



NSU College of Pharmacy
Drug Information & Resources Center
N e w s l e t t e r

March 2007

Question of the Month

What medication is a controlled substance under Florida law but not federal law?

In the News

The Heart Of A Woman

<http://www.time.com/time/magazine/article/0,9171,1595228,00.html?cnn=yes>

"Medical myths die hard, and one of the biggest is that heart disease is a problem mostly for men. That's not even close to being true: according to the American Heart Association (AHA), more women than men die from heart disease in the U.S., and 1 in 3 women is living with it today. Yet despite these striking statistics, most patients and even many physicians still fail to think of heart problems when a woman has the classic symptoms of chest pain and arm or jaw numbness. Trying to reverse this faulty thinking and drive down mortality rates, the AHA has published a brand-new set of guidelines for reducing women's risk of heart disease, heart attack and stroke.

One way to do it is with low-dose aspirin, already a well-known preventive for men. Women of any age who are at high risk for heart disease, says the AHA, should definitely consult their doctors about taking the blood-thinning painkiller daily. Women over 65 should do so regardless of their health history--a reversal of the AHA's earlier guidelines. It gets trickier, though, for the average healthy woman under 65. In that population, aspirin doesn't help in preventing heart attacks, although it can reduce the risk of the nonbleeding types of stroke. (Men, by contrast, generally get little or no stroke-prevention benefit from aspirin.) The trick here is for doctors to figure out on a case-by-case basis when the benefits of stroke reduction outweigh aspirin's risk of triggering bleeding in the stomach and the brain.

What's really noticeable about the new guidelines is how starkly straightforward the AHA is about who's at risk--which is almost every woman. Anyone who has at least one major cardiovascular-disease risk factor (including physical inactivity, poor diet and smoking) falls into that category. That leaves a scant 10% of U.S. women at optimal risk, meaning they have no major risk factors.

"Our biggest message is don't wait until you have a risk factor, because 40% of the time the first symptom of heart disease for a woman is a fatal heart attack," warns preventive cardiologist Dr. Lori Mosca, chair of the expert panel that wrote the updated guidelines.

In addition to new aspirin protocols, the guidelines add an exercise recommendation of 60 to 90 min., preferably daily, for women who are trying to either lose weight or sustain a weight loss. According to the U.S. Department of Health and Human Services, more than 60% of American women are overweight or obese--so again, most women need to comply with this new fitness prescription. For women not battling the bulge, the previous guideline of 30 min. a day stands.

"We still have to answer the question of whether it's feasible to do an hour or 90 minutes of exercise a day," admits Mosca, "but we also need to think about how to incorporate exercise into our everyday lives." Mosca, for instance, says she takes workout clothes to her son's sports events in case she can sneak in a few circuits around the track.

Alongside the list of dos, the guidelines also single out don'ts. Although it can have significant benefits for fetal development, folic acid, recommended just a few years ago, turns out not to help prevent heart disease and should not be used for that purpose. Neither should hormone-

replacement therapies or antioxidant supplements such as beta-carotene and vitamins E and C. Omega-3 fatty-acid supplements, on the other hand, are a good thing, says the AHA.

If you're a woman and still not sure whether you should be concerned about heart-disease risks, whip out a tape measure and circle it around your waist. If it reads more than 35 in., chances are that you are at high risk for or already have high blood pressure, diabetes and/or high cholesterol. It's time to talk to your doctor, make some lifestyle changes and get heart healthy. That's one thing men and women also have in common: the basics still work."

Rising Blood Sugar Means Rising Heart Risk

<http://health.msn.com/centers/diabetes/articlepage.aspx?cp-documentid=100157406>

"The danger begins even before glucose climbs abnormally high, experts say-- Even "high normal" fasting glucose levels increase the risk of hospitalization for congestive heart failure, according to a study that looked at data on more than 31,500 patients in two international trials. Researchers concluded that even small increases in fasting glucose levels increased the risk of congestive heart failure in patients with diabetes and in patients whose blood sugar levels were in the normal range.

The average follow-up time for the patients in the study was 2.4 years. An increase of 1 millimole per liter of blood (mmol/L) in blood glucose level increased the risk of hospitalization for congestive heart failure or cardiovascular death by nine percent for all patients, by five percent for those with diabetes, and by three percent for those without diabetes.

"Even in the normal range, our results indicate that elevated blood glucose is associated with the risk of heart failure," study lead author Dr. Claes Held, associate professor of cardiology at the Karolinska Institute in Stockholm, Sweden, said in a prepared statement.

"You can look at blood glucose much like blood pressure or cholesterol. Even if you have normal blood glucose, there is a gradual increase in risk wherever you start on the scale. If the blood sugar is 'high normal,' there is a higher risk than those with 'low normal' fasting blood glucose levels," Held said.

The study is published in the new issue of the journal *Circulation*.

The researchers noted there are a number of possible reasons for the link between higher blood glucose levels and an increased risk of congestive heart failure.

"Individuals with disturbances in their glucose regulation usually have more coronary artery disease, which is a well known underlying risk factor for heart failure. That is a strong explanation for our findings but the others are more speculative and hypothetical," Held said."

FDA Approves New Drug Treatment for High Blood Pressure

<http://www.fda.gov/bbs/topics/NEWS/2007/NEW01580.html>

"The U.S. Food and Drug Administration (FDA) today announced the approval of Tekturna (aliskiren) tablets for the treatment of high blood pressure, or hypertension, which affects an estimated 25 percent of Americans and causes increased risk of stroke, heart attack, kidney failure, heart failure and death.

Tekturna, a new molecular entity (NME), is the first high blood pressure drug approved by FDA that inhibits renin, a kidney enzyme associated with the regulation of blood pressure. Tekturna acts at the beginning of the blood pressure regulation process, while other available high blood pressure medications act at later stages.

"Hypertension is rightly called "the silent killer" because it usually has no symptoms until it causes major damage to the body organs," said Douglas C. Throckmorton, M.D., Deputy Director of FDA's Center for Drug Evaluation and Research. "Today's approval adds a new safe and effective treatment option for people who need help to control their blood pressure."

The effectiveness of Tekturna in lowering blood pressure has been demonstrated in six placebo-controlled eight-week clinical trials, which studied more than 2,000 patients with mild to moderate hypertension.

The effect was maintained for up to one year. Tekturna was effective across all demographic subgroups, but African American patients tended to have smaller reductions in blood pressure

than Caucasians and Asians, as is generally true for drugs that affect the renin-angiotensin system, a component of blood pressure regulation.

When Tekturna was used in combination with hydrochlorothiazide, a diuretic, further reductions in blood pressure were achieved.

Tekturna was evaluated for safety in more than 6,460 patients, including 1,740 who were treated longer than six months, and more than 1,250 for over one year. Side effects were usually mild and brief. The most common side effect experienced by patients taking Tekturna was diarrhea. Diarrhea was reported by approximately 2 percent of patients on the higher of the two approved doses, compared with approximately 1 percent on placebo. Rarely, patients taking Tekturna developed an allergic reaction with swelling of the face, lips or tongue and difficulty breathing, as has been seen with other drugs for high blood pressure that act directly on the renin-angiotensin system.

Tekturna and other drugs that act directly on the renin-angiotensin system should not be used during pregnancy because they can cause injury and even death to the developing fetus.

Tekturna is manufactured by Novartis Pharmaceuticals Corp., East Hanover, N.J."

Global use of ADHD drugs nearly triples

<http://www.msnbc.msn.com/id/17503743/>

"The use of drugs to treat attention-deficit/hyperactivity disorder, or ADHD, has more than tripled worldwide since 1993, U.S. researchers reported on Tuesday.

And spending on such drugs rose ninefold between 1993 and 2003, the team at the University of California, Berkeley reported.

"ADHD could become the leading childhood disorder treated with medications across the globe," Richard Scheffler, an expert in health economics and public policy who led the study, said in a statement.

"We can expect that the already burgeoning global costs for medication treatment for ADHD will rise even more sharply over the next decade."

Roughly one in 25 U.S. children and adolescents is taking medication for ADHD, the researchers found.

They used an international pharmaceutical database to examine data from nearly 70 countries. In 1993, 31 countries used ADHD drugs, but by 2003 that number had risen to 55, they found.

France, Sweden, Korea and Japan all showed increases in ADHD drug use among 5- to 19-year-olds.

"The usage of ADHD medications increased 274 percent during the study period," Scheffler's team wrote in the journal *Health Affairs*.

The United States led the pack, accounting for 83 percent of the prescriptions and \$2.4 billion in 2003. Canada and Australia also had much heavier use than the researchers predicted.

Costs likely to rise globally ADHD is marked by poor concentration, distractibility, hyperactivity, impulsiveness and other symptoms beyond what might be expected for the patient's age.

Amphetamine drugs can control the symptoms, but their use is sometimes controversial.

Methylphenidate, sold under the brand name Ritalin by Novartis, was once the standard. But costly and long-acting medications like Johnson & Johnson's Concerta, Strattera, made by Eli Lilly and Co., and Adderall XR, made by British drugmaker Shire Plc, are now driving up costs, the researchers said.

"Costs are likely to rise globally as long-acting medications, which offer easier use and result in better compliance, become more prevalent outside the U.S.," said Dr. Peter Levine, a pediatrician with Kaiser Permanente in Walnut Creek, California.

Psychologist Stephen Hinshaw of UC Berkeley said "cross-cultural research has shown that ADHD exists in all cultures, with increased access to public education a factor in its detection."

The researchers recommended that countries keep tabs on the use of ADHD drugs and make sure their benefits are worthwhile."

Tamiflu side effect worries after deaths

<http://www.msnbc.msn.com/id/17480897/>

“Concerns that the influenza drug Tamiflu — seen as effective against a possible pandemic triggered by bird flu — may induce fatal side effects are growing in Japan after two people who took it fell to their deaths last month.

The deaths, the latest cases of abnormal behavior by those who took Tamiflu, prompted the Health Ministry to issue a warning last week that influenza patients could show psychiatric problems, although it has denied the drug was responsible for them.

But the move was too little too late, said a group whose members say they are victims of Tamiflu side effects, which came to light in Japan in 2005 after 12 children died and 32 experienced abnormal behaviour after taking the drug.

“Had they issued a warning earlier, then the number of deaths could have been halved,” said Haruhiko Nokiba, whose 17-year-old son walked onto an expressway shortly after taking Tamiflu and was hit and killed by a truck in 2004.

The incident was seen as a suicide, but Nokiba, who heads the victims and families group, said his son had no reason to kill himself and circumstances showed that it was a result of abnormal behaviour.

“He ran out into the snow barefoot in his pajamas, climbed over a 3-metre fence to cross train tracks and then ran into a truck,” Nokiba told Reuters in an interview this week.

According to the Health Ministry, 54 people have died so far after taking Tamiflu, and in February, a 14-year-old girl and a boy fell to their deaths from their apartment homes in separate incidents after taking the drug. Neither had left a suicide note.

No link proven

Swiss drug maker Roche Holding AG, which produces Tamiflu, also known generically as oseltamivir, has denied a link between the medication and the deaths, adding that influenza itself could cause psychiatric problems.

“These events are extremely rare in relation to the number of patients treated,” Roche spokeswoman Martina Rupp said last week.

“It’s very important to state that none of these events were linked to Tamiflu.”

Tamiflu has been used to treat 50 million people since it was approved in 1999, and in 2005, there were only 103 reports of neuropsychiatric problems, Rupp added.

Countries around the world are stockpiling the antiviral drug in case of a human influenza pandemic that experts fear could be sparked by the H5N1 bird flu virus.

Chugai Pharmaceutical Co. Ltd., which sells the drug in Japan, added a reference to abnormal behaviour as a possible side effect inside Tamiflu’s package in 2004, but victims’ groups want a stronger warning.

In November, the U.S. Food and Drug Administration decided to require Roche to put a caution on Tamiflu labels urging close monitoring for abnormal behaviour, such as delirium, although it said it was unknown if the drug contributed to the psychiatric problems.

A survey of some 2,800 children conducted by a Health Ministry team last year found that there was no evidence of a relationship between Tamiflu and abnormal behaviour.

Of those who took the drug, 11.9 percent showed such behaviour, while 10.6 percent of patients who did not use the medication also exhibited abnormal behaviour, the poll showed.

But Rokuro Hama, a medical doctor who heads a watchdog group on the side effects of drugs, said the ratio of those showing abnormal behaviour is four times higher among those who took Tamiflu if limited to the period immediately after taking the drug.

The ministry is carrying out a more thorough survey aiming to poll 10,000 influenza patients and come up with the results later in the year, a ministry official said.”

Website of the Month

How to get your medications at free of charge?

The Free Medicine Program has been helping qualified patients in obtaining prescription drugs and medications absolutely free of charge. According to the website, the requirements for obtaining free medications are:

1. You do not currently have insurance coverage for outpatient prescription medicines
2. Your income is at a level that causes hardship when prescription medicines are purchased at retail price
3. You do not qualify for a government or third party program that provides for prescription medicine coverage

<http://www.freemedicineprogram.org/>

Articles in Press

NEW ENGLAND JOURNAL OF MEDICINE

Belshe, Robert B.; Edwards, Kathryn M.; Vesikari, et. al. Live Attenuated versus Inactivated Influenza Vaccine in Infants and Young Children. *N Engl J Med* 2007;356: 685-96.

Background: Universal vaccination of children 6 to 59 months of age with trivalent inactivated influenza vaccine has recently been recommended by U.S. advisory bodies. To evaluate alternative vaccine approaches, we compared the safety and efficacy of intranasally administered live attenuated influenza vaccine with those of inactivated vaccine in infants and young children.

Methods: Children 6 to 59 months of age, without a recent episode of wheezing illness or severe asthma, were randomly assigned in a 1:1 ratio to receive either cold-adapted trivalent live attenuated influenza vaccine (a refrigeration-stable formulation of live attenuated intranasally administered influenza vaccine) or trivalent inactivated vaccine in a double-blind manner. Influenza-like illness was monitored with cultures throughout the 2004-2005 influenza season.

Results: Safety data were available for 8352 children, and 7852 children completed the study according to the protocol. There were 54.9% fewer cases of cultured-confirmed influenza in the group that received live attenuated vaccine than in the group that received inactivated vaccine (153 vs. 338 cases, $P < 0.001$). The superior efficacy of live attenuated vaccine, as compared with inactivated vaccine, was observed for both antigenically well-matched and drifted viruses. Among previously unvaccinated children, wheezing within 42 days after the administration of dose 1 was more common with live attenuated vaccine than with inactivated vaccine, primarily among children 6 to 11 months of age; in this age group, 12 more episodes of wheezing were noted within 42 days after receipt of dose 1 among recipients of live attenuated vaccine (3.8%) than among recipients of inactivated vaccine (2.1%, $P = 0.076$). Rates of hospitalization for any cause during the 180 days after vaccination were higher among the recipients of live attenuated vaccine who were 6 to 11 months of age (6.1%) than among the recipients of inactivated vaccine in this age group (2.6%, $P = 0.002$).

Conclusions: Among young children, live attenuated vaccine had significantly better efficacy than inactivated vaccine. An evaluation of the risks and benefits indicates that live attenuated vaccine should be a highly effective, safe vaccine for children 12 to 59 months of age who do not have a history of asthma or wheezing.

Schade, R; Andersohn, F; Suissa, S; Haverkamp, W; Garbe, E. Dopamine Agonists and the Risk of Cardiac-Valve Regurgitation. *N Engl J Med* 356(1):29-38, January 4, 2007

Background: Case reports and echocardiographic studies suggest that the ergot-derived dopamine agonists pergolide and cabergoline, used in the treatment of Parkinson's disease and the restless legs syndrome, may increase the risk of cardiac-valve regurgitation.

Methods: We used data from the United Kingdom General Practice Research Database to

identify a population-based cohort comprising 11,417 subjects 40 to 80 years of age who were prescribed antiparkinsonian drugs between 1988 and 2005. We conducted a nested case-control analysis within this cohort in which each patient with newly diagnosed cardiac-valve regurgitation was matched with up to 25 control subjects from the cohort, according to age, sex, and year of entry into the cohort. Incidence-rate ratios for cardiac-valve regurgitation with the use of different dopamine agonists were estimated by conditional logistic-regression analysis.

Results: Of 31 case patients with newly diagnosed cardiac-valve regurgitation, 6 were currently exposed to pergolide, 6 were currently exposed to cabergoline, and 19 had not been exposed to any dopamine agonist within the previous year. The rate of cardiac-valve regurgitation was increased with current use of pergolide (incidence-rate ratio, 7.1; 95% confidence interval [CI], 2.3 to 22.3) and cabergoline (incidence-rate ratio, 4.9; 95% CI, 1.5 to 15.6), but not with current use of other dopamine agonists.

Conclusions: In this study, use of the dopamine agonists pergolide and cabergoline was associated with an increased risk of newly diagnosed cardiac-valve regurgitation.

Von Drygalski, A; Curtis, BR.; Bougie, DW.; McFarland, JG.; Ahl, S; Limbu, I; Baker, KR.; Aster, RH. Vancomycin-Induced Immune Thrombocytopenia. *N Engl J Med* 2007;356: 904-10

Background: Vancomycin has only rarely been implicated as a cause of thrombocytopenia, and there is only limited evidence that this complication is caused by immune mechanisms. We conducted a study to determine whether thrombocytopenia is caused by vancomycin-dependent antibodies in patients being treated with vancomycin.

Methods: We identified and characterized vancomycin-dependent, platelet-reactive antibodies in patients who had been referred for testing during a 5-year period because of a clinical suspicion of vancomycin-induced thrombocytopenia. We obtained clinical information about the patients from their referring physicians.

Results: Drug-dependent, platelet-reactive antibodies of the IgG class, the IgM class, or both were identified in 34 patients, and clinical follow-up information was obtained from 29 of these patients. The mean nadir platelet count in these patients was 13,600 per cubic millimeter, and severe bleeding occurred in 10 patients (34%). Platelet levels returned to baseline in all 26 surviving patients after vancomycin was stopped. In 15 patients, the drug was continued for 1 to 14 days while other possible causes of thrombocytopenia were investigated. Vancomycin-dependent antibodies were not found in 25 patients who had been given vancomycin and in whom thrombocytopenia did not develop.

Conclusions: Severe bleeding can occur in patients with vancomycin-induced immune thrombocytopenia. The detection of vancomycin-dependent antiplatelet antibodies in patients receiving the antibiotic in whom thrombocytopenia develops, and the absence of antibodies in patients given the drug in whom platelet counts remain stable, indicate that these antibodies are the cause of the thrombocytopenia.

ANNALS OF PHARMACOTHERAPY

Chris RR, Kevin CF, Staci ML, et. al. Validity of a Stage of Change Instrument in Assessing Medication Adherence in Indigent Patients with HIV Infection. *Ann Pharmacother* 2007;41:208-214.

Background: Adherence to antiretroviral therapy (ART) is vital to achieve durable suppression of viral replication. Effective mechanisms to predict adherence can be difficult to implement in clinical

practice settings. Self-administered questionnaires are a practical option for assessing patient adherence but may lack validation with objective measures of adherence.

Objective: To examine the ability of a 2 item stage of change (SOC) questionnaire to predict medication adherence in indigent patients receiving ART.

Methods: Patients participating in an ongoing study to examine adherence interventions were administered a 2 item SOC instrument to assess readiness for adherence behavior. The SOC instrument was given to patients prior to beginning ART and readministered after they had received 16 weeks of treatment. Electronic monitoring was used to examine the validity of the SOC instrument to predict patient readiness for adherence behavior.

Results: Thirty-one patients completed the SOC questionnaire prior to beginning a new ART regimen. Most (87%) patients were male, had previously received antiretroviral therapy (77%), and had an AIDS diagnosis (77%). The SOC category determined at baseline was a poor predictor of adherence at 4 and 16 weeks; however, the SOC category determined after treatment onset (week 16) was a strong predictor of adherence at both time points ($p < 0.001$ for 4 and 16 weeks; one way ANOVA).

Conclusions: The SOC category determined at baseline correlated poorly with subsequent medication adherence in our indigent, HIV-infected patient population. Prediction of adherence based on SOC after treatment initiation may provide a better estimate of adherence behavior. Recognition of this limitation may help clinicians more accurately interpret predicted adherence behavior from self-report instruments.

Edward CB, William RR, Kimberly BL, et. al. Effects of St. John's Wort Supplementation on Ibuprofen Pharmacokinetics. *Ann Pharmacother* 2007;41:229-234.

Background: St. John's wort is a popular herbal supplement that has been involved in various herb-drug interactions. Experimental findings suggest that the supplement may impact CYP2C9 metabolism. CYP2C9 is responsible for the irreversible metabolism of ibuprofen.

Objectives: To examine the effect of 3 weeks of St. John's wort administration on the stereoselective pharmacokinetics of ibuprofen.

Methods: Eight male subjects participated in this study. The single-dose pharmacokinetics of ibuprofen were evaluated before and after 21 days of St. John's wort administration. Plasma ibuprofen concentrations were determined, using a stereoselective, reversed-phase HPLC assay. Model independent methods were used to evaluate the pharmacokinetics of each ibuprofen enantiomer. Data were analyzed by 2 way ANOVA testing and confidence interval testing.

RESULTS: *S*(+)-ibuprofen mean \pm SD AUC and maximum concentration (C_{max}) values were 131.6 ± 26.8 $\mu\text{g}\cdot\text{h}/\text{mL}$ and 31.8 ± 7.33 $\mu\text{g}/\text{mL}$, respectively, for control samples and 122.4 ± 32.9 $\mu\text{g}\cdot\text{h}/\text{mL}$ and 33.6 ± 7.83 $\mu\text{g}/\text{mL}$, respectively, after St. John's wort treatment. *R*(-)-ibuprofen mean AUC and C_{max} values were 85.1 ± 26.6 $\mu\text{g}\cdot\text{h}/\text{mL}$ and 28.4 ± 8.72 $\mu\text{g}/\text{mL}$, respectively, for control samples and 87.7 ± 30.1 $\mu\text{g}\cdot\text{h}/\text{mL}$ and 30.0 ± 8.97 $\mu\text{g}/\text{mL}$, respectively, for St. John's wort treatment samples. St. John's wort administration resulted in no significant effects on the C_{max} and AUC of either stereoisomer. A 31% decrease in *S*(+)-ibuprofen mean residence time ($p = 0.02$) was observed.

Conclusions: St. John's wort administration for 21 days had no apparent clinically important impact on the single-dose pharmacokinetic parameters of *S*(+)- and *R*(-)-ibuprofen. Although St. John's wort treatment appears to significantly reduce the mean residence time of *S*-ibuprofen, no ibuprofen dose adjustments appear warranted when the drug is administered orally with St. John's wort, due to the lack of significant change observed in ibuprofen AUC and C_{max} for either enantiomer.

Kathleen A Hazlewood , Susan E Fugate, PharmD BCPS CACP , Donald L Harrison, PhD et. al. Effect of Oral Corticosteroids on Chronic Warfarin Therapy. *The Annals of Pharmacotherapy*: Vol. 40, No. 12, pp. 2101-2106.

Background: A potential drug interaction exists between oral corticosteroids and warfarin, but there is limited documentation.

Objective: To evaluate the potential drug interaction between oral corticosteroids and long-term warfarin therapy.

Methods: A retrospective review was conducted of 387 medical records for active patients within an anticoagulation clinic. Inclusion criteria were stable anticoagulation therapy, short-term oral corticosteroid therapy, international normalized ratio (INR) recorded within 30 days prior to corticosteroid initiation (pre-INR), and INR recorded during corticosteroid therapy or within 14 days of discontinuation (post-INR). Patients were excluded if they had been started on any antibiotic or other drug with a probable interaction with warfarin at the same time as corticosteroid initiation. Thirty-two patient encounters met the predetermined inclusion and exclusion criteria. The primary outcome assessed was the difference between pre- and post-INR values. Secondary endpoints included bleeding events, emergency department (ED) visits, hospitalizations, and warfarin dose modifications.

Results: The mean difference between pre- and post-INR values was 1.24 (95% CI 0.86 to 1.62). Ninety-seven percent of the 32 patient encounters resulted in a change in their post-INR value, and 62.5% of patients had supratherapeutic INR values at the post-corticosteroid assessment. The majority of patients assessed had an elevation of their INR following concomitant use of warfarin and corticosteroids. The INR change was observed at a mean \pm SD of 6.7 ± 3.3 days following the first dose of corticosteroid. Overall, 16 patients (50%) required a modification of their anticoagulation therapy during or following corticosteroid therapy. Only one adverse event of minor epistaxis was reported, and no ED visits or hospitalizations occurred as a consequence of the drug combination.

Conclusions: Use of oral corticosteroids in patients on long-term warfarin therapy may result in a clinically significant interaction, which requires close INR monitoring and possible warfarin dose reduction.

Darego O Maclayton, Hall RG. Pharmacologic Treatment Options for Nosocomial Pneumonia Involving Methicillin-Resistant *Staphylococcus aureus*. *Ann Pharmacother* 2007;41:235-244

Objective: To discuss current and potential treatment options for nosocomial pneumonia due to methicillin-resistant *Staphylococcus aureus* (MRSA).

Data Sources: A MEDLINE search (1966-January 2007) was conducted to identify English-language literature on pharmacotherapy of nosocomial pneumonia and the bibliographies of pertinent articles. Programs and abstracts from infectious disease meetings were also searched. Search terms included MRSA, nosocomial pneumonia, pulmonary infections, vancomycin, quinupristin/dalfopristin, linezolid, daptomycin, tigecycline, dalbavancin, oritavancin, and ceftobiprole.

Data Selection and Data Extraction: All articles were critically evaluated and all pertinent information was included in this review.

Delta Synthesis: Vancomycin has been the drug of choice for MRSA infections for many years. Recent data suggest that linezolid may be superior to vancomycin in the treatment of MRSA nosocomial pneumonia. However, there are limitations to the available data. Therefore, prospective, randomized studies are needed before linezolid is recommended as the preferred first-line therapy. Other approved agents for nosocomial MRSA infections, such as

quinupristin/dalfopristin and daptomycin, should not be used in the treatment of MRSA pneumonia, as they were inferior in clinical trials. Tigecycline has excellent activity against MRSA in vitro, but should not be routinely used for the treatment of MRSA pneumonia, as clinical data are lacking. In a Phase III clinical trial, an anti-MRSA cephalosporin, ceftobiprole, is being evaluated for effectiveness against nosocomial pneumonia. Investigational glycopeptides may eventually have a role in the treatment of nosocomial pneumonia, but data are currently lacking.

Conclusions: Vancomycin is still the drug of choice for treatment of MRSA pneumonia, and linezolid should be used as an alternative agent. Linezolid should carry strong consideration for patients with vancomycin-induced nephrotoxicity or a documented lack of response to vancomycin. Tigecycline and investigational agents with activity against MRSA may be future options for nosocomial pneumonia due to MRSA.

AMERICAN JOURNAL OF PHARMACEUTICAL EDUCATION

Kenneth L, Sherida N, Cynthia R, et. al. Evaluation of Pharmacy Students' Blood Pressure and Heart Rate Measurement Skills After Completion of a Patient Assessment Course. *American Journal of Pharmaceutical Education* 2007 Feb 1; Vol. 71 (1): Article 1.

Objectives: to evaluate pharmacy students' skills at measuring brachial artery blood pressure and radial heart rate at the completion of a patient assessment course in the second-professional year of a doctor of pharmacy (PharmD) program.

Methods: students enrolled in a required patient assessment laboratory course (n = 83) participated in this study. Each student was randomly matched with a classmate and manually measured the classmate's blood pressure by auscultation of the brachial artery and heart rate by palpation of the radial pulse.

Results: the student-device absolute disagreement was 6.5 ± 4.8 mmHg for systolic blood pressure (SBP), 6.2 ± 4.5 mmHg for diastolic blood pressure (DBP), and 5.3 ± 4.0 beats per minute (BPM) for heart rate. Student and machine measurements of SBP, DBP, and HR significantly correlated.

Conclusions: pharmacy students in the second-professional year of a PharmD program demonstrated competence in but not mastery of manual blood pressure and heart rate measurement. These skills need further refinement during third- and fourth-professional year APPEs.

Christopher J, Sam E, Joel G, et. al. An Introductory Pharmacy Practice Experience Emphasizing Student-Administered Vaccinations. *American Journal of Pharmaceutical Education* 2007 Feb 1; Vol. 71 (1): Article 3

Objectives: to introduce a requirement for second-professional year (P2) and third-professional year (P3) students to administer vaccinations to adults in community pharmacy-based immunization clinics.

Design: second-professional year students were trained to administer influenza, pneumococcal, and other vaccinations to adults following the American Pharmacists Association's standards. All P2 students in fall 2004 and all P2 and P3 students in fall 2005 were assigned to 2 community pharmacy-based immunization clinics in the metropolitan Denver area under the supervision of immunization-certified staff pharmacists. An evaluation of the experience was conducted using retrospective preceptor and student-based survey data.

Assessment: in 2004 and 2005, the students administered approximately 5,000 (30-50 immunizations per student) and 15,000 (60-70 per student) immunizations, respectively. Students

and preceptors agreed that the requirement to administer vaccinations was an appropriate activity for students and that it increased the students' self-confidence. When asked to rate the value of the students' work administering adult immunizations in the fall 2004 semester, the mean score given by the P2 students' immunization-certified preceptors was 9.2 on a 10-point Likert scale (1 = no value and 10 = great value).

Conclusion: consistent with accreditation standards for students to have direct patient care responsibilities in introductory pharmacy practice experience courses, a requirement for P2 and P3 students to administer vaccines to adult patients in community pharmacies was successfully introduced.

OTHER JOURNALS

Lowy, Douglas R. Schiller, John T. Prophylactic human papillomavirus vaccines. *Journal of Clinical Investigation* 2006; 116(5):1167-73.

Human papillomavirus (HPV) infection causes virtually all cases of cervical cancer, the second most common cause of death from cancer among women worldwide. This Review examines prophylactic HPV subunit vaccines based on the ability of the viral L1 capsid protein to form virus-like particles (VLPs) that induce high levels of neutralizing antibodies. Following preclinical research by laboratories in the nonprofit sector, Merck and GlaxoSmithKline are developing commercial versions of the vaccine. Both vaccines target HPV16 and HPV18, which account for approximately 70% of cervical cancer. The Merck vaccine also targets HPV6 and HPV11, which account for approximately 90% of external genital warts. The vaccines have an excellent safety profile, are highly immunogenic, and have conferred complete type-specific protection against persistent infection and associated lesions in fully vaccinated women. Unresolved issues include the most critical groups to vaccinate and when the vaccine's cost may be low enough for widespread implementation in the developing world, where 80% of cervical cancer occurs.

Van Tassel BW, Munger MA. Aliskiren for Renin Inhibition: A New Class of Antihypertensive. *Ann Pharmacother* 2007;41

Objectives: To review the safety, efficacy, pharmacology, pharmacokinetics, and drug interactions of aliskiren for the treatment of mild-to-moderate hypertension. DATA

Study Selection and Data Extraction: Available English-language data from reviews, abstracts, and clinical trials were selected. For review of efficacy, randomized controlled trials were preferred.

Data Synthesis: Aliskiren is a renin inhibitor, the first in a new class of antihypertensives. As renin catalyzes the rate-limiting step of the renin-angiotensin system (RAS), renin inhibition may offer a theoretical advantage over other RAS inhibitors, such as angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs). In short-term clinical trials (8 wk) of subjects with mild-to-moderate hypertension, single daily doses of aliskiren 150-300 mg produced significant systolic and diastolic blood pressure reduction similar to that achieved with ACE inhibitors and ARBs, with placebo-like tolerability, without an elevation in heart rate or evidence of tolerance.

Conclusions: Aliskiren appears to be a safe and effective treatment option in mild-to-moderate hypertension. Although long-term outcome data have not been published, aliskiren is a promising option for RAS inhibition.

Answer of the Month

Soma[®] (carisoprodol) is a Schedule IV controlled substance under Florida Statutes 893.03. However, it is not a controlled substance under federal law.

Preceptor: Matthew Seamon, PharmD, JD
Resident: Jennifer Fass, PharmD
Students: Cristina Alvarez-Correa
Nestor Duprey
Tuan Tong