Open Forum Infectious Diseases

MAJOR ARTICLE

Antimicrobial Stewardship Practices in Outpatient Parenteral Antimicrobial Therapy Programs in the United States

Sara F. Azimi,[1] Esther Golnabi,[2] Ryan P. Mynatt,[3] Donna Burgess,[3] Ashley Logan,[3] Rebekah H. Wrenn,[4] Michael Parisi Mercado,[5] Kimberly Boeser,[6] Ardath Plauche,[7] Mary Elizabeth Sexton,[8] and Carla Walraven[1]

[1]Department of Pharmacy, University of New Mexico Hospitals, Albuquerque, New Mexico, USA, [2]Pharmacy Department, University of Texas Southwestern Medical Center, Dallas, Texas, USA, [3]Department of Pharmacy Services, University of Kentucky HealthCare, Lexington, Kentucky, USA, [4]Department of Pharmacy, Duke Center for Antimicrobial Stewardship and Infection Prevention, Durham, North Carolina, USA, [5]Department of Pharmacy, The Ohio State University Wexner Medical Center, Columbus, Ohio, USA, [6]Department of Pharmacy, M Health Fairview University of Minnesota Medical Center, Minneapolis, Minnesota, USA, [7]Department of Pharmacy, Memorial Hermann Health System, Houston, Texas, USA, and [8]Division of Infectious Diseases, Emory University School of Medicine, Atlanta, Georgia, USA

Background. Outpatient parenteral antimicrobial therapy (OPAT) regimens typically prioritize ease of antimicrobial administration, tolerability, safety, and accessibility over using the narrowest-spectrum antimicrobial. In light of this, OPAT providers often utilize different techniques to promote antimicrobial stewardship (AMS) in their OPAT programs. This study aims to characterize the AMS practices of OPAT programs across the United States that might meet The Joint Commission requirements for outpatient AMS metrics.

Methods. This is a cross-sectional electronic survey of the Vizient AMS network. A total of 95 possible questions were designed to inquire about demographics, OPAT program structure, AMS initiatives, performance metrics, and resources.

Results. Seventy-four survey responses were received, with 58 (78.4%) of the respondents indicating their institution offered OPAT services. Respondents reported having at least 1 AMS protocol and tracking at least 1 metric in 91% and 74% of OPAT programs, respectively. Only 40% of programs reported billing for OPAT-related services. Approximately 45% of respondents disagreed or strongly disagreed that their OPAT program had the resources needed to care for the population it serves. Respondents identified data analytics (69%), funding for expansion of services (67%), and pharmacists (62%) as resources of greatest need for their OPAT programs.

Conclusions. This survey collectively describes the AMS practices currently employed by OPAT programs across the United States. The results provide specific examples of AMS initiatives, metrics, and resources that institutions may reference to advance the practices of their OPAT programs to meet The Joint Commission Outpatient Antimicrobial Stewardship standards.

Keywords. Antimicrobial stewardship; Joint Commission; OPAT; Survey; Metrics.

Outpatient parenteral antimicrobial therapy (OPAT) is the administration of intravenous (IV) antimicrobial therapy on at least 2 separate days in the outpatient setting [1]. An estimated 250 000 patients are treated through OPAT in the United States (US) each year [1]. For decades, the healthcare system has utilized OPAT as a patient-centered tool that reduces length of hospitalization, hospital-associated complications, and cost.

To optimize feasibility, OPAT regimens typically prioritize ease of antimicrobial administration, tolerability, safety, and accessibility for patients over using the narrowest-spectrum antimicrobial [2, 3]. This may run counter to acute care antimicrobial stewardship (AMS) principles, which often prioritize de-escalation to the antimicrobial with the narrowest spectrum of activity. In light of this dilemma, other strategies are utilized to promote AMS in OPAT programs. Such strategies include implementation of treatment pathways and IV to oral transition protocols, enhancement of metric tracking, and expansion of resources within a multidisciplinary OPAT healthcare team [1–3]. Unfortunately, a lack of resources and standardization among OPAT programs may pose a barrier to implementing these AMS efforts.

Previous surveys of OPAT programs in the US have largely focused on OPAT structure as well as individual OPAT provider experiences and practices [4–8]. Collective information elucidating how OPAT programs incorporate AMS into their

Received 13 April 2024; editorial decision 12 June 2024; accepted 21 June 2024; published online 26 June 2024

Correspondence: Sara F. Azimi, PharmD, Department of Pharmacy, University of New Mexico Hospital, 2211 Lomas Blvd NE, Albuquerque, NM 87106 (saazimi4@gmail.com); Carla Walraven, MS, PharmD, BCIDP, Department of Pharmacy, University of New Mexico Hospital, 2211 Lomas Blvd NE, Albuquerque, NM 87106 (cwalraven@salud.unm.edu).

Open Forum Infectious Diseases®

https://doi.org/10.1093/ofid/ofae347

practice is lacking. The objective of this survey is to characterize AMS practices of US OPAT programs, particularly with regard to stewardship initiatives, metrics, and resources.

METHODS

This was a cross-sectional electronic survey of the Vizient network describing its current AMS practices in US OPAT programs. Vizient Inc is the third-largest healthcare management consulting firm, servicing 97% of academic medical centers and >50% of acute care health systems in the US. Ninety-five potential questions were designed to inquire about OPAT demographics, program structure, AMS initiatives, metrics, and resources (Supplementary Material). This survey was emailed to the Vizient Pharmacy Network and Antimicrobial Stewardship listservs, regardless of institutional presence of an OPAT program. In total, 4322 members representing up to 667 organizations across the nation were contacted. Of note, the number of individual OPAT programs represented is unknown. Email recipients were asked to have 1 representative per institutional OPAT program complete the survey. Survey responses were collected from 16 November 2023 to 19 January 2024 with 3 email reminders sent during this period. Survey responses were documented within the Research Electronic Data Capture system (REDCap; Vanderbilt University). Incomplete surveys were excluded. Survey respondents were prompted to end the survey once they indicated that their institution did not offer OPAT services, though these responses were still recorded. Descriptive statistics were performed on data from completed surveys using SPSS software (version 19; Chicago, Illinois). This study was reviewed and approved by the Institutional Review Board (New Mexico site).

RESULTS

From the 667 organizations contacted, a total of 74 surveys were completed (11.1%). Of the completed surveys, 58 respondents (78.4%) indicated that their institution offered OPAT services. Responses were received from across all regions of the US (Table 1), with the highest portion of respondents representing institutions in the Southern geographic region (46.6%). The majority of OPAT programs serviced >1 institution with most being academic medical centers (77.6%) or community hospitals (32.8%). The number of acute care beds serviced by OPAT programs associated with multiple institutions ranged from 251 to 2000 beds. Among OPAT programs associated with a single institution, 13 (48%) serviced >500 acute care beds.

OPAT programs varied in age, with most programs in operation for 5–10 years (37.9%) (Table 1). All programs monitored adult patients, with 21% also monitoring a pediatric patient population. Other patient populations monitored via OPAT programs included those requiring hemodialysis (90%), those who were uninsured or underinsured (81%), or those with cancer (81%). Among the 47 (81%) programs that reported managing patients with remote histories of injection drug use, 6 programs had criteria for what defined remote history. Remote IV drug use was often defined as drug use that occurred longer than 6–12 months ago. Among the 40 (69%) programs that reported managing patients who actively inject drugs, 12 programs permitted these patients to administer IV antimicrobials with home health or to self-infuse at home.

Twenty-one (36.2%) OPAT programs managed an average of 51–100 patients weekly (Table 1). The majority of programs received OPAT referrals from inpatient (91.4%) or outpatient (70.7%) infectious diseases (ID) consultants, with 43 (74.1%) programs requiring ID consultation prior to initiation of OPAT. Forty-two (72.4%) OPAT teams assumed care after inpatient discharge. Almost all programs (93.1%) had at least 1 OPAT team member with ID training, which were most often physicians (92.6%) or pharmacists (72.2%).

AMS initiatives varied among survey respondents. Almost all (91%) OPAT programs had at least 1 AMS protocol, with the most common among these being therapeutic drug monitoring (eg, serum vancomycin and aminoglycoside levels) (90.6%), laboratory monitoring (84.9%), and antimicrobial dose adjustment protocols (75.5%) (Table 2). Thirty-one (53.4%) programs reconcile OPAT orders prior to inpatient discharge, with most orders being reviewed by pharmacists. Only 3 (5.9%) programs reported that modification of OPAT orders were not permitted at their institution. Telehealth appointments or consultations were offered by 43 (74.1%) OPAT programs. Thirty-two (55.2%) programs continue to follow OPAT patients who transitioned from IV to oral antimicrobials, and 28 (42.3%) programs monitor patients prescribed prolonged durations (≥2 weeks) of oral antimicrobials.

AMS metrics were tracked by 43 (74.1%) OPAT programs (Table 3). The most common metrics tracked included adverse events (81.4%), unscheduled hospital readmissions or emergency department visits (58.1%), and duration of antimicrobial therapy (51.2%). Respondents largely reported that metric data are pulled manually by OPAT pharmacists or physicians. On average, programs spent 3.5 ± 3.3 hours per week tabulating and analyzing metrics. Metrics were reported to leadership among 38 (88.4%) of the programs that track them, most frequently to department leadership or the institutional AMS Committee. A minority of programs reported metrics to the institutional Pharmacy and Therapeutics Committee, institution chiefs, or other leadership departments (specified by respondents as "Quality and Safety" or "Home Infusion Leadership Team"). Metrics were most often reported to leadership on a quarterly or annual basis.

Forty-six (79.3%) respondents indicated that their institution had a formal OPAT team (Table 4). Established OPAT teams commonly included nurses (58.6%) with a median full-time equivalent (FTE) of 1.0 (range, 0.5–8.0), pharmacists (46.6%) with median FTE of 1.0 (range, 0.25–3.0), or physicians (36.2%) with median FTE of 0.4 (range, 0.1–0.6). OPAT

Table 1. Demographics and Structure of Represented Outpatient Parenteral Antimicrobial Therapy Programs

Characteristic	n = 58
OPAT programs per geographic region	
South	27 (46.6)
Midwest	13 (22.4)
West	9 (15.5)
Northeast	9 (15.5)
Institution types serviced*	
Academic medical center	45 (77.6)
Community hospital	19 (32.8)
Rehabilitation hospital	4 (6.9)
Critical access hospital	3 (5.2)
Specialty hospital	3 (5.2)
Children's hospital	3 (5.2)
Other[a]	1 (1.7)
No. of institutions serviced	
1	27 (46.6)
2–4	23 (39.7)
5–7	6 (10.3)
8	2 (3.4)
Age of OPAT program	
<1 y	3 (5.2)
1–4 y	18 (31.0)
5–10 y	22 (37.9)
10–15 y	10 (17.2)
>15 y	5 (8.6)
Patient populations monitored*	
Adults	58 (100)
Hemodialysis	52 (89.7)
Uninsured or underinsured	47 (81.0)
Remote history of using intravenous drugs	47 (81.0)
Cancer	47 (81.0)
Others receiving immunomodulatory infusion therapy	44 (75.9)
Solid organ transplantation	42 (72.4)
Active use of injection drugs	40 (69.0)
Experiencing homelessness or unstable housing	36 (62.1)
Incarcerated	27 (47.6)
Pediatrics	12 (20.7)
No. of patients managed by OPAT weekly[b]	
<10	6 (10.3)
10–25	4 (6.9)
26–50	9 (15.5)
51–100	21 (36.2)
101–150	8 (13.8)
>150	5 (8.6)
Unknown/unable to answer	5 (8.6)
Type of patient referral*	
Inpatient ID consultant	53 (91.4)
Outpatient ID	41 (70.7)
Inpatient primary team	19 (32.8)
Other non-ID outpatient provider	14 (24.1)
Outside hospital or facility	10 (17.2)
Other[c]	2 (3.4)
Point in patient care where the OPAT team assumes care*	
After inpatient discharge	42 (72.4)
Outpatient referral	29 (50.0)
During inpatient admission at ID sign-off	19 (32.8)
During inpatient admission when OPAT consult service requested	3 (5.2)
During inpatient admission while ID consult is following	1 (1.7)
Point in patient care that ID consultation is required*	
Prior to initiation of OPAT	43 (74.1)
Not required at any point	14 (24.1)
Prior to discontinuation of OPAT	12 (20.7)
Upon conclusion of OPAT	6 (10.3)
At least 1 OPAT team members with ID training[d]	54 (93.1)
Physician*	50 (92.6)
Pharmacist*	39 (72.2)
Advanced practice provider*	11 (20.4)

Data are reported as No. (%).

Abbreviations: ID, infectious diseases; OPAT, outpatient parenteral antimicrobial therapy.

[a]Specified by respondent as home infusion.

[b]Includes patients seen in person and/or followed for monitoring only (eg, lab reviews).

[c]Specified by respondents as no official protocol or self-consult per protocol.

[d]Includes residency training, fellowship training, or certification.

*Respondents could select all that apply.

programs received funding from a variety of sources including ID departments (46.6%) or the pharmacy division (21.0%). The majority of OPAT programs (79.3%) operate Monday through Friday. Only 23 (39.7%) programs bill for OPAT-related services, which largely involve in-person or telehealth visits and drug administration. Of the 23 programs that bill for OPAT-related services, 10 (43.5%) had physicians with FTE dedicated to OPAT.

Most respondents (44.8%) disagreed or strongly disagreed that their OPAT program had the resources needed to care for the population it serves. Very few reported having data analytics (19%), funding for patient care coordination (9%), or funding for expansion of services (9%) (Figure 1). Data analytics, funding for expansion of services, and pharmacists were the most desired resources identified among respondents.

Sixteen (27.6%) respondents considered their OPAT program to have best practice initiatives or electronic medical record tools. Best practice trends included utilization of electronic treatment order sets, documentation templates, automated alerts, data pulling, and automated/protocolized OPAT referrals. One program described having a buprenorphine-OPAT program in which persons who inject drugs could be discharged on IV antimicrobials with close follow-up from an ID and addiction medicine team. Twenty-one (32.2%) respondents anticipated changes to their OPAT program within the next year. Common plans included the addition of OPAT team members, improvements in electronic medical record support and data analytics, increased funding for expansion of services, or the offering of new OPAT-specific services. Examples of new OPAT-specific services included the offering of vaccines, transitions of care coordination, and expanding care to pediatric patients. Eleven (19%) respondents reported

Table 2. Antimicrobial Stewardship Initiatives of Outpatient Parenteral Antimicrobial Therapy Programs

Initiative	n = 58
OPAT protocols available to guide therapeutic management	53 (91.4)
Therapeutic drug monitoring[a,*]	48 (90.6)
Specific lab monitoring based on antimicrobial regimen*	45 (84.9)
Antimicrobial dose adjustments*	40 (75.5)
Long-acting antimicrobial use criteria*	33 (62.3)
IV to PO stepdown*	24 (45.3)
Opioid addiction support*	3 (5.7)
OPAT orders reviewed or reconciled prior to inpatient discharge	31 (53.4)
Proportion of OPAT orders reviewed, mean ± SD	89.2 ± 22.7
Reviewed by ID/AMS/OPAT pharmacist*	24 (77.4)
Reviewed by staff pharmacist*	6 (19.4)
Reviewed by transition of care pharmacist*	3 (9.7)
Reviewed by other team member*	2 (6.5)
Team members who can modify OPAT orders*	
ID physicians (including fellows)	50 (86.2)
Advanced practice providers	32 (55.2)
ID/OPAT pharmacist	29 (50.0)
Non-ID physicians	14 (24.1)
Not permitted	3 (5.9)
Other[b]	1 (1.7)
Telehealth appointments or consultations offered by OPAT program	43 (74.1)
Continue to follow those transitioned from IV to PO antimicrobials	
No	26 (44.8)
Yes–Any prolonged oral antimicrobials	18 (31.0)
Yes–Specific oral antimicrobials only	14 (24.1)
Monitor patients who receive prolonged oral antimicrobials only[c,d]	
No	30 (51.7)
Yes–Any prolonged oral antimicrobials	14 (21.1)
Yes–Specific oral antimicrobials only	14 (21.1)

Data are reported as No. (%) unless otherwise specified.

Abbreviations: ID, infectious diseases; IV, intravenous; OPAT, outpatient parenteral antimicrobial therapy; PO, per os (oral); SD, standard deviation.

[a]Includes vancomycin levels, aminoglycoside levels, etc.

[b]Specified by respondent as OPAT team.

[c]Prolonged is defined as ≥2 weeks.

[d]Includes patients receiving oral antimicrobials for acute treatment, chronic suppression, or prophylaxis.

*Respondents could select all that apply.

Table 3. Antimicrobial Stewardship Metrics of Outpatient Parenteral Antimicrobial Therapy

Metric	n = 43
Metrics tracked*	
AEs or complications related to devices, antibiotic use, or toxicities	35 (81.4)
Unscheduled hospital readmissions or ED visits	25 (58.1)
Duration of antimicrobial therapy	22 (51.2)
Utilization of long-acting antimicrobials	17 (39.5)
Clinical outcomes	17 (39.5)
OPAT clinic appointment adherence	16 (37.2)
Rate of antimicrobial regimen changes in OPAT setting	14 (32.6)
Rate of OPAT therapy completed on time or as scheduled	14 (32.6)
Rate of regimen changes by OPAT team predischarge from inpatient	9 (20.9)
Microbiological outcomes	9 (20.9)
Patient satisfaction	8 (18.6)
Other[a]	7 (16.3)
Rate of appropriately drawn serum antimicrobial levels	5 (11.6)
Metric tracking method*	
Manual data pull	35 (81.4)
Electronic data capture	20 (46.5)
Other[b]	1 (2.3)
Team members responsible for pulling metrics*	
OPAT pharmacist	29
Non-OPAT pharmacist	3
OPAT physician[c]	15
OPAT advanced practice providers	6
OPAT clerical staff	1
OPAT data analytics or IT staff	6
OPAT nurse	2
Nonclinical specialist (eg, data analyst)	6
Hours per week spent on tabulating or analyzing metrics, mean ± SD	3.5 ± 3.3
Metrics reported to hospital leadership teams	38 (88.4)

Data are reported as No. (%) unless otherwise specified.

Abbreviations: AE, adverse event; ED, emergency department; IT, information technology; OPAT, outpatient parenteral antimicrobial therapy; SD, standard deviation.

[a]Specified by respondents as pharmacist or OPAT team interventions and intervention acceptance rate, OPAT census, rate of OPAT avoidance, rate of central line or midline avoidance, rate of first OPAT doses given in clinic, hospital length of stay, accuracy rate of OPAT orders, use of long-term oral regimens in place of OPAT, process metrics (including rate of patients discharged without a documented OPAT note, OPAT use outside of an infectious diseases consult), and weekly laboratory monitoring adherence rate.

[b]Specified by respondent as Hospital Consumer Assessment of Healthcare Providers and Systems scores.

[c]Includes attendings and fellows.

*Respondents could select all that apply.

that the COVID-19 pandemic impacted their OPAT program. Both increases and decreases in OPAT patient census postpandemic were described by respondents. A reduction in available services, such as radiology, was also noted. Several respondents reported increased use of home infusion therapy, telemedicine, oral antimicrobials, or long-acting injectable antimicrobials.

DISCUSSION

In 2019, The Joint Commission (TJC) published 5 new elements of performance (EPs) that addressed AMS in the ambulatory healthcare setting [9]. These new EPs involve (1) identifying an individual responsible for promoting AMS practices, (2) setting at least 1 annual AMS goal, (3) developing an associated evidence-based practice guideline, (4) providing clinical staff with educational resources related to this goal, and (5) tracking and reporting data on this goal to organizational leadership. This survey demonstrates that many OPAT programs already meet TJC ambulatory AMS standards with their services and practices as implementation of AMS initiatives among surveyed OPAT programs was robust. Nearly all had at least 1 AMS protocol to guide therapeutic management for their patients. A large portion of OPAT programs reported

Table 4. Antimicrobial Stewardship Resources for Outpatient Parenteral Antimicrobial Therapy

Resource	n = 58
No formal OPAT team	12 (20.7)
OPAT teams consisting of at least ≥3 different healthcare disciplines	16 (27.6)
FTE dedicated for specific professions, median (range)*	
Nurse (n = 34)	1.0 (0.25–3.0)
Pharmacist (n = 27)	1.0 (0.25–3.0)
Physician (n = 21)	0.4 (0.1–0.6)
Nurse practitioner (n = 9)	1.25 (1.0–2.0)
Administrative assistant (n = 9)	1 (0.5–2)
Physician assistant (n = 8)	1.0 (0.75–1.0)
Other (n = 2)[a]	2 (2)
Budgets used to fund OPAT program*	
Infectious diseases	27 (46.6)
Pharmacy division	18 (31.0)
Unknown	13 (22.4)
Ambulatory	12 (20.7)
Inpatient	5 (8.6)
No funding	3 (5.2)
College/academic	2 (3.4)
Other[b]	1 (1.7)
Days of OPAT program operation	
Monday through Friday	46 (79.3)
Sunday through Saturday	6 (10.3)
Partial week	4 (6.9)
Other[c]	2 (3.4)
Billing for any OPAT-related services	23 (39.7)

Data are reported as No. (%) unless otherwise specified.

Abbreviations: FTE, full-time equivalent; OPAT, outpatient parenteral antimicrobial therapy.

[a]Specified by respondents as pharmacy technicians.

[b]Specified by respondent as "hospital quality" budget.

[c]Specified by respondents as OPAT program having no formal hours of operation.

*Respondents were permitted to select all that apply.

tracking at least 1 type of AMS metric and reporting these data to hospital leadership on a regular basis. These metrics were often related to treatment efficacy and patient safety outcomes, as opposed to patient census or productivity. Many programs also reported having materials and personnel available to support AMS efforts. Collectively, these trends suggest that AMS principles are commonly integrated into normal OPAT workflows. They also provide specific examples of how OPAT programs might further align their services to meet TJC ambulatory EPs.

The survey results also highlight areas that OPAT programs can further leverage to meet TJC regulatory requirements. One example is the tracking and reporting of AMS metrics. Notably, about 74% of OPAT programs are already tracking at least 1 metric. Among these programs, the majority pulled data manually and spent an average of 3.5 hours every week on data analysis. This emphasizes that efforts around metric tracking and reporting are time and resource intensive [10]. For those programs that do not currently track any metrics, they may lack access to data analytics and financial resources. Unfortunately, funding for expansion of services as well as data analytics were the least available resources cited among OPAT programs and were also the top 2 resources that respondents cited as necessary to care for the population their OPAT program serves. Data analytic capabilities were often described as best practices among survey respondents. Accordingly, studies have shown that the use of automation and flowsheets in OPAT improves patient outcomes, program efficiency, and team satisfaction [10–12]. These technical features could also help optimize the tracking of metrics so that reports are readily available to stakeholders [10]. This survey highlights the importance of tracking

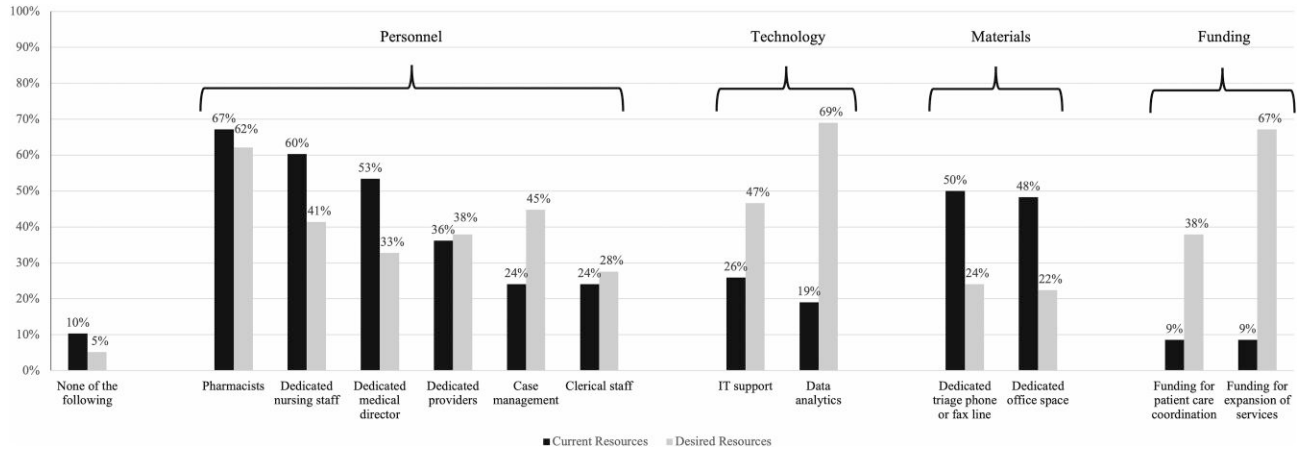

Figure 1. Antimicrobial stewardship resources for outpatient parenteral antimicrobial therapy (OPAT). Respondents were asked to select current resources available at their OPAT program and which resources were needed to care for the population the OPAT program serves. Respondents were permitted to select all that apply. n = 58. Abbreviation: IT, information technology.

and reporting OPAT data in order to fully comply with TJC regulatory requirements within ambulatory care settings.

Additional funding for OPAT programs may be impacted by challenges with billing for OPAT-related services. Only 40% of OPAT programs reported billing for an OPAT-related service. This may be secondary to state laws and requirements that permit only those with specific licenses, particularly physicians, to bill for clinic visits. Less than half of programs reported having dedicated FTE specifically for physicians. Physicians also had the least amount of FTE dedicated to OPAT among the disciplines listed. Further, the absence of a formal OPAT team in general was reported among 21% of respondents. This survey offers strategies that OPAT programs may utilize to improve their rate of billing for services rendered. For example, OPAT programs may consider leaning into telehealth visits to increase census and optimize available physician time or collaborating with infusion centers to bill for drug administration.

This survey also identified other opportunities for OPAT program expansion. More than half of OPAT programs reported managing patients who actively use IV drugs. One program described collaboration between ID and addiction medicine teams via a buprenorphine-OPAT program model. This demonstrates how OPAT programs can increase their services to provide comprehensive patient care beyond just antimicrobial administration. OPAT programs might consider adding protocols that incorporate addiction medicine or that provide guidance in accommodating patients with high-risk social behaviors. Further, tracking metrics associated with these protocols (eg, treatment adherence, treatment success) may be used as an AMS initiative.

Our study has several limitations. This was an electronic survey only sent to members of the Vizient network, which inherently poses the risk of recall and selection bias that may reduce the applicability of data to some institutions. The survey also had a low response rate, which may have been in part due to an extensive number of detailed questions. However, we believe that these questions were necessary to comprehensively describe AMS practices among US OPAT programs and that the qualitative data obtained from this survey provide great value. Of note, we did not know how many Vizient member institutions had OPAT programs. We asked that only 1 respondent submit the survey on behalf of their OPAT program to attempt to prevent duplicate responses. Further, some respondents indicated that their OPAT program represented multiple institutions. Considering this information, the true survey response rate was likely higher than that reported.

CONCLUSIONS

This survey serves as a benchmark of current OPAT AMS practices that have not been previously described. The results provide specific examples regarding the implementation of AMS initiatives among OPAT programs, the application of metric tracking and reporting, and the resources required to support these efforts. Institutions may use this information to improve the AMS practices of their OPAT programs while meeting ambulatory AMS regulatory requirements.

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

Author contributions. S. F. A.: first author, study design, data collection, data analysis, manuscript writing and editing. E. G., R. P. M., D. B., A. L. R. H. W., M. P. M., K. B., A. P., and M. E. S.: study design, manuscript review. C. W.: senior author, study design, manuscript review and editing.

Participant consent. This study did not include factors necessitating participant written consent. Participants agreed to participate in the research study by returning the electronic survey. The Institutional Review Board (IRB) (New Mexico site) reviewed this study and determined it to be exempt from IRB review.

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

References

1. Infectious Diseases Society of America. Handbook of outpatient parenteral antimicrobial therapy for infectious diseases. 3rd ed. CRG Publishing; **2016**. https://www.idsociety.org/journals–publications/opat-e-handbook/. Accessed 5 January 2024.
2. Mahoney MV, Childs-Kean LM, Khan P, Rivera CG, Stevens RW, Ryan KL. Recent updates in antimicrobial stewardship in outpatient parenteral antimicrobial therapy. Curr Infect Dis Rep **2021;** 23:24.
3. Gilchrist M, Seaton RA. Outpatient parenteral antimicrobial therapy and antimicrobial stewardship: challenges and checklists. J Antimicrob Chemother **2015;** 70: 965–70.
4. Chary A, Tice AD, Martinelli LP, et al. Experience of infectious diseases consultants with outpatient parenteral antimicrobial therapy: results of an Emerging Infections Network survey. Clin Infect Dis **2006;** 43:1290–5.
5. Lane MA, Marschall J, Beekmann SE, et al. Outpatient parenteral antimicrobial therapy (OPAT) practices among adult infectious disease physicians. Infect Control Hosp Epidemiol **2014;** 35:839–44.
6. Muldoon EG, Switkowski K, Tice A, Snydman DR, Allison GM. A national survey of infectious disease practitioners on their use of outpatient parenteral antimicrobial therapy (OPAT). Infect Dis **2015;** 47:39–45.
7. Hamad Y, Lane MA, Beekmann SE, Polgreen PM, Keller SC. Perspectives of United States–based infectious diseases physicians on outpatient parenteral antimicrobial therapy practice. Open Forum Infect Dis **2019;** 6:ofz363.
8. Rivera CG, Mara KC, Mahoney MV, Ryan KL. Survey of pharmacists on their roles and perceptions of outpatient parenteral antimicrobial therapy in the United States. Antimicrob Steward Healthc Epidemiol **2022;** 2:e69.
9. The Joint Commission. R3 report issue 23: antimicrobial stewardship in ambulatory health care. Available at: https://www.jointcommission.org/standards/r3-report/r3-report-issue-23-antimicrobial-stewardship-in-ambulatory-health-care/. Accessed 3 February 2024.
10. Rivera CG. We shape our tools and then our tools shape us: OPAT and the EHR. Open Forum Infect Dis **2024;** 11:ofae006.
11. Munsiff SS, Burgoyne C, Dobson E, Yamshchikov A. Making the EHR work for you—modifications of an electronic health record system to improve tracking and management of patients receiving outpatient parenteral antibiotic therapy. Open Forum Infect Dis **2024;** 11:ofae005.
12. Canterino J, Malinis M, Liu J, Kashyap N, Brandt C, Justice A. Creation and validation of an automated registry for outpatient parenteral antibiotics. Open Forum Infect Dis **2024;** 11:ofae004.