EVIDENCE-BASED INFORMATION FOR HOSPITALISTS, INTENSIVISTS, AND ACUTE CARE CLINICIANS

HOSPITAL MEDICINE ALERT

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Risk of Hemorrhage on Warfarin

ABSTRACT & COMMENTARY

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This article originally appeared in the September 2011 issue of Clinical Cardiology Alert. *It was edited by Michael H. Crawford, MD, and peer reviewed by Ethan Weiss, MD. Dr. Crawford is Professor of Medicine, Chief of Clinical Cardiology, University of California, San Francisco, and Dr. Weiss is Assistant Professor of Medicine, Division of Cardiology and CVRI, University of California, San Francisco. Dr. Crawford reports no financial relationships relevant to this field of study, and Dr. Weiss is a scientific advisory board member for Bionovo.*

Source: Fang MC, et al. A new risk scheme to predict warfarin-associated hemorrhage: The ATRIA (Anticoagulation and Risk Factors in Atrial Fibrillation) study. *J Am Coll Cardiol* 2011;58:395-401.

In this study, the authors attempt to develop a risk stratification score to predict bleeding in patients treated with warfarin oral anticoagulation. The Anticoagulation and Risk Factors in Atrial Fibrillation (ATRIA) study follows 13,559 adults with nonvalvular permanent atrial fibrillation enrolled in the Kaiser Permanente Health System of Northern California. Clinical characteristics for these patients are maintained in a large system-wide database. This database was searched for discharge diagnoses for extracranial hemorrhages and for primary and secondary diagnoses of intracranial bleeding events including intracerebral, subarachnoid, or subdural hemorrhages. The records of patients with an identified hemorrhagic event were reviewed by a clinical outcomes committee and classified using a formal protocol. Only events that occurred within 5 days of warfarin exposure were included. Hemorrhages that were not present on admission but occurred during a hospitalization or were procedurally related were excluded. Major hemorrhages were defined as those that were either fatal, required a transfusion of greater than or equal to two units of packed cells, or involved a critical anatomic site.

The data in this report were obtained in 9186 subjects in the

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ATRIA study cohort who contributed 32,888 person-years of warfarin exposure. The group was split into "derivation" and "validation" cohorts for developing and testing the risk scheme. Among these patients, there were 461 warfarin-associated major hemorrhages for an annualized rate of 1.4% per year. Five variables were identified as having the highest predictive value: baseline anemia, severe renal disease, age greater than 75 years, any prior hemorrhage diagnosis, and a diagnosis of hypertension. Stratification of these variables resulted in anemia and severe renal disease being assigned 3 points, age greater than 75 being assigned 2 points, and prior hemorrhage diagnosis and hypertension being assigned 1 point each. Therefore, the final risk scheme had a possible range of 0 to 10 points. The score was essentially equally effective in both the derivation and validation cohorts. In the combined derivation and validation group, events per 100 patient years ranged from 0.4 for those with a risk score of 0, 2.6 for those with a risk score of 4, and up to 12.4 and 17.25 for patients with risk scores of 9 or 10. When grouped into low (0 to 3 points), intermediate (4 points), and high-risk (5-10 points) category groups, the event rates were 0.76, 2.62, and 5.76 events per 100 patient years. The calculated c-index statistics for the three category score system was 9 and for continuous scores 0.74. These values were superior to the c-index scores for six other published risk schemes.

The authors conclude that a relatively simple scoring system based on these five parameters will help clinicians estimate the magnitude of hemorrhagic risk when prescribing or continuing anticoagulant therapy.

■ **Commentary**

Anticoagulation therapy in patients with non-valvular atrial fibrillation requires physicians and patients to carefully weigh the potential risks and benefits of long-term therapy. The two most prevalent stroke risk scoring systems are the CHADS2 and the CHA2DS2VASc, and practice guidelines guideline rely heavily on them. Bleeding risk has received less attention in the atrial fibrillation population. Therefore, the new system proposed here should be quite valuable to clinicians planning to start therapy.

Several other factors also must be considered. Favoring a decision for anticoagulation is the observation that only intracranial bleeding is frequently fatal and/or disabling, while many strokes are not. Against anticoagulation is the frequent "minor" bleeding that adversely affects the lifestyle of many patients. We should also note that the recent release of dabigatran, an oral direct thrombin inhibitor, and the expected approval of one or more Factor Xa inhibitors for stroke prevention in atrial fibrillation have changed the playing field in oral anticoagulation. Although it is likely that the bleeding risk score here will also work for patients treated with these new agents, that will have to be documented clinically. It is also somewhat unfortunate that the authors chose not to compare their risk scheme to the recently published HAS-BLED scheme used in the recent European Society of Cardiology atrial fibrillation guidelines. The HAS-BLED score includes points for a history of a labile INR, hepatic disease, use of drugs or alcohol, and age 65-75. Both of these two new bleeding risk scoring systems are relatively simple and should prove helpful to clinicians as they deal with atrial fibrillation patients. ■

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Questions & Comments
Please call Russ Underwood, Executive Editor, at (404) 262-5521 or e-mail at russ.underwood@ahcmedia.com.

Respite Staffing Decreases Intensivist Burnout

ABSTRACT & COMMENTARY

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Dr. Hoffman reports no financial relationship to this field of study.

This article originally appeared in the September 2011 issue of Critical Care Alert. *It was edited by David J. Pierson, MD, and was peer reviewed by William Thompson, MD. Dr. Pierson is Professor Emeritus, Pulmonary and Critical Care Medicine, University of Washington, Seattle, and Dr. Thompson is Associate Professor of Medicine, University of Washington, Seattle. Drs. Pierson and Thompson report no financial relationships relevant to this field of study.*

Synopsis: *Intensivists experienced significantly less burnout, work-home life imbalance, and job distress under an interrupted schedule vs a continuous (half-month) schedule. ICU length of*

stay and mortality were non-significantly higher under continuous scheduling.

Source: Ali NA, et al on behalf of the Midwest Critical Care Consortium. Continuity of care in intensive care units: A cluster-randomized trial of intensivist staffing. *Am J Respir Crit Care Med* 2011;Jun 30. [Epub ahead of print].

This study assessed the impact of two formats, intermittent scheduling (IS) or continuous scheduling (CS), on intensivist and patient outcomes. The study involved five medical ICUs in four academic-affiliated hospitals in the United States. The units were 12-15 bed, closed-model ICUs with care teams that included a board-certified intensivist, internal medicine residents, and ICU fellows. Intensivists were in the ICU or nearby during the day and took calls overnight from home, returning to the ICU at their discretion. Internal medicine residents were continuously present overnight. ICU fellows were present during the day and took home calls overnight. In the CS format, a single intensivist was responsible every day during a half-month rotation. In the IS, a single intensivist was responsible Mondays-Fridays for half the month and each weekend was cross-covered by a different intensivist from the same pool of partners. Weekend-covering intensivists could have non-ICU responsibilities during weekdays, but not during weekend ICU coverage. The ICUs were randomized to one of two sequences (CS-IS-CS or IS-CS-IS) over a 9-month period. Job burnout, job stress, and work-home life imbalance were measured using scales derived from the National Study of the Changing Workforce.

Forty-five intensivists and 1900 patients participated in the study. As expected, continuity of care was higher under CS; 72% of patients had a single intensivist care for them during their entire ICU stay under CS vs. 38% under IS ($P < 0.0001$). ICU and hospital length of stay (LOS) were nonsignificantly higher under CS (Δ ICU LOS 0.36 days, $P = 0.20$; Δ hospital LOS 0.34 days, $P = 0.71$; ICU mortality, odds ratio 1.43, $P = 0.12$; hospital mortality, odds ratio 1.17, $P = 0.41$). Intensivists experienced significantly higher burnout, work-home life imbalance, and job distress working under CS.

■ Commentary

Projections indicate a future imbalance in numbers of intensivists required to meet patient care needs vs. those prepared in this specialty. In addition, there is an ongoing debate whether ICUs should be staffed by intensivists around the clock (24/7) to ensure optimal patient care, a factor that would increase staffing needs. A further concern relates to Accreditation Council for Graduate Medical Education (ACGME) requirements that place stringent limits on coverage by house staff. Implementation of these regulations typically requires more frequent handoffs and, consequently, interruptions in the continuity of care, as well as more hours of care by an attending physician. Findings of this article are thus timely and provocative. Despite less continuity of care with weekend-end cross coverage, IS proved better for intensivists in regard to measures of job stress, burnout, and work-life balance and was not associated with worse outcomes for patients. As the authors note, this finding challenges conventional wisdom, but does not contradict existing knowledge. Research showing better outcomes with higher intensity of intensivist involvement has not examined the variable of continuity of care, and studies demonstrating problems related to handoffs — a consequence of discontinuity of care — have used subjective assessment of outcomes. Job burnout is known to predispose to more errors, as are factors that increase job stress (e.g., workload and work duration).

Additional rigorously designed studies are needed to clarify the best way to provide ICU care, including advantages and disadvantages of continuous vs interrupted intensivist staffing, incorporating acute care nurse practitioners into the care team, and use of telemedicine. The design of this study suggests it should be possible to implement designs testing these variables within the same institution by changing providers or provider schedules in a systematic manner and examining patient care outcomes. ■

ICU Telemedicine Can Improve Patient Outcomes

ABSTRACT & COMMENTARY

By David J. Pierson, MD

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This article originally appeared in the September 2011 issue of Critical Care Alert. *It was peer reviewed by William Thompson, MD. Dr. Thompson is Associate Professor of Medicine, University of Washington, Seattle. Drs. Pierson and Thompson report no financial relationships relevant to this field of study.*

Synopsis: *In the ICUs of a well-staffed academic medical center committed to quality improvement, in which closed staffing, multidisciplinary rounds, and the daily use of checklists were already in place, implementation of a 24-hour ICU telemedicine system that was well accepted by the medical staff was associated with impressive improvements in adherence to best practice standards as well as with reductions in hospital mortality and lengths of stay.*

Source: Lilly CM, et al. Hospital mortality, length of stay, and preventable complications among critically ill patients before and after tele-ICU reengineering of critical care processes. *JAMA* 2011;305:2175-2183.

Intensive care unit (ICU) telemedicine has been widely embraced in U.S. hospitals as part of the current focus on preventing medical errors and improving an array of measures related to the quality of care. This comprehensive study from the University of Massachusetts sought to document the impact of implementing ICU telemedicine on patient outcomes and the use of best practices that had already been established in the institution. A culture of enthusiasm for and widespread adoption of quality improvement measures was already in place in the authors' two component hospitals before the study began, as were the following practices:

- An intensivist-led, closed ICU staffing model;
- Daily interdisciplinary ICU rounds;
- Comprehensive staffing and call schedules;
- Multidisciplinary, locally developed protocols for the prevention of venous thrombosis, cardiovascular complications, ventilator-associated pneumonia, and stress ulcers;
- Use of checklists for formulating daily patient care goals.

In a staggered fashion over 10 months, continuous, 7-day, 24-hour ICU telemonitoring was introduced to the 834-bed institution's seven adult ICUs. The intensivists performing the telemonitoring were staff members who also worked in the monitored ICUs. All patients admitted to the three medical, three surgical, and one mixed cardiovascular ICUs for several months before and several months after the switch to telemedicine in the respective units were included in the study. The primary outcome measures were case-mix and severity-adjusted hospital mortality before and after introduction of ICU telemedicine in the ICU in question; others included hospital and ICU lengths of stay, adherence to best practices, and complication rates.

During the prospective, stepped-wedge clinical practice study design period, 6465 patients were admitted to the study ICUs, of whom 6290 met all entry criteria and were evaluated. Slightly more of the telemedicine-period patients had medical rather than surgical diagnoses, and their severity of illness was slightly greater; otherwise the patient population did not change. Hospital mortality declined from 13.6% (95% confidence interval [CI], 11.9-15.4%) to 11.8% (95% CI, 10.9-12.8%) after implementation of telemedicine (adjusted odds ratio, 0.40; 95% CI 0.31-0.52). Concomitantly, adherence to best practices in the ICUs increased (prevention of deep venous thrombosis, 85% vs. 99%; stress ulcer prevention, 83% vs. 96%; cardiovascular protection, 80% vs. 99%; prevention of ventilator-associated pneumonia, 33% vs. 52%). The rates of ventilator-associated pneumonia (OR, 0.15; 95% CI, 0.09-0.23) and catheter-related bloodstream infections (OR, 0.50; 95% CI, 0.27-0.93) went down after implementation of ICU telemedicine, and hospital lengths of stay decreased significantly, with no differences between the clinical services (medicine vs surgery) on which the patients were managed.

■ Commentary

This study demonstrated statistically significant, clinically important improvements in the outcome variables examined after implementation of ICU telemedicine. However, the title of this abstract/commentary was deliberately chosen as "telemedicine CAN improve outcomes" rather than that it WILL do so. A recent systematic review[1] and two thoughtful commentaries by Kahn[2,3] emphasize that positive results from the implementation of an ICU telemedicine system are not automatic and cannot be expected unless several other things are also present.

The meta-analysis by Young et al[1] shows that the research previously published in this area is generally weak and has mainly consisted of observational time-series, which are notoriously susceptible to bias and confounding. In addition, several previous studies have failed to show benefits from implementing ICU telemedicine. As pointed out by Kahn,[2,3] these studies have had at least two important differences from the present study of Lilly et al. First, local physician buy-in of ICU telemedicine has been poor, with only a minority of them participating in the study institutions. The Lilly study took place in an institution in which a culture of quality improvement had already been firmly established. The physicians doing the telemonitoring were fully integrated into the medical staff, and buy-in on the part of the overall staff was excellent. Second, the implemented telemedicine programs in the negative studies have focused primarily on preventing medical errors — and generally only at night — rather than on improving adherence to best practices across the board. As Kahn states, "rather than using ICU telemedicine to prevent medical errors, perhaps we should use it to implement ICU best practices, such as evidence-based sedation and mechanical ventilator management."[3]

This study shows that, in the right institutional environment and as part of a comprehensive, system-wide program to improve ICU outcomes by identifying and implementing evidence-based best practices, ICU telemedicine can further those efforts and benefit patients. However, introducing telemedicine in the absence of the other components of the program employed by Lilly et al would seem to offer much less promise of success. ■

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Tdap for Health Care Workers

By Carol A. Kemper, MD, FACP

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Dr. Kemper does research for Abbott Laboratories and Merck. This article originally appeared in the August 2011 issue of Infectious Disease Alert. *At that time it was peer reviewed by Timothy Jenkins, MD, Assistant Professor of Medicine, University of Colorado, Denver Health Medical Center. Dr. Jenkins reports no financial relationship to this field of study.*

Source: ACIP Provisional recommendations for health care personnel on use of tetanus toxoid, reduced diptheria toxoid, and acellular pertussis vaccine (Tdap) and use of post-exposure antimicrobial prophylaxis. Available at: www.cdc.gov/vaccines/recs/provisional/default/htm.

Add Tdap to the growing list of recommended (and often required) vaccinations for health care workers (HCWs) in hospital, including MMR, hepatitis B, influenza, and possibly varicella. In April, the American College of Immunization Practices (ACIP) issued provisional recommendations for pertussis vaccination (Tdap) of all hospital HCWs, regardless of age and prior vaccine history (i.e., regardless of the time since last Td dose). Current hospital employees (and future hires) should receive a single dose of vaccine now, in one broad sweep to provide blanketed coverage of every hospital, and then continue to receive the usual booster vaccine recommended for adults.

Pertussis appears to be cycling up in our communities, especially in California, where 8,383 cases were reported in 2010, including 10 deaths in infants. Neonates and infants < 12 months of age are at the greatest risk for severe infection. For this reason, initial ACIP recommendations were to provide vaccination to all caregivers of small children, thus providing a protective "cocoon" of immunogenic individuals. The current recommendations expand on this philosophy, especially to physicians and nurses who provide care for infants and small children.

HCWs are at risk for pertussis exposure — both from their patients and fellow colleagues. Outbreaks of pertussis in the hospital setting can rapidly evolve, resulting in significant hours and effort to provide post-exposure prophylaxis to everyone exposed. Those who develop symptoms of pertussis are required to receive antibacterial therapy and are furloughed for a minimum of 5 days. In two separate outbreaks in Minnesota, 12% and 52% of cases occurred in HCWs who were exposed to either an ill index case or to each other. At our county hospital in the 1990s, an outbreak of a pertussis-like illness (pre-PCR test availability) necessitated the administration of chemoprophylaxis to more than 400 HCWs; a supreme effort over a Memorial Day weekend, with significant cost to the hospital.[1]

HCWs who have received Tdap vaccine nonetheless require close monitoring for signs and symptoms for 21 days after pertussis exposure. Post-exposure prophylaxis is still recommended for vaccinated HCWs with documented exposure. Even mild respiratory symptoms (e.g., runny nose, sneezing, low grade fever, or cough) should prompt PCR testing for pertussis, receipt of antibiotics, and furlough from work for 5 days. The paroxysmal stage of pertussis, with the characteristic cough, generally only begins 1-2 weeks into the illness. ■

r eference

1. Martinez SM, et al. Azithromycin prophylaxis during a hospitalwide outbreak of a pertussis-like illness. *Infect Control Hosp Epidemiol* 2001;22:781-783.

Leishmaniasis and Human Trafficking

By Carol A. Kemper, MD, FACP

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Dr. Kemper does research for Abbott Laboratories and Merck. This article originally appeared in the July 2011 issue of Infectious Disease Alert. *At that time it was peer reviewed by Timothy Jenkins, MD, Assistant Professor of Medicine, University of Colorado, Denver Health Medical Center. Dr. Jenkins reports no financial relationship to this field of study.*

Source: Cannella AP, et al. A cluster of cutaneous Leishmaniasis associated with human smuggling. *Am J Trop Med Hyg* 2011;84:847-850.

Physicians at the University of California-San Diego (UCSD) report a cluster of 5 cases of cutaneous Leishmaniasis in illegal immigrants from East Africa, which surprisingly turned out to be consistent with New World Leishmaniasis, although all 5 had come from an area endemic for Old World Leishmaniasis. How did this occur?

Four Somali and one Ethiopian were brought to the Emergency Room at UCSD by Immigration and Customs Enforcement agents. They had all been found being smuggled across the U.S.-Mexico border about 20 miles south of the city, and had been held in custody for up to 60 days. They each presented with one small cutaneous ulcer, either nodular or pustular, in different locations on the body (thumb, ear, foot, etc.) and in different stages of development. Initially thought to be MRSA folliculitis, prison officials had attempted administration of trimethoprim-sulfamethoxazole and doxycycline without response. The patients were then

referred to UCSD for further care.

Skin biopsies were obtained, and the histology was consistent with Leishmaniasis, although the presence of a number of features, such as large vacuoles, was more consistent with New World Leishmaniasis. Cultures yielded a *Leishmania* spp. and isoenzyme analysis confirmed *L. panamensis*, which is a member of the *Viannia* group of *Leishmania*. Confirmatory PCR was performed at the Centers for Disease Control and Prevention. All of the patients responded to liposomal amphotericin, although one patient relapsed, requiring a second course of therapy.

The story of how they had arrived at the Mexican border from East Africa was not readily forthcoming, but eventually it was learned that all 5 individuals had been smuggled at different times along an identical route from Djibouti to Dubai to Moscow to Havana, Cuba, and then to Quito, Ecuador, through Colombia, and then by ground via Panama to the U.S.-Mexico border. The trip through Panama required foot travel, and the individuals slept outdoors on the ground at night in sleeping bags. They described many insect bites.

New World Leishmaniasis occurs throughout Central and South America and is caused by the bite of a sand fly. Only a small number of the 76 sand fly species in Ecuador, Colombia, and Panama can transmit Leishmaniasis, and recent data suggest that up to 1% of female *Lutzomyia* sand flies are infected. Within 2-8 weeks of a sand fly bite, a small pustule develops, which progresses to a painless ulcer. Fourteen different species of *Leishmania* exist in the New World, a number of which can cause mucocutaneous involvement, including *L. panamensis*. More aggressive therapy with amphotericin is therefore warranted.

Subsequent to this event, 3 individuals from East Africa presented to the physicians in Tacoma, WA, with a similar story. They had been smuggled along the identical route, and skin biopsies yielded the same organism. The discovery of two clusters of Leishmaniasis, in San Diego and in Tacoma, suggest that human trafficking from East Africa through this route must be fairly common with important public health implications for U.S. residents. ■

The Broken Heart: It CAN Be Mended

ABSTRACT & COMMENTARY

By Barbara A. Phillips, MD, MSPH

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Dr. Phillips serves on the speakers bureaus for Cephalon, Resmed, and Respironics. This article originally appeared in the August 29, 2011, issue of Internal Medicine Alert. *It was edited by Stephen A. Brunton, MD, and peer reviewed by Gerald Roberts, MD. Dr. Brunton is Adjunct Clinical Professor, University of North Carolina, Chapel Hill, and Dr. Roberts is Assistant Clinical Professor of Medicine, Albert Einstein College of Medicine, New York, NY. Dr. Brunton serves on the advisory board for Amylin, Boehringer Ingelheim, Novo Nordisk, and Symbiotix; he serves on the speakers bureau of Boehringer Ingelheim, Novo Nordisk, and Teva. Dr. Roberts reports no financial relationship to this field of study.*

Synopsis: *The authors advocate that cardiovascular magnetic resonance imaging using specific criteria may be useful as a diagnostic tool for patients with stress cardiomyopathy at the time of acute clinical presentation.*

Source: Eitel I, et al. Clinical characteristics and cardiovascular magnetic resonance findings in stress (takotsubo) cardiomyopathy. *JAMA* 2011;306:277-286.

These investigators set out to learn more about the clinical presentation and outcomes of stress cardiomyopathy (also known as Takotsubo cardiomyopathy) in a multicenter study in Europe and North America. Potential patients for inclusion in the study were recruited at the time of initial hospitalization. The evaluation included electrocardiogram (ECG), transthoracic echocardiogram, blood sample analysis, coronary angiogram and ventriculogram, as well as cardiovascular magnetic resonance imaging. The diagnosis of stress cardiomyopathy was defined as: 1) an acute cardiac event typically presenting with chest pain and/or shortness of breath; 2) transient systolic dysfunction with marked left ventricular (LV) contraction abnormality extending beyond a single coronary perfusion bed; 3) absence of significant (> 50%) obstructive coronary artery disease or angiographic evidence of acute plaque rupture; 4) new ECG abnormalities (either ST elevation or T-wave inversion) or modest elevation in cardiac troponin level; 5) absence of pheochromocytoma; and 6) absence of myocarditis or typical ischemic transmural late gadolinium enhancement (LGE) on cardiovascular magnetic resonance imaging.[1] One to 6 months after the acute event, patients with suspected stress cardiomyopathy were readmitted for clinical evaluation and cardiovascular magnetic resonance imaging follow-up in order to confirm that diagnosis. Some participants chose not to undergo repeat imaging, and had echocardiography instead, but the cohort is remarkably well-studied.

Over a 5-year period, 256 patients were recruited, and most (93%) had cardiovascular resonance imaging performed shortly after admission. Patients who were ultimately diagnosed with stress cardiomypathy had a mean age of 69 years, and 89% were women. Most (207) of these women were postmenopausal. Men accounted for 11% of cases, and there were no age differences between men and women. Most (88%) of the patients reported symptoms consistent with acute coronary syndrome (ACS) at their initial presentation. Among those who did not, the acute event was most likely characterized as either syncope (n = 9 [4%]) or asystole (n = 3; [1%]). The rest were admitted for suspected

ACS detected during monitoring of noncardiac conditions because of new ECG abnormalities, acute onset of chest pain, and/or positive troponin levels.

Most of the patients (71%) could identify a significant stressful event that happened within 48 hours of clinical symptoms. These events were emotional stress in 77 (30%) and physical stress in 105 (41%).

At initial presentation, ECGs showed abnormalities in 222 patients (87%). The initial troponin T level was typically only mildly increased in 231 patients (90%). No relation was evident between ballooning patterns seen on the imaging studies and troponin levels, age, sex, or reported stress trigger.

All 256 patients underwent cardiac catheterization at initial presentation. Left ventriculography revealed typical apical ballooning in 210 (82%), midventricular ballooning in 44 (17%), and an inverted, basal pattern in 2 (1%). Of note, most (75%) patients had healthy coronary arteries. Of the remainder, only 6% had coronary artery stenosis of 75% or more; and the areas of coronary artery stenosis did not correspond to the area of wall motion abnormality seen on magnetic resonance imaging. The remaining 47 patients (18%) had only mild coronary atherosclerosis. Two patients (1%) had spontaneous coronary spasm. No patient had cardiovascular plaque rupture.

Cardiovascular magnetic resonance imaging detected ballooning patterns with moderate to severe reduction of LV function in all patients (mean LV ejection fraction, 47.7%). Biventricular ballooning was observed in 81 patients (34%). Interestingly, LV ejection fraction was lower than in patients without RV involvement. Patients with biventricular ballooning were older (mean, 73.4 vs 66.5 years) and had significantly more frequent preceding stressful events. Myocardial edema was visible on cardiovascular resonance imaging in 162 of 199 patients (81%) with the regional distribution pattern matching the distribution of LV dysfunction. LGE (thought to be a marker of subtle fibrosis) was uncommon and did not correlate with clinical presentation. Pleural effusions were common (33%), as were pericardial effusions (43%).

Initially, most patients were treated using standard cardiovascular medications for ACS (aspirin, clopidogrel, heparin, beta-blockers, angiotensin-converting enzyme inhibitors, vasodilators, and diuretics). After exclusion of coronary artery stenosis, the patients received standard supportive care for congestive heart failure with beta-blockers, angiotensin-converting enzyme inhibitors/angiotensin II receptor blockers, diuretics, and aldosterone antagonists. In seven patients (3%) with severe hemodynamic compromise, an intra-aortic balloon pump was implanted. Four patients had thrombi, and were treated with warfarin with no subsequent events. Four patients (3 women and 1 man) died in the hospital. Causes of death in these patients were ventricular fibrillation (n = 2), cardiogenic shock (n = 1), and hypoxic brain injury (n = 1). Of these, three patients had apical and one patient had midventricular ballooning. No relation was evident between in-hospital outcome and ECG pattern, troponin level, or clinical features. Another four patients died during the follow-up period.

Among the remaining 248 patients, a complete clinical follow-up including imaging and/or echocardiography for confirmation of LV function recovery was available.

Follow-up echocardiography and cardiovascular magnetic imaging showed normalization of LV ejection fraction in all patients, and end-diastolic and end-systolic volume decreased.

■ Commentary

This study was largely focused on cardiovascular magnetic resonance imaging in stress cardiomyopathy, but the authors helped us to expand our knowledge of this newly-described syndrome. Stress cardiomyopathy was first reported in Japan as takotsubo cardiomyopathy. It is characterized by acute, profound, but reversible left ventricular dysfunction in the absence of significant coronary artery disease, triggered by acute emotional or physical stress.[1-4] This phenomenon is identified by a distinctive imaging pattern of "apical ballooning" and has previously been reported to primarily affect postmenopausal women. Most patients have a clinical presentation similar to that of ACS. Recent studies revealed a prevalence of approximately 2% of patients presenting with ACS in the United States and Europe.[1,4] Enhanced sympathetic activity is believed to play a causal role in the transient myocardial dysfunction, and the prognosis is generally considered favorable.[1,4]

The current study is a large multicenter trial which used exquisite imaging techniques and careful follow-up. This carefully described group of patients had a considerably broader clinical profile than previously reported, including men, some younger individuals, and some patients who could not identify a precipitating physical or emotional stress. The authors also advocate that cardiovascular magnetic resonance imaging using specific criteria may be useful as a diagnostic tool for patients with stress cardiomyopathy at the time of acute clinical presentation; they note that those with biventricular ballooning were more likely to have longer hospitalizations, markers of heart failure (as reflected by a lower LV ejection fraction and a high incidence of bilateral pleural effusions), and older age, and thus biventricular ballooning may be an important prognostic marker.

An important take home message from this study is that the absence of an identifiable stressful event does not rule out the diagnosis of stress cardiomyopathy. And, in this study, many more patients had a physical than an emotional stress as the precipitating event, contrary to the common notion that emotional stress is generally the trigger. The authors note, "…preceding stress is not evident in every case, and it would therefore seem inappropriate to assume a common trigger among all...patients." Clearly, we still have much to learn about the Broken Heart Syndrome. ■

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CME Questions

1. In the study by Fang and colleagues of patients with atrial fibrillation on warfarin, which of the following cluster of variables had the highest predictive value for bleeding?

a. Anemia, severe renal disease, age > 75 years, any prior hemorrhage, and hypertension

b. Advanced liver disease, age > 55 years, previous myocardial infarction, heart failure

c. Anemia, advanced liver disease, pulmonary hypertension, previous stroke

d. Hypertension, previous stroke, alcohol use, heart failure, diabetes mellitus

2. In the prospective single-center study by Lilly, et al., the introduction of ICU telemedicine led to which of the following outcomes?

a. Decreased hospital mortality

b. Improved adherence to ICU best practices.

c. Decreased rates of ventilator-associated pneumonia.

d. All of the above.

3. According to the new provisional recommendations by the American College of Immunization Practices, vaccination with acellular pertussis vaccine (Tdap) is recommended for which health care workers (HCW)?

a. Only previously unvaccinated hospital HCW under the age of 45 years.

b. All hospital HCW regardless of age and prior vaccine history.

c. Only HCW who work in intensive care units or with immunocompromised patients.

d. Only previously unvaccinated HCW who work in skilled nursing facilities (nursing homes) caring for patients over the age of 70 years.

CME/Objectives

Upon completion of this educational activity, participants should be able to:

- discuss pertinent safety, infection control and quality improvement practices;
- explain diagnosis and treatment of acute illness in the hospital setting; and
- discuss current data on diagnostic and therapeutic modalities for common inpatient problems. ■

CME Instructions

1. Read and study the activity, using the provided references for further research.

2. Log on to **www.cmecity.com** to take a post-test; tests can be taken after each issue or collectively at the end of the semester. *First-time users will have to register on the site using the 8-digit subscriber number printed on their mailing label, invoice, or renewal notice.*

3. Pass the online tests with a score of 100%; you will be allowed to answer the questions as many times as needed to achieve a score of 100%.

4. After successfully completing the last test of the semester, your browser will be automatically directed to the activity evaluation form, which you will submit online.

5. Once the evaluation is received, a credit letter will be sent to you. ■

AHC Media

Dear *Hospital Medicine Alert* Subscriber:

The September issue of your newsletter marked the start of a new continuing medical education (CME) semester, and provides us with an opportunity to tell you about some new procedures for earning CME.

Hospital Medicine Alert, sponsored by AHC Media, provides you with evidence-based information and best practices that help you make informed decisions concerning treatment options. Our intent is the same as yours — the best possible patient care.

The objectives of *Hospital Medicine Alert* are:

- Discuss pertinent safety, infection control and quality improvement practices;
- Explain diagnosis and treatment of acute illness in the hospital setting; and
- Discuss current data or diagnostic and therapeutic modalities for common inpatient problems.

The American Medical Association, which oversees the Physician's Recognition Award and credit system and allows AHC Media to award *AMA PRA Category 1 Credit*™, has changed its requirements for awarding *AMA PRA Category 1 Credit*™. Enduring materials, like this newsletter, are now required to include an assessment of the learner's performance; the activity provider can award credit only if a minimum performance level is met. AHC Media considered several ways of meeting these new AMA requirements and chose the most expedient method for our learners.

HERE ARE THE STEPS YOU NEED TO TAKE TO EARN CREDIT FOR THIS ACTIVITY:

1. Read and study the activity, using the provided references for further research.
2. Log on to **www.cmecity.com** to take a post-test; tests can be taken after each issue or collectively at the end of the semester. *First-time users will have to register on the site using the 8-digit subscriber number printed on their mailing label, invoice, or renewal notice.*
3. Pass the online tests with a score of 100%; you will be allowed to answer the questions as many times as needed to achieve a score of 100%.
4. After successfully completing the last test of the semester, your browser will be automatically directed to the activity evaluation form, which you will submit online.
5. Once the evaluation is received, a credit letter will be sent to you.

This activity is valid 36 months from the date of publication. The target audience for this activity is hospitalists, intensivists, and acute care clinicians.

If you have any questions about the process, please call us at (800) 688-2421, or outside the U.S. at (404) 262-5476. You can also fax us at (800) 284-3291, or outside the U.S. at (404) 262-5560. You can also email us at: customerservice@ahcmedia.com.

On behalf of AHC Media, we thank you for your trust and look forward to a continuing education partnership.

Sincerely,

Lee Landenberger
Continuing Education Director
AHC Media