Clinical Monitoring of Outpatient Parenteral Antimicrobial Therapy (OPAT) - Adult - Inpatient/Ambulatory

Consensus Care Guideline

Population/Problem

This guideline provides information for adults prescribed outpatient parenteral antimicrobial therapy (OPAT) to guide laboratory monitoring selection and frequency and to guide OPAT discharge workflow.

Recommendations

All recommendations are derived from 2018 IDSA Clinical Practice Guideline for the Management of Outpatient Parenteral Antimicrobial Therapy.[1] For monitoring recommendations on medications not listed below, see the IDSA guidelines.

Based on the 2018 IDSA Clinical Practice Guidelines for the Management of Outpatient Parenteral Antimicrobial Therapy, the monitoring recommendations below are based on frequency and severity of adverse effects. The monitoring plan may be tailored to patient-specific factors, such as infection being treated, comorbid conditions, intended duration of OPAT, or other factors. Some patients may require more frequent or less frequent monitoring.

Inpatient infectious disease consults often have OPAT monitoring recommendations and should be followed when available.

Table 1 provides a summary of 2018 IDSA Clinical Practice Guidelines for the Management of Outpatient Parenteral Antimicrobial Therapy.

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Table 1[a,b,c]: Recommendations for OPAT and selected oral antimicrobial agents monitoring frequency (per week)[1]

	CBC with differential	BMP including K, Cr, BUN[d]	ALT, AST, Alkaline phosphatase, and Total bilirubin[e]	Drug Concentration	Other
Aminoglycosides • gentamicin • tobramycin • amikacin	Once	Twice		Drug concentration(s) at minimum weekly	Clinical monitoring for vestibular and hearing dysfunction (optimal frequency of monitoring unknown)
Beta-lactams • penicillins • cephalosporins • aztreonam • carbapenems • piperacillin-tazobactam	Once	Once	Once weekly with ceftriaxone, oxacillin, nafcillin, penicillin G, piperacillin-tazobactam, aztreonam, and carbapenems		
Fluoroquinolones • ciprofloxacin • levofloxacin	Not defined	Not defined	Not defined		Consider changing to enteral therapy if possible For longer courses of fluoroquinolone therapy, weekly lab monitoring may be appropriate
Daptomycin	Once	Once			Monitor CK at baseline and once weekly For guidance on when to consider discontinuing therapy based on CK elevations, see full IDSA guideline
Linezolid	Once		Once		Consider changing to enteral therapy if possible Monitor for neuropathy, optic neuritis, and potential for drug-drug interactions
Trimethoprim-sulfamethoxazole	Once	Once	Once		Consider changing to PO therapy if possible high fluid requirement; spurious increase in serum creatinine
Glycopeptides • vancomycin • dalbavancin • oritavancin	Once	Once		Vancomycin trough levels or AUC/MIC weekly and with dose changes	Oritavancin: unknown monitoring recommendations for duration greater than single dose Dalbavancin: unknown monitoring recommendations for duration longer than 2 weeks
Amphotericin B, including lipid formulations	Once	Twice	Once		Outpatient amphotericin use is very rare and if needed, should be managed in conjunction with Infectious Diseases Chemistry 10 preferred (sodium, potassium, chloride, bicarbonate, BUN, creatinine, glucose, calcium, magnesium, and phosphate) Sodium loading recommended
Azole antifungals • fluconazole • voriconazole • posaconazole (oral)	Once (posaconazole and voriconazole)	Once (posaconazole and voriconazole)	Once	Monitor plasma concentrations when appropriate	Consider changing to enteral therapy if possible. Avoid IV voriconazole if CrCL <50 mL/min unless benefit clearly outweighs risk.

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	CBC with differential	BMP including K, Cr, BUN[d]	ALT, AST, Alkaline phosphatase, and Total bilirubin[e]	Drug Concentration	Other
• itraconazole (oral) • isavuconazole (oral)					
Echinocandins • caspofungin • micafungin • anidulafungin	Once	Once	Once		
Ganciclovir	Twice	Once			Consider changing to enteral valganciclovir if possible
Acyclovir	Once	Once			Hydration is critical to prevent nephrotoxicity Consider changing to enteral valacyclovir, famciclovir, or acyclovir if possible

[a] Frequencies are minimal criteria for patients with normal or stable renal function. Different criteria may apply for children

[b] Some antimicrobials are not included due to low use in outpatient parenteral therapy. If necessary, refer to IDSA OPAT Guideline

[c] Oral therapy may require less intensive therapy

[d] UW Health Basic Metabolic Panel (BMP) includes: Electrolytes (sodium, potassium, chloride, total carbon dioxide and anion gap), Glucose, BUN, Creatinine, Calcium

[e] UW Health Comprehensive Metabolic Panel (CMP) includes: Electrolytes (sodium, potassium, chloride, total carbon dioxide and anion gap), Glucose, BUN, Creatinine, Calcium, Albumin, Total Protein, Total Bilirubin, AST, ALT, Alkaline Phosphatase. UW Health Liver Function Tests (LFTs) include: Alanine aminotransferase (ALT/SGPT); Albumin (ALB); Alkaline Phosphatase (ALKP); Aspartate Aminotransferase (AST/SGOT); Bilirubin, Direct (DBIL); Bilirubin, Total (TBIL); Protein, Total (TP)

Disclaimer

Consensus care models assist clinicians by providing a framework for the evaluation and treatment of patients. This guideline outlines the preferred approach for most patients. It is not intended to replace a clinician's judgment or to establish a protocol for all patients. It is understood that some patients will not fit the clinical condition contemplated by a guideline and that a guideline will rarely establish the only appropriate approach to a problem.

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Committee Approvals:
Antimicrobial Use Subcommittee: July 2022
Pharmacy & Therapeutics Committee:

Collateral Tools & Resources
The following collateral tools and resources support staff execution and performance of the evidence-based model recommendations in everyday clinical practice.

Guidelines

- Intravenous Vancomycin Use - Adult - Inpatient/Ambulatory Clinical Practice Guideline
- Pharmacokinetic and Pharmacodynamic Dose Optimization of Antibiotics (β-lactams, aminoglycosides, and ciprofloxacin) for the Treatment of Gram-Negative Infections - Adult - Inpatient/Emergency Department Clinical Practice Guideline

Protocols

- Vancomycin Dosing and Monitoring - Adult - Ambulatory Delegation Protocol [220]

References

1. Norris AH, Shrestha NK, Allison GM, et al. 2018 Infectious Diseases Society of America Clinical Practice Guideline for the Management of Outpatient Parenteral Antimicrobial Therapy. *Clin Infect Dis*. 2019;68(1):e1-e35. doi: 10.1093/cid/ciy745. PMID: 30423035.

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Appendix. Clinical Considerations for OPAT and/or Home Infusions

- Try to avoid checking inpatient drug concentrations on the day of discharge if possible; Infusion agencies process orders and prepare the first home dose the morning of discharge; pending troughs will delay care
- Coordinate recommended lab monitoring with the primary team and the ID recommendations
- Methods of administration in the home for anti-infectives may include IV push, flow regulator on an IV pole, elastomerics, or an ambulatory infusion pump
  - Coordinate pump type/infusion duration with case managers and home infusion company/infusion center staff/SNFs, etc.
  - Factors that may improve OPAT regimen adherence:
    - Once-daily administration or bag change
    - Short infusion duration or IV push administration
  - Factors that prohibit short infusions or IV push antibiotics with OPAT may include (but are not limited to):
    - Accepting facility or patient family unable to perform multiple administrations daily
    - Patient inability to complete short infusion or IV push independently
    - Therapeutic inferiority with short infusion
- The following antimicrobials have frequent dosing intervals and can therefore be made in a 24-hour bag by UW Health Care Direct (other home infusion agencies may have different practices), which can be given as continuous infusion or programmed on a pump that fires intermittent doses from the same bag:

Acyclovir	Cefotetan	Ceftolozane-tazobactam
Ampicillin	Cefoxitin	Meropenem*
Aztreonam	Ceftazidime	Nafcillin
Cefazolin	Cefuroxime	Oxacillin
Cefepime	Clindamycin	Penicillin G potassium
Cefotaxime	Piperacillin-tazobactam	Vancomycin

  * Must change bag after 12 hours instead of 24 hours
- Ampicillin-sulbactam does not have good home stability and cannot be given as a 24-hour bag; patients or caregivers have to be willing and able to administer this medication multiple times a day
- Some SNFs or Home Health agencies cannot run extended infusions, cannot administer medications every 6 hours, and/or cannot hook patients up to 24-hour pumps
  - This is rare, but can create difficulty if it occurs. Attempt to confirm this before discharge day
  - The dosing for extended beta-lactam infusions and intermittent/short infusions may be different; refer to the Pharmacokinetic/Pharmacodynamic Dose Optimization of Antibiotics for the Treatment of Gram-negative Infections Clinical Practice Guidelines
- If antimicrobial infusion cost is preventing discharge to home or to other facility, work with attending team and/or Infectious Disease service to identify if other antimicrobial choices may facilitate discharge

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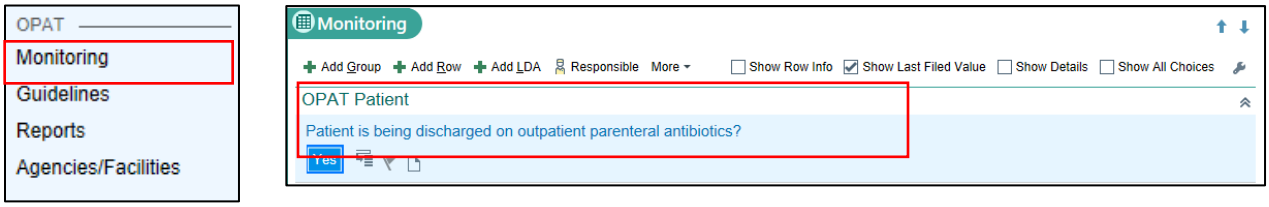
Appendix. Coordinating an OPAT Discharge

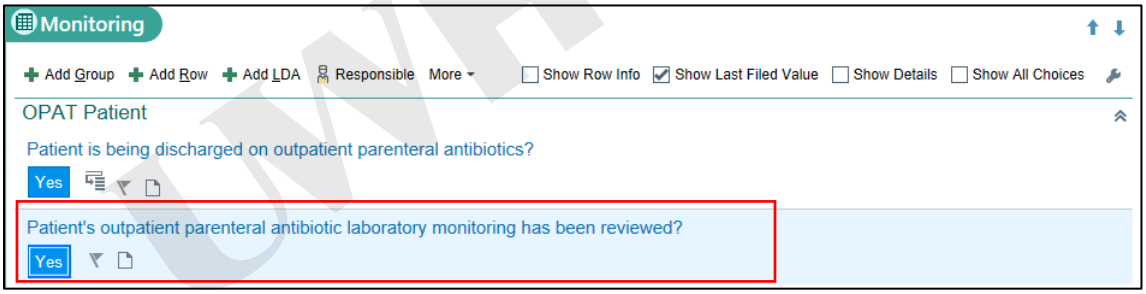
Step 1: OPAT Discharge Navigator and Laboratory Monitoring

1. Select the OPAT button for ALL patients that discharge on IV antimicrobials



2. Confirm team has ordered appropriate labs
    a. Labs should appear in the OPAT monitoring navigator if they are ordered through UW Health. If ordered outside of UW Health, labs will not appear in this section and confirmation of ordering will need to be made by discussion with primary team.

    b. Compare ordered labs to OPAT Consensus Care Guideline (see Table 1 above) and/or IDSA OPAT guidelines and the ID consult note (if available)
    c. Ask team to order any missing labs (lab ordering is the responsibility of the provider)
    d. Confirm date for first outpatient drug level (if necessary) by communicating with infusion agency
        i. Some Home Health nurses can only draw labs on certain days; discuss with infusion agency to confirm most appropriate time for first outpatient drug level
    e. Select "laboratory monitoring has been reviewed" button in HealthLink



Step 2: Contact Home Infusion Agency

1. Look at social work or UW Health Care Direct note in HealthLink for fax numbers, contact information, or planning information
2. UW Health Care Direct nurses are available during business hours at UW University Hospital
3. UW Health Care Direct main office: 608-831-8555
    a. Can speak to pharmacist during business hours for drug or dosing questions
    b. Can ask to speak with on-call pharmacist after-hours or on weekends
4. UW Health Care Direct fax: 608-831-9747
5. Paging (262-2122) can assist in contacting a home infusion agency

Step 3: Preparing OPAT Prescription

1. Ensure team orders drug for injection on discharge
    a. Discharge Navigator → Order Reconciliation → Discharge Orders → *Type in the antimicrobial name* → Database lookup

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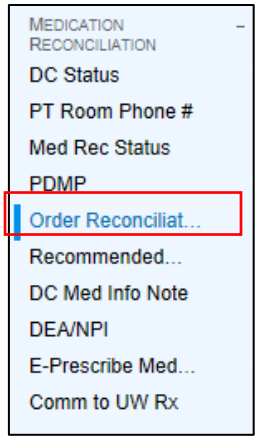

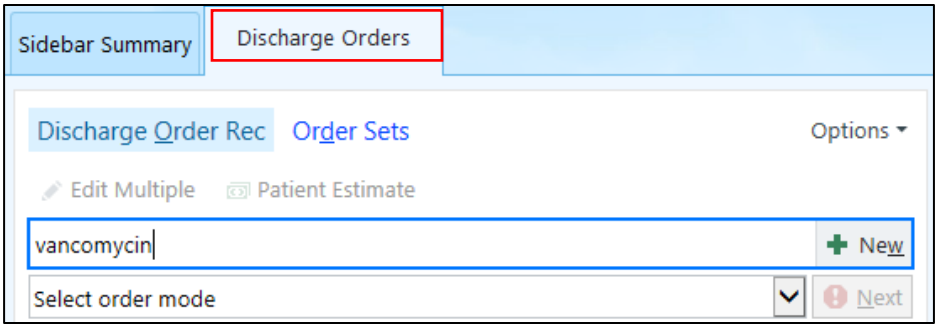

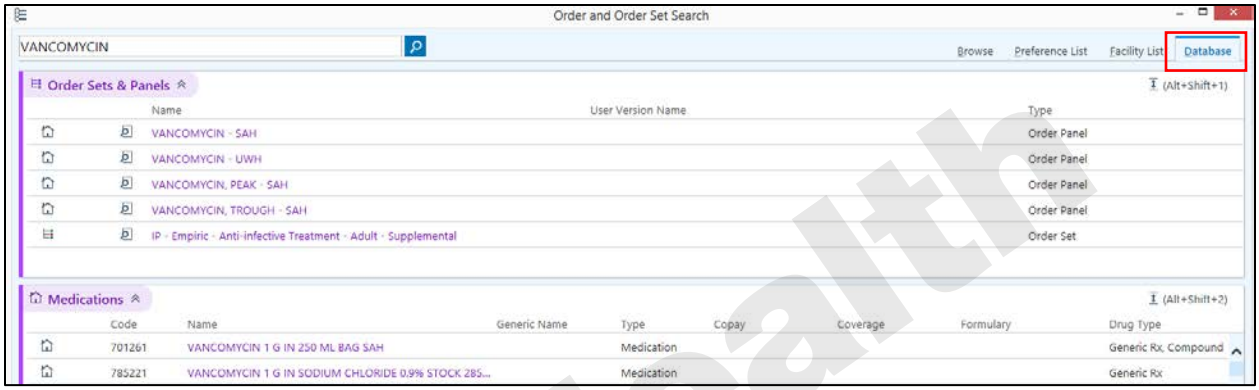

   b. Use chart below to select the correct product
2. Do NOT order the drug in a base fluid
   a. The infusion agency will put the drug in the most appropriate fluid and concentration for home stability when the infusion agency pharmacists receive the prescription
3. Round dose to nearest 10 mg for daptomycin
   a. To avoid drug waste, consider rounding to nearest vial size if within 10 mg. Available vial sizes are 350 mg or 500 mg.
4. Change dispense quantity to “1 each”
5. Change refills to “70” even if duration is known
   a. This allows the infusion agency to re-dispense drug if patients have storage issues or malfunctions while dispensing at home
6. If duration is known, add anticipated stop date as a note in Discharge Medication List and discharge hand-off note
7. Print prescription for fax and have prescriber sign
8. Fax to infusion agency
9. Include the name of the provider who will follow the patient after discharge in the discharge hand-off note

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Antimicrobial Drug for Injection Medication Record Numbers (ERx):

Antimicrobial	ERx for OPAT Injection Database Lookup (F7)	Concentrations or Strengths
Liposomal amphotericin	58058	50 mg
Acyclovir	44030	500 mg
Amikacin	785038	250 mg/mL
Ampicillin	34543	1 g
	34546	2 g
Ampicillin-sulbactam	50601	1.5 g
	50599	3 g
Azithromycin	57146	500 mg
Aztreonam	44264	1 g
	44265	2 g
Caspofungin	66233	50 mg
	66234	70 mg
Cefazolin	35636	1 g
Cefepime	52161	1 g
	52163	2 g
Cefoxitin	44555	1 g
	44557	2 g
Ceftazidime	44571	500 mg
	44568	1 g
	63789	2 g
Ceftazidime-avibactam	167521	2.5 g
Ceftolozane-tazobactam	166371	1.5 g
Ceftriaxone	44581	1 g
	44582	2 g
Cefuroxime	35657	750 mg
	700179	1.5 g
Ciprofloxacin	144939	200 mg/20 mL
	144940	400 mg/40 mL
Clindamycin	119041	300 mg/2 mL
	119039	600 mg/4 mL
	119040	900 mg/6 mL
Daptomycin	73977	500 mg
Ertapenem	68678	1 g
Ganciclovir	45226	500 mg
Gentamicin	37859	10 mg/mL
	37860	40 mg/mL
Levofloxacin	54892	25 mg/mL
Linezolid	170913	200 mg/100 mL
	170914	600 mg/300 mL
Meropenem	53238	500 mg
	53239	1 g
Micafungin	107268	50 mg
	115014	100 mg
Nafcillin	39988	1 g
	39990	2 g
	179516	10 g
Oxacillin	40651	1 g

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Antimicrobial	ERx for OPAT Injection Database Lookup (F7)	Concentrations or Strengths
	40653	2 g
	18684	10 g
Penicillin G Potassium	40825	5,000,000 units
	40824	20,000,000 units
Penicillin G Sodium	40826	5,000,000 units
Piperacillin-tazobactam	54253	2.25 g
	54252	3.375 g
	54251	4.5 g
Rifampin	46481	600 mg
Sulfamethoxazole-trimethoprim	42456	400-80 mg/5 mL
Tigecycline	107987	50 mg
Tobramycin	135889	40 mg/mL
	104635	80 mg/2 mL
Vancomycin	43437	500 mg
	135474	750 mg
	180797	1000 mg
Voriconazole	69968	200 mg

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