Update in Hospital Medicine: Practical Lessons from the Literature

Alfred Burger, MD[1]*, Chad Miller, MD[2], Bradley A. Sharpe, MD[3], Rachel E. Thompson, MD, MPH[4]

[1]Mount Sinai Beth Israel, Icahn School of Medicine at Mount Sinai, New York, New York; [2]Saint Louis University School of Medicine, Saint Louis University Hospital, Saint Louis, Missouri; [3]University of California San Francisco Medical Center, San Francisco, California, [4]University of Nebraska Medical Center, Omaha, Nebraska.

BACKGROUND: Hospital Medicine has a widening scope of practice. This article provides a summary of recent high-impact publications for busy clinicians who provide care to hospitalized adults.

METHODS: The authors reviewed articles published between March 2016 and March 2017 for the Update in Hospital Medicine presentations at the 2017 Society of Hospital Medicine and Society of General Internal Medicine annual meetings. Nine of the 20 articles presented were selected for this review based on the article quality and potential to influence practice.

RESULTS: The key insights gained include: pulmonary embolism may be a more common cause of syncope and acute exacerbation of COPD than previously recognized; nonthoracic low-tesla MRI is safe following a specific protocol for patients with cardiac devices implanted after 2001; routine inpatient blood cultures for fever are of a low yield with a false positive rate similar to the true positive rate; chronic opioid use after surgery occurs more frequently than in the general population; high-sensitivity troponin and a negative ECG performed 3 hours after an episode of chest pain can rule out acute myocardial infarction; sitting at patients' bedsides enhances patients' perception of provider communication; 5 days of antibiotics for community-acquired pneumonia is equivalent to longer courses; oral proton pump inhibitors (PPI) are as effective as IV PPIs after an esophagogastroduodenoscopy (EGD) for the treatment of bleeding peptic ulcers.

CONCLUSIONS: Recent research provides insight into how we approach common medical problems in the care of hospitalized adults. These articles have the potential to change or confirm current practices. *Journal of Hospital Medicine* 2018;13:626-630. Published online first February 27, 2018. © 2018 Society of Hospital Medicine

The practice of hospital medicine continues to grow in its scope and complexity. The authors of this article conducted a review of the literature including articles published between March 2016 and March 2017. The key articles selected were of a high methodological quality, had clear findings, and had a high potential for an impact on clinical practice. Twenty articles were presented at the Update in Hospital Medicine at the 2017 Society of Hospital Medicine (SHM) and Society of General Internal Medicine (SGIM) annual meetings selected by the presentation teams (B.A.S., A.B. at SGIM and R.E.T., C.M. at SHM). Through an iterative voting process, nine articles were selected for inclusion in this review. Each author ranked their top five articles from one to five. The points were tallied for each article, and the five articles with the most points were included. A second round of voting identified the remaining four articles for inclusion. Each article is summarized below, and the key points are highlighted in Table 1.

***Address for correspondence**: Alfred Burger MD, SFHM, FACP, Senior Associate Program Director, Internal Medicine Residency,Mount Sinai Beth Israel, Icahn School of Medicine at Mount Sinai, 350 East 17th Street, Baird Hall, 20th Floor, New York, NY 10003; Telephone: 212-420-2690; Fax: 212-420-4615; Email: Alfred.burger@mountsinai.org

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ESSENTIAL PUBLICATIONS

Prevalence of Pulmonary Embolism among Patients Hospitalized for Syncope. Prandoni P et al. *New England Journal of Medicine*, 2016;375(16):1524-31.[1]

Background

Pulmonary embolism (PE), a potentially fatal disease, is rarely considered as a likely cause of syncope. To determine the prevalence of PE among patients presenting with their first episode of syncope, the authors performed a systematic workup for pulmonary embolism in adult patients admitted for syncope at 11 hospitals in Italy.

Findings

Of the 2,584 patients who presented to the emergency department (ED) with syncope during the study, 560 patients were admitted and met the inclusion criteria. A modified Wells Score was applied, and a D-dimer was measured on every hospitalized patient. Those with a high pretest probability, a Wells Score of 4.0 or higher, or a positive D-dimer underwent further testing for pulmonary embolism by a CT scan, a ventilation perfusion scan, or an autopsy. Ninety-seven of the 560 patients admitted to the hospital for syncope were found to have a PE (17%). One in four patients (25%) with no clear cause for syncope was found

TABLE. **Nine articles, 9 practical implications.**

Practical Implications
1. Consider PE in patients admitted for syncope without a clear cause
2. 1.5 Tesla nonthoracic MRIs done on a protocol are safe in patients with non-MRI conditional cardiac devices implanted after 2001
3. Routine blood cultures for fever in hospitalized patients is of a low yield, with a significant potential for false positives
4. Developing chronic opioid use is more common in the postoperative year than in a matched nonsurgical cohort
5. A negative high-sensitivity troponin test performed at least 3 hours after an episode of chest pain, in conjunction with a negative ECG, can rule out acute myocardial infarction
6. Consider PE in patients with acute exacerbations of COPD without other exacerbation triggers
7. Patients perceive better communication from physicians who sit, compared to those who stand, at the bedside
8. A shorter course of antibiotics (5 days) is as effective as a longer course (10 days) for inpatient treatment of community-aquired pneumonia
9. Oral PPI treatment after EGD for bleeding peptic ulcers is as effective as IV PPI

Abbreviations: COPD, Chronic Obstructive Pulmonary Disease; EGD, Esophagogastroduodenoscopy; PE, Pulmonary embolism; PPI, proton pump inhibitors.

to have a PE, and one in four patients with PE had no tachycardia, tachypnea, hypotension, or clinical signs of DVT.

Cautions

Nearly 72% of the patients with common explanations for syncope, such as vasovagal, drug-induced, or volume depletion, were discharged from the ED and not included in the study. The authors focused on the prevalence of PE. The causation between PE and syncope is not clear in each of the patients. Of the patients' diagnosis by a CT, only 67% of the PEs were found to be in a main pulmonary artery or lobar artery. The other 33% were segmental or subsegmental. Of those diagnosed by a ventilation perfusion scan, 50% of the patients had 25% or more of the area of both lungs involved. The other 50% involved less than 25% of the area of both lungs. Also, it is important to note that 75% of the patients admitted to the hospital in this study were 70 years of age or older.

Implications

After common diagnoses are ruled out, it is important to consider pulmonary embolism in patients hospitalized with syncope. Providers should calculate a Wells Score and measure a D-dimer to guide the decision making.

Assessing the Risks Associated with MRI in Patients with a Pacemaker or Defibrillator. Russo RJ et al. *New England Journal of Medicine*, 2017;376(8):755-64.[2]

Background

Magnetic resonance imaging (MRI) in patients with implantable cardiac devices is considered a safety risk due to the potential of cardiac lead heating and subsequent myocardial injury or alterations of the pacing properties. Although manufacturers have developed "MRI-conditional" devices designed to reduce these risks, still 2 million people in the United States and 6 million people worldwide have "non-MRI-conditional" devices. The authors evaluated the event rates in patients with "non-MRI-conditional" devices undergoing an MRI.

Findings

The authors prospectively followed up 1,500 adults with cardiac devices placed since 2001 who received nonthoracic MRIs according to a specific protocol available in the supplemental materials published with this article in the *New England Journal of Medicine*. Of the 1,000 patients with pacemakers only, they observed five atrial arrhythmias and six electrical resets. Of the 500 patients with implantable cardioverter defibrillators (ICDs), they observed one atrial arrhythmia and one generator failure (although this case had deviated from the protocol). All of the atrial arrhythmias were self-terminating. No deaths, lead failure requiring an immediate replacement, a loss of capture, or ventricular arrhythmias were observed.

Cautions

Patients who were pacing dependent were excluded. No devices implanted before 2001 were included in the study, and the MRIs performed were only 1.5 Tesla (a lower field strength than the also available 3 Tesla MRIs).

Implications

It is safe to proceed with 1.5 Tesla nonthoracic MRIs in patients, following the protocol outlined in this article, with non–MRI -conditional cardiac devices implanted since 2001.

Culture If Spikes? Indications and Yield of Blood Cultures in Hospitalized Medical Patients. Linsenmeyer K et al. *Journal of Hospital Medicine*, 2016;11(5):336-40.[3]

Background

Blood cultures are frequently drawn for the evaluation of an inpatient fever. This "culture if spikes" approach may lead to unnecessary testing and false positive results. In this study, the authors evaluated rates of true positive and false positive blood cultures in the setting of an inpatient fever.

Findings

The patients hospitalized on the general medicine or cardiology floors at a Veterans Affairs teaching hospital were prospectively followed over 7 months. A total of 576 blood cultures were ordered among 323 unique patients. The patients were older (average age of 70 years) and predominantly male (94%). The true-positive rate for cultures, determined by a consensus among the microbiology and infectious disease departments based on a review of clinical and laboratory data, was 3.6% compared with a false-positive rate of 2.3%. The clinical characteristics associated with a higher likelihood of a true positive included: the indication for a culture as a follow-up from a previous culture (likelihood ratio [LR] 3.4), a working diagnosis of bacteremia or endocarditis (LR 3.7), and the constellation

of fever and leukocytosis in a patient who has not been on antibiotics (LR 5.6).

Cautions
This study was performed at a single center with patients in the medicine and cardiology services, and thus, the data is representative of clinical practice patterns specific to that site.

Implications
Reflexive ordering of blood cultures for inpatient fever is of a low yield with a false-positive rate that approximates the true positive rate. A large number of patients are tested unnecessarily, and for those with positive tests, physicians are as likely to be misled as they are certain to truly identify a pathogen. The positive predictive value of blood cultures is improved when drawn on patients who are not on antibiotics and when the patient has a specific diagnosis, such as pneumonia, previous bacteremia, or suspected endocarditis.

Incidence of and Risk Factors for Chronic Opioid Use among Opioid-Naive Patients in the Postoperative Period. Sun EC et al. *JAMA Internal Medicine*, 2016;176(9):1286-93.[4]

Background
Each day in the United States, 650,000 opioid prescriptions are filled, and 78 people suffer an opiate-related death. Opioids are frequently prescribed for inpatient management of postoperative pain. In this study, authors compared the development of chronic opioid use between patients who had undergone surgery and those who had not.

Findings
This was a retrospective analysis of a nationwide insurance claims database. A total of 641,941 opioid-naive patients underwent 1 of 11 designated surgeries in the study period and were compared with 18,011,137 opioid-naive patients who did not undergo surgery. Chronic opioid use was defined as the filling of 10 or more prescriptions or receiving more than a 120-day supply between 90 and 365 days postoperatively (or following the assigned faux surgical date in those not having surgery). This was observed in a small proportion of the surgical patients (less than 0.5%). However, several procedures were associated with the increased odds of postoperative chronic opioid use, including a simple mastectomy (Odds ratio [OR] 2.65), a cesarean delivery (OR 1.28), an open appendectomy (OR 1.69), an open and laparoscopic cholecystectomy (ORs 3.60 and 1.62, respectively), and a total hip and total knee arthroplasty (ORs 2.52 and 5.10, respectively). Also, male sex, age greater than 50 years, preoperative benzodiazepines or antidepressants, and a history of drug abuse were associated with increased odds.

Cautions
This study was limited by the claims-based data and that the nonsurgical population was inherently different from the surgical population in ways that could lead to confounding.

Implications
In perioperative care, there is a need to focus on multimodal approaches to pain and to implement opioid reducing and sparing strategies that might include options such as acetaminophen, NSAIDs, neuropathic pain medications, and Lidocaine patches. Moreover, at discharge, careful consideration should be given to the quantity and duration of the postoperative opioids.

Rapid Rule-out of Acute Myocardial Infarction with a Single High-Sensitivity Cardiac Troponin T Measurement below the Limit of Detection: A Collaborative Meta-Analysis. Pickering JW et al. *Annals of Internal Medicine*, 2017;166:715-24.[5]

Background
High-sensitivity cardiac troponin testing (hs-cTnT) is now available in the United States. Studies have found that these can play a significant role in a rapid rule-out of acute myocardial infarction (AMI).

Findings
In this meta-analysis, the authors identified 11 studies with 9,241 participants that prospectively evaluated patients presenting to the emergency department (ED) with chest pain, underwent an ECG, and had hs-cTnT drawn. A total of 30% of the patients were classified as low risk with negative hs-cTnT and negative ECG (defined as no ST changes or T-wave inversions indicative of ischemia). Among the low risk patients, only 14 of the 2,825 (0.5%) had AMI according to the Global Task Forces definition.[6] Seven of these were in patients with hs-cTnT drawn within three hours of a chest pain onset. The pooled negative predictive value was 99.0% (CI 93.8%–99.8%).

Cautions
The heterogeneity between the studies in this meta-analysis, especially in the exclusion criteria, warrants careful consideration when being implemented in new settings. A more sensitive test will result in more positive troponins due to different limits of detection. Thus, medical teams and institutions need to plan accordingly. Caution should be taken for any patient presenting within three hours of a chest pain onset.

Implications
Rapid rule-out protocols—which include clinical evaluation, a negative ECG, and a negative high-sensitivity cardiac troponin—identify a large proportion of low-risk patients who are unlikely to have a true AMI.

Prevalence and Localization of Pulmonary Embolism in Unexplained Acute Exacerbations of COPD: A Systematic Review and Meta-analysis. Aleva FE et al. *Chest*, 2017;151(3):544-54.[7]

Background
Acute exacerbations of chronic obstructive pulmonary disease (AE-COPD) are frequent. In up to 30%, no clear trigger is found. Previous studies suggested that one in four of these patients

may have a pulmonary embolus (PE).[7] This study reviewed the literature and meta-data to describe the prevalence, the embolism location, and the clinical predictors of PE among patients with unexplained AE-COPD.

Findings

A systematic review of the literature and meta-analysis identified seven studies with 880 patients. In the pooled analysis, 16% had PE (range: 3%–29%). Of the 120 patients with PE, two-thirds were in lobar or larger arteries and one-third in segmental or smaller. Pleuritic chest pain and signs of cardiac compromise (hypotension, syncope, and right-sided heart failure) were associated with PE.

Cautions

This study was heterogeneous leading to a broad confidence interval for prevalence ranging from 8%-25%. Given the frequency of AE-COPD with no identified trigger, physicians need to attend to risks of repeat radiation exposure when considering an evaluation for PE.

Implications

One in six patients with unexplained AE-COPD was found to have PE; the odds were greater in those with pleuritic chest pain or signs of cardiac compromise. In patients with AE-COPD with an unclear trigger, the providers should consider an evaluation for PE by using a clinical prediction rule and/or a D-dimer.

Sitting at Patients' Bedsides May Improve Patients' Perceptions of Physician Communication Skills. Merel SE et al. *Journal of Hospital Medicine,* 2016;11(12):865-8.[9]

Background

Sitting at a patient's bedside in the inpatient setting is considered a best practice, yet it has not been widely adopted. The authors conducted a cluster-randomized trial of physicians on a single 28-bed hospitalist only run unit where physicians were assigned to sitting or standing for the first three days of a seven-day workweek assignment. New admissions or transfers to the unit were considered eligible for the study.

Findings

Sixteen hospitalists saw on an average 13 patients daily during the study (a total of 159 patients were included in the analysis after 52 patients were excluded or declined to participate). The hospitalists were 69% female, and 81% had been in practice three years or less. The average time spent in the patient's room was 12:00 minutes while seated and 12:10 minutes while standing. There was no difference in the patients' perception of the amount of time spent—the patients overestimated this by four minutes in both groups. Sitting was associated with higher ratings for "listening carefully" and "explaining things in a way that was easy to understand." There was no difference in ratings on the physicians interrupting the patient when talking or in treating patients with courtesy and respect.

Cautions

The study had a small sample size, was limited to English-speaking patients, and was a single-site study. It involved only attending-level physicians and did not involve nonphysician team members. The physicians were not blinded and were aware that the interactions were monitored, perhaps creating a Hawthorne effect. The analysis did not control for other factors such as the severity of the illness, the number of consultants used, or the degree of health literacy.

Implications

This study supports an important best practice highlighted in *etiquette-based medicine*[10]: sitting at the bedside provided a benefit in the patient's perception of communication by physicians without a negative effect on the physician's workflow.

The Duration of Antibiotic Treatment in Community-Acquired Pneumonia: A Multi-Center Randomized Clinical Trial. Uranga A et al. *JAMA Intern Medicine,* 2016;176(9):1257-65.[11]

Background

The optimal duration of treatment for community-acquired pneumonia (CAP) is unclear; a growing body of evidence suggests shorter and longer durations may be equivalent.

Findings

At four hospitals in Spain, 312 adults with a mean age of 65 years and a diagnosis of CAP (non-ICU) were randomized to a short (5 days) versus a long (provider discretion) course of antibiotics. In the short-course group, the antibiotics were stopped after 5 days *if* the body temperature had been 37.8° C or less for 48 hours, and no more than one sign of clinical instability was present (SBP < 90 mmHg, HR >100/min, RR > 24/min, O_2Sat < 90%). The median number of antibiotic days was five for the short-course group and 10 for the long-course group (P < .01). There was no difference in the resolution of pneumonia symptoms at 10 days or 30 days or in 30-day mortality. There were no differences in in-hospital side effects. However, 30-day readmissions were higher in the long-course group compared with the short-course group (6.6% vs 1.4%; P = .02). The results were similar across all of the Pneumonia Severity Index (PSI) classes.

Cautions

Most of the patients were not severely ill (~60% PSI I-III), the level of comorbid disease was low, and nearly 80% of the patients received fluoroquinolone. There was a significant crossover with 30% of patients assigned to the short-course group receiving antibiotics for more than 5 days.

Implications

Inpatient providers should aim to treat patients with community-acquired pneumonia (regardless of the severity of the illness) for five days. At day five, if the patient is afebrile and has no signs of clinical instability, clinicians should be comfortable stopping antibiotics.

Is the Era of Intravenous Proton Pump Inhibitors Coming to an End in Patients with Bleeding Peptic Ulcers? A Meta-Analysis of the Published Literature. Jian Z et al. *British Journal of Clinical Pharmacology,* 2016;82(3):880-9.[12]

Background

Guidelines recommend intravenous proton pump inhibitors (PPI) after an endoscopy for patients with a bleeding peptic ulcer. Yet, acid suppression with oral PPI is deemed equivalent to the intravenous route.

Findings

This systematic review and meta-analysis identified seven randomized controlled trials involving 859 patients. After an endoscopy, the patients were randomized to receive either oral or intravenous PPI. Most of the patients had "high-risk" peptic ulcers (active bleeding, a visible vessel, an adherent clot). The PPI dose and frequency varied between the studies. Re-bleeding rates were no different between the oral and intravenous route at 72 hours (2.4% vs 5.1%; $P = .26$), 7 days (5.6% vs 6.8%; $P = .68$), or 30 days (7.9% vs 8.8%; $P = .62$). There was also no difference in 30-day mortality (2.1% vs 2.4%; $P = .88$), and the length of stay was the same in both groups. Side effects were not reported.

Cautions

This systematic review and meta-analysis included multiple heterogeneous small studies of moderate quality. A large number of patients were excluded, increasing the risk of a selection bias.

Implications

There is no clear indication for intravenous PPI in the treatment of bleeding peptic ulcers following an endoscopy. Converting to oral PPI is equivalent to intravenous and is a safe, effective, and cost-saving option for patients with bleeding peptic ulcers.

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