Miami Cancer Institute
BAPTIST HEALTH SOUTH FLORIDA

Immunocompromised Infectious Diseases
Advanced Pharmacy Practice Experience Syllabus

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Rotation Site Information:
The Miami Cancer Institute (MCI) at Baptist Hospital of Miami (BHM) is a next-generation cancer treatment destination comprising of several outpatient clinics known and is known for its leading clinical care and research, compassionate patient experience and state-of-the-art technology. Enhanced by an alliance with Memorial Sloan Kettering, our 140,000-square-foot research facility provides patients access to clinical trials and ground-breaking treatments that could lead to positive outcomes. The outpatient clinics are continuing to grow but as of writing the site has about 1,300 total employees which includes 82 physicians and 106 Advance Practice Providers. MCI is attached to BHM which is the flagship hospital of Baptist Health South Florida. MCI has two floors in Hope Tower at BHM dedicated to its cancer patients. Founded in 1960, BHM has nearly 700 inpatient beds, 100 emergency room beds, and over 36,000 admissions every year.

Rotation Description:
The Immunocompromised Infectious Diseases (ID) rotation is an Advanced Pharmacy Practice Experience (APPE) offered at MCI. The purpose of this rotation is to expand the learners knowledge base of opportunistic ID in immunocompromised hosts, specifically in the oncology patient population. This rotation will provide the learner with the opportunity to round inpatient with the Blood & Marrow Transplant (BMT) multidisciplinary team and/or ID physicians taking care of patients in the oncology wards with a variety of infectious diseases within a large community hospital. Multidisciplinary BMT rounds occur every morning and include a BMT attending, advanced practice providers, nurses, an oncology clinical pharmacy specialist, pharmacy residents, and pharmacy students. Individual rounds with ID physicians will be dependent upon the physician's schedule.

With supervision, the learner will demonstrate ownership of and responsibility for the patients on the oncology wards at BHM. The learner will work up patients individually and plan to discuss patients. When working with the BMT consult service, it is expected the learner will attend interdisciplinary and bedside rounds when available. The learner should be able to provide concise, applicable, comprehensive, and timely responses to requests for drug information from the medical teams. Lastly, the learner should communicate ongoing infectious diseases concerns and recommendations to the primary team pharmacist with appropriate documentation.

Rotation Objectives:
- Evaluate, present, and discuss appropriate pharmacotherapy recommendations for patients with infectious complications to optimize antibiotic selection, dosing, and duration
- Explain common infectious diseases related conditions including patient symptoms, diagnostic criteria, therapeutic considerations and pharmacokinetic/pharmacodynamic concerns
- Develop monitoring plans for selected therapies to assess for expected therapeutic response or antimicrobial toxicities
- Investigate clinical questions and formulate evidence-based recommendations to inquiries posed by BMT and ID Consult Services with supervision by MCI/BHM Antimicrobial Stewardship pharmacy preceptors

Competencies and Tasks:

1. Collect patient specific data (pharmacy database system, computerized laboratory system, patient chart, nursing records) to design a pharmacotherapeutic plan.
   The learner will be able to collect and analyze subjective/objective data related to infectious processes.
   a) Identify relevant information with respect to acquisition of infection (i.e., source, travel history, social history, etc)
   b) Quality of symptoms
   c) Quantity, e.g., intensity, frequency, volume (i.e., sputum, drainage), etc.
   d) Identify relevant information on the flowsheet including vital signs, pain scale, ins and outs, etc.
   e) Identify relevant radiology and laboratory data
   f) Cite relevant drug specific guidelines

2. Identify and interpret signs suggestive of infectious diseases:
   a) Interpret vital signs such as pulse, temperature, respiration rate and blood pressure.
   b) Interpret culture and susceptibility data, drug levels, diagnostic test results and other relevant laboratory data to evaluate liver function, fluid balance and renal function.
   c) Interpret changes in any secretions or oxygen requirement.
   d) Interpret Gram stains of clinical specimens such as sputum, tissue, and spinal fluid.
   e) Interpret CSF, urinalysis, peritoneal fluid cell count results
   f) Identify other abnormal signs of different organ systems
   g) Identify limitations (including the effect of medication) to utilizing test results
   h) Identify any discrepancies between medications ordered and those dispensed

3. Develop a infectious diseases pharmacotherapy problem list
   a) Assess each patient for the potential of the following drug related problems:
      - receiving medication which is not needed
      - not receiving needed medication
      - therapeutic duplication
      - drug-drug interactions
      - adverse drug reactions
      - antibiotic allergies
      - failure to receive medication
      - inappropriate dosage regimen
      - inappropriate medication selection
   b) Perform literature search to identify evidence-based support for the presence of the drug related problem (if needed)

4. Develop a therapeutic plan for identified patient-specific problem(s) through utilization of pharmacodynamic, pharmacokinetic, pharmacotherapeutic, economic, quality of life and ethical/legal considerations
   a) Develop a complete plan in sufficient detail that a clear medication and/or monitoring order can be written
   b) Identify how pharmacodynamics/pharmacokinetics of antimicrobials can be used in the development of dosage regimen recommendations in renally impaired patients
   c) Provide literature to support drug therapy plan
   d) Discuss patient specific factors which make a desired therapeutic agent undesirable (i.e., comorbidities, drug interactions, etc.
   e) Identify mechanisms of resistance employed by microorganisms and their impact on the pharmaceutical care plan

5. Implement the pharmacotherapy plan
   a) Verbally communicate the complete plan with supporting rationale to the physician or other health care provider
   b) When appropriate write a verbal order and have it cosigned by a licensed practitioner

6. Monitor/modify the therapeutic plan
   a) Follow appropriate monitoring parameters
   b) Identify desired outcome and time frame for achieving (if appropriate) each parameter
   c) Use results of monitoring parameters to adjust the pharmacotherapy regimen as needed

7. Document outcomes achieved through the implementation of the therapeutic plan
   a) Document in chart all kinetic evaluations (level assessment and plan for continued therapy), and provide appropriate documentation on pharmacist daily progress notes for kinetics
   b) Document in Cerner

8. Disseminate pharmacotherapeutic knowledge to patients, practitioners, and health-care team members to foster the safe, effective, and cost-effective use of therapeutic agents.
   a) Formulate appropriate responses to all drug therapy questions arising from daily rounds, attending physicians, nurses, residents and preceptors
   b) When possible provide medication education to patients (especially those admitted due to a drug-related problem)
   c) Deliver a case/topic presentation to the pharmacy staff

9. Appropriately interview each patient for medication history
   a) Identify key questions to ask
   b) Identify appropriate time to approach family members or call the patient's outpatient pharmacy to clarify medication history

10. Present daily cases in an organized and complete case presentation format
    a) Adhere to the case presentation format provided
    b) Maintain patient data in a systematic, concise manner

11. Extract important and relevant information from primary literature and apply it to patient care
    a) Demonstrate competence in extracting important aspects of primary literature articles
    b) Identify issues which appear to be controversial or inconsistent from one article to another
    c) Draw appropriate conclusions from primary literature
    d) Critique results from an individual article and apply to a particular patient
    e) Using tasks a-d above, be prepared to participate in therapeutic discussions of topics which may include pathogenesis, natural history, epidemiology, differential diagnosis, treatment and prevention of the following problems and diagnoses related to infectious diseases.
       - Principles of anti-infective therapy
       - Pharmacokinetics and pharmacodynamics of anti-infective agents
       - Pneumonia
       - Peritonitis, gastrointestinal/abdominal infections
       - Genitourinary tract infections
       - Skin and soft tissue infections
       - Overview of Infectious Complications after Hematopoietic Stem Cell Transplantation (HSCT)
       - Overview of Infectious Complications of Chimeric Antigen Receptor (CAR) T-cell Therapy
       - Overview of Infections in Malignant Hematology
       - Inpatient Antimicrobial Stewardship in the Adult Oncology and HSCT Population
       - Opportunistic Infections in Immunocompromised Hosts

- Febrile Neutropenia
- Adenovirus
- Cytomegalovirus (CMV)
- *Toxoplasma gondii*
- *Pneumocystis jirovecii* pneumonia
- Hepatitis B Virus (HBV)
- Epstein-Barr virus-related post-transplant lymphoproliferative disease (EBV-PTLD)
- Human herpesvirus 6 (HHV-6)
- Varicella-Zoster Virus Disease (VZV)
- Respiratory Syncytial Virus (RSV)
- Invasive Fungal Infections

12. The learner will have a basic understanding of pharmacologic principles to utilize antimicrobial agents safely and effectively. This includes distribution to peripheral as well as specialized sites. Though not limited to, but the learner will review the following class of anti-infectives;
    - Aminoglycosides
    - Penicillins and B-Lactam Inhibitors
    - Cephalosporins
    - Carbapenems and Monobactams
    - Macrolides, Clindamycin, Ketolides
    - Glycopeptides, Streptogramins, Lipopeptides, Linezolid
    - Polymyxins
    - Sulfonamides and Trimethoprim
    - Quinolones
    - Antifungal Agents
    - Miscellaneous (Rifamycins, Metronidazole, TCNs, etc)
    - Antiviral Agents (Other Than Antiretrovirals)

13. Demonstrate a sense of responsibility for drug therapy outcomes of the patients being followed
    a) Ensure all accepted recommendations are implemented
    b) Review medication administration record daily
    c) Monitor patients to ensure obtainment of desired outcome and avoidance of negative outcomes
    d) When available review medical chart of patient(s) as necessary
    e) Always evaluate assigned patients prior to attending rounds

14. Perform physical assessment when appropriate and ability to interpret the results of the physical exam
    a) Understand the pathophysiology behind rales, rhonchi, crackles & wheezes
    b) For patients with unique physical findings, go with the resident to view findings

15. Respond appropriately to constructive criticism
    a) Incorporates daily feedback to strive for continual performance improvement

16. Complete all assignments on time
    a) Adheres to deadlines for case presentation, therapeutic discussion, and draft of inservices
    b) Demonstrates appropriate time management skills in meeting deadlines

17. Shows initiative and accepts responsibility for own learning
    a) After sufficient instruction is given learner works independently
    b) Demonstrates independent problem solving skills
    c) Demonstrates desire to accomplish more than minimum requirements

18. Deliver a well prepared inservice to the healthcare team members
    a) Works independently to develop the presentation
    b) Incorporates key references from the literature
    c) Responds well to questions which arise during the inservice

Housekeeping/Orientation

- It is expected the learner review assigned patients with their preceptor daily. Typical start times for rounding with the BMT consult service is 0900, but is dependent upon attending preference and number of patients on the service.
- Successful completion of a rotation is dependent on the active participation of the learner in the care of their patients. The learner will take full responsibility for the patients under their review. Learners will develop and present therapeutic plans with monitoring their patients and perform an abbreviated presentation prior to daily rounding with the BMT team if allowed. Patients that have opportunities for therapeutic optimization will be presented and discussed with pharmacy preceptors. If experiencing a reduced patient load, learners should take advantage of this to spend time reviewing infectious diseases topics related to patients under their care or topic presentation.
- A minimum of 40 hours of patient care activities per week are expected on each clinical rotation. Meetings unrelated to infectious diseases will not count toward the 40 hour target. Meetings outside of this rotation should NOT be scheduled before 2pm to avoid interrupting the rounding experience unless pre-approved by the lead preceptor(s).
- Primary work area is flexible and includes the learner's designated work space on the oncology wards or in the MCI administration office if space allows.
- If an unanticipated conflict arises that causes the learner to be absent from rotation they must: notify the preceptor and email the program director, or the absence will be considered unexcused.
- Intro to key pharmacy team members:
    - Timothy Gauthier, PharmD, BCPS, BCIDP — Manager, BHSF Antimicrobial Stewardship Clinical Program
    - Jefferson Cua, PharmD, BCIDP – PGY1 pharmacy practice at the University of Michigan. PGY2 Infectious Diseases at the University of Wisconsin. A member of the BHSF ID clinical team since August 2020.
    - Kelsey Williams, PharmD, BCIDP – PGY1 pharmacy practice at the University of Cincinnati. PGY2 Infectious Diseases at Massachusetts General Hospital. A member of the BHSF ID clinical team since August 2020.
    - Lee Amaya, PharmD, BCIDP – PGY1 pharmacy practice at the University of Nebraska. PGY2 Infectious Diseases at Beaumont Health. A member of the BHSF ID clinical team since August 2020.
- Orientation to Antimicrobial Stewardship
    - Learners will be assigned patients based upon interest to assess antimicrobial therapy. It is expected at least 3 patients will be discussed daily.
- Orientation to BMT and ID Consult Services
    - It is recommended, when available, that learners on service round with their appropriate team members to identify the rounding plan for the day and offer assistance with pharmaceutical treatment plans or transitions of care. Ideally, patient review has been completed by this time.

Activities/Expectations

Pre-rotation

- Prior to the rotation, the learner is to complete the APPE Intake Form and send to the lead preceptor(s).
- On Day 1 of rotation, the lead preceptor of the rotation will discuss the learning experience, learner specific goals/objectives, and create a calendar to facilitate the planning of rotation activities. This should include a review of the learner's customized plan
- Infectious Diseases resources include:
    - Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases.
    - IDSA Guidelines
        - https://www.idsociety.org/practice-guideline/alphabetical-guidelines/
    - NCCN – Prevention and Treatment of Cancer-Related Infections
        - https://www.nccn.org/professionals/physician_gls/default.aspx#infections
    - CLSI
        - https://clsi.org/standards/products/free-resources/access-our-free-resources/
    - HIV and Opportunistic Infections:
        - https://clinicalinfo.hiv.gov/guidelines
        - https://www.hiv-druginteractions.org/checker
        - https://hivdb.stanford.edu/hivdb/by-mutations/
    - BHSF Clinical Practice Guidelines
        - http://intranet.bhssf.org/en/departments-and-directories/pharmacy/Pages/Pharmacy-Protocols.aspx
    - The Sanford Guide to Antimicrobial Therapy
    - Lexicomp
    - Uptodate
- Complete pre-rotation assessment on first day of rotation. The same assessment will be completed upon completion of the rotation to evaluate learner progress.

Teaching

- The learner is to lead a case presentation or topic discussion at least 2-3 times per week.
- The learner is expected to prepare a one-page handout for each topic discussion to share with other learners and preceptors.

Conferences

- ID Stewardship Meeting: Weekly on Mondays via Zoom 1230-1300
- Antimicrobial Review Committee (ARC): 4th Monday of the Month 1800-1900 (optional)
- BHM Antimicrobial Stewardship Collaborative Meeting: 2nd Thursday of the Month 1200-1300
- MCI Antimicrobial Stewardship Collaborative Meeting: 1st Wednesday of the Month 1300-1400

Administrative Activities

- The learner will be given opportunities to conduct Medication Use Evaluations and other performance improvement projects that are deemed appropriate for the timeframe and learning experience. The goal is to complete one project during the rotation.

Patient Care Activities

- Assigned patients are expected to be reviewed daily. Patients receiving antimicrobial therapy with suboptimal dosing, spectrum, pharmacokinetics or have an inappropriate lifting of restriction will be discussed with the ID preceptor and physician. It is expected at least 3 stewardship patients will be discussed with the ID pharmacist daily.
- If the BMT and ID consult services have low censuses, the learner is expected to work on their topic discussion or dive into a therapeutic concern regarding their patients.
- Residents are expected to document interventions via Ad hoc. Refer to table 1 for reference.
- Timing will be customized for each learner based upon learner's abilities and timing of the learning experience during the academic year.

Evaluation:

- All written evaluations will be documented in PharmAcademic® or school-specific evaluation form.
- The learner will be provided verbal feedback on a weekly basis and be provided a summative evaluation no later than 7 days after the completion of the rotation. The summative evaluation must contain specific, actionable feedback the learner can complete on future rotations to meet that objective or a description of how the learner demonstrated achievement. Listing activities that were completed is not sufficient without prospective comments about what to improve on in the future. The Program Director will send back for revision any evaluation that does not contain this level of feedback. Team pharmacists are expected to provide feedback to the lead preceptor for collation and distribution to the team.
- The learner will complete a summative self-evaluation and an evaluation of the lead preceptor(s), team preceptors and learning experience within 3 days after completion of the rotation. This must contain specific, actionable feedback the preceptor can use with future learners or it must be sent back for revision.

Sample Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
	1	**2**	**3**	**4**	**5**
Week 1	• Rotation orientation/ Day 1 checklist	• Round with BMT • Topic/patient discussions	• Round with ID • Patient discussions	• Round with BMT • Topic/patient discussions	• Round with BMT • Patient discussions • Feedback Friday
	8	**9**	**10**	**11**	**12**
Week 2	• Round with BMT • Report-driven interventions • Patient discussions • **Formal Presentation Topic Due**	• Round with BMT • Report-driven interventions • Topic/patient discussions	• Round with ID • Report-driven interventions • Patient discussions	• Round with BMT • Report-driven interventions • Topic/patient discussions	• Round with BMT • Report-driven interventions • Patient discussions • **Midpoint checkpoint**
	15	**16**	**17**	**18**	**19**
Week 3	• Round with BMT • Report-driven interventions • Patient discussions	• Round with BMT • Report-driven interventions • Topic/patient discussions	• Round with ID • Report-driven interventions • Patient discussions	• Round with BMT • Report-driven interventions • Topic/patient discussions	• Round with BMT • Report-driven interventions • Patient discussions • Feedback Friday • **Formal Presentation Draft Due** (by 11:59 pm)
	22	**23**	**24**	**25**	**26**
Week 4	• Round with BMT • Patient discussions	• Round with BMT • Topic/patient discussions	• Round with ID • Patient discussions	• Round with BMT • Topic/patient discussions • **Formal presentation**	• Round with BMT • Patient discussions • **Final evaluation**

*Schedule is subject to change

Baptist Health South Florida Cerner AdHoc Antimicrobial Stewardship Intervention Guide

Table 1. Antimicrobial Stewardship Intervention Descriptions

#	Legend Key	Intervention Name	Intervention Definition	Intervention Example(s)
1	RDA	Dose optimization of antimicrobial: renal	Change to an antimicrobial dose or frequency (increase or decrease) due to renal function status. Excludes vancomycin and aminoglycosides.	• Reduce meropenem from 1gm TID to 1gm BID due to worsening renal function
2	NRDA	Dose optimization of antimicrobial: non-renal	Change to an antimicrobial dose or frequency due to something other than renal function. Excludes vancomycin and aminoglycosides.	• Reduce tigecycline dose based upon hepatic function • Increase voriconazole dose based upon level
3	VANCO/AGDA	Dose optimization: IV vancomycin or aminoglycoside	Change to IV vancomycin dose (interval or dose)	• Change IV vancomycin 1gm BID to 1gm daily
4	VANCO/AGAM	Antimicrobial monitoring (vancomycin or aminoglycoside)	Any monitoring intervention related to vancomycin or aminoglycosides	• Order initial vancomycin level • Order BMP • Modify ordered gentamicin level to new plan • Weight clarification that relates to antimicrobial dose changes
5	AM	Antimicrobial monitoring (not vancomycin or aminoglycoside)	Any monitoring intervention for an antimicrobial besides vancomycin or aminoglycosides	• Order CK level for daptomycin • Order BMP and CBC during osteomyelitis treatment with 6 weeks of cefazolin • Weight clarification that relates to antimicrobial dose changes
6	MICRO	Microbiology lab intervention	Microbiology lab test ordering, clarification(s) and/or request(s) for additional testing	• Order MRSA nasal swab • Request additional susceptibility testing
7	INT	Initiation of antimicrobial therapy	Start of an antimicrobial therapy not currently ordered	• Initiate PCP prophylaxis • Start daptomycin for VRE in blood
8	DIS MRSA	Discontinuation of antimicrobial therapy (for MRSA)	Stop an antibiotic being used to cover for MRSA	• Discontinue vancomycin that was empiric for pneumonia in patient with MRSA-negative nasal swab
9	DIS PSA	Discontinuation of antimicrobial therapy (for Pseudomonas)	Stop an antibiotic being used to cover Pseudomonas	• Discontinue piperacillin-tazobactam if patient on vancomycin + piperacillin-tazobactam and now has *E. coli* in blood • Switch from cefepime to ceftriaxone for Klebsiella when isolate returns sensitive
10	DIS DUP	Discontinue duplicate anaerobic therapy	Discontinue unnecessary anaerobic therapy	• Discontinue metronidazole for patient already on piperacillin-tazobactam when no indication for metronidazole is present
11	DIS	Discontinuation of antimicrobial therapy (for other)	Stop an antimicrobial being use to cover anything besides MRSA or Pseudomonas	• Discontinue azithromycin when patient has already received 5 days of CAP coverage

12	DET	Change to targeted antimicrobial therapy (“De-Escalation”)	Change to targeted therapy based upon clinical and/or microbiological data	• Discontinue vancomycin, initiate cefazolin for MSSA bacteremia
13	ESC	Change antimicrobial to cover drug-resistant organism (“Escalation”)	Change antimicrobial therapy to cover more drug-resistant organisms	• Change from ceftriaxone to cefepime for ceftriaxone-resistant *E. coli* pyelonephritis
14	IVPO	IV to PO conversion of antimicrobial drug	Change from parenteral route to enteral route antimicrobial drug	• Change from ampicillin-sulbactam to amoxicillin-clavulanic acid for infected human bite wound • Change from ceftriaxone to cephalexin for pan-sensitive *E. coli* UTI
15	DDI	Drug-drug interaction management	Recommend monitoring or change to therapy based upon drug-drug interaction	• Modify omeprazole schedule due to ledipasvir/ sofosbuvir dosing schedule
16	DFI	Drug-food interaction management	Recommend monitoring or change to therapy based upon drug-food interaction	• Modify dosing schedule so that oral fluoroquinolone is not given at meal time
17	DOT SHORT	Change to duration of therapy ordered (shorten)	Modify stop date so order will expire earlier	• Plan per provider is 7 days but current order allows for 10 day course, modify stop date to be consistent with plan
18	DOT EXTEND	Change to duration of therapy ordered (extend)	Modify stop date so order will expire later	• Plan per provider is 7 days but current order allows for 5 day course, modify stop date to be consistent with plan
19	CDI	*C difficile*-related intervention	Any intervention directed at the prevention, treatment, or diagnosis of *C. difficile*	• Discontinue repeat C difficile PCR ordered to test for cure at day 5 of therapy • Discontinue unnecessary PPI in patient undergoing C. difficile therapy
20	RES/NF	Restricted or non-formulary antimicrobial review	Review any restricted or non-formulary antimicrobial	• Review ceftolozane-tazobactam and document approval or disapproval
21	VACCINE	Vaccine recommendation	Recommend vaccination(s)	• Recommend pneumococcal vaccine in asplenic patient • Recommend flu vaccine for pregnant woman
22	EDU	Patient/ care-giver education	Provide education on antimicrobial(s) to patient or care-giver	• Review appropriate dosage and administration of an oral antibiotic with a patient • Discuss potential side effects of an antimicrobial drug with patient’s family member
23	ALLERGY	Allergy clarification	Clarification of an antimicrobial allergy	• Identify an inappropriate allergy label for penicillin and adjust the chart to reflect an accurate history or more accurate current allergy status

24	ART	Antiretroviral therapy intervention	Review any antiretroviral therapy for drug interactions, regimen optimization, or opportunistic infection prophylaxis modification	• Initiate MAC prophylaxis • Reconcile home medication regimen that was not ordered correctly inpatient (i.e. dolutegravir (Tivicay) missing from a combination regimen with emtricitabine / tenofovir alafenamide (Descovy)) • Modify omeprazole schedule due to atazanavir (Reyataz) dosing schedule
25	OTHER	Other antimicrobial intervention	Any intervention that does not fit into the above categories	
26	APR	Antimicrobial profile review	Any profile review that does not require an actionable intervention Note this is not an intervention, but is being retained in this capacity for workflow	• Review for dosing and monitoring of cefepime that does not lead to an intervention b/c no change needed
27	AADR	Antimicrobial Adverse Drug Reaction Management	Intervention that identifies and/or guides management of an antimicrobial adverse drug reaction	• Recommend pre/post hydration for acyclovir or amphotericin B infusions • Recommend discontinuing daptomycin due to CPK elevation with symptoms of rhabdomyolysis