

# Drugs & Therapy

B • U • L • L • E • T • I • N

## FORMULARY UPDATE

The Pharmacy and Therapeutics Committee met February 19, 2002. 4 drugs were added in the *Formulary*. 1 drug was deleted. 3 drugs were designated not available.

◆ **ADDED**

**Dexrazoxane**  
(Zinecard® by Pharmacia and Upjohn)

**Gemtuzumab ozogamicin**  
(Mylotarg® by Wyeth-Ayerst)

**Lansoprazole**  
(PREVACID® by TAP)†

**Liposomal Daunorubicin**  
(DaunoXome® by Nextar)\*

†Suspension & Packets only — Pantoprazole is the oral solid in the *Formulary*

\*Restricted to ECOG 4999 only — only stocked by the Investigational Drug Service

◆ **DELETED**

**Vidarabine**  
(Vira A® by Parkdale)

◆ **NONFORMULARY, NOT AVAILABLE**

**Diltiazem ER (Cardizem® SR by Aventis)‡**

**Diltiazem ER**  
(Dilacor® XR by Watson)‡

**Diltiazem ER**  
(Tiazac® by Biovail)‡

‡Automatically interchanged to a Cardizem® CD generic equivalent

**Dexrazoxane** is a parenteral chemoprotectant agent used for reducing the incidence and severity of cardiomyopathy associated with the use of anthracycline-based chemotherapy regimens.

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## COST MANAGEMENT

# Converting patients from IV to PO medications

Several studies have shown that converting patients from intravenous to oral medications can dramatically decrease hospital costs. Past studies have found that 50% of patients receiving medications that are equally effective when given intravenously or orally were also on

### TARGET DRUGS FOR AUTOMATIC IV TO PO ROUTE CHANGE

Ciprofloxacin	Gatifloxacin
Famotidine	Pantoprazole
Fluconazole	Ranitidine

Past studies have found that 50% of patients receiving medications that are equally effective when given intravenously or orally were also on other oral medications, suggesting they could be switched to oral drugs.

other oral medications, suggesting they could be switched to oral drugs. These drugs are targeted because the direct cost reduction potential for them is high.

If total costs are considered, the savings are much more. The administration-associated costs must be considered for intravenous medications. These costs include tubing, diluents, time to prepare the medication, and delivery. The administration costs are much less for oral medications than the administration cost for the intravenous medications.

The bioavailabilities of the drugs in this program (see table) are good. Essentially, the same amount of drug is found in the blood when given intravenously or orally. There usually is no reason patients taking oral medications cannot receive these drugs orally.

After a daily screen using the pharmacy's computer system, pharmacists review patients receiving both intravenous and oral medications and 1 of the targeted drugs. A pharmacist then reviews the patient's chart to see if there is potential to change the patient from intravenous to an oral route. Patients are considered for conversion when the following criteria are met.

- Patient is not NPO.
- Patient is receiving other oral medications.
- Patient is not a psychiatric patient who refuses oral medications.
- Patient does not have a mechanical obstruction, such as esophageal sphincter incompetence or severe nausea and vomiting.
- Patient does not have a small bowel syndrome, inflammatory bowel disease, malabsorption syndrome, or any condition that prohibits receiving medications by mouth.

If the oral route is determined to be appropriate, the pharmacist will place an order in the patient's chart and document the change in the progress notes. The order and the note will be noted as a "P&T-Authorized Change."

## INSIDE THIS ISSUE

- ◆ Pharmacy intranet website
- ◆ Possible Avandia® error

**Formulary update, from page 1** Dexrazoxane has an FDA-labeled indication for use with doxorubicin administration in women with metastatic breast cancer who have received a cumulative doxorubicin dose of 300 mg/m<sup>2</sup>.

Dexrazoxane has been shown in clinical trials to reduce anthracycline-induced cardiac toxicity in patients who have already received 300 mg/m<sup>2</sup> of doxorubicin. Several large clinical trials have shown a statistically significant reduction in the change of left ventricular ejection fraction (LVEF) when dexrazoxane was used.

Although 1 study showed a statistically significant higher tumor response rate in patients receiving doxorubicin plus placebo versus doxorubicin plus dexrazoxane, the median survival time in the dexrazoxane group was nearly double that in the placebo group. Another study evaluated the effects of dexrazoxane when treatment was started after patients received a cumulative dexrazoxane dose of 300 mg/m<sup>2</sup>. It showed that the beneficial effects persisted despite the delay in administration. Therefore, it is prudent to delay therapy until a patient has received 300 mg/m<sup>2</sup>.

Dexrazoxane was associated with hematological toxicity in clinical trials. Patients experienced lower WBC nadirs during the 2 weeks following administration of dexrazoxane. Patients also had a lower platelet count; however, no patients suffered greater than grade 1 toxicity. Nonhematological effects included pain at the injection site.

Dexrazoxane was added in the *Formulary* for the prevention of cardiac toxicity in adult patients who have received 300 mg/m<sup>2</sup> of an anthracycline cytotoxic agent and who would benefit from additional treatment. The estimated cost of dexrazoxane for a course of chemotherapy is approximately \$650. Dexrazoxane may be considered for pediatric patients who have received 300 mg/m<sup>2</sup>, will continue doxorubicin therapy, and who are not eligible to participate in ongoing dexrazoxane clinical trials.

**Gemtuzumab ozogamicin** is an antibody-targeted chemotherapy agent. It is a conjugate of a cytotoxic agent (ie, calicheamicin) linked to a humanized antibody against the CD33 antigen. CD33 antigen is expressed on the surface of normal committed human colony-forming cells and on leukemia cells of most patients with acute myelocytic

leukemia (AML). Binding of gemtuzumab ozogamicin to leukemia cells results in cellular internalization of calicheamicin and cell death.

The most recent data documenting the efficacy and safety of gemtuzumab ozogamicin in patients with CD33-positive AML in first relapse showed an overall rate of remission of 30%. The median time to remission was 60 days.

Bone marrow suppression is the dose-limiting toxicity of gemtuzumab ozogamicin. Hepatotoxicity, including veno-occlusive disease (VOD), has been reported in association with gemtuzumab ozogamicin treatment.

The cost per dose is approximately \$5000. In a proportion of patients, this medication can be administered on an outpatient basis. However, often patients referred to Shands at UF cannot tolerate outpatient administration. Inpatient reimbursement will not compensate for the increased cost of gemtuzumab. For eligible patients, there is an outpatient reimbursement code, and gemtuzumab should be administered in the outpatient setting whenever possible. Gemtuzumab was added in the *Formulary* for use in patients with CD33-positive AML who are refractory to or intolerant to conventional chemotherapy.

**Lansoprazole** is an oral proton-pump inhibitor (PPI). It is as effective as other oral (ie, omeprazole, pantoprazole, rabeprazole, and esomeprazole) and parenteral (ie, pantoprazole) PPIs. The P&T Committee has previously designated PPIs therapeutically equivalent and has approved the therapeutic interchange to the preferred products listed in the *Formulary*. Pantoprazole remains the only intravenous PPI and is listed in the *Formulary*. Oral pantoprazole is the oral solid PPI listed in the *Formulary*.

Lansoprazole suspension and packets (ie, 15- and 30-mg doses) will now replace omeprazole suspension in the *Formulary* for all patients greater than 3 years of age. Omeprazole suspension will continue to be available, but will be restricted to patients less than 3 years of age. All other PPIs remain nonformulary and not available.

Lansoprazole suspension is more than 90% less expensive than omeprazole suspension. Also, the unit dose powder packet for reconstitution decreases workload and can be stocked in SureMed® cabinets for better access.

Initially, lansoprazole suspension will not be automatically interchanged in children less than 3 years of age because of the limited amount of data published in this age range. There are

5 published trials using lansoprazole in pediatric patients to increase stomach pH, GERD, and H. pylori infections. There are several other published abstracts. Benchmarking data revealed several pediatric hospitals that are already interchanging lansoprazole for omeprazole. Also, lansoprazole suspension is already being frequently prescribed to children at the Shands outpatient pharmacies because Florida Medicaid does not cover omeprazole.

Lansoprazole suspension and packets were added in the *Formulary* and the automatic interchange of omeprazole suspension will occur for all patients greater than 3 years old. Patients on intravenous pantoprazole (40 mg) who are receiving other medications down a tube, will be switched to lansoprazole suspension (30 mg). (See *Converting Patients from IV to PO Medications*, on page 1.)

**Liposomal daunorubicin** is a formulation of daunorubicin designed in an attempt to maximize the selectivity of daunorubicin for solid tumors in situ. In the circulation, liposomes help to protect the entrapped daunorubicin from chemical and enzymatic degradation, minimize protein binding, and generally decrease uptake by normal tissues. The specific mechanism by which liposomal daunorubicin is able to deliver daunorubicin to solid tumors is not known. Liposomal daunorubicin has a labeled indication for Kaposi's sarcoma in patients with advanced HIV disease.

Liposomal daunorubicin is restricted to use only in a specific clinical trial. This trial (ie, ECOG 4999) is a 4-arm protocol for the treatment of relapsed acute myelocytic leukemia (AML). The 4 arms are: intermediate dose cytarabine (IDAC) + gemtuzumab; IDAC + liposomal daunorubicin; or, cyclophosphamide-mesna + IDAC + topotecan. Currently, there are no published clinical trials to support the use of liposomal daunorubicin for refractory AML. This study is designed to help determine whether this is an appropriate indication.

The cost of liposomal daunorubicin for an average patient is approximately \$4000 per cycle. The patient or their insurance company will pay for the cost of the medication. The informed consent for this trial discloses this increased cost.

Liposomal daunorubicin will be stored only with investigational drug inventory to assure proper use and to prevent medication errors. There is  
(continued on next page)

**Formulary update**, from page 2 potential for confusion between liposomal and regular daunorubicin and between liposomal doxorubicin (Doxil<sup>®</sup>) and liposomal daunorubicin.

**Vidarabine** (adenine arabinoside or Ara-A) is an antiviral drug with activity against herpes viruses. It has been discontinued by its manufacturers. There are alternative antiviral agents listed in the *Formulary*.

**Diltiazem ER** is any dosage form of extended-release diltiazem. The FDA does not differentiate among the different extended-release diltiazem products when listing generic names. There are 4 extended-release diltiazem products

on the market. Cardizem<sup>®</sup> SR and its generic equivalents are dosed twice a day. The other products, (ie, Cardizem<sup>®</sup> CD, Dilacor<sup>®</sup> XR, and Tiazac<sup>®</sup>) are given once a day. Cardizem<sup>®</sup> CD and Dilacor<sup>®</sup> XR have generic equivalents and Tiazac<sup>®</sup> generics are anticipated soon.

These various products create problems because they are not generically equivalent (ie, "bio-equivalent") to each other. Each product has a different sustained-release mechanism. Although the pharmacokinetics of the once-a-day products are not identical, they are close and are considered clinically equivalent by many practitioners.

Cardizem<sup>®</sup> CD has the least peak-to-trough fluctuation.

As long as a beaded-capsule is available for use in small children, a twice-a-day product is not needed in the *Formulary*. Having both twice-a-day and once-a-day products available could lead to medication errors. Therefore, Cardizem<sup>®</sup> CD or a generic equivalent of Cardizem<sup>®</sup> CD was chosen and all other products will be interchanged to this product. The once-a-day products will be interchanged on a milligram-per-milligram basis. If Cardizem<sup>®</sup> SR is ordered, the dosage will be doubled and changed to an order for once-a-day administration.

## NEWS

# New pharmacy intranet site launched

The new Shands intranet, MedIC, was launched at the end of January. MedIC stands for Medical Information Center. It represents a new look, organization, and rules for the Shands intranet. You can access the site from any Shands or UF computer at <http://intranet.shands.org/>.

The Shands at UF Department of Pharmacy Services was 1 of the first departments to adopt the MedIC structure. The new website can be found at <http://intranet.shands.org/pharm/menu.htm>.

The website is packed with useful information that can help answer questions about drug therapy or the Department of Pharmacy Services. If you cannot find the information that you want on the website, there is contact information, including email addresses and telephone numbers, which should direct you to someone who can help you find the information that you need.

The figure shows the Department of Pharmacy Services' homepage. The homepage contains News and Announcements and contact information

for the various areas of the department. For example, there is contact information for the various clinical specialists, the P&T Committee, and the Outpatient Pharmacy.

The navigation bar at the far left provides links that help the user move around the site. This navigation bar is designed to provide the most used links at the top and provide an outline for the information that is available in the site. The major sections are Drug Information, The Formulary, The P&T Committee, The Outpatient Pharmacy, and Pharmacy Department Tools.

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The screenshot shows a web browser window with the URL <http://intranet.shands.org/pharm/menu.htm>. The page title is "MedIC Pharmacy Services". A search bar labeled "Search MedIC:" is located in the top right. The left sidebar contains a navigation menu with the following sections:

- Drug Information**
  - Clinical Pharmacology 2000
  - Drug Information Center
  - Drug Information Links
  - Drugs & Therapy Bulletin
  - Pediatric Dosing Guide
- The Formulary**
  - Drugs Listed
  - Do Not Crush
  - Recent Updates
  - Restricted Drugs
  - Therapeutic Interchange
  - Nonformulary & Not Available
  - Request Nonformulary Drugs
  - Shortages
  - Adding a Drug
  - Charity Care Formulary
- The P&T Committee**
  - Description
  - Adding a Drug
  - ADR Reporting
  - Contact Information
- The Outpatient Pharmacy**
  - Contact Information
  - Charity Care Formulary
  - Employee Refills
- Pharmacy Department Tools**

The main content area is divided into several sections:

- News and Announcements**: A photograph of various pharmaceutical bottles and pills is shown. To the right of the image is a bullet point: "New Pharmacy Intranet Site Launched February 1, 2002".
- Department Contacts**: This section lists contact information for two individuals:
  - Department of Pharmacy Services**
    - Alan K. Knudsen, MS, Director of Pharmacy Services, (352) 265-0404, e-mail: [knudsen@shands.ufl.edu](mailto:knudsen@shands.ufl.edu)
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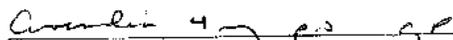
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## MEDICATION ERROR PREVENTION

# Avandia® or Coumadin?

Confusion has been reported between poorly handwritten orders for Avandia® (rosiglitazone), an anti-diabetic agent and Coumadin® (warfarin). Although it is difficult to imagine why the 2 names would be confused, they can look alike when handwritten. As the figure shows, confusion is possible. Is this order (from another hospital) for Avandia® or Coumadin®?

Both medications are available in 2-mg and 4-mg strengths. The usual dosage frequency is daily for both drugs. Clearly written orders will help avoid an error. Consider printing these orders.



### News, from page 3

The popular drug information reference *Clinical Pharmacology 2000* (CP 2000) is the first link on the navigation bar. A link to the Drug Information Center, where you directly submit questions, is second. A page of useful drug information links is next. The current and back issues of the *Drugs & Therapy Bulletin* are also available. Soon, an updated version of the popular *Pediatric Dosing Guide* will be posted.

The first link under The Formulary is Drugs Listed in the Formulary. This page allows the user to determine whether a medication is readily available for use at Shands at UF. A radio button will enable searches by Therapeutic Class or Generic-Brand Name. This search page has been enhanced to allow the user to type in the first few letters of a drug name into the search box. Once the drug is found, hit enter, and the dosage forms and cost of each item will be displayed. Please remember that we list common brand names so that listing can be located. This does not mean that that particular brand is available. Drugs are listed in the *Formulary* as generic entities.

Also, listed under The Formulary are links for Restricted Drugs, Thera-

peutic Interchanges, Shortages, and the forms that can be used to request that a drug be added in the *Formulary*. Recent changes in the *Formulary* can be found at Recent Updates. This is essentially the same information that is found in the Formulary Update section of the *Bulletin*.

If you are having trouble navigating the intranet, remember the Search MedIC box. This allows you to search the entire intranet. If you are trying to remember when or if a drug was added in the *Formulary*, simply type the drug's name in the box and hit search. This can be done from any page, including the main MedIC page. This will avoid clicking multiple links to find a page.

There are many more resources on the Pharmacy Services website. Please take a few minutes to familiarize yourself with the resources provided. More enhancements are planned for the near future including information on investigational drugs and protocols and recommendations for formulary alternatives to drugs not listed in the *Formulary*.

If you have questions or comments about the Department of Pharmacy Services website, please e-mail [hatton@ufl.edu](mailto:hatton@ufl.edu).