone-based MOUD at a subacute rehabilitation/skilled nursing facility [33]. Further awareness of patient outcomes in the post-acute setting may shift how resident providers feel about various discharge options.

The key role of MOUD as a part of comprehensive treatment of opioid-related SIRI is highlighted in recent guidance from the American Heart Association on the treatment of endocarditis [29]. Initiation of MOUD in the acute setting for patients with SIRI appears to improve rates of successfully completed treatment and reduces rehospitalization [34–36], and in concert with other interdisciplinary efforts may increase the rate of discharge with a PICC [18]. There were high levels of interest in utilizing MOUD for patients with opioid-related SIRI, and notably nearly two-thirds of respondents reported that starting MOUD would increase their comfort discharging SIRI patients home with a PICC. However, MOUD remains underused, with ample opportunity to increase training for hospital-based providers [23, 37], and many hospitals do not currently have addiction medicine or addiction psychiatry consultation services [38]. Data continue to accumulate on the considerable benefits of interprofessional collaborations to improve care of SIRI, with various new collaborative models emerging involving ID, addiction medicine, and other relevant providers such as surgical services [39–43]. Closer collaboration between ID



and addiction services is likely to promote PICC use and successful discharge for selected patients, which benefits both patients and hospitals.

This study had several limitations. Though multisite, it was still limited to one hospital system in one city, with a modest response rate and sample size, which precluded intersite comparisons. Future studies would benefit from both a numerically and geographically larger sample to allow exploration of variation in practices. The MCRS, while having strong validity evidence and use in many studies, may still be vulnerable to social desirability bias. Despite this, a significant correlation found between stigmatizing views endorsed and concerns about PICC use for this population suggests that meaningful information is being captured by the MCRS despite the risk of bias. Another limitation is that residents are likely not well-versed in the specifics of OPAT and what is required of patients and the healthcare team, and this lack of understanding could have affected survey responses, especially regarding home environment. Further training on OPAT would be beneficial for the care of all patients on prolonged intravenous antibiotics, SIRI or otherwise.

In conclusion, this study suggests that while there are still barriers, both concrete and perceived, to broader acceptability of home discharge with a PICC for PWID with SIRI, there is also reason for optimism. Levels of expressed stigma were generally low, and many of the identified barriers could be addressed with focused educational interventions. ID providers in academic centers may be able to take a more active role in educating their consulting teams around these issues and, in partnership with their addiction medicine colleagues, improve patient-centered outcomes for infections in this vulnerable patient population.

### Supplementary Data

Supplementary materials are available at *Open Forum Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

### Notes

**Acknowledgments.** We thank Dr Kara Ryan for thoughtful discussions around the creation of this manuscript. We are also grateful to the program directors, program coordinators, chief residents, and members of participating residencies for their support, participation, and assistance in survey design, pilot testing, and recruitment.

**Patient consent.** Our study does not include factors necessitating patient consent.

**Disclaimer.** This work reflects the views of the authors and does not necessarily reflect the views of the funding agencies or US government.

**Financial support.** This work was supported by the National Institute on Drug Abuse (grant numbers R01 DA057940 and K01 DA048172) and by the Dalio Center for Health Justice at New York–Presbyterian.

**Potential conflicts of interest.** All authors: No reported conflicts.

### References

- Gomes T, Kitchen SA, Tailor L, et al. Trends in hospitalizations for serious infections among people with opioid use disorder in Ontario, Canada. *J Addict Med* 2022; 16:433–9.
- Ceniceros AG, Shridhar N, Fazzari M, Felsen U, Fox AD. Low use of outpatient parenteral antimicrobial therapy for drug use–associated infective endocarditis in an urban hospital system. *Open Forum Infect Dis* 2021; 8:ofab083.
- Bearnot B, Mitton JA, Hayden M, Park ER. Experiences of care among individuals with opioid use disorder–associated endocarditis and their healthcare providers: results from a qualitative study. *J Subst Abuse Treat* 2019; 102:16–22.
- Fanucchi L, Leedy N, Li J, Thornton AC. Perceptions and practices of physicians regarding outpatient parenteral antibiotic therapy in persons who inject drugs. *J Hosp Med* 2016; 11:581–2.
- Guta A, Perri M, Strike C, Gagnon M, Carusone SC. “With a PICC line, you never miss”: the role of peripherally inserted central catheters in hospital care for people living with HIV/HCV who use drugs. *Int J Drug Policy* 2021; 96:103438.
- Moore N, Kohut M, Stoddard H, et al. Health care professional perspectives on discharging hospitalized patients with injection drug use–associated infections. *Ther Adv Infect Dis* 2022; 9:20499361221126868.
- Wakeman SE, Rich JD. Barriers to post-acute care for patients on opioid agonist therapy; an example of systematic stigmatization of addiction. *J Gen Intern Med* 2017; 32:17–9.
- Jawa R, Rozansky H, Clemens D, Fagan M, Walley AY. Rethinking home-based outpatient parenteral antibiotic therapy for persons who inject drugs: an opportunity for change in the time of COVID-19. *J Addict Med* 2022; 16:e70–2.
- Kimmel SD, Rosenmoss S, Bearnot B, LaRoche M, Walley AY. Rejection of patients with opioid use disorder referred for post-acute medical care before and after an anti-discrimination settlement in Massachusetts. *J Addict Med* 2021; 15: 20–6.
- Ashraf B, Hoff E, Brown LS, et al. Health care utilization patterns for patients with a history of substance use requiring OPAT. *Open Forum Infect Dis* 2021; 8: ofab540.
- Hrycko A, Mateu-Gelabert P, Ciervo C, Linn-Walton R, Eckhardt B. Factors associated with severe bacterial infections in people who inject drugs: a single-center observational study. *J Addict Med* 2023; 17:e202–5.
- Appa A, Barocas JA. Can I safely discharge a patient with a substance use disorder home with a peripherally inserted central catheter? *NEJM Evid* 2022; 1: EVIDcon2100012.
- Cortes-Penfield N, Cawcutt K, Alexander BT, Karre VMM, Balasnovaa AA. A proposal for addiction and infectious diseases specialist collaboration to improve care for patients with opioid use disorder and injection drug use associated infective endocarditis. *J Addict Med* 2022; 16:392–5.
- D’Couto HT, Robbins GK, Ard KL, Wakeman SE, Alves J, Nelson SB. Outcomes according to discharge location for persons who inject drugs receiving outpatient parenteral antimicrobial therapy. *Open Forum Infect Dis* 2018; 5:ofy056.
- Hurley H, Sikka M, Jenkins T, Cari EV, Thornton A. Outpatient antimicrobial treatment for people who inject drugs. *Infect Dis Clin North Am* 2020; 34:525–38.
- O’Callaghan K, Tapp S, Hajkovicz K, Legg A, McCarthy KL. Outcomes of patients with a history of injecting drug use and receipt of outpatient antimicrobial therapy. *Eur J Clin Microbiol Infect Dis* 2019; 38:575–80.
- Fanucchi LC, Walsh SL, Thornton AC, Nuzzo PA, Lofwall MR. Outpatient parenteral antimicrobial therapy plus buprenorphine for opioid use disorder and severe injection-related infections. *Clin Infect Dis* 2020; 70:1226–9.
- Kershaw C, Lurie JD, Brackett C, et al. Improving care for individuals with serious infections who inject drugs. *Ther Adv Infect Dis* 2022; 9:20499361221142476.
- Avery J, Han BH, Zerbo E, et al. Changes in psychiatry residents’ attitudes towards individuals with substance use disorders over the course of residency training. *Am J Addict* 2017; 26:75–9.
- Boggiano V, Gilmore Wilson C, Fagan EB, Kirk J, Bossenbroek-Fedoriw K, TakCR. The impact on future prescribing patterns of opioid use disorder (OUD) education and waiver provision during residency. *J Am Board Fam Med* 2020; 33:998–1003.
- Robles M, Mortazavi L, Vannerson J, Matthias MS. How a medication for opioid use disorder curriculum translates into experiences and internal medicine residents’ understanding of patients with opioid use disorder. *Teach Learn Med* 2022; 34:514–21.
- Solomon DA, Beiler AM, Levy S, et al. Perspectives on the use of outpatient parenteral antibiotic therapy for people who inject drugs: results from an online survey of infectious diseases clinicians. *Open Forum Infect Dis* 2023; 10:ofad372.
- Shuey B, Lee D, Ugalde I, et al. Evaluation of resident physicians’ knowledge of and attitudes towards prescribing buprenorphine for patients with opioid use disorder. *J Addict Med* 2021; 15:219–25.
- Christison GW, Haviland MG, Riggs ML. The Medical Condition Regard Scale: measuring reactions to diagnoses. *Acad Med* 2002; 77:257–62.
- Avery J, Knoepfelmacher D, Mauer E, et al. Improvement in residents’ attitudes toward individuals with substance use disorders following an online training module on stigma. *HSS J* 2019; 15:31–6.

26. Morales Y, Smyth E, Zubiago J, Bearnot B, Wurcel AG. "They just assume that we're all going to do the wrong thing with it. It's just not true": stakeholder perspectives about peripherally inserted central catheters in people who inject drugs. *Open Forum Infect Dis* **2022**; 9:ofac364.
27. Suzuki J, Johnson J, Montgomery M, Hayden M, Price C. Outpatient parenteral antimicrobial therapy among people who inject drugs: a review of the literature. *Open Forum Infect Dis* **2018**; 5:ofy194.
28. Eaton EF, Mathews RE, Lane PS, et al. A 9-point risk assessment for patients who inject drugs and require intravenous antibiotics: focusing inpatient resources on patients at greatest risk of ongoing drug use. *Clin Infect Dis* **2019**; 68:1041–3.
29. Baddour LM, Weimer MB, Wurcel AG, et al. Management of infective endocarditis in people who inject drugs: a scientific statement from the American Heart Association. *Circulation* **2022**; 146:e187–201.
30. Snyder ECR, Boucher LM, Bayoumi AM, et al. A cross-sectional study of factors associated with unstable housing among marginalized people who use drugs in Ottawa, Canada. *PLoS One* **2021**; 16:e0253923.
31. Ducray K, Pilch M. Health student regard for substance-using patients as measured by the Medical Condition Regard Scale: a systematic review. *Ir J Psychol Med* **2017**; 34:183–96.
32. Dhanani M, Goodrich C, Weinberg J, Acuna-Villaorduna C, Barlam TF. Antibiotic therapy completion for injection drug use-associated infective endocarditis at a center with routine addiction medicine consultation: a retrospective cohort study. *BMC Infect Dis* **2022**; 22:128.
33. Pytell JD, Sharfstein JM, Olsen Y. Facilitating methadone use in hospitals and skilled nursing facilities. *JAMA Intern Med* **2020**; 180:7–8.
34. Barocas JA, Gai MJ, Amuchi B, Jawa R, Linas BP. Impact of medications for opioid use disorder among persons hospitalized for drug use-associated skin and soft tissue infections. *Drug Alcohol Depend* **2020**; 215:108207.
35. Marks LR, Munigala S, Warren DK, et al. A comparison of medication for opioid use disorder treatment strategies for persons who inject drugs with invasive bacterial and fungal infections. *J Infect Dis* **2020**; 222:S513–20.
36. Nolan NS, Marks LR, Liang SY, Durkin MJ. Medications for opioid use disorder associated with less against medical advice discharge among persons who inject drugs hospitalized with an invasive infection. *J Addict Med* **2021**; 15:155–8.
37. Jakubowski A, Singh-Tan S, Torres-Lockhart K, et al. Hospital-based clinicians lack knowledge and comfort in initiating medications for opioid use disorder: opportunities for training innovation. *Addict Sci Clin Pract* **2023**; 18:31.
38. Englander H, Davis CS. Hospital standards of care for people with substance use disorder. *N Engl J Med* **2022**; 387:672–5.
39. Beielor AM, Klein JW, Bhatraju E, Iles-Shih M, Enzian L, Dhanireddy S. Evaluation of bundled interventions for patients with opioid use disorder experiencing homelessness receiving extended antibiotics for severe infection. *Open Forum Infect Dis* **2021**; 8:ofab285.
40. Paras ML, Wolfe SB, Bearnot B, et al. Multidisciplinary team approach to confront the challenge of drug use-associated infective endocarditis. *J Thorac Cardiovasc Surg* **2023**; 166:457–64.e1.
41. Serota DP, Tookes HE, Hervera B, et al. Harm reduction for the treatment of patients with severe injection-related infections: description of the Jackson SIRI team. *Ann Med* **2021**; 53:1960–8.
42. Sikka MK, Gore S, Vega T, Strnad L, Gregg J, Englander H. "OPTIONS-DC", a feasible discharge planning conference to expand infection treatment options for people with substance use disorder. *BMC Infect Dis* **2021**; 21:772.
43. Thakarak K, Kohut M, Stoddard H, et al. 'I feel like they're actually listening to me': a pilot study of a hospital discharge decision-making conversation guide for patients with injection drug use-associated infections. *Ther Adv Infect Dis* **2023**; 10:20499361231165108.