High-dose atorvastatin (80 mg per day) reduces the risk of subsequent TIA and markedly lowers LDL cholesterol in older and younger patients alike with equal tolerability to placebo, but doesn't reduce risk of subsequent stroke in patients aged >65 years.

**Background:** There are sparse data in patients aged ≥65 years treated with HMG-CoA reductase (statin) therapy for secondary prevention of stroke or transient ischemic attack (TIA).

**Design/Methods:** The Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL) data were retrospectively analyzed for comparisons between a young cohort (age <65 years) and an elderly cohort (age ≥65 years) of ambulatory patients who were diagnosed with a stroke or TIA within the previous 1 to 6 months. Patients were randomized either to placebo or atorvastatin 80 mg daily. Patients were excluded if they had atrial fibrillation (AF), coronary disease, an intracardiac source of embolization, or subarachnoid hemorrhage. Primary end points were recurrent fatal or nonfatal stroke with or without bilateral carotid stenosis. Secondary end points were stroke or TIA, coronary events, need for revascularization, and all-cause mortality.

**Results:** Younger patients were twice as likely to be active smokers as their elder cohort counterparts. Older patients were more likely to have systemic hypertension or a history of carotid stenosis. A total of 2249 older patients (mean age, 72 years) and 2482 younger patients (mean age, 54 years) were analyzed. There were no statistically significant reductions in the primary end points, except for an absolute risk reduction of 2.6% for stroke in the younger cohort (P=0.022) compared with placebo. Within each cohort, there were statistically significant reductions in all secondary end points, except all-cause mortality, when compared with placebo. Cohorts did not differ significantly in terms of liver or muscle enzyme elevation when compared with placebo.

**Conclusions:** Patients aged >65 years had similar tolerance, similar LDL reduction, and fewer occurrences of secondary end points with high-dose atorvastatin similar to their younger counterparts. The younger cohort had meaningful reductions in subsequent stroke when treated with atorvastatin.

**Reviewer's Comments:** There are several concerns worthy of criticism. First, as with most "high dose" statin studies, there was no dose-response evaluation. Instead, an arbitrarily high dose of atorvastatin was selected and compared with placebo. The second is that this was a retrospective study, not a placebo-controlled trial design. Third, the authors cite numerous references to the poor adherence of older patients to statin therapies and demonstrated that 35% of older patients in this study who received the atorvastatin had higher associated complications (ostensibly non-myopathic, non-transaminitis, non-specified reactions compared with 23% of older patients receiving placebo), essentially side-stepping that these side-effects are likely, in fact, why older patients tend to discontinue statins. And last of all, the authors conclude that both older and younger patients benefited from atorvastatin since it reduced secondary end points in all-comers (except all-cause mortality). However, the biggest reduction in the primary end point, stroke, was seen in the younger cohort and not in the older cohort. I'd like to see a little more shine and pizzazz before I subscribe to the SPARCL data. (Reviewer-Jason Persoff, MD).

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Keywords: Secondary Stroke Prevention, Statins, Elderly Patients

Print Tag: Refer to original journal article
Critically ill patients with ongoing cold extremities or poor capillary refill after hemodynamic stabilization have more organ dysfunction and are likely to worsen.

**Background:** In classic teaching of the physical exam, skin temperature in the setting of critically ill patients can be a marker of peripheral tissue perfusion. Yet, it is not known if subjective assessment of the extremities can help aid in prognosis in the intensive care unit (ICU).

**Objective:** To determine if subjective assessment of peripheral perfusion in critically ill patients can help identify more organ dysfunction or a worse prognosis.

**Design:** Prospective observational study.

**Participants/Methods:** Consecutive critically ill patients who had been resuscitated and stabilized (normal blood pressure) within 24 hours of ICU admission were enrolled. Patients with severe vascular disease were excluded. All patients were examined by a single physician and were considered to have abnormal peripheral perfusion if they had cold extremities or a delayed capillary refill time. All patients also had forearm-to-fingertip skin gradient, central-to-toe temperature difference, and peripheral flow index measured. All patients were followed for organ dysfunction as expressed by high Sequential Organ Failure Assessment (SOFA) scores and lactate levels.

**Results:** 50 patients were enrolled, 39 of whom had shock on presentation (21 of these from sepsis). Of the 50 patients, 23 (46%) had abnormal peripheral perfusion as determined by subjective assessment of skin temperature and capillary refill. The mechanical skin temperature measurements and the peripheral flow index measurements confirmed the subjective assessment of poor perfusion. Patients with abnormal peripheral perfusion had more organ dysfunction and higher lactate at enrollment. Additionally, those with poor perfusion were more likely to worsen and develop more organ dysfunction compared to those with more normal perfusion. Notably, global vital signs (eg, mean arterial pressure, urine output, etc) did not predict worsening. Use of vasopressors did not impact the results.

**Conclusions:** In this small prospective single-center study, subjective assessment of peripheral perfusion after stabilization identified hemodynamically stable patients with more severe organ dysfunction and higher lactate. Ongoing poor perfusion predicted higher odds of worsening organ failure as well.

**Reviewer's Comments:** Although this was a small study, these are intriguing results. This does not help answer whether or not extremity temperature can help predict the etiology of shock. Rather, this study tells us that, in critically ill patients who have been stabilized (normal blood pressure), cold extremities or poor capillary refill predict worse outcomes. If patients with recent hypotension have ongoing cold extremities, we should not only worry about cardiogenic shock, but also about global tissue hypoperfusion. (Reviewer-Bradley A. Sharpe, MD).

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Keywords: Peripheral Perfusion, Organ Dysfunction, Critical Illness

Print Tag: Refer to original journal article
A patient-centered approach to dying may yield financial savings and improved quality of life at the time of death.

**Objective:** To determine the association between end-of-life (EOL) discussions and health care costs in the last week of life, and to determine the relationship between costs in the last week of life and quality of death measurements.

**Design/Methods:** In a longitudinal multi-institutional study of 627 patients with advanced cancer, baseline patient interviews were conducted to ascertain both patient's experiences with EOL care discussions and their preferences regarding EOL care. Formal and informal caregivers were asked to assess the patient's quality of life in the last week of life. These same caregivers were contacted 1 month after death and were asked about services the patient received in the last week of life (eg, mechanical ventilation, chemotherapy, hospice). Patient costs in the last week of life were aggregated based on nationally representative per capita costs of the reported services used in the last week of life. Patients who reported receiving EOL care discussions were propensity score-matched against those who did not. Independent relationships between costs and quality of death were also measured.

**Results:** 188 (30%) of 603 participating patients reported EOL discussions. After propensity score matching, costs in the last week of life were found to be 35.7% lower in those receiving EOL discussions. These patients were also less likely to undergo mechanical ventilation, resuscitation, or be admitted to an ICU in the final week of life. In all patients who died during the study, higher costs were associated with more physical distress and a worse overall quality of death in their final week as reported by a caregiver. Higher costs had no association with survival at the EOL.

**Conclusions:** EOL conversations in patients with advanced cancer were associated with significantly lower health care costs in their final week of life. Higher costs had no impact on survival and were associated with worse quality of death.

**Reviewer's Comments:** This article is one of the first to show reduced EOL costs associated with increased patient-centered care. Even though their cost estimates for this patient population were conservative compared to others (ie, less chemotherapy, less ICU time, higher hospice use), the authors were able to show a statistically significant difference in cost with a well-matched control group. When extrapolated to all patients with cancer who die each year, the savings are enormous--upwards of $76 million. While it is tempting to generalize these findings to the 5% of Medicare patients who die each year, these findings are in a cohort with severe cancer and good access to medical care, rather than those with chronic illness. This article certainly paves the way for similar research to be done on other at-risk patient populations. (Reviewer-Michelle Mourad, MD).

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**Keywords:** Health Care Costs, End of Life

**Print Tag:** Refer to original journal article
Electronic Medication Reconciliation Tool Interesting, But Not Ready for Prime Time


Schnipper JL, Hamann C, et al:

Arch Intern Med 2009; 169 (April 27): 771-780

Electronic medication reconciliation applications coupled with work redesign may have potential to decrease PADEs at discharge.

**Background:** Direct impact of medication reconciliation efforts on patient outcomes is unclear.

**Objective:** To examine whether a medication reconciliation program supported by information technology (IT) decreases medication discrepancies that potentially harm patients (potential adverse drug events [PADEs]).

**Design:** Cluster-randomized controlled trial at 2 large academic medical centers.

**Participants/Methods:** General medicine patients assigned to chosen teams were randomized to usual care versus intervention. The intervention utilized a computerized "Preadmission Medication List" (PAML) that included preadmission medications compiled from multiple sources including ambulatory databases and prior discharge orders. On admission, physicians were required to indicate whether each medication on the PAML should be continued, discontinued, or changed, and they reconciled preadmission medications from the PAML with inpatient medications at discharge. In the intervention group, work flow was redesigned to eliminate redundant medication history taking and promote interdisciplinary communication.

**Results:** 322 patients admitted to 14 teams were enrolled. Intervention group physicians were assigned primary responsibility for taking preadmission medication histories and ordering medications from the PAML on admission, during hospitalization, and at discharge. Pharmacists reconciled medications on admission; nurses at discharge. In total, 46% of intervention patients had a PAML completed on admission; 75% by discharge. In the intervention group, there was an overall reduction in PADEs (1.05 PADEs per patient vs 1.44 PADEs per control; adjusted relative risk [ARR], 28%; NNT, 2.6). The intervention significantly reduced PADEs at discharge (ARR, 31%; NNT, 2.9), but not on admission. There was no significant reduction in PADEs by error type (history vs reconciliation errors). The intervention effect was greater among higher risk patients (lower medication understanding, ≥16 preadmission medications, ≥4 high-risk medications, and ≥13 outpatient visits) and was significant at 1 hospital only.

**Conclusions:** Implementation of an electronic medication reconciliation tool with multidisciplinary work redesign may decrease unintentional medication discrepancies at discharge, decreasing potential patient harm.

**Reviewer's Comments:** This study demonstrates the complexities of medication reconciliation and suggests that electronic tools have potential to support reconciliation efforts if they facilitate medication comparison at care transitions. The effect was greatest at discharge and was more pronounced when implementation coincided with a hospital-wide roll-out of medication reconciliation. It is important to study the effect of medication reconciliation on outcomes, but investigators were only able to examine decreased potential for harm (not actual ADEs). The authors' study methodology requires significant IT support including possible computerized provider order entry (may not be widely realistic). In academic environments, study over longer time periods will be required to demonstrate effectiveness and sustainability in a system in which key stakeholders are only present for a short time (this study was conducted over 2 months). Overall, this is an interesting concept for hospitalists often charged with improving transitions of care, but further study is required. (Reviewer-Anneliese M. Schleyer, MD).

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Keywords: Medication Reconciliation, Discrepancies, Adverse Events

Print Tag: Refer to original journal article
Routine measurement of BNP in patients with moderate-to-severe shortness of breath presenting to the ED may not reduce admission rates, clinical outcomes, or resource utilization.

**Background:** Prior studies have shown B-type natriuretic peptide (BNP) to be a useful diagnostic test in patients presenting to the emergency department (ED) with a chief complaint of dyspnea.

**Objective:** To determine whether BNP testing in patients presenting to the ED with dyspnea changes patient outcomes or use of health resources.

**Design:** Randomized single-blind study.

**Participants/Methods:** In 2 Australian teaching hospitals, consecutive patients presenting to the ED with a chief complaint of dyspnea were enrolled and randomized to BNP measurement or not (patients were blinded). In both groups, diagnostic testing and decisions about treatment and admission were left to the discretion of the physicians involved.

**Results:** 612 patients were randomized to BNP testing (n=306) or no BNP (n=306). The patients were similar in both groups, with approximately 40% having a history of congestive heart failure (CHF) and 60% with a history of chronic obstructive pulmonary disease (COPD). Admission rates in the BNP and no BNP groups were similar (85.6% vs 86.6%; \( P = 0.73 \)). The median length of stay between the 2 groups was also not statistically significantly different (4.4 days vs 5.0 days; \( P = 0.94 \)). Overall 30-day mortality and readmission rates were similar in the 2 groups. Slightly more patients in the BNP group were diagnosed with heart failure (48.4%) than patients in the no BNP group (41.2%), but this did not appear to impact outcomes.

**Conclusions:** In a single-blind randomized trial, BNP measurements in patients presenting to the ED with acute dyspnea did not impact clinical outcomes or use of health resources. The authors state possible reasons for this result including: (1) delayed timing of the test result (BNP returned >60 minutes after ordering); (2) short length of stay (the study would be unlikely to show a difference); and (3) that most of these patients had moderate-to-severe shortness of breath (BNP may not be that helpful in this patient population). The authors conclude that BNP testing should not be routine in all moderately to severely dyspneic patients presenting to the ED.

**Reviewer's Comments:** A prior well-done study with similar methodology showed that routine use of BNP in this patient population decreased admission rates, improved outcomes, and saved money. This study seems to debunk that prior finding, so what to do? I believe this study argues for judicious and smart use of the BNP test. This test may not be useful in patients with obvious CHF or dyspnea from some other apparent cause (as the patients in this study). Yet, it can be the perfect test in patients in whom the cause of the shortness of breath is not immediately clear based on history, exam, and diagnostic testing. (Reviewer-Bradley A. Sharpe, MD).

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Keywords: B-Type Natriuretic Peptide, Congestive Heart Failure, Emergency Department

Print Tag: Refer to original journal article
Medical management of microalbuminuria via agents that act on the renin-angiotensin system is recommended, although the effects of this approach in preventing VTE have not been studied.

**Background:** Microalbuminuria is associated with arterial thromboembolism. Many venous thromboembolic events occur in absence of an identified risk factor. The relationship between venous thromboembolism (VTE) and microalbuminuria has been unexplored.

**Objective:** To determine whether there is a relationship between microalbuminuria and VTE.

**Design:** Prospective community-based cohort study.

**Participants:** All inhabitants of Groningen, the Netherlands (85,421) aged 28 to 74 years with urinary albumin excretion (UAE) of <10 mg/L (normal) versus ≥10 mg/L (study group) completed the screening protocol. A cohort of 8574 individuals in the PREVEND (Prevention of Renal and Vascular End-Stage Disease) was evaluated. Pregnant patients and those with insulin-dependent diabetes mellitus were excluded.

**Methods:** Subjects completed a questionnaire regarding demographics, cardiovascular morbidity, and medication use, and provided laboratory samples for testing (serum creatinine, lipid profile, tissue plasminogen activator, and plasminogen activator inhibitor-1) and two 24-hour urine samples for UAE. Results were classified as low-normal (<15 mg/24h), high-normal (15 to 29 mg/24h), microalbuminuria (30 to 300 mg/24h), or macroalbuminuria (≥300 mg/24h). Community anticoagulation, death certificate, and discharge diagnosis databases were used to identify patients who developed verified deep venous thrombosis (DVT) or pulmonary embolism (PE).

**Results:** 129 of 8574 patients (0.14%) developed VTE at a mean of 8.6 years. Annual incidence of VTE was 0.4% for those with increased UAE versus 0.12% in normals. DVT was the most common VTE event (57%). After adjustment for sex and age, UAE, body mass index, oral contraceptive use, and plasminogen activator inhibitor-1 level were significantly associated with risk of VTE. Microalbuminuria conferred a hazard ratio (HR) for VTE of 2.2 (95% CI, 1.44 to 3.36) and macroalbuminuria had a HR of 2.82 (95% CI, 1.21 to 6.61) as compared with normal UAE (P =0.001), with a stronger association for unprovoked VTE. The adjusted HR for microalbuminuria versus normal UAE was 2.0 (95% CI, 1.34 to 2.98); the adjusted HR for number needed to harm was 388. Spot UAE provided similar results to 24-hour urine collection.

**Conclusions:** This study demonstrates a linear relationship between UAE and risk of VTE, especially unprovoked events. It is postulated that this effect of microalbuminuria relates to endothelial injury and secondary changes in clot-forming proteins. Microalbuminuria may be treated with medication, particularly angiotensin-converting enzyme inhibitors or angiotensin-receptor blockers. Limitations of this study include possible misclassification of retrospective chart reviews and lack of generalizability to diabetics requiring insulin, or oral contraceptive users aged <28 years, who were not included in this study population.

**Reviewer's Comments:** It may be worthwhile to check a spot UAE on patients in whom a hypercoagulability work-up is negative and the event unexplained, as ACE inhibitors and ARBs offer theoretical benefit. This study, however, did not evaluate whether pharmacologically decreasing UAE confers protection. Other open questions include cost/benefit analysis for screening for UAE and which, if any, of these patients might benefit from prophylactic anticoagulation. This study does support my practice of utilizing spot urine for protein as a surrogate for 24-hour measurement. (Reviewer-Jennifer Best, MD).

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**Keywords:** Venous Thromboembolism, Risk Factors

**Print Tag:** Refer to original journal article
Augmented Hospital-Based Care Coordination Improves Transitions for High-Risk Elderly

Reduction of 30-day Postdischarge Hospital Readmission or Emergency Department (ED) Visit Rates in High-Risk Elderly Medical Patients Through Delivery of a Targeted Care Bundle.

Koehler BE, Richter KM, et al:


Supplemental hospital care coordination bundles reduce 30-day hospital readmissions and ED visits in the elderly.

Background: The impact of hospital-based care coordination on healthcare utilization has not been consistently demonstrated.

Objective: To determine whether a supplemental care bundle that enhances existing hospital care coordination for elderly inpatients decreases 30- and 60-day hospital readmission and/or ED visits.

Design: Randomized controlled pilot study of elderly medical patients admitted to 2 hospital medicine groups at 1 academic medical center.

Participants/Methods: All patients aged ≥70 years with ≥3 comorbidities, taking ≥5 medications, requiring assistance with >1 activity of daily living, and preadmission residence at home/assisted living were eligible. The study excluded patients from skilled nursing facilities and those admitted for surgery, those with terminal disease, with limited English proficiency, or lack of access to a telephone for follow-up. After consent, patients were randomized to usual care coordination or usual coordination with a supplemental bundle including daily disease-specific and discharge education, identification of barriers to discharge by an experienced care coordinator, daily medication reconciliation, and counseling by a clinical pharmacist. Telephone follow-up was provided 5 to 7 days after discharge. Personal health records completed by patients and caregivers and supplemental discharge forms for patients and primary care providers were included in the intervention.

Results: 41 of 157 eligible patients were enrolled; 60 declined participation and 56 were unable to consent. Intervention and control groups were statistically similar. There was a trend toward greater illness severity and mortality risk in the intervention group. Thirty-day readmissions and ED visits were lower in the intervention group (10% vs 38%; P =0.03). This reduction was not seen at 60 days (intervention, 20% vs controls, 5%; P =0.18); however, overall time to ED visit/readmission was longer in the intervention group (36.2 days vs 15.7; P =0.05). This study was insufficiently powered to detect a difference in length of stay. Care coordinators and pharmacists spent an average of 20 additional minutes per day with intervention patients.

Conclusions: A supplemental hospital-based care coordination bundle of intensive daily education, communication, and discharge planning with follow-up calls by care coordinators, pharmacists, and existing hospital personnel decreased utilization within 30 days of hospitalization in elderly patients. This result was not seen at 60 days.

Reviewer's Comments: This is a nicely done, small study demonstrating that existing resources can efficiently augment current hospital-based care coordination. Involvement of a clinical pharmacist is particularly high-yield. Care coordinators and pharmacists in this study were all very experienced, allowing them to create maximum benefit for patients without significant supplemental time investment. This study shows promise and highlights the need for additional investigation in other high-risk groups such as patients with limited English proficiency and those who cannot be reached by telephone after discharge (excluded here) to help guide future investigations of transitions of care—a key target area for hospital medicine practice. (Reviewer-Anneliese M. Schleyer, MD).

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Keywords: Care Coordination, Transitions of Care, Readmission

Print Tag: Refer to original journal article
Save bicarbonate therapy for severe metabolic acidosis (manifesting as arterial pH <7.1), because bicarbonate may prove harmful and it does not often reverse the underlying cause of the acidosis.

**Background:** Metabolic acidosis is common; the tenets that guide the use of bicarbonate therapy for acidosis are guided mostly by clinical background.

**Design:** Review article.

**Results:** Nephrologists and intensivists differ on when intravenous bicarbonate therapy is most helpful for patients, with the former giving patients bicarbonate therapy earlier than the latter (40% of intensivists would wait until arterial pH is <7.0, whereas only 6% of nephrologists would wait that long). Also, nephrologists are more likely to treat a lactic acidosis and diabetic ketoacidosis (DKA) with bicarbonate than intensivists (86% vs 66% and 60% vs 28%, respectively). Four questions are paramount: (1) Is the acidemia clinically deleterious, (2) Is the acidosis severe enough to warrant treatment, (3) How much bicarbonate should be given, and (4) Is the bicarbonate therapy deleterious? Acidemia changes the effects of many medications, making them more toxic; changes the intracellular milieu; negatively shifts the oxygen-hemoglobin dissociation curve toward releasing more oxygen from the blood earlier; and impairs myocardial contractility. These negative effects are thought to begin with arterial pH <7.1 based on several physiologists. Due to the dynamic changes in PCO$_2$ that occur with bicarbonate therapy, it is not possible to easily calculate an exact replacement strategy--something that may be overcome by using non-“sodium bicarbonate” bicarbonate solutions such as Carbicarb® or THAM®, which do not appear to change PCO$_2$ over time. Bicarbonate therapy has been associated with higher mortalities from myriad possible mechanisms, including paradoxical worsening of intracellular pH as bicarbonate is converted to water and CO$_2$; deleterious effects in blood pressure and cardiac output; overcompensation of the pH ("rebound"); volume overload with pulmonary edema; and changes in ionized cations. In patients with DKA, bicarbonate therapy may paradoxically increase ketoacid generation. In patients with lactic acidosis, improvement in pH alone does not improve mortality.

**Conclusions:** There are no rigid rules for bicarbonate therapy in severe metabolic acidosis. Bicarbonate therapy should be given very cautiously due to potential to paradoxically worsen clinical course.

**Reviewer's Comments:** This is a terrific quick review article that summarizes our (limited) knowledge about the etiology and management of metabolic acidosis. It is noteworthy that clinical experience and training had dramatic impacts on when and how much bicarbonate therapy was given for metabolic acidosis, with nephrologists treating earlier, but more precisely, than intensivists. While there are theoretical risks and some practical risks to the patient from significant acidosis with acidemia, there are equal issues with treatment of the acidemia with replacement of bicarbonate. The biggest take-home message is: fix the underlying problem and don't use bicarbonate unless the arterial pH is <7.1. (Reviewer-Jason Persoff, MD).
Reserve PPIs for patients with clear indications, such as proven gastroesophageal reflux disease, recent gastrointestinal bleeding, or mechanical ventilation.

Background: Acid-suppressive medications (ASM) are commonly continued or initiated in the hospital in the absence of a clear indication. Such medications have been shown in other populations to increase the risk of community-acquired pneumonia (PNA).

Objective: To determine whether there is an association between ASMs and incidence of hospital-acquired pneumonia (HAP).

Design: Prospective cohort study.

Methods: Data regarding patient characteristics, prescription of a proton pump inhibitor (PPI) or histamine₂ receptor antagonist (HRA) at any time during admission, and presence or absence of HAP were obtained from electronic health records. Primary outcome measured was HAP (defined as PNA occurring >48 hours from admission); secondary outcomes were aspiration and non-aspiration PNA. Multivariate analysis was employed to adjust for confounders.

Participants: 42,093 non-ventilated patients (63,878 distinct admissions) with an inpatient admission of >3 days at a single academic medical center were evaluated. Patients who required an ICU stay were excluded.

Results: ASM was ordered in 52% of the cohort (83% PPI and 23% HRA). Most orders were written within 48 hours of admission and continued to within 48 hours of discharge. The use of ASM was associated with a 30% increase in the odds of HAP (adjusted OR, 1.3; 95% CI, 1.1 to 1.4). The relationship between aspiration PNA (OR, 1.4; 95% CI, 1.1 to 1.8) was greater than that for non-aspiration PNA (OR, 1.2; 95% CI, 1.1 to 1.4); both were significant. In subgroup analysis, this association held for PPI use, but not for HRA.

Conclusions: ASMs, particularly PPIs, are commonly prescribed in the hospital. Use of ASMs for "stress ulcer prophylaxis" in non-critically ill patients has not been well studied. This large study demonstrates a clear association between PPI use and incidence of HAP with a number needed to harm of 111, adding to the growing body of literature relating PPI use to infectious diseases, including C difficile colitis, ventilator-associated PNA, and community-acquired PNA. The mechanism for this effect has not been fully elucidated. This study was limited by lack of access to outpatient medication records and information on date of HAP diagnosis, resulting in inability to draw a temporal relationship between prescription of ASM and this outcome, and limited generalizability.

Reviewer's Comments: One of our important roles as hospitalists is medication reconciliation, including an honest assessment of whether a given medication is clinically indicated. We have, perhaps, been cavalier with the use of PPIs, as it has long been thought that these are relatively safe medications. This well-done study, however, strengthens the mounting argument that acid suppression with PPIs comes at a price--in this case, increased risk of HAP. Hospitalists are advised to limit their use to populations with demonstrated benefit.

(Reviewer-Jennifer Best, MD).

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Keywords: Pneumonia, Hospital Acquired, Aspiration, Acid-Suppressive Medications

Print Tag: Refer to original journal article
In patients admitted to the hospital with a COPD exacerbation, the prevalence of acute PE may be as high as 25%. PE should be considered in all patients admitted with a COPD exacerbation.

**Background:** Up to 30% of chronic obstructive pulmonary disease (COPD) exacerbations have no known cause (trigger). There is some evidence that patients with COPD are at increased risk for pulmonary embolism (PE) or deep venous thrombosis (DVT).

**Objective:** To determine the prevalence of acute PE in patients admitted to the hospital with a COPD exacerbation.

**Design:** Systematic review and meta-analysis.

**Participants/Methods:** This systematic review included only articles that prospectively enrolled patients presenting to the hospital with a COPD exacerbation. The diagnosis of COPD was based on clinical presentation and spirometry. In the included articles, all patients then had to undergo diagnostic imaging (CT angiography) for PE. The authors excluded studies in which there was a selection bias for PE; that is, the studies had to enroll patients randomly without any specific concern for PE.

**Results:** 5 articles involving 550 patients were included, 4 of which were published after 2000. The overall prevalence of PE was 19.9% ($P = 0.014$). In those patients who were hospitalized for their COPD exacerbation, the prevalence was 24.7% ($P = 0.001$). Overall, all studies, signs, and symptoms at presentation could not be used to identify those patients with PE. None of the studies reported on outcome differences between those with and without PE.

**Conclusions:** A systematic review of the literature revealed a high prevalence of PE in patients presenting with a COPD exacerbation. The authors state that the data should be interpreted cautiously given the small sample sizes and heterogeneous studies and populations. They argue that this may overestimate the prevalence, but it is likely that overall PE is not uncommon in the setting of a COPD exacerbation.

**Reviewer's Comments:** This was a well-performed meta-analysis with truly shocking results--up to 25% of all patients we admit to the hospital with a COPD exacerbation have PE by CT scanning. Note, some have argued that it is hard to know what to do with this information as it is unclear whether all PEs on imaging need therapy. In addition, based on clinical experience, this number seems to be an overestimation. Yet, this raises an "orange flag" for me--even if the true prevalence is not 25%, but 12% or 8%, that still means there are a lot of COPD patients out there with PEs. I would recommend strongly considering PE in all patients with COPD exacerbations, especially those with a reasonable pre-test probability and those with no clear trigger or cause for the exacerbation. (Reviewer-Bradley A. Sharpe, MD).

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Keywords: Pulmonary Embolism, COPD Exacerbation

Print Tag: Refer to original journal article