



## Pharmacy

# The role of clinical pharmacist is pivotal in HIV outpatient clinics

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One of the major outcomes of the application of highly active antiretroviral therapy (HAART) to HIV disease, is the dramatic decrease in opportunistic infections that often accompany untreated or poorly treated HIV infections, thereby making this disease a chronic but manageable infection, amenable to long-term ambulatory care management.

The gains of HIV pharmacotherapy notwithstanding, problems with long-term toxicities due to antiretroviral therapy remain a concern, sometimes causing a parallel increase in hospital admissions. As this transition into long-term ambulatory care occurs within the prevailing atmosphere of lifelong polypharmacy, pharmacists, as gatekeepers for patients' medications, are placed in a position to offer unique services.

As the healthcare provider most accessible to the general public, and especially HIV-infected patients in-between their provider visits, ambulatory care pharmacists can play a pivotal role in optimizing HIV therapies. This can be done through their understanding of the pharmacology, side effects, issues affecting adherence for each individual patient, and drug-drug interactions associated with each patient's combination therapy. When ambulatory care pharmacists are trained to

effectively communicate this information to other members of the healthcare team through formal and informal HIV updates, as well as one-on-one consults to providers, patients, significant others and caregivers, improvements in clinical and virologic outcomes can be achieved for HIV-infected patients.

One such area where pharmaceutical care services can be optimized is through an assessment of the overlapping toxicities that tend to occur or be exacerbated when different combinations of drugs are offered to an individual patient. Since most current pharmacy computer software is able to list active and inactive medications on the patient profile, ambulatory care pharmacists are well-positioned to assist the provider in assessing to what extent individual drugs being administered to the patient may have caused or exacerbated toxicity. The tables shown here attempt to offer guidance on such overlapping adverse toxicities as they occur in HIV-infected patients undergoing HAART therapy along with concomitant drugs that cause similar toxicities. Hopefully their use will assist providers of HIV care to achieve better overall treatment outcomes. ♦

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**Table 1: HIV-related drugs with overlapping toxicities\***

- a) Drugs that cause bone marrow suppression**
- AZT
  - Cidofovir
  - Cancer chemotherapy
  - Dapsone
  - Flucytosine
  - Ganciclovir
  - Hydroxyurea
  - Interferon- $\alpha$
  - Pentamidine
  - Pyrimethamine
  - Ribavirin
  - Sulfadiazine
  - Trimethoprim-sulfamethoxazole (high doses)
  - Trimetrexate
- b) Drugs that cause nephrotoxicity**
- Adefovir (now removed from clinical trials)
  - Aminoglycosides
  - Amphotericin B
  - Foscarnet
  - Indinavir
  - Pentamidine
- c) Drugs that cause pancreatitis**
- Didanosine
  - Ethanol
  - Lamivudine (in children)
  - Pentamidine
  - Valproic acid



\* Concomitant administration of agents not recommended or if unavoidable, close clinical monitoring suggested.

**\*\*Cotrimoxazole**

\*\* Cotrimoxazole causes a 40% increase in the plasma concentrations of lamivudine and so may increase lamivudine toxicity such as headaches, myalgia and neutropenia. Monitor closely upon concomitant use.

**d) Drugs that cause hepatotoxicity**

Delavirdine  
Efavirenz  
Fluconazole  
Isoniazid  
Ketoconazole  
Nevirapine  
Nucleoside reverse transcriptase inhibitors  
Protease inhibitors  
Rifabutin  
Rifampin

**e) Drugs that cause rash with or without pruritis**

Abacavir  
Cotrimoxazole  
Dapsone  
NNRTIs  
Amprenavir

**f) Drugs that cause diarrhea**

Clindamycin  
Didanosine  
Nelfinavir  
Ritonavir  
Saquinavir  
Lopinavir/ritonavir

**g) Drugs that cause ocular toxicity**

Isoniazid (optic neuritis and optic atrophy)  
Cidofovir  
Ethambutol  
Lamivudine (uveitis in children)  
Rifabutin

**h) Drugs to avoid in patients with peripheral neuropathy (provider should assess risk to individual patient and take action as needed)**

**Single Ingredient drugs**

Didanosine (Videx, ddl)  
Nitrofurantoin (oral)  
Nitrofurantoin macrocrystal (oral)  
Nitrofurantoin sodium injection  
Stavudine (Zerit, d4T)  
Zalcitabine (Hivid, ddC)

**Multiple ingredient drugs**

Didanosine/calcium carbonate/magnesium salt (oral)  
Didanosine/magnesium salt/sodium citrate (oral)  
Nitrofurantoin/hexylresorcinols/cetrimonium (oral)  
Nitrofurantoin/nitrofurantoin macrocrystal (oral)  
Nitrofurantoin/pyridoxine HCL (oral)  
Nitrofurantoin/tetracaine (oral)  
Sulfadiazine/nitrofurantoin (oral)  
Sulfadiazine/nitrofurantoin/phenazopyridine (oral)  
Sulfamethizole/nitrofurantoin (oral)

**Related table  
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**Plan ahead to attend HIV conferences...**

- ▲ July 8-11, 2003  
5th International Workshop on Adverse Drug Reactions and Lipodystrophy in HIV  
Paris, France  
Email: lipodystrophy@us.intmedpress.com
- ▲ July 13-17, 2003  
The 2nd IAS Conference on HIV Pathogenesis and Treatment  
Paris, France  
Contact: JCD Conseil  
Email: ias2003@jcdconseil.com
- ▲ July 27-30, 2003  
2003 National HIV Prevention Conference  
Atlanta, Georgia  
Email: info@2003HIVPrevConf.org
- ▲ October 26-29, 2003  
9th European Conference on Clinical Aspects and Treatment of HIV-Infection  
Warsaw, Poland  
Sponsor: European AIDS Clinical Society  
Email: eacs2003@kit.de
- ▲ December 2-5, 2003  
8th World STI/AIDS Congress  
Punta del Este, Uruguay  
Contact: Congrex Sweden AB  
Email: congrex@congrex.se
- ▲ May 2-7, 2004  
17th International Conference on Antiviral Research  
Tucson, Arizona  
Sponsor: The International Society for Antiviral Research  
Contact: Dr. Brent C. Korba  
Email: korbabe@gusun.georgetown.edu
- ▲ June 3-5, 2004  
13th International Symposium on HIV & Emerging Infectious Diseases  
Toulon, France
- ▲ July 11-16, 2004  
XV International AIDS Conference  
Bangkok, Thailand



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**Table 2: Drug interactions with anti-*Pneumocystis carinii* pneumonia agents**

<b>Drug</b>	<b>Major adverse reactions</b>	<b>Interactions</b>
Atavoquone	Transaminase elevation, rash, fever	Increases levels of ZDV
Dapsone	Rash, nausea/vomiting, anemia, methemoglobinemia, neutropenia, thrombocytopenia, transaminase elevation	Increases levels of trimethoprim and dapsone that may increase both the pharmacologic and toxic effects of both drugs. Rifampin increases metabolism of dapsone while ddl decreases absorption of dapsone and may lead to failure of dapsone prophylaxis. Avoid.
Pentamidine	Nephrotoxicity, hyperglycemia, transaminase elevation, hyperkalemia, neutropenia, thrombocytopenia, pancreatitis, potentially life-threatening ventricular arrhythmias	Foscarnet: increased risk of nephrotoxicity, severe hypoglycemia and hypocalcemia. Avoid drugs that cause or exacerbate pancreatitis such as ddl.
Primaquine	Hemolysis (especially in G6PD-deficiency). Fever, rash, methemoglobinemia, transaminase elevation.	
Clindamycin	Diarrhea, nausea, vomiting, pseudomembraneous colitis, rash, fever, transaminase elevation	Opiates and diphenoxylate may worsen diarrhea. Kaolin-pectin antidiarrheals decrease absorption of clindamycin. Patient needs close monitoring.
Trimethoprim-sulfamethoxazole	Skin: erythema multiforme (Stevens-Johnson syndrome, rare), generalized skin eruptions, epidermal necrolysis, exfoliative dermatitis, photosensitivity, urticaria, pruritus. Nausea, vomiting, transaminase elevation, neutropenia, thrombocytopenia and fever.	Increased prothrombin time for patients on warfarin. Increases levels of dapsone and half-life of phenytoin due to protein binding.

Source: Adapted from multiple sources, mostly from Pharmacist's Drug Handbook 2002, American Society of Health Systems Pharmacists, Bethesda, Maryland and the DHHS Guidelines for the use of antiretroviral agents in HIV-infected adults and adolescents. Washington, DC. Department of Health and Human Services (DHHS) and the Henry J. Kaiser Foundation, February 4, 2002.