

A Bundle of the Top 10 OPAT Publications in 2021

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As outpatient parenteral antimicrobial therapy (OPAT) becomes more common, it may be difficult to stay current with recent related publications. A group of multidisciplinary OPAT clinicians reviewed and ranked all OPAT publications published in 2021. This article provides a high-level summary of the OPAT manuscripts that were voted the “top 10” publications of 2021.

Keywords. OPAT; COpAT; outpatient parenteral antimicrobial therapy.

Outpatient parenteral antimicrobial therapy (OPAT) is the administration of intravenous (IV) antimicrobials outside of the acute care hospital setting for at least 2 doses without intervening hospitalization [1]. OPAT is administered in various models including at infusion centers or ambulatory care clinics, at home with nursing services and/or caregiver(s), and in skilled nursing facilities [2]. The most common infections treated via OPAT are bone and joint, skin and soft tissue, pulmonary, cardiac/bloodstream, central nervous system, intra-abdominal, and urogenital infections with treatments ranging from 2 to 8 weeks or longer. The use of oral antimicrobials for extended periods of time or that require outpatient monitoring has been termed complex outpatient antimicrobial therapy (COpAT) or described synonymously with OPAT [3].

The practice of OPAT, akin to antimicrobial stewardship, is a core function of infectious diseases (ID) practice. Research focused on the field of OPAT is generally investigator-led and rarely for-profit or industry-sponsored. This lends itself to a propensity toward research questions seeking to address common challenges encountered by clinicians in daily practice. Herein, we offer a summary of 10 important OPAT publications from 2021 curated by multidisciplinary ID clinical practitioners.

METHODS

A Medline search was performed utilizing the key terms “OPAT” and “COpAT” to identify PubMed indexed publications with a citation date between 1/1/2021 and 12/31/2021 for potential inclusion. Reviews (without a case series), opinion pieces, in vitro only (eg, stability studies), research protocols, and guidelines were excluded. Research limited to acute care hospital (inpatient) settings was also excluded. Qualifying studies were assigned a Grading Outcomes–based research in Antimicrobial Therapy (GOAT) score. The GOAT score was equal to the journal's Impact Factor multiplied by the average number of citations per month (total number of citations divided by the delta between the date of publication and the date of scoring in months) (Figure 1). All publications were scored on the same day. The GOAT score underwent validation to screen for time bias (potential for longer time since publication being associated with higher GOAT score). There was no linear or nonlinear statistical relationship found between publication date and GOAT score (data not shown).

There were 73 publications identified for potential inclusion. Of these, 50 met inclusion criteria and were scored. A survey containing 20 publications with the highest GOAT score was administered to a geographically diverse panel of 10 multidisciplinary experts in the field of OPAT for selection of 10 publications for inclusion. If works by any of the current authors were included in the voting or in the final top 10 papers, a sensitivity analysis was performed without their votes included. If the papers scored above the cutoff without the authors' scores, they were included in the final listing. The survey panel was blinded to the GOAT score (other than C.G.R. and M.V.M., who were involved in score calculation and survey build). The panelists were directed to consider clinical practice applicability, feasibility, and innovation and independently select 10 of the 20 articles listed alphabetically by citation in a nonranked

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$$\text{GOAT Score} = \text{Journal Impact Factor} \times \left(\frac{\text{Total number of citations}}{\text{Date of scoring} - \text{date of publication}} \right)$$

Figure 1. GOAT score. Abbreviation: GOAT, Grading Outcomes–based research in Antimicrobial Therapy.

fashion. The 10 articles with the most votes from the panel were included. A 3-way tie occurred for the ninth and 10th articles. A second round of voting was performed by the panel for these 3 articles, and the 2 with the most votes were subsequently included (Figure 2). The authors were randomly assigned an article to summarize, avoiding those they may have been coauthors on, and are presented alphabetically by first author below and in Table 1.

PUBLICATION SUMMARIES

Clinical Experience of Implementing Oral vs Intravenous Antibiotics in a Specialist Orthopedic Hospital

The Oral vs Intravenous Antibiotics for Bone and Joint Infection (OVIVA) study, an open label, prospective, randomized, multicenter trial, demonstrated noninferiority of 6 weeks of oral antimicrobials to intravenous (IV) antimicrobials for treatment of bone and joint infections (BJIs) [14]. This groundbreaking study challenged the status quo in 2019; however, the

implications of operationalizing OVIVA findings in the real-world setting were unknown.

Azamgarhi et al. performed a comparison of BJI treatment in the year before implementation of an OVIVA-based protocol (May 2017) with the year postimplementation at the Royal National Orthopedic Hospital in the United Kingdom [4]. Antibiotic choice, duration, and laboratory monitoring plan were at the discretion of treating clinicians. The OPAT service performed weekly telemedicine visits, multidisciplinary team review, and in-person evaluation at 6 and 12 weeks. At 1 year, definitive treatment failure was determined in concordance with the OVIVA trial. Outcome analysis excluded patients who died and those with planned infection suppression.

There were 328 patients included: 145 pre-implementation (all IV) and 183 (121 oral and 62 IV) postimplementation. In the postimplementation group, IV was used due to multidrug resistance (48.4%), culture-negative infection (29.0%), allergies or intolerances (11.3%), adherence concerns (4.8%), and malabsorption (1.6%). Clinical failure was numerically more

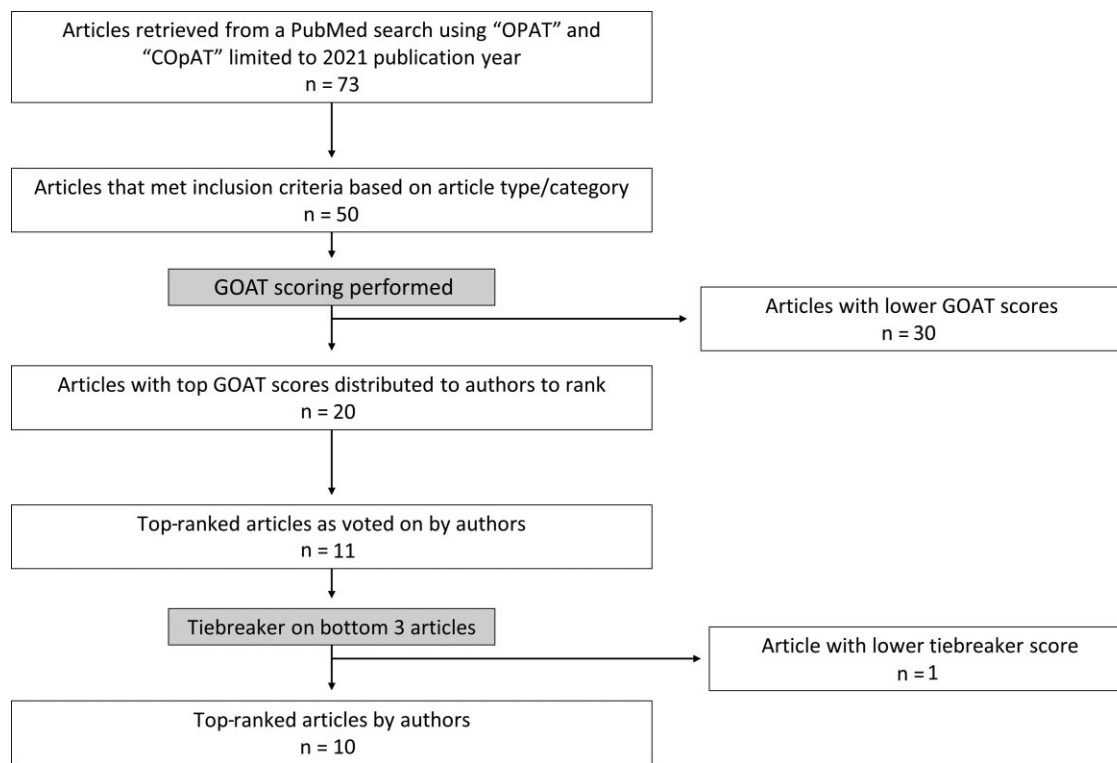


Figure 2. Selection of articles. Abbreviation: Grading Outcomes–based research in Antimicrobial Therapy.

Table 1. Summary of Top 10 OPAT Publications From 2021

Citation	Study Design	Primary and Secondary Outcomes
Azamgarhi et al. CID 2021 [4]	Cohort evaluation of pre-/postimplimentation of oral antibiotic treatment protocol for bone and joint infections	<ul style="list-style-type: none"> No significant difference in infection-free survival at 12 mo (13.6% vs 18.6%; $P = .154$) More adverse drug reactions occurred in the postimplimentation group; drive mainly by GI intolerances (9% vs 24%) Hospital length of stay was shorter in the postimplimentation group (13 d vs 9 d)
Bernard et al. NEJM 2021 [5]	Open-label, randomized control, noninferiority trial of 6 vs 12 wk of therapy for the treatment of PJI	<ul style="list-style-type: none"> Treatment duration of 6 wk was not noninferior to 12 wk for persistent infection (9.4% vs 18.1%) Secondary outcomes 6 vs 12 wk: <ul style="list-style-type: none"> Treatment failure due to a new infection (6.8% vs 12.6%; -3.8% points; 95% CI, -9.7% to 2.0%) Probable treatment failure (4.2% vs 3.7%; 0.5%; 95% CI, -3.8% to 4.8%) Length of stay 14 d vs 13 d Nonserious adverse events were more common in 12-wk arm (69.7% vs 49.3%; $P = .01$)
Beleler et al. OFID 2021 [6]	Retrospective cohort study of individuals experiencing homelessness with opioid use disorder who received any combinations of 4 interventions: ID consult, addiction consult, case management referral, MOUD at discharge	<ul style="list-style-type: none"> Of the 63 infectious episodes: <ul style="list-style-type: none"> 92% had ID consult 51% had addiction consult 86% received MOUD 59% received case management 90-d readmission rate 44% Receipt of all 4 interventions compared with ≤ 3: <ul style="list-style-type: none"> Clinical cure (adjusted OR, 3.03; 95% CI, 1–9.115) Retention in addiction care at 30 d (adjusted OR, 6.36; 95% CI, 1.84–21.85) Completion of antibiotics (adjusted OR, 2.63; 95% CI, 0.87–7.98)
Burnett et al. AAC 2021 [7]	Descriptive report of safety outcomes in 42 patients receiving L-AMB via OPAT for invasive fungal infections	<ul style="list-style-type: none"> Most common L-AMB doses were 3 mg/kg and 5 mg/kg (actual body weight) Serum labs were monitored twice weekly (median); AKI developed in 50% of patients; 65% returned to baseline after 1 y Readmission within 30 d occurred in $>50\%$ of patients; most (1/7/22) were not attributed to L-AMB adverse events
Ingram et al. J Vasc Access 2021 [8]	Case-control study in OPAT services at 2 large Australian hospitals between 2018 and 2020 to investigate risk factors for CRT among patients receiving home-based OPAT	<ul style="list-style-type: none"> Of 1803 patients and 32 896 catheter-d, there were 19 cases of CRT (1.1%; 0.58/1000 catheter-d) at a median of 23 d after PICC insertion Cases were more likely to have had a malpositioned catheter tip or complicated catheter insertion Michigan Risk Score for PICC thrombosis, catheter size, number of lumens, and anticoagulation was not associated with CRT

Table 1. Continued

Citation	Study Design	Primary and Secondary Outcomes
Matt et al. J Global Antimicrob Resis 2021 [9]	Case series of 17 patients with PJI who received dalbavancin and literature review	<ul style="list-style-type: none"> • Most PJIs occurred in the hip (47.1%) or knee (35.3%) • 16 had positive cultures: 5 (31.3%) polymicrobial (n = 15, 100%) <i>Staphylococcus</i> species • Dalbavancin was started at a median of 34.5 d as a switch or add-on; dalbavancin 1500 mg on day 1 and 1500 mg on day 8 were used in 8 (47.1%) patients • Cure was achieved in 8 patients (47.1%)
Sikka et al. BMC Infect Dis 2021 [10]	Descriptive report of a novel multidisciplinary program to discharge patients with SUD with optimal antimicrobial regimens	<ul style="list-style-type: none"> • Team consists of primary team, addiction consult service, ID provider, OPAT pharmacist, OPAT nurse, case manager ± bedside nurse • Discussion points include infection type and management, antimicrobial administration and setting safety, substance use history, patient goals and preferences, stability for discharge, and access to outpatient care • Use of this program resulted in a 70% antimicrobial completion rate and 40% completion rate at home
Vollmer et al. CID 2021 [11]	Retrospective cohort study of unplanned discontinuation of oral antibiotics in patients with staphylococcal PJI managed with DAIR	<p>Primary outcome: unplanned discontinuation rate associated with FQ vs non-FQ regimens (36% vs 3%; $P < .001$)</p> <p>Secondary outcomes:</p> <ul style="list-style-type: none"> • Rates of SAEs (7.8% vs 1.5%; $P = .14$) • Unplanned discontinuation due to rifamycins (16.7% vs 12.1%; $P = .43$) • Mean time to unplanned discontinuation (3.5 vs 1.3 wk in THA, 9.5 vs 20.3 wk in TKA) • Observed AEs (see study for details) • All-cause mortality (4.4% vs 4.5%; $P = .99$)
Wu et al. OFID 2021 [12]	A 5-question telephone survey administered by the physician to patients who completed OPAT therapy with daptomycin or vancomycin	<ul style="list-style-type: none"> • Daily interference rating: DAP 0 (none) vs VAN 5 (moderate) ($P = .03$) • Satisfaction with OPAT: DAP 100% vs VAN 67% ($P = .03$)
Yeager et al. Int J Antimicrob Agents 2021 [13]	Retrospective cohort study of standard parenteral therapy (SPT) vs oral linezolid step-down therapy in patients with MRSA-BSI	<p>Primary outcome: composite of 90-d infection-relation readmission (26% vs 17%; $P = .159$)</p> <p>Secondary outcomes:</p> <ul style="list-style-type: none"> • All-cause mortality (6% vs 4%; $P = .487$) • Length of hospitalization (13 vs 11 d; $P = .079$) • Drug-related AEs (16% vs 17%; $P = .843$)

Abbreviations: AE, adverse event; AKI, acute kidney injury; BSI, bloodstream infection; CRT, catheter-related thrombosis; DAIR, debridement, antibiotics, and implant retention; DAP, daptomycin; FQ, fluoroquinolone; ID, infectious diseases; L-AMB, liposomal amphotericin B; MRSA, methicillin-susceptible; PICC, peripherally inserted catheter; OPAT, outpatient parenteral antimicrobial therapy; PJI, periprosthetic joint infection; SAE, severe adverse event; SPT, standard parenteral therapy; SUD, substance use disorder; THA, total hip arthroplasty; TKA, total knee arthroplasty; VAN, vancomycin.

common postimplantation (18.6% vs 13.6%; $P = .154$). Postimplantation failure was more frequent in cases with no suitable oral option. Kaplan-Meier analysis of infection-free survival at 12 months showed no difference between groups. Adverse events while on treatment were higher in the postimplantation group (36.2% vs 23.0%), primarily driven by an almost 3 times higher gastrointestinal intolerance rate (24.0% vs 9.0%). The most commonly used antimicrobials were IV cephalosporins, IV glycopeptides, oral tetracyclines, oral fluoroquinolones, oral rifamycins, and oral penicillins. The most common organism identified was *Staphylococcus aureus* (32.9% pre-implantation and 24.3% postimplantation), followed by coagulase-negative *Staphylococcus* (30.1% pre-implantation and 28.7% postimplantation). More than half the cohort received ≥ 2 antimicrobials. The median time to oral switch was 6 days. Length of stay was decreased by 4 days with a median cost reduction of £2764.28.

This study demonstrated that OVIVA findings can be implemented in routine clinical practice with close follow-up by an established OPAT service. Gastrointestinal intolerance associated with orals was a notable observation. There is potential for decreased length of stay and cost of care with use of oral antimicrobials for BJI when clinically appropriate.

Antibiotic Therapy for 6 or 12 Weeks for Prosthetic Joint Infection

The management of periprosthetic joint infections (PJIs) consists of a combination of surgery and antimicrobial therapy [15]. Patients often receive long courses of antibiotic therapy, which are coordinated and monitored by OPAT programs, but the optimal duration of treatment remains unclear. In the Duration of Antibiotic Treatment in PJI (DATIPO) trial, Bernard et al. performed an open-label, randomized, controlled, noninferiority trial comparing 6 vs 12 weeks of postsurgical antibiotic therapy for microbiologically confirmed PJI [5]. The primary outcome evaluated was persistent infection within 2 years after the end of antibiotic therapy.

A total of 410 patients from 28 French centers were randomized to receive 6 weeks (205 patients) or 12 weeks (205 patients) of antibiotic therapy following an appropriate surgical procedure (1- or 2-stage implant exchange or debridement with implant retention [DAIR]). Baseline characteristics were balanced between the 2 trial groups; however, there were more patients with *S. aureus* identified in the 6-week group (38%) than the 12-week group (30%) and more coagulase-negative *Staphylococcus* identified in the 12-week group (35.2%) than the 6-week group (29.5%). The median duration of IV therapy was 9 days in each group. In the modified intention-to-treat analysis, persistent infections occurred in 35 of 193 patients (18.1%) receiving 6 weeks of therapy and in 18 of 191 patients (9.4%) receiving 12 weeks of therapy (risk difference, 8.7%; 95% CI, 1.8%–15.6%). This did not meet the criterion for noninferiority. The largest difference in treatment failures in favor of 12

weeks of therapy over 6 weeks was in patients who had undergone DAIR. In patients with knee PJIs treated with DAIR, failure was 38.2% for 6 weeks and 13.5% for 12 weeks for a risk difference of 24.7% (95% CI, 4.4%–43.1%). Patients in the 12-week group had more nonserious adverse events (mainly gastrointestinal disorders and mycosis) than those in the 6-week group. Clinically significant differences in serious adverse events, *Clostridioides difficile* infection, duration of hospital stay, and functional outcomes were not seen.

In this trial, a shorter course (6 weeks) of postsurgical antibiotics did not meet the criterion for noninferiority to a longer course (12 weeks) for the treatment of PJI. Unfavorable outcomes occurred in a higher percentage of patients receiving short-course therapy, most of whom had undergone DAIR. A novel finding of DATIPO is a substantial reduction of treatment failure in all PJIs.

Evaluation of Bundled Interventions for Patients With Opioid Use Disorder Experiencing Homelessness Receiving Extended Antibiotics for Severe Infection

The management of patients with opiate use disorder (OUD) who also need prolonged antibiotic treatment has historically been challenging in the outpatient setting [16]. Patient management in those who are also experiencing homelessness or have a substance use disorder (SUD) with agents for which there are few medications for treatment (ie, methamphetamine) has proved additionally challenging due to concerns regarding safe use of central venous catheters and potential for elopement. Management of these high-risk patients often requires a multidisciplinary approach to address both clinical and socioeconomic factors.

Beiler et al. performed a retrospective cohort review of a bundle intervention ([1] ID consult, [2] addiction medicine consult, [3] referral to case management, and [4] medications for OUD usage [MOUD]) approach to the management of patients experiencing homelessness who require at least 14 days of antibiotic treatment (IV or oral) within a 2-year period at 1 urban county hospital in the United States [6]. In total, 53 patients were included, representing 63 infectious episodes. Of the 63 episodes evaluated, 77.8% (49) episodes received at least 3 interventions, with 38.1% (24) receiving all 4. Roughly half of all patients completed the entire course of antibiotics, and 44% were readmitted within 90 days of discharge. Two deaths were noted in the cohort, 1 of which was from overdose. Receiving all 4 interventions was associated with higher odds of clinical cure (adjusted OR, 3.03; 95% CI, 1–9.15) and successful retention in addiction care at 30 days (adjusted OR, 6.36; 95% CI, 1.84–21.85). The receipt of all 4 interventions did not significantly increase the likelihood of antibiotic completion (adjusted OR, 2.63; 95% CI, 0.87–7.98).

A multidisciplinary intervention bundle for people with OUD experiencing homelessness could be a safe approach to

ensure successful treatment of severe infections in this patient population. Readmission rates were high in this study, but may be related to the complexity of the patient population more than the intervention.

Experience With Liposomal Amphotericin B in Outpatient Parenteral Antimicrobial Therapy

With the development of broad-spectrum triazole and echinocandin antifungals, clinicians have generally moved away from utilizing amphotericin. When the infecting organism necessitates the use of amphotericin, clinicians may be hesitant to utilize OPAT services, in part due to the monitoring and adverse effect profile of the medication.

Burnett et al. report their experience administering liposomal amphotericin B (L-AMB) via OPAT [7]. The authors treated 42 patients with L-AMB over a 3.5-year period, primarily for histoplasmosis (31%), aspergillosis (26%), and cryptococcosis (14%); the mean age was 50 years, two-thirds were male, and 83% received OPAT at home. The most common L-AMB doses were 3 mg/kg and 5 mg/kg by actual body weight (38% and 33%, respectively), and the median OPAT duration was 14 days. The median laboratory monitoring frequency was twice weekly. Approximately half of the patients treated with L-AMB via OPAT developed acute kidney injury (AKI) after a median of 8.5 days. Risk factors for this included higher L-AMB dose, more severe hypokalemia after starting L-AMB, and need for potassium supplementation at discharge. Interestingly, sodium loading with saline IV hydration, a practice to mitigate nephrotoxicity that originated when amphotericin B deoxycholate was more commonplace, was not associated with lower nephrotoxicity in this cohort receiving L-AMB. Two patients who developed AKI died (both of worsening invasive fungal infection; the only 2 deaths in the cohort); of the remainder, all had at least partial renal recovery within 30 days; 25% returned to their prior baseline renal function within a month of stopping L-AMB, and 65% returned to their prior baseline by 1 year. While more than half the cohort was readmitted within 30 days of discharge, most readmissions (17/22) were not driven by adverse events related to L-AMB (listed only as graft-vs-host disease, stem cell transplant, *Clostridioides difficile* infection, and bacterial sepsis). Only 3 patients were readmitted due to AKI and 2 due to hypokalemia. While 26 (62%) of patients completed their anticipated L-AMB duration, another 14 patients were changed to an azole antifungal. Note that antifungal efficacy outcomes were not assessed.

While this study demonstrates that receipt of L-AMB via OPAT with at least twice-weekly laboratory monitoring is feasible, such monitoring may be difficult to implement in all OPAT programs. While frequent readmissions should be expected, these are primarily related to the medical complexity and morbidity of the patient population rather than L-AMB toxicity, per se.

Risk Factors for Catheter-Related Thrombosis During Outpatient Parenteral Antimicrobial Therapy

Catheter-related thrombosis (CRT) is an underrecognized complication of OPAT that can cause significant adverse outcomes such as readmission and occasionally pulmonary embolism, and also can increase costs and lead to interruptions in antimicrobial therapy. Ingram et al. investigated risk factors for CRT among patients receiving home-based OPAT as an essential step in understanding how to prevent CRT [8].

The authors performed a case-control study in OPAT services at 2 large Australian hospitals between 2018 and 2020. All patients underwent peripherally inserted central catheter (PICC) placement. All OPAT was delivered by community nurses, and all patients underwent weekly laboratory monitoring, clinical review by ID clinical staff, and discussion at a multidisciplinary meeting. Some patients also received CRT prophylaxis using low-molecular weight heparin. Cases were defined as patients with symptomatic catheter-related deep vein thrombosis confirmed by ultrasounds and were matched to contemporaneous controls with a 1:3 ratio. The authors used the Michigan Risk Score to predict CRT risk.

Of 1803 patients and 32 896 catheter-days, there were 19 cases of CRT (1.1%; 0.58/1000 catheter-days) at a median of 23 days after PICC insertion. Almost half of those with CRT experienced unplanned readmission, and 11% experienced pulmonary embolism. Cases were more likely to have had a malpositioned catheter tip or complicated catheter insertion. Interestingly, the Michigan Risk Score for PICC thrombosis was not associated with CRT, nor was catheter size, number of lumens, or anticoagulation (either prophylactic or therapeutic).

Several important conclusions can be drawn from this study. First, as the authors discuss, the overall low rate of CRT supports not routinely administering prophylactic anticoagulation in patients receiving OPAT. Second, risks for CRT in OPAT may require further study. And third, as malpositioned catheters and complicated catheter insertions were associated with CRT, supporting the hypothesis that the pathophysiology of CRT is through endothelial trauma, close attention to catheter insertion technique is essential in CRT prevention.

Dalbavancin Treatment for Prosthetic Joint Infections in Real Life: A National Cohort Study and Literature Review

Dalbavancin is a lipoglycopeptide antibiotic with a half-life of 346 hours. While it has FDA approval for the treatment of skin and soft tissue infections, it has broader appeal as a “lineless” antibiotic for patients requiring lengthy IV treatment courses, such as in OPAT. Matt et al. report on a case series of 17 patients with PJI [9]. Most PJIs occurred in the hip (47.1%) or knee (35.3%). Sixteen patients had identified microbiology; 5 (31.3%) were polymicrobial, and all (n = 16, 100%) grew *Staphylococcus* species. Sixteen patients received surgical interventions, with DAIR being the most common (n = 9,

52.9%). Dalbavancin was frequently used as salvage therapy, with a median of 34.5 days of antibiotics before switch or add-on. Dalbavancin doses varied, but 1500 mg on day 1 and 1500 mg on day 8 were used in 8 (47.1%) patients. Cure was achieved in 8 (47.1%) patients. More patients with failures presented with severe disease (sepsis or shock) and had lack of surgical intervention.

The authors also performed a literature review and identified 102 instances of gram-positive PJIs treated with dalbavancin. Coagulase-negative staphylococci were highest (57.8%), and the most common dose was 1000 mg, followed by 500 mg weekly. Overall cure was estimated at 73.1%.

The study by Matt et al. is an important addition to the OPAT literature because it builds upon the phase 2 study by Rappo et al. [17]. Whereas Rappo et al. investigated BJI, they excluded PJI. Furthermore, it provides a summary of previous literature of dalbavancin use in PJI in table format. Several key patient differences were seen in this study, such as higher numbers of patients with polymicrobial infection, salvage therapy, severe disease, or lack of source control. Caution may be warranted in these patients before using dalbavancin for PJI.

“OPTIONS-DC,” a Feasible Discharge Planning Conference to Expand Infection Treatment Options for People With Substance Use Disorder

Hospitalizations for serious infection have increased in patients with OUD [18]. Sikka and colleagues retrospectively reviewed a novel program, “OPTIONS-DC,” that provides patient-centered treatment in a harm reduction model for those with SUD [10]. The authors describe an interprofessional conference, involving ID, addiction consult service members, an OPAT nurse and pharmacist, care management, and a hospital inpatient team to develop individualized antibiotic treatment plans, taking patient preferences into consideration, while mitigating identified risks. Using a structured form with standardized language to evaluate multiple factors (SUD, infection type, antibiotic route, discharge location, method of communication/transportation, and outpatient care), the authors utilized shared decision-making to develop patient-specific and feasible outpatient antibiotic regimens.

In total, 50 patients had an OPTIONS-DC conference, 42 with IV substance use, 44 with active SUD (opioids and/or methamphetamines), and 26 with insecure housing. Medication for MOUD was started in 32 patients while admitted. The conference recommended that 35 patients receive IV antibiotics, 14 receive long-acting injectable antibiotics, and 1 receive oral antibiotics at discharge, with recommended discharge locations for each patient (home, inpatient, skilled nursing facility). Twenty patients were discharged to home, and of those, 4 were prescribed home IV antibiotics, 4 were sent to an infusion office, 9 were given long-acting injectables, and 3 were provided oral antibiotics. Overall, 35 patients completed their intended/recommended regimen. Six patients prematurely self-discharged before their planned course completion, with 8 patients incompletely treated or lost to care.

The mean hospital length of stay was 28 days, with a mean of 12 days of antibiotics postdischarge.

Limitations identified when utilizing the conference to honor individual preferences included patient medical complexity, lack of support, transportation, or method of communication, and unsafe discharge settings. The OPTIONS-DC conference can provide a structure for shared decision-making, combining guideline-recommended treatment approaches with consideration of risks and patient goals, to develop tailored antimicrobial plans.

Safety and Tolerability of Fluoroquinolones in Patients With Staphylococcal Periprosthetic Joint Infections

With a broad antimicrobial spectrum, once- or twice-daily dosing, and high bioavailability, fluoroquinolones (FQs) are used frequently in PJI after an initial IV antibiotic course, consistent with guidelines from the Infectious Diseases Society of America [15]. However, given a growing number of adverse events reported with FQ use, the setting of extended courses of FQ in PJI necessitates the need for review of safety and tolerability.

Vollmer et al. performed a single-center, retrospective cohort study reviewing unplanned discontinuation of FQ-containing regimens compared with non-FQ-containing regimens in patients with staphylococcal PJI, with both groups receiving rifamycin [11]. One hundred fifty-six patients were included, with 64 (41%) having total hip arthroplasty (THA) infections and 92 (59%) having total knee arthroplasty (TKA) infections. Ninety (57%) patients received an FQ-based regimen. Unplanned drug discontinuations occurred in 32 (36%) of those in the FQ group compared with 2 (3%) in the non-FQ group. Median time to drug discontinuation in the FQ group was 3.5 weeks compared with 1.3 weeks in the non-FQ group in THA, and 9.5 weeks vs 20.3 weeks in TKA. The most frequent cause for drug discontinuation in the FQ group was tendinopathy, followed by myalgia, arthralgia, and nausea. However, the difference in severe ADEs in the FQ vs non-FQ group did not reach statistical significance; however, the overall rate of nonsevere ADEs in FQ compared with non-FQ regimens was 43.3% vs 6.1% ($P < .001$). Separately, the safety and tolerability of rifamycin were also evaluated. Twenty-three (14.7%) patients in this study had an early, unplanned rifamycin discontinuation, with the most common reasons including nausea, diarrhea, and pruritis. Ultimately, there was a significantly higher drug discontinuation rate in the FQ group when compared with the non-FQ group for long-term antimicrobial therapy in PJI, suggesting the need for management of these regimens by a specialized outpatient antimicrobial team.

Vancomycin or Daptomycin for Outpatient Parenteral Antibiotic Therapy: Does It Make a Difference in Patient Satisfaction?

Both vancomycin and daptomycin are IV antibiotics with activity against gram-positive organisms, including methicillin-resistant

S. aureus (MRSA). Vancomycin often requires multiple doses per day, with infusion times of at least an hour, and necessitates therapeutic drug monitoring. Daptomycin is given once every 24 or 48 hours and can be administered via IV push. The impact of antibiotic choice between these 2 agents on OPAT patient satisfaction was explored by Wu et al. [12].

In this study, the OPAT supervising physician completed a 5-question survey with adult patients via phone after they finished an OPAT course of vancomycin or daptomycin at home. Twenty-seven patients completed the study, with 15 receiving daptomycin and 12 receiving vancomycin. The median amount of interference with daily routines was higher for patients receiving vancomycin than those receiving daptomycin (5 [moderate] vs 0 [none]; $P = .03$). Patients receiving vancomycin also reported lower OPAT satisfaction scores (percentage of patients scoring at least 8 out of 10, where 0 is unsatisfied and 10 is extremely satisfied: 67% vs 100%; $P = .03$). There were no differences in rates of adverse events, hospital readmissions, or need to take time off work between the groups.

This small study indicates significantly higher patient satisfaction in receiving daptomycin instead of vancomycin for OPAT. Larger studies comparing other antibiotics and evaluating the interplay between patient satisfaction, health care costs, and overall outcomes would further add to the literature.

Comparison of Linezolid Step-Down Therapy With Standard Parenteral Therapy in Methicillin-Resistant *Staphylococcus aureus* Bloodstream Infections

Bloodstream infections (BSIs) due to MRSA are a major cause of morbidity and mortality, and treatment typically requires a lengthy course of IV antibiotics. Intravenous antibiotic use can be expensive, can increase the rate of hospital readmission, and is associated with catheter-related complications. As a result, the role of oral antibiotics as step-down therapy for MRSA BSIs has become a subject of interest.

Yeager et al. performed a retrospective single-center cohort study assessing adults receiving step-down/outpatient linezolid or standard parenteral therapy (SPT) with vancomycin or daptomycin for MRSA BSIs from 2011 to 2019 [13]. The primary outcome was 90-day infection-related re-admission (IRR) due to clinical worsening/relapse or infection recurrence. Yeager et al. included 215 patients, with 54 in the linezolid group and 161 in the SPT group (62% vancomycin, 38% daptomycin). The median total duration of therapy was 22 days for the linezolid group and 45 days for the SPT group. Patients received a median of 5 days of IV therapy before linezolid step-down. Ninety-day IRR occurred in 17% of the linezolid group and 26% of the SPT group ($P = .159$). The most common infection source was skin (34%), followed by BJI (15%), endocarditis (13%), catheter-related infection (12%), pneumonia (12%), and multiple sources (6%). Linezolid was more commonly used in BSI secondary to pneumonia, and SPT was more

commonly used when endocarditis or bone/joint was the source of infection. When applicable, patients were more likely to achieve source control within 72 hours of infection onset in the linezolid group. The severity of illness was similar across cohorts when comparing ICU admissions, vasopressor requirements, APACHE II score, and Pitt bacteremia score. However, patients in the SPT group were significantly more likely to have complicated BSI and metastatic foci. There was no difference between the groups for 90-day mortality or incidence of drug-related adverse events. However, more patients in the SPT group developed an adverse effect requiring hospitalization (12% vs 2%; $P = .024$).

This study demonstrated the efficacy and safety of linezolid oral step-down therapy for MRSA BSIs, particularly for those with BSI secondary to pneumonia and/or source control achieved in <72 hours. Furthermore, using linezolid as oral step-down therapy was associated with shorter hospital length of stay and fewer adverse effects requiring hospitalization. This could potentially lead to reduced cost of patient care and improved patient quality of life.

DISCUSSION

The practice of OPAT continues to grow in popularity among clinicians and patients. As a result, the amount of literature focusing on OPAT and COPAT has likewise increased. As clinicians may not be aware of, or able to read, all the relevant publications, our multidisciplinary, experienced OPAT group set out to summarize what we deemed the “top 10” OPAT papers published last year. Several themes emerged from the included articles. The use of, or switch to, oral antibiotics was discussed in 3 articles. Additionally, the treatment of patients with SUD was central to 2 articles. The remaining articles examined durations of therapy, unique indications, patient preference, and complications of OPAT.

For clinicians practicing or interested in OPAT, review of the articles presented in this manuscript will serve as a high-level review of some of the most important or impactful OPAT publications of 2021.

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