AMERICAN COLLEGE OF CLINICAL PHARMACY
ADULT MEDICINE PRN NEWSLETTER
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## MESSAGE FROM THE CHAIR

JESSICA A. STARR, PHARM.D., BCPS
AUBURN UNIVERSITY

As I reflect upon my year as Chair of the Adult Medicine Practice and Research Network (PRN), it is exciting to realize its growth and development. Our PRN now has over 1000 members and continues to grow. We have approximately 100 student members and 63 resident/fellow members. I am encouraged that we are able to continue to reach out and encourage the practice of adult medicine to those who are at the beginning of their careers.

I would like to personally thank our Chair-Elect Rolee Das, our Secretary/ Treasurer Jacky Olin, our Past-Chair Nancy Yunker, and each of our committee chairs and members for their hard work this year. Our PRN has undergone several structural changes at the committee level and these individuals did a great job with their charges and engaging the members of their committee. We currently have approximately 100 members participating on one of our PRN committees. It makes me proud that so many members want to be involved and give back to the PRN.

The programming committee worked very hard this year and has put together a Focus Session for our Annual Meeting on "**All Things Statin**" to be held on Monday, October 14th from 3:45 to 5:45 PM. This session will specifically focus on the following: (1) Pleiotropic Effects of Statins, (2) Management of Statin-Induced Myopathy, and (3) How Low Can You Go? I would like to encourage all of you attending the Annual Meeting in Albuquerque to join your colleagues who developed this programming.

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**Amed PRN Business Meeting and Networking forum!**
**Tuesday October 15, 2013 6 –9 pm**
**2013 ACCP Annual Meeting - Albuquerque, NM**

## In this issue:



## PRN OFFICERS

CHAIR: Jessica Starr

CHAIR-ELECT: Rolee Das

SECRETARY/TREASURER: Jacqueline Olin

BOARD LIAISON: Krystal Haase

## MESSAGE FROM THE CHAIR

JESSICA A. STARR, PHARM.D., BCPS
AUBURN UNIVERSITY

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As you know, our PRN has been working hard over the last several years to be able to utilize some of our funds to help support student and resident/fellow travel along with new practitioner travel. We have also restructured our nominations committee with hopes of improving the award process. Despite our efforts, we continue to be challenged with the nomination process. I strongly encourage each of you to review the award criteria on our PRN's website and help promote your colleagues by nominating those who you feel are worthy of these awards. I am pleased to announce that we were able to give the following awards this year: new practitioner, student research, resident research, clinical practice, and distinguished investigator. The award winners will be announced at our business meeting in Albuquerque.

I would like to recognize 5 of our members who will be awarded Fellow status in ACCP at the Annual meeting this fall. Please join me in congratulating **Michele Splinter**, **Zachary Stacy**, **Jeffrey Stroup**, **Toby Trujillo**, and **Nancy Yunker** who will be recognized for their sustained contributions to the College and who have demonstrated exceptional performance in clinical pharmacy practice and/or research.

In closing, I want to say thank you. It has been a great year, and I could not have served our PRN without the help of my fellow officers and committee members. This has been a great experience and as we move forward, I would like to encourage all of you to get involved with our PRN and help it continue to grow. I look forward to seeing you in Albuquerque in October!


## MEMBER ACCOMPLISHMENTS

**Sarah L. Anderson, PharmD, BCPS**
Awarded the 2013 Colorado Distinguished Young Pharmacist Award from the Colorado Pharmacists Society
Elected to the Colorado Pharmacists Society Board of Directors

**Mary Bridgeman, PharmD, BCPS, CGP**
Awarded the Preceptor of the Year Award from the New Jersey Society of Health-System Pharmacists

**Paul P. Dobesh, Pharm.D., FCCP, BCPS (AQ Cardiology)**
Awarded the Outstanding Teaching Award from the University of Nebraska Medical Center

**Erica Fredette, Pharm.D., BCPS**
Promoted to Medication Safety Officer, a new position at South Shore Hospital, South Weymouth, MA

**Branden Nemecek, PharmD, BCPS**
New Assistant Professor of Pharmacy Practice at Mylan School of Pharmacy, Duquesne University

## PRACTICE SPOTLIGHT

### HEATHER A. KEHR, PHARM.D., BCPS
### CABARRUS FAMILY MEDICINE

Cabarrus Family Medicine (CFM) is a group of 9 primary care clinics within Cabarrus County, North Carolina. It is also associated with the CFM Residency Program which trains up to 24 residents a year in the three year family medicine residency. If patients from 6 of the 9 CFM clinics need to be admitted to the hospital, they are admitted to the CFM Residency Inpatient Service at Carolinas Medical Center – NorthEast. The CFM Residency Inpatient Service consists of 4 – 6 residents who rotate every 4 weeks and 3 attending physicians, 1 hospitalist and 2 physicians from the clinics who rotate weekly. The daily census for the service ranges from 25 to 50 patients but it sometimes reaches close to 60.

In 2008, a relationship with the CFM Residency Program and Wingate University School of Pharmacy (WUSOP) was established by my partner at the time and me. At least one WUSOP faculty member has been an integral part of the CFM Residency Inpatient Service since 2008. As the clinical pharmacists for the Inpatient Service, my partner and I round on the patients and address any medication issues as well as make therapy recommendations and answer drug information questions. We are also responsible for the 30-minute pharmacy- based topic lectures given every Monday to the residents and attending physicians on service. In addition to our clinical role with the CFM Residency Program, we also serve on their Education Faculty Committee. Our contribution to the Inpatient Service was recognized by the residents when they gave us the Ambulatory Teaching Award for outstanding contributions toward enhancing the learning experience of CFM residents. Over the past several years we have built a strong relationship with CFM and their residency program. This has translated into a positive experience for the third and fourth year pharmacy students that rotate through our practice site. The students enjoy working closely with the residents and get to see how integral a clinical pharmacist can be to a family medicine inpatient team.

# Congratulations

## AMED PRN 2013 Fellows of the American College of Clinical Pharmacy (FCCP)

| | |
|---|---|
| **Michele Y. Splinter, Pharm.D., BCPS** | **University of Oklahoma HSC, OK** |
| **Zachary A. Stacy, Pharm.D., BCPS** | **St. Louis College of Pharmacy, MO** |
| **Jeffrey S. Stroup, Pharm.D., BCPS** | **Oklahoma State University, OK** |
| **Toby C. Trujillo, Pharm.D, BCPS** | **University of Colorado, CO** |
| **Nancy S. Yunker, Pharm.D., BCPS** | **Virginia Commonwealth University, VA** |

## WELCOME TO THE LAND OF ENCHANTMENT!

LORI ANN PRATER, PHARM.D., MPP, BCPS
NEW MEXICO VA HEALTHCARE SYSTEM

I hope October finds many of you in Albuquerque, New Mexico for the 2013 ACCP Annual Meeting! In addition to investing in your own professional development and in advancing the pharmacy profession, I invite everyone to immerse yourselves in the unique culture and heritage of the Southwest. Take the time to start your love affair with green and red chile, or take a trip on the Sandia Peak Tramway, which is North America's longest single-span aerial tram. Those of you arriving early for the annual meeting will also have the opportunity to catch the end of the 2013 Albuquerque International Balloon Fiesta which is held from October 5th – 13th.

### New Officers for AMED PRN 2013-2014

| | |
|---|---|
| **President:** | **Rolee Das, Pharm.D., BCPS** |
| **President-Elect:** | **Jacqueline Olin, M.S., Pharm.D., BCPS** |
| **Secretary/Treasurer:** | **Diane Rhee, Pharm.D.** |

### Thank You to the AMED PRN 2012-2013 Newsletter Committee and Contributors!

**Melissa Badowski, Christy Burrows-Grandstaff, Allison Clemons, Amy Donihi, Stacy Elder, Heather Kehr, Laura MacCall, Pamela Moye, Kim Nealy, Jacky Olin, Lori Ann Prater, Beth Resman-Targoff, Jessica Starr, Mickala Thompson, Andy Woods**

## ACCP 2012 ANNUAL MEETING
## BEST POSTER ABSTRACT!

AMY C. DONIHI, PHARM.D., BCPS
UNIVERSITY OF PITTSBURGH

**Pharmacist-centered hospital to home care transition initiative improves patient outcomes**

Kim C. Coley, Pharm.D., Rima A. Mohammad, Pharm.D., Jenny Kim, Pharm.D., Amy C. Donihi, Pharm.D., and Patricia D. Kroboth, PhD

We were honored to have been selected as the winner of the PRN Best Poster at the annual ACCP meeting held October 21-24, 2012 in Hollywood, Florida. We would like to thank the Walk Rounds Committee and all those who volunteered time to participate in the walk rounds.

Everyone knows that community practitioners (such as primary care providers and community pharmacists) are often unaware of medication-related issues faced by their patients immediately following hospital discharge. We hypothesized that inpatient clinical pharmacists who know and care for the patient during the hospital stay are well-positioned to identify and manage medication-related problems during the time of transition from hospital to home.

As described in our poster, ***Pharmacist-centered hospital to home care transition initiative improves patient outcomes***, we piloted a transitions of care (TOC) model on a hospitalist unit utilizing a hospital pharmacist to conduct TOC activities with 220 general medicine patients during their hospitalization and after discharge to home. Specifically, within 72 hours after discharge, the pharmacist who cared for the patient during hospitalization contacted the patient by telephone and identified and resolved any medication-related problems that had arisen after discharge.

In addition to all the medication-related issues they resolved during admission medication reconciliation and during the hospitalization, the hospital consumer assessment of healthcare providers and systems (HCAHPS) scores on the unit improved from 22% before the pilot to 75% during the pilot on the item measuring whether patients were informed about their new medications and from 27% to 75% on the item measuring whether patients were told about the side effects of their medications.

The hospital pharmacists spoke to 113 patients following discharge. They identified 886 medication discrepancies (mean 7.8 per patient) between the current medications and those included in the outpatient record. Interventions included providing medication education and/or working with the patient's PCP, outpatient pharmacy or insurance company to make an average of 1.7 medication-related interventions per patient. The 30-day readmission rate was 10.5% for the patients in the care transitions program compared with 23.7% for matched control patients. ($p = 0.22$)

Our pilot program established a standardized approach for utilizing a hospital pharmacist conducting transition of care activities to bridge the inpatient to outpatient care divide. The findings show that many medication discrepancies are identified both at admission and after discharge by utilizing a pharmacist who has expertise in medication reconciliation. Additionally, the pharmacist was able to identify and manage many medication-related problems after discharge and most importantly, lower 30-day readmission rates.

# PLACE IN THERAPY OF NEW ANTIPLATELET AGENTS

AUTHORS: ALLISON CLEMONS, PHARM.D.
CHRISTY BURROWS-GRANDSTAFF, PHARM.D., BCPS

Several new oral anticoagulants and antiplatelet agents have emerged in the last few years and have expanded our anticoagulation arsenal. As new options become available, clinicians must be aware of the patient populations who would most benefit from using these agents. These challenges present themselves especially to the clinical pharmacist, who must be knowledgeable and up-to-date when making therapy recommendations to other healthcare practitioners.

The two newest antiplatelet agents, prasugrel (Effient®)[1] and ticagrelor (Brilinta®)[2], were approved in 2009 and 2011, respectively. Both of these agents have been compared to clopidogrel[3-5], but no head-to-head clinical data currently exist. Prasugrel and ticagrelor can be favorable alternatives for patients who have failed clopidogrel therapy (e.g, re-stent thrombosis or hypersensitivity reaction). While there is a lack of cross-reactivity information, both of these agents vary widely from clopidogrel structurally and can be substituted for clopidogrel therapy if necessary.[7] Category-specific comparisons for all three agents can be found on page 8.

Prasugrel is a thienopyridine that is structurally different from clopidogrel, but it still must be converted from a prodrug to its active compound in order to exert its antiplatelet effect. When compared to clopidogrel in pharmacodynamic studies, prasugrel produces a more potent and rapid inhibition of platelet aggregation.[8] Two major trials compared the clinical effects of prasugrel versus clopidogrel.[3-4] TRITON-TIMI 38 evaluated patients experiencing ACS undergoing revascularization.[3] Patients receiving prasugrel demonstrated an 18% relative reduction in the incidence of the primary efficacy outcome of cardiovascular death, MI, or stroke compared to patients receiving clopidogrel up to 15 months of treatment (9.9% vs. 12.1%, HR 0.81, 0.73-0.90; p<0.001). However, prasugrel also produced more bleeding events. There were significantly more non-CABG TIMI major bleeding (2.4% vs. 1.8%, p=0.03), life-threatening bleeding (1.4% vs. 0.9%, p=0.01), fatal bleeding (0.4% vs. 0.1%, p=0.002), and CABG-related TIMI bleeding (13.4% vs. 3.2%, p<0.001). Patients with a history of stroke or TIA, age ≥75 years, and weight <60 kg were more likely to experience these bleeding events and demonstrated a net harm (for history of stroke or TIA) with prasugrel therapy. Therefore, prasugrel should be used with caution in patients age ≥75 years or weight <60 kg and is contraindicated in patients with a history of stroke or TIA. A subgroup analysis in patients with diabetes mellitus and patients presenting with STEMI demonstrated a greater risk reduction with prasugrel over clopidogrel without an increase in risk of major bleeding compared to the overall study population. Based on these analyses, prasugrel use may still be warranted in patients ≥75 years of age and/or weight <60 kg if they also have diabetes mellitus or present with STEMI . The TRILOGY ACS trial evaluated patients with ACS who were medically managed (without revascularization) for up to 30 months of treatment.[4] At a median 17 month follow-up analysis, there was no significant differences in the primary efficacy outcome of cardiovascular death, MI, or stroke in the prasugrel group compared to the clopidogrel group (13.9% vs. 16%, HR 0.91, 0.79-1.05; p=0.21). Prasugrel does not currently have an indication for use in the medically managed patient population.

Prasugrel is a beneficial antiplatelet option for a patient presenting with ACS necessitating an intervention. Advantages include a more rapid and sustained antiplatelet effect, fewer drug interactions, and superiority data in patients with diabetes mellitus and STEMI compared to clopidogrel. Caution should be exercised in elderly patients (age ≥75 years) with low body weight (<60 kg) and a higher baseline bleeding risk. Patients with any history of stroke or TIA should not be placed on prasugrel therapy.

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CABG = coronary artery bypass grafting; STEMI = ST-segment elevation myocardial infarction; TIMI = Thrombolysis in myocardial infarction

## PLACE IN THERAPY OF NEW ANTIPLATELET AGENTS (CONT.)

AUTHORS: ALLISON CLEMONS, PHARM.D.
CHRISTY BURROWS-GRANDSTAFF, PHARM.D., BCPS

Ticagrelor, a cyclopentyltriazolopyrimidine, produces a direct and reversible inhibition of the $P2Y_{12}$ receptor to exert its antiplatelet effects. Ticagrelor is not a prodrug, but it is converted to an active metabolite. Since the antiplatelet effects of ticagrelor are reversible, recovery of platelet function is faster compared with other agents. However, package labeling still recommends holding therapy for five days prior to any elective procedure. Another unique feature of ticagrelor is a structural similarity to adenosine.[8] Due to this relationship, bronchial irritation, dyspnea, temporary bradycardia, and chest tightness can occur. These adverse effects do not necessarily require specific treatment or interruption in therapy unless not tolerated by the patient.[8] The PLATO trial was the major clinical trial evaluating the safety and efficacy of ticagrelor compared to clopidogrel in patients experiencing ACS with or without revascularization.[5] Patients receiving ticagrelor demonstrated a 16% relative reduction in the incidence of the primary efficacy outcome of any vascular death, MI, or stroke compared to patients receiving clopidogrel (9.8% vs. 11.7%, HR 0.84, 0.77-0.92; $p<0.001$). There were also significantly fewer stent thromboses in the ticagrelor group ($p=0.009$). While no difference in major bleeding was found between the treatment groups (11.6% vs. 11.2%, $p=0.43$), there were other increased bleeding events associated with ticagrelor. There were significantly more non-CABG PLATO and TIMI major bleeding ($p=0.03$) and PLATO intracranial fatal bleeding (0.1% vs. 0.01%, $p=0.02$), but less PLATO nonintracranial fatal bleeding (0.1% vs. 0.3%, $p=0.03$). Therefore, ticagrelor is contraindicated in patients with a prior history of intracranial bleeding. Dyspnea occurred more frequently in the ticagrelor group (13.8% vs. 7.8%, $p<0.001$), which led to study withdrawal ($p<0.001$). In addition, a higher incidence of ventricular pauses lasting $\geq$ 3 seconds was demonstrated in the ticagrelor group within the first week of therapy (5.8% vs. 3.6%, $p=0.01$). These adverse effects could be predicted based on the structural relationship of ticagrelor to adenosine. A criticism of the PLATO trial comes from FDA Advisory Committee data demonstrating significant differences in outcomes for centers in the United States compared to centers outside the United States enrolled in the trial. Patients treated in the United States experienced worse outcomes for all efficacy parameters, which may be due to inconsistencies in aspirin doses utilized. Greater treatment effect of ticagrelor occurs when lower maintenance doses of aspirin are used, so it is contraindicated to use aspirin doses >100 mg.

Ticagrelor is a favorable option for all patients presenting with ACS, whether or not an intervention is performed. Benefits include a more rapid and sustained antiplatelet effect, direct and reversible platelet inhibition, theoretical quicker loss of medication effects, and superior efficacy data compared to clopidogrel. Caution should be exercised in patients with asthma, hyperuricemia, bradycardia, and a higher risk for bleeding at baseline. Due to its metabolism, CYP3A4 drug interactions can occur and therapy may need to be adjusted in patients using strong inducers or inhibitors. Patient compliance should also be evaluated as ticagrelor requires twice daily dosing. Patients with any history of intracranial hemorrhage or taking aspirin doses >100 mg should not be placed on ticagrelor therapy.

While there currently is no head-to-head comparison of ticagrelor and prasugrel, a pharmacodynamics study comparing platelet inhibition with the two agents exists.[9] Reduced platelet reactivity was observed with ticagrelor versus prasugrel ($p<0.001$) after initially starting clopidogrel therapy post revascularization. Major bleeding events did not occur with either agent. Future clinical studies evaluating ticagrelor and prasugrel will further delineate the most appropriate patient subgroups for use of these agents. Choosing the correct antiplatelet drug can be challenging, but it is important to evaluate each patient individually and formulate an evidence-based and patient-specific therapeutic regimen.

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CYP = Cytochrome P450; PLATO = Platelet inhibition and patient outcomes; TIMI = Thrombolysis in myocardial infarction

# ANTIPLATELET AGENT COMPARISON CHART[1,2,6]

AUTHORS: ALLISON CLEMONS, PHARM.D.
CHRISTY BURROWS-GRANDSTAFF, PHARM.D., BCPS

| | Clopidogrel (Plavix) | Prasugrel (Effient) | Ticagrelor (Brilinta) |
|---|---|---|---|
| **Class** | Thienopyridine | | Cyclopentyl-triazolopyrimidine |
| **MOA** | Irreversibly inhibits $P2Y_{12}$ site of ADP receptors, preventing GP IIb/IIIa receptor activation | | Reversibly inhibits $P2Y_{12}$ receptor, preventing ADP-induced platelet aggregation |
| **Platelet Inhibition** | Indirect | | Direct |
| **Indication(s)** | ACS medically managed or with PCI<br>Secondary CVA prevention<br>PAD | ACS with PCI | ACS medically managed or with PCI |
| **Prodrug** | Yes | | No |
| **Pregnancy Category** | B | | C |
| **Onset (loading)** | 300 mg – 6 h<br>600 mg – 2 h | 2 h<br>(effect within 30 min) | 1 h<br>(effect within 30 min) |
| **Peak Effect (maintenance)** | ~5 days | 3 days | 3 days |
| **Metabolism** | Hepatic<br>(CYP2C19) | Intestine, Serum, and Hepatic<br>(CYP2B6, 3A4) | Hepatic<br>(CYP3A4/5) |
| **Half life** | 6 hrs | ~7 hrs (2-15 hrs) | 7-9 hrs |
| **PO Loading Dose** | 300-600 mg | 60 mg | 180 mg |
| **Maintenance Dose** | 75 mg PO Daily | 10 mg PO Daily<br>5 mg PO Daily (<60 kg or ≥75 yrs) | 90 mg PO BID |
| **Cautions** | Severe hepatic impairment<br>PPIs (omeprazole)<br>Bleeding risk (ex. concomitant NSAIDS, warfarin)<br>CYP2C19*2 or *3 polymorphisms (poor metabolizers) | Severe hepatic impairment (not studied)<br>Bleeding risk (e.g., concomitant NSAIDs, warfarin)<br>Age ≥75 yrs<br><60 kg | Dialysis (nondialyzable); Mod/severe hepatic impairment (not studied); Bleeding risk ( e.g., concomitant NSAIDs, warfarin); Asthma (dyspnea ≥14%); Bradycardia; Hyperuricemia; Strong CYP3A4 inducers and inhibitors |
| **Contraindications/ Boxed Warnings** | Active bleeding<br>Hypersensitivity | Active bleeding<br>Hypersensitivity<br>Prior TIA/CVA | Active bleeding<br>Hypersensitivity<br>Prior ICH<br>ASA >100 mg |
| **Discontinuation Recommendation Time Prior to Elective Procedures** | 5 days | 7 days | 5 days |

ACS = acute coronary syndromes; ASA = aspirin; CVA = cerebrovascular accident; CYP = cytochrome P450; ICH = intracranial hemorrhage; NSAID = nonsteroidal anti-inflammatory drug; PAD = peripheral artery disease; PCI = percutaneous coronary intervention; PPI = proton pump inhibitor; TIA = transient ischemic attack



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## ANTIPLATELET AGENT COMPARISON

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# CANNABINOID HYPEREMESIS SYNDROME

AUTHOR: J.ANDREW WOODS, PHARM.D., BCPS
WINGATE UNIVERSITY SCHOOL OF PHARMACY

Marijuana (cannabis) is the most commonly abused illicit drug in the United States.[1] The prevalence of past-year cannabis use has increased to approximately 3 million cases during the last decade with a cumulative, lifetime prevalence estimated to be 42% - 46% in the United States.[2] The use of cannabis for medicinal purposes is currently legal in 20 states with legislation pending in 4 others.[3] A recent poll indicates that many physicians favor the use of cannabis for medicinal purposes.[4] Traditionally, cannabinoids have been utilized therapeutically as antiemetics in the treatment of chemotherapy-induced nausea and vomiting. However, a small number of cannabis users have been reported over the past decade to have developed a type of cyclic vomiting syndrome secondary to chronic cannabis use now known as cannabinoid hyperemesis.[5-8]

Cannabinoid hyperemesis syndrome (CHS) is a disorder characterized by recurrent, intractable episodes of severe nausea, vomiting, and abdominal pain (epigastric or periumbilical) interspersed with symptom-free periods. The learned behavior of compulsively applying heat to the abdomen (typically by bathing in scalding water) in an effort to reduce associated nausea, vomiting and abdominal pain is a hallmark of CHS. Additional clinical features supportive of CHS include negative findings on diagnostic evaluation, normal bowel habits, significant weight loss (> 5 kg), and morning predominance of symptoms.[8] Consistent with the demographic that habitually uses cannabis, age less than 50 years at presentation is typical for CHS.[8]

Long recognized for their antiemetic effects, how cannabinoids illicit hyperemesis is currently a medical enigma. However, several hypotheses centered around their pharmacokinetic and pharmacodynamic properties exist. The marijuana plant contains greater than 400 chemicals of which at least 60 have cannabinoid-like structures.[9] Several marijuana components are highly-lipid soluble and have extremely long half-lives, increasing their potential accumulation in the CNS with heavy cannabis use. It is plausible that any of these components could induce hyperemesis. Cannabidiol, with a known cannabinoid-like structure, has been shown to induce hyperemesis in animal models.[10] It has also been hypothesized that cannabinoids may induce hyperemesis by disturbing the hypothalamic-pituitary-adrenal axis, inciting autonomic instability.[8,11]

Acute treatment of CHS is limited to supportive care. Patients typically present with varying degrees of volume depletion and associated prerenal azotemia. Dehydration is treated with aggressive intravenous fluid hydration for 24 to 48 hours. Nausea and vomiting are treated with antiemetics as needed . Secondary to studies in animal models suggestive of complex interactions between dopamine and cannabinoid receptor signaling mechanisms, antiemetics that antagonize dopaminergic receptors (e.g., phenothiazines, butyrophenones, metoclopramide) may offer benefit in comparison to other antiemetics in the treatment of CHS-associated nausea and vomiting. Abdominal pain should be treated with mild analgesics, using narcotics sparingly, if at all, in order to avoid superimposed narcotic adverse effects on the gastrointestinal tract. CHS resolves with the cessation of cannabis use, and, therefore, patients should receive appropriate counseling.

Given the preponderance of illicit cannabis use and considering an enhanced interest in its medicinal use in the United States, the prevalence of CHS is likely to increase. CHS should be considered as a diagnosis in patients with otherwise unexplained cyclic, intractable nausea, vomiting, and abdominal pain who habitually use cannabis. Pharmacists should be aware of this emerging drug-induced disease so that they may further optimize patient care.

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# GLUCOCORTICOID USE AS A RISK FACTOR FOR VENOUS THROMBOEMBOLISM

AUTHOR: KIMBERLY LOVIN NEALY, PHARM.D., BCPS
WINGATE UNIVERSITY SCHOOL OF PHARMACY

Venous thromboembolism (VTE) occurs in roughly 1 of every 1000 people annually, with 48 and 69 developing a pulmonary embolus (PE) or deep vein thrombosis (DVT) per 100,000 patients each year, respectively.[1,2] Although some cases of VTE are idiopathic, the majority of thromboembolic events can be attributed to identifiable causes. Virchow's triad of venous stasis, vascular endothelial injury, and hypercoagulability is frequently used in the clinical setting to assess for potential causes of VTE. Some medications, such as glucocorticoids, have data to suggest they may cause or contribute to an acquired hypercoagulable state.

Although data to suggest glucocorticoids increase the incidence of VTE are scarce[2-4], a recent study was published to provide further insight.[1] Researchers utilized a Danish national database to identify prescriptions filled for systemic, inhaled, and intestinally active glucocorticoids. Additional patient-specific information including diagnoses and other prescribed medications was collected. The investigators identified 38,765 VTE cases between January 1, 2005 and December 31, 2011 and matched these with 387,650 controls by birth year and gender. Case patients were taking a variety of agents, including betamethasone, methylprednisolone, prednisolone, prednisone, triamcinolone, and hydrocortisone. Glucocorticoid association with VTE incidence was evaluated based on duration of medication use, cumulative systemic dose, and current versus former use. Results support previous literature with a greater incidence of VTE in patients currently taking glucocorticoids. As expected, the greatest risk of VTE was detected amongst current users of systemic glucocorticoids and those with higher cumulative systemic glucocorticoid consumption. Within all groups, the incidence rate ratio (IRR) was higher among new current users (medication initiated within 90 days of the study index date) when compared to continuing, recent, or former users. The authors noted that the increase for the new users was 3-fold compared with non-users. Another finding which may have clinical value is the relatively higher risk of developing a PE rather than DVT.[1]

One previous case-control study evaluated a similar database in the United Kingdom to describe risk factors associated with VTE.[3] This study collected data on 6,550 cases of VTE, which were newly diagnosed between 1994 and 2000. Patient cases were matched using age, sex, and year with 10,000 controls. Oral corticosteroid use was identified as an independent risk factor for developing a VTE. Current users had a statistically significant increase in both DVT and PE. Past users had an increased risk of developing a PE, but DVT incidence was not statistically greater in this group. Use within 30 days prior to the index date represented the highest risk compared with longer durations or past use. There was also a trend toward higher rate of PE compared with DVT in all corticosteroid users, regardless of duration of use. These results are consistent with those of the more recent Danish study.[1,3] This study did not compare different routes of administration, types of agents, or dose association.[3]

Common indications for the use of glucocorticoids, both oral and inhaled, are potential confounders for determining the risk of VTE. Conditions such as arthritis, inflammatory bowel disease, chronic obstructive pulmonary disease, asthma, and malignancy are independently associated with increased incidence of VTE. Authors of these studies took measures to account for known risk factors, comorbidities, and concomitant medications. However, this is a common problem with assessing the epidemiology of VTE, as most occurrences are thought to be multifactorial in nature.[2] Moving forward, it is important to determine how these data will affect clinical practice. Glucocorticoid use is not currently identified as an indication for VTE prophylaxis, however, it will be important to remain cognizant of this risk when evaluating potential candidates for therapy.[5] Specifically, clinicians may need to monitor patients more closely when initiating glucocorticoid therapy and counsel them on signs and symptoms of VTE.

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