Harper Hospital
Detroit Medical Center / Wayne State University

5BS
Infectious Diseases

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[1]Process Improvement tool for cross-coverage of 5 Brush South patients
Cystic Fibrosis, Multidrug-resistant tuberculosis, HIV- Monica Shieh, Pharm.D.

Dr. Kissner (pager #2325) has an adult cystic fibrosis clinic. When patient's require in-patient treatment they will be admitted to HUH, generally 5BS. If 5BS is full, they may be admitted to another unit, preferably in a private room. If Dr. Kissner is off she is usually covered by Dr's. Krell, Bander, Abousouan, or otherwise you can page Yvette LeFlore who is the CF coordinator who know all of the patients very well.

Patients with cystic fibrosis (CF) have altered pharmacokinetic parameters, specifically larger volume of distribution and higher clearances. However, as patients are repetitively exposed to aminoglycosides renal function may decline.

Currently all CF patients old "PMR's" are kept in the drug information center in the file cabinet directly below the case that hold the various patient floor dividers. Generally patients are started on doses that they were receiving on previous admissions. If you cannot find a PMR assume the patient has not been admitted to HUH.

Bacteria and antibiotic treatment associated with pulmonary exacerbations in CF patients. Antibiotics should be based on prior sputum samples and respective susceptibilities. Ceftazidime is only utilized when organism's susceptibilities are better than cefepime. Meropenem may be used when there are improved susceptibilities over imipenem,

Bacteria	**Drug**	**Dose**
P. aeruginosa	Cefepime **or** Ceftazidime (if resistant to cefepime) **or** Piperacillin/tazobactam **or** Imipenem **or** meropenem (fill out non-formulary form) Plus tobramycin **or** ciprofloxacin (give po if fxn git, check for drug allergies that decrease absorption)	2 gm iv q8h 2 gm iv q8h 3.375 iv q4h 750mg – 1gm iv q6h 1 –2 gm iv q8h per kinetic evaluation 400 mg iv q8h or 750mg po tid
S. aureus *MSSA* *MRSA*	 Nafcillin Vancomycin	 2mg iv q4h **or** 12gm iv q24h (continuous infusion) dose per nomogram
B. cepacia	Tmp/smx (dose based on tmp) **or** Chloramphenicol	5 mg/kg q6h po/iv 15 - 20 mg/kg q6h

Patients are also typically maintained on azithromycin 250mg MWF (<40kg) or 500mg MWF (>40kg). Azithromycin has been found to have anti-inflammatory and anti-pseudomonal properties. The recommendation for azithromycin is based on a multicenter, double blind placebo controlled trial, which demonstrated longer exacerbation free periods and improved FEV_1.

[1] Updated 11/01/04

Pharmacokinetic parameters for the CF patient

Vd = 0.35-0.45 l/kg for aminoglycosides
Vd = 0.65 l/kg for vancomycin
CrCl > 100ml/min assume KE 0. 3 – 0.4 – hr for aminoglycosides
Target levels: Cmax/Cmin: 14-16/<1mcg/ml
CF is an exclusion criteria for HDODA due to their altered pharmacokinetic parameters

Inhaled antibiotics

TOBI – tobramycin for inhalation 300mg via nebulizer bid
Colistin – 75 - 150mg inhaled bid

These typically are continued on a daily basis and may be altered monthly.

When should you check serum levels?

In general, most patients have ports already in place or Dr. Kissner will order a PICC line to be placed during the admission. PICC lines may be used after they have been placed. However, newly placed ports cannot be used for the first 72 hours. Dr. Kissner is very concerned regarding unnecessarily "poking" patients for lab tests that they do not require. Once you have determined the patient has a PICC or a port you can order levels.

Patient's weights should be checked/verified by the RN weighing the patient. One indicator of morbidity in the CF patient population is declining weights. Obviously a patient who has declining weight may have and altered (↓) volume of distribution than with previous admissions. In general, there is really no need to check levels on a weekend and can be delayed until Monday/Tuesday. BUN/SCr you may order on a weekly or twice weekly basis For Dr. Kissner if the patient has a port or a PICC. If a patient does not have this access, page Dr. Kissner and ask if she thinks the patient will be here long, or if she plans to send them out on IV antibiotics. If the patient is to be on aminoglycosides short-term (less than 5 days) there is no need to check levels.

Multi-drug resistant tuberculosis

These patients are also seen by Dr. Kissner. Since tuberculosis is a communicable disease we have had patients admitted to HUH who are court-ordered to be here, specifically to receive their medications.

Please check the doses of the medications based on mg/kg basis. The doses are included in the antimicrobial formulary and clinical guide page 33. If a quinolone is utilized we will continue to stock **levofloxacin** for this indication only. Generally, Dr. Kissner will trust the oral bioavailability of the quinolones. However, there have been a few scenarios in which she has insisted on intravenous administration. Generally this occurs in patients that may be refusing oral medications or she questions the patients GIT function and the subsequent oral absorption. If this is not the case then speak with

Dr. Kissner directly. If she refuses to change to oral and the patient can take oral medications, document this as an attending override (AO) from Dr. Kissner.

Aminoglycosides for tuberculosis

Dosing for the antitubercular drugs is found in the white antimicrobial formulary and clinical guide. Streptomycin levels are NOT routinely done. There is no accepted "therapeutic/toxic" levels associated with streptomycin levels. If they are drawn turn-around time is extensive (> 14days) and interpreting the levels once they are back is questionable. Streptomycin is the least nephrotoxic aminoglycoside, however it is the most ototoxic. As these patients tend to be on these regimens for an extended period of time, it is in your, and the patient's, best interest to interview the patient regarding ototoxicity. It may manifest as vestibular and auditory dysfunction- specifically balance and hearing. Questions that should be asked of the patient included:

1. Can you walk up and down the hallway now?
    a. If so are you having any problems with balance/dizziness?
    b. If you do develop any problems PLEASE let the pharmacist, nurse, physician know about it. (Remember ototoxicity is permanent and can significantly decrease the patient's quality of life!)
2. Do you have any hearing problems?
    a. Remember, the type of hearing that is generally lost with aminoglycosides is high pitch frequency. Most people do not speak in a high pitch frequency, so if there is any question regarding hearing ability or loss, an audiogram needs to be done. This is not done in the hospital. Generally ENT is consulted and they will take the patient to the clinic to do the audiogram. The results will be placed either in the consult section or the progress note section of the chart. It is ideal to have a baseline audiogram and repeated as needed. Having the baseline information helps to assess if loss of function is recent or antecedent. If you get feedback from the patient regarding any potential ototoxicity problems, inform the primary team for further evaluation. Obtaining an audiogram may take a few days up to a week depending on scheduling.

Streptomycin is given as an intra-muscular injection. Streptomycin may be substituted in the patient's drug regimen with **amikacin**, in order to give intravenously and to assess levels. If the patient qualifies for a high-dose aminoglycoside regimen, this dosing regimen can and should be utilized to maximize the pharmacodynamics. Levels can be ordered per pharmacokinetic policy, with appropriate interpretation and alterations in the regimen. Again, please do not go overboard with levels and ordering bun/scr as many of these patients will only have peripheral access. A weekly bun/scr is acceptable in these patients with stable renal function.

HIV

The HIV service has changed in 2003. There is no longer an admitting HIV service. Patients will be admitted under medicine, generally the medicine team then asks for an ID consult. (However, consults for ID are not automatic or always done.) The HIV patients are now seen by the Harper B Infectious Disease's service. The ID consulting

service has also changed slightly. The first consult of the day for the general service goes to the VA/Hutzel ID service. The various ID services are posted monthly in central pharmacy.

Patients with HIV infection tend to get quite complicated. One problem I see frequently is patients admitted to the hospital on the incorrect HIV regimens. Adherence to HIV medications is essential to decrease viral loads and ultimately increase CD4 counts. There is a computer system in the 5B conference room that if a patient is seen in the Infectious Diseases clinic in 7B in UHC, you can check their outpatient records. The computer system is called HAPI and the password changes monthly (only HIV clinic personnel have access to this system). **THIS IS NOT AN EXPECTATION FOR CROSS-COVERAGE!** If you are unable to access the HAPI system, try calling the clinic (x30934) to obtain the patient's regimen.

There are a number of reasons why HIV medications may be held when a patient is admitted to the hospital (for example: pancreatitis, drug hypersensitivity reactions, nausea/vomiting, acute renal failure, myelosuppression). The important thing when holding HIV medications is to hold the entire regimen rather than 1 or 2 drugs. Otherwise the development of resistance is quite likely to occur.

Since there are limited options for HIV treatment and drug choice is frequently based on individual resistant pattern, HIV medications are NOT substitutable. In general, all HIV medications that come to market will be added to formulary and we will be expected to stock and provide for in-patients.