



Resident Journal Review: January-February 2009

David Wallace, MD MPH; Dana Sajed, MD; Christopher Doty, MD and Amal Mattu, MD

This is a continuing column providing journal article summaries pertinent to EM residents. It is not meant to be an extensive review of the articles, nor is it wholly comprehensive of all the literature published. Rather, it is a short list of potentially useful literature that the busy EM resident may have missed. Residents should read the articles themselves to draw their own conclusions. This edition will include articles published in September and October 2008.

Awasthi S, Mao A, Wooton-Gorges SL, Wisner DH, Kuppermann N, Holmes JF. Is hospital admission and observation required after a normal abdominal computed tomography scan in children with blunt abdominal trauma? Acad Emerg Med 2008;15:895-9

Children who have sustained blunt abdominal trauma are frequently admitted to the hospital for observation despite having a normal abdominal computed tomography (CT) scan. This study aimed to quantify the risk of intraabdominal injury (IAI) after having a normal abdominal CT in the emergency department (ED).

1,085 patients under 18 years of age comprised the cohort with abdominal trauma and normal CT scans. None of the 348 patients who were sent home were later determined to have IAI, and only two of the 737 that were hospitalized were later found to have an IAI. The negative predictive value of a negative abdominal CT scan for IAI was 99.8% in this study. No oral contrast was used in the scans; weight-based intravenous contrast was used in the scans. All studies were interpreted by a board certified or board eligible faculty radiologist.

In this cohort, the incidence of IAI was very low. As such, admission for serial abdominal exams and repeat laboratory measurements may be unwarranted in a majority of patients. These findings will need to be validated in other centers prior to a widespread change in practice; however, they raise interesting questions about the incidence of occult IAI in pediatric trauma.

Holcomb JB, Wade CE, Michalek JE, et al. Increased plasma and platelet to red blood cell ratios improves outcome in 466 massively transfused civilian trauma patients. Annals of surgery 2008;248:447-58

The ideal ratio of blood products to be administered in massive transfusion is unclear. Traditionally, the use of plasma and platelets has been reserved for patients with persistently low blood pressure unresponsive to saline administration, those who have received more than six units of packed red blood cells, abnormal coagulation laboratory findings or obvious microvascular bleeding. The investigators examined outcomes in 467 massive transfusions (≥ 10 units packed red blood cells) at sixteen level 1 trauma centers. Patients were stratified into one of four groups, based on high or low plasma and platelet to red blood cell ratios. Patients who died within 30 minutes of arriving to the hospital were excluded.

The plasma:RBC ratio ranged from 0 to 2.89, and the platelet:RBC ratio ranged from 0 to 2.5. A plasma:RBC ratio $\geq 1:2$ was associated with an improved 30-day survival (40% vs. 60%, $p < 0.01$). The same was true for a platelet:RBC ratio $\geq 1:2$ (40% vs. 60%, $p < 0.01$). The injury severity score and maximal regional abbreviated injury scores were not different between groups.

This study challenges current recommendations regarding the administration of platelets and plasma in the setting of massive transfusion. Expect more discussions on this topic as attention shifts to this interesting question.

Scalea TM, Bochicchio KM, Lumpkins K, et al. Early aggressive use of fresh frozen plasma does not improve outcome in critically injured trauma patients. Annals of surgery 2008;248:578-84

Scalea et. al report on their experience with 806 patients admitted to the intensive care unit of the R Adams Cowley Shock Trauma Center over a two year period. In this cohort, 365 patients (45%) were transfused during the first 24 hours, with 250 patients receiving both packed red blood cells (PRBCs) and fresh frozen plasma. After controlling for injury severity, there was no association between mortality and transfusion of plasma products either overall or in a 1:1 ratio with PRBCs. Furthermore, subgroup analysis of those requiring at least 10 units of PRBCs did not find a mortality benefit for the 1:1 ratio of PRBCs to FFPs.

The investigators acknowledge the difference in their population compared to the Holcomb et. al. study. Specifically, the patients in the Scalea investigation were those who survived to be admitted to the intensive care unit. For the group who received a blood transfusion, the 24 hour mortality was 14%. The Holcomb study had a sicker population overall, with 24 hour mortality of 31%. Kaplan-Meier survival plots reported in the Holcomb paper showed that an early transfusion strategy could have a sustained mortality impact at both 24 hours and 30 days. These differences prevent direct comparisons between the papers and partially explain their findings.

These studies highlight the need for further investigation in the best transfusion strategy for trauma patients. While new insights are becoming available from military experience with platelets, FFP and RBCs, the translation of these findings into an older civilian population with higher ISSs needs to be better defined.

Kemp AM, Dunstan F, Harrison S, et al. Patterns of skeletal fractures in child abuse: systematic review. BMJ 2008;337:a1518

This systematic review sought to identify characteristics of fractures that distinguished child abuse from benign causes. In addition, the investigators sought to calculate the probability of abuse for individual fracture types.

Thirty-two studies were included in their review. Fractures attributable to abuse were found throughout the skeletal system, but were most commonly found in infants and toddlers. After exclusion of major trauma as a cause, rib fractures had the highest likelihood of abuse (71%), followed by humeral fractures (66%). Despite historical associations between metaphyseal fractures and abuse,

continued on page 24



Resident Journal Review - continued from page 19

there was insufficient evidence to support or refute this observation. Similarly, the location of rib fracture was not found to correlate with abuse, despite the widely held belief that posterior fractures indicate abuse. In fact, no fracture on its own was able to conclusively distinguish abuse from non-abuse, although some should raise serious concerns (such as femoral shaft fractures in children that are not yet walking). The authors offer a radiographic strategy to identify fractures in cases of suspected abuse: skeletal survey with oblique view of the chest (for improved identification of rib fractures).

Seamon MJ, Medina CR, Pieri PG, et al. Follow-up after asymptomatic penetrating thoracic injury: 3 hours is enough. J Trauma. 2008 Sep;65(3):549-53

Patients with asymptomatic penetrating thoracic trauma are typically managed with an initial chest X-ray (CXR) then followed up with a second CXR six hours later to exclude the development of delayed pneumothorax (PTX) or hemothorax (HTX). Over a 30 month period, the authors of this study screened 648 patients who presented with penetrating thoracic injury, of whom 127 had no initial findings and were asymptomatic. Of these 127 cases, 100 completed the study protocol which included an initial supine anteroposterior CXR, continuous pulse oximetry, hourly blood pressure monitoring and upright posteroanterior and lateral radiographs at three and six hour intervals. Of these patients, two developed delayed PTX between arrival and three hours. No patient developed PTX or HTX between three and six hours. The two with delayed injury were admitted and received tube thoracostomy.

The study authors conclude that three hours is a safe amount of observation time for asymptomatic penetrating chest wounds. In addition, the cost efficiency of the potentially shorter emergency department stay is also calculated, and as expected, three hour observation is less expensive to both patient and hospital when compared to six hour observation.

Two limitations of this study are the low incidence of delayed injury when compared to prior published reports and the very low follow up rate for patients in their group (only 17 returned to their trauma clinic). However, the timing of delayed insult in their cohort is consistent with two prior studies^{1,2} which indicate the same thing – that delayed injuries typically occur within a three hour window, and patients may be safely discharged after a brief period of observation and serial CXR. It appears that a shortened stay in the emergency department is not only safe, but would be beneficial to alleviate overcrowding and is cost-effective as well.

1. Kiev J, Kerstein MD. Role of the three hour roentgenogram of the chest in penetrating and nonpenetrating injuries of the chest. *Surg Gynecol Obstet.* 1992;175:249–253
2. Shatz DV, Pedraja J, Erbella J, Hameed M, Vail SJ. Efficacy of follow-up evaluation in penetrating thoracic injuries: 3- vs. 6-hour radiographs of the chest. *J Emerg Med.* 2001;20:281–284

Newton MF, Keirns CC, Cunningham R, et al. Uninsured adults presenting to US emergency departments: assumptions vs. data. JAMA. 2008 Oct 22;300(16):1914-24

The authors of this paper review the existing data regarding emergency department utilization by uninsured patients in the U.S. to ex-

amine certain assumptions found in both medical literature and lay media regarding the potential strain placed on emergency care. After an extensive literature search for articles dealing with medical, surgical or trauma care for uninsured patients in an emergency setting, they identified 127 relevant studies. After careful review, the most commonly held perceptions from these articles were analyzed.

Interestingly, the authors found that some commonly held assumptions are not necessarily true:

1. Uninsured patients use the ED for nonurgent care. This assumption does not necessarily hold true, although it is difficult to clearly define what constitutes urgent versus nonurgent conditions. Often times, this data is based on a triage-based definition of urgency and nonurgency, although many supposed nonurgent conditions can be appropriately managed in an ED (e.g. orthopedic injuries, lacerations).
2. Uninsured patients are a leading cause of ED overcrowding. Again, this is not clearly supported by available data. What is known is that ED overcrowding is multifactorial and likely due to a lack of inpatient bed availability, ED closings and an aging population with increasing prevalence of chronic illnesses. Additionally, overcrowded emergency departments are a challenge in many countries with universal healthcare coverage, which goes against this assumption.

Some commonly held notions about access to care for the uninsured and ED use were supported by the available literature: the uninsured lack access to primary care, the uninsured pay more to use emergency resources than they would pay elsewhere and the uninsured present with higher acuity of illness. Additionally, it is noted that uninsured patients are more likely to delay getting care for their illnesses and once in the healthcare environment, receive less care than their insured counterparts.

While this study is not likely to change patient management on a day-to-day clinical shift, it is important to understand this data, because if solutions to ED overcrowding are designed based on false assumptions, these efforts will waste resources on unnecessary issues and will fail to fix the true problems.

Body R, McDowell G, Carley S, Mackway-Jones K. Do risk factors for chronic coronary heart disease help diagnose acute myocardial infarction in the Emergency Department? Resuscitation 2008;79:41-5

The Thrombolysis In Myocardial Infarction score (TIMI) assigns one point for the presence of three or more cardiac risk factors. Incremental TIMI points correlate with risk of death, myocardial infarction or need for urgent revascularization at 14 days. The score is used to risk stratify patients presenting with unstable angina or non-ST elevation myocardial infarction. In consideration of this use, the study authors conducted an emergency department based cohort study of traditional risk factors for the diagnosis or exclusion of acute myocardial infarction.

Consecutive patients older than twenty-five years of age presenting to the emergency department with a complaint of chest pain within

continued on page 25



Healthcare in America: Medicaid, SCHIP, and Why There are Still Uninsured - continued from page 18

The uninsured in America are a diverse group, with varying income levels, racial and ethnic backgrounds and education levels. More information about Medicaid, SCHIP and the uninsured in America can be found at the Centers for Medicare and Medicaid Services website, the Robert Wood Johnson Foundation and the U.S. Census Bureau.

Learn more by reading these primary sources:

Employee Benefit Research Institute estimates from the March Current Population Survey, 2007 Supplement.

"Income, Poverty, and Health Insurance Coverage in the United States: 2006." U.S. Census Bureau, August 2007, table 6, p. 21.

Cover the Uninsured, a Project of the Robert Wood Johnson Foundation: <http://covertheuninsured.org/>.

The Centers for Medicare and Medicaid Services: <http://www.cms.hhs.gov/>.

Resident Journal Review - continued from page 24

the prior 24 hours that was felt to be cardiac in origin were included. All patients were followed up six months after presentation. The primary outcome of interest was acute myocardial infarction, as defined by the American Heart Association and European Society of Cardiology. Logistic regression was used to evaluate individual risk factors for the diagnosis of acute myocardial infarction.

796 patients were included in the final analysis; 148 patients were diagnosed with acute myocardial infarction. There was no trend towards increasing incidence of AMI with increasing number of risk factors. In addition, 12% of patients who ultimately ruled in for AMI had no traditional risk factors.

Management of patients presenting to the emergency department with a complaint of chest pain remains challenging. Traditional risk factors may not be useful for predicting who is currently having an acute myocardial infarction – careful scrutiny of the patient's EKG, attention to history of present illness and management including provocative testing when indicated remain cornerstones of optimal care.

Dana Sajed is an emergency medicine chief resident at SUNY Downstate/Kings County Hospital.

David Wallace is the emergency medicine/internal medicine (EM/IM) chief resident at SUNY Downstate/Kings County Hospital.

Christopher Doty is the residency program director for emergency medicine and co-director of combined EM/IM at SUNY Downstate/Kings County Hospital.

Amal Mattu is the residency program director for emergency medicine and co-director of combined EM/IM at University of Maryland.

UCIEM+G

The Emergency Medicine Interest Group (EMIG) at the University of California, Irvine School of Medicine is proud to present its 4th biennial **Emergency Medicine Student Symposium** for EM physicians, residents and medical students. The Symposium will be held February 7, 2009, at the Doubletree in Orange, CA, across the street from UCIMC.

This year's focus is Subspecialties in Emergency Medicine. The Symposium will consist of lectures, didactic sessions, skills workshops, a research panel, a residency panel and much more.

For questions, please email the UCI EMIG at uciemig@gmail.com or contact our Outreach VP, Shannon Toohey at stohey@uci.edu.

